



**2019** 11<sup>th</sup> EUROPEAN SYMPOSIUM  
OF PORCINE HEALTH MANAGEMENT  
UTRECHT/NETHERLANDS  
22-23-24 MAY 2019



# ABSTRACT BOOK

[ESPHM2019.ORG](http://ESPHM2019.ORG)

# COME MEET US AND START AN AMAZING SWINE HEALTH TOUR AT OUR BOOTH



## Featuring

- Brand new approach for reproductive problems
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😞 I want the 🏆  
results 🎯 on  
💰 for my 🐷 🐷  
08:35 ✓✓

I use 🐷. It is  
a 🌍 leader in  
*M. Hyo* 💉!  
08:36

**They say 'lung lesions'.  
I say 'performance'.**



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## WELCOME TO UTRECHT, THE NETHERLANDS!

On behalf of the 11<sup>th</sup> European Symposium of Porcine Health Management (ESPHM) organising committee, I am thrilled to welcome you to the Netherlands from 22 to 24 May 2019 in the city of Utrecht.

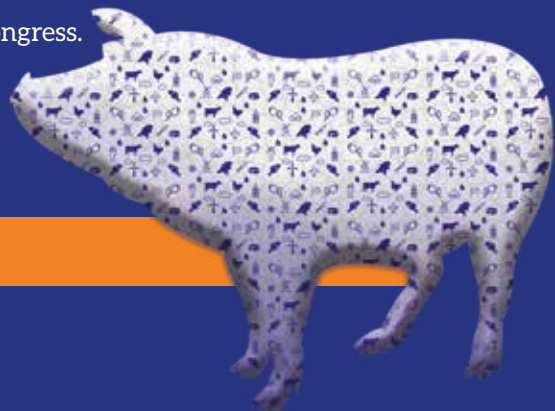
The ESPHM 2019 is a collaboration of the European College and the European Association of Porcine Health Management (ECPHM and EAPHM) and the local Dutch organising committee. The idea of hosting the 11th ESPHM in the Netherlands in 2019 originated within GD Animal Health, a leading organisation in Animal Health and Animal Production in the Netherlands, founded in 1919 so indeed exactly a century ago. Furthermore, within the organising committee the Dutch porcine veterinary community with leading institutes like Utrecht and Wageningen Universities, main industrial partners and especially the veterinary practitioners, is very well represented.

The Netherlands is a prominent European country when it comes to pig production and porcine health management. Our relatively small country is densely populated with on one hand livestock and on the other hand critical, empowered consumers. Hence we are dealing with many challenges when it comes to animal care, environmental and welfare issues and the necessary technical innovations to be prepared for a sustainable future of the European pig producing sector. So after ten consecutive increasingly successful ESPHM meetings it is about time the Netherlands is hosting the 11<sup>th</sup> version of the European Symposium.

Utrecht is a vibrant city of knowledge with young, brainy residents, a thriving creative sector and attractive business locations, just 30 minutes from Amsterdam Schiphol Airport and at the junction of the country's key motorways and railway lines. Furthermore, Utrecht is also the home town of one of the oldest universities of the Netherlands, founded 1636, and the only faculty of veterinary medicine of the country with the largest academic veterinary hospital in Europe. The congress centre of the 11th ESPHM is Tivoli-Vredenburg, the exciting brand new concert and congress venue right in the city centre, next to the central railway station, close to hotels and within walking distance of all the historic highlights of Utrecht.

We wish you a very pleasant stay and a fruitful congress.  
Welcome to the Netherlands!

Theo M.J. Geudeke,  
President of the 11<sup>th</sup> ESPHM





## COMMITTEES

### LOCAL ORGANIZING COMMITTEE

- Theo Geudeke (*Chair*)
- Alex Eggen
- Hetty Schreurs
- Arjan Stegeman
- Tineke van de Veerdonk
- Peter van der Wolf

### BOARD OF THE EAPHM

- Rick Janssen - *President*
- Giovanbattista Guadagnino - *President-elect (Junior Vice-President)*
- Andreas Palzer - *immediate Past-President (Senior Vice-President)*
- Thomas Würth - *Treasurer*
- Tijs Tobias - *Secretary*
- Marco Terreni - *Industry Representative, Board Member*
- Kazimierz Tarasiuk - *Ordinary Board Member*

### THE EAPHM IS SUPPORTED BY

- Alex Eggen - *Executive Director*
- Ulrike Tewes - *Secretary, based at the FVE office in Brussels, Belgium*
- Tania Susmelj - *Secretary, based at MV Congressi in Parma, Italy*

### BOARD OF THE ECPHM

- Paolo Martelli - *President*
- Heiko Nathues - *Vice-President*
- Joaquim Segalés - *Past-President*
- Isabel Hennig-Pauka - *Treasurer*
- Tijs Tobias - *Secretary*
- Francisco Javier Martinez Lobo - *Board Member*
- Helle Stege - *Board Member*

### THE ECPHM IS SUPPORTED BY

- Tania Susmelj - *Secretary, based at MV Congressi in Parma, Italy*



[www.ECPHM.org](http://www.ECPHM.org)

The ECPHM is a non-profit organization within the European Board of Veterinary Specialization (EBVS). EBVS recognizes new speciality Colleges and maintain a register of European veterinary specialists (Diplomates); moreover, EBVS encourage and promote the enhanced utilization and availability of speciality services to the public and the veterinary profession. Therefore, the ECPHM is the College that works for the advance of health oriented porcine production management in the herd context in Europe and the increase of the competency of those who practice in this field. Major objectives of the ECPHM include:

- Establishing guidelines and standards of training for postgraduate education and experience prerequisite to become a specialist in the speciality of porcine health management.
- Examining and authenticating veterinarians as specialists in porcine herd health management to serve health and welfare of the animals, the economic outcome of the herd, and the production of safe quality product for consumers in a sustainable animal production by providing expert care for pigs.
- Encouraging research and other contributions to the science and practice of porcine herd health management including husbandry, reproduction, epidemiology, pathogenesis, diagnosis, therapy, prevention, and control of diseases directly or indirectly affecting pigs and the maintenance of healthy and productive pig herds. Porcine health management also includes the impact on quality and safety of pork and gives special consideration to herd health and production, production systems and targets and the management of pig populations.
- Promoting communication and dissemination of knowledge.

The ECPHM is organized through different bodies that take care of the different activities performed:

- Board: represent the College and it is its main government body
- Education Committee: educational issues for the residents, including organization of the pre-symposium workshop and the summer school.
- Examination Committee: exam preparation and examination of residents.
- Credentials Committee: review and approve the candidacy of applicants to sit the exam, to set a new residency program, and re-accreditation of the diplomates.
- Nominations Committee: receive and manage the proposals for nominates at the different committees and board.

THE EUROPEAN ASSOCIATION OF  
PORCINE HEALTH MANAGEMENT



[www.EAPHM.org](http://www.EAPHM.org)  
[info@eaphm.org](mailto:info@eaphm.org)

The EAPHM is a non-profit organization and aims at joining all veterinarians dedicated to swine health and production including other professionals and industry staff members with an interest in pork production.

The EAPHM is representing all veterinary professionals in the field of porcine health management. This includes that all members of the European College of Porcine Health Management (Diplomates and Residents of the ECPHM) are automatically a member of the EAPHM. The EAPHM is also closely connected to the Federation of Veterinarians in Europe (FVE). The FVE is offering secretarial services and physical accommodation to the EAPHM in Brussels, Belgium.

The association was founded in 2010. Although still young the EAPHM is very active and this is reflected in the steadily increasing number members. The EAPHM would like to accommodate all practitioners, as well as veterinarians in the industry, irrespective whether they are members of the ECPHM or not, that work with pig health and/or production in Europe (full members category) but also all related non-veterinary academics (affiliated member category) and veterinarians not residing in the EU (associate member category). Please consult the website for membership category details.

The association is a meeting point for industry professionals, promoting and facilitating contracts between them, regardless of country of origin and is collaborating with other organizations, both veterinary and agricultural. Among the objectives of the EAPHM, the most important is to represent veterinarians and other professionals working in the pig sector in the various legislative committees and executives in Europe. Moreover, the EAPHM plays an important role in the continuous postgraduate education of swine practitioners. Therefore, the association is publishing clinical cases written by Residents of the ECPHM. In addition, the association is responsible for publishing all the material presented at the annual European Symposium of Porcine Health Management (ESPHM) on its website. By doing so, the members of the EAPHM have continuous access to the posters and oral presentations of every ESPHM. The bi-monthly EAPHM newsletter keeps the members informed on actual topics.

Becoming a member is easy, just visit the website [www.eaphm.org](http://www.eaphm.org) and sign up for a membership. The annual fee is worth every Euro, when you look to the benefit of being an "EAPHM member".

Visit the EAPHM booth at the ESPHM2019 and JOIN THE EAPHM TODAY!



Website: changing from year to year; this time [www.esphm2019.org](http://www.esphm2019.org)

The first ESPHM was organized by the EXPHM in 2009 in Copenhagen (Denmark). Subsequent meetings were organized in Hannover (Germany) and Helsinki (Finland). After the creation of the European Association of Porcine Health Management (EAPHM) in 2010, the following symposia were organized in a three-party fashion, involving the EAPHM, the ECPHM and the local organizers.

ESPHM 2009	Copenhagen (Denmark)	ESPHM 2014	Sorrento (Italy)
ESPHM 2010	Hannover (Germany)	ESPHM 2015	Nantes (France)
ESPHM 2011	Helsinki (Finland)	ESPHM 2016	Dublin (Ireland)
ESPHM 2012	Bruges (Belgium)	ESPHM 2017	Prague (Czech Republic)
ESPHM 2013	Edinburgh (United Kingdom)	ESPHM 2018	Barcelona (Spain)

By means of this organizational formula, the ESPHM has been held so far in various European Countries. The 11<sup>th</sup> edition will be held in in 2019 in Utrecht (The Netherlands).

The ESPHM in the expression of a long-standing need at a European level. The lack of a continental swine veterinarian congress like in North-America (American Association of Swine Veterinarians Annual Meeting) and Asia (Asian Pig Veterinary Society), prompted first the EXPHM and then the EAPHM to organize a yearly meeting devoted to all subjects of porcine health management. The symposium philosophy consist of mounting a sound program, with cutting-edge scientific-technical knowledge, practically oriented, which is able to catch the attention of swine veterinarians all over Europe, but with full international vocation. The symposium's content includes invited lectures, initiating always with the state-of-art swine production in the organizing country, as well as oral communications and posters.

Importantly, the ESPHM is an excellent platform for introducing the ECPHM Residents into the scientific world, by presenting their studies (Resident oral communication sessions) and participating in the College activities organized around the symposium (e.g., Resident workshop, farm visits). In addition, the ESPHM must serve as a vehicle for potentiating networking among pig veterinary professionals all around Europe, and emphasize the global character of a borderless profession. Also, Annual General Meetings of both EAPHM and ECPHM are organized within the program of the symposium, and facilitate that the critical masses of both organizations can join together once a year.

Porcine Health Management (PHM) is an open access peer-reviewed journal that aims to publish relevant, novel and revised information regarding all aspects of swine health medicine and production. The journal provides a venue for global research on swine health and production, including infectious and non-infectious diseases, reproduction, epidemiology, management, economics, genetics, housing, nutrition, animal welfare and ethics, legislation, food safety, drugs and surgery. This journal is aiming at readers, and attracting authors, with different levels of experience; Diplomates and Residents of the ECPHM and other colleges as well as PhD students and experienced researchers from outside! Anticipated articles include: original research, reviews, short communications, case reports, case-studies and commentaries.

The Editors-in-Chief are Dominiek Maes (University of Ghent, Belgium) and Joaquim Segalés (Universitat Autònoma de Barcelona and CReSA-IRTA, Spain).

PHM has been published articles since 2015 and it is now indexed in different databases, including the MedLine (PubMed). Please use the online submission system to submit your manuscript. For all enquiries about the journal, technical issues, payment of article processing chargers (APCs), etc. please contact: [porcinehealthmanagement@biomedcentral.com](mailto:porcinehealthmanagement@biomedcentral.com).

There are many reasons to publish in PHM:

- High visibility / PHM's open access policy allows maximum visibility of articles published in the journal as they are available to wide, global audience.
- Speed of publication / PHM offers a fast publication schedule whilst maintaining rigorous peer reviews.
- Flexibility / Online publication in PHM gives authors the opportunity to publish large datasets, large numbers of color illustrations and moving pictures, etc.
- Promotion and press coverage / Articles published in PHM are included in article alerts and regular email updates.
- Copyright / Authors of articles published in PHM retain the copyright of their articles and are free to reproduce and disseminate their work.

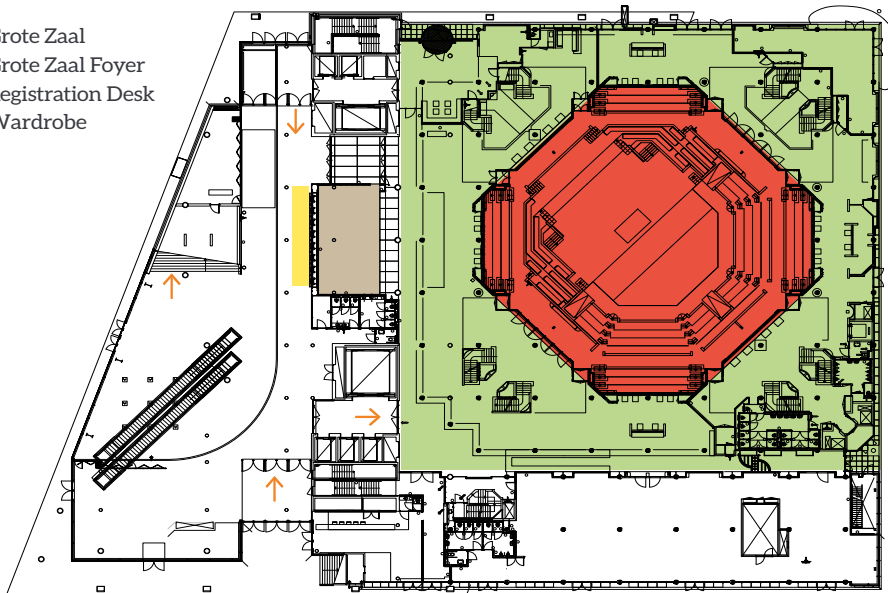
## PROGRAMME AT A GLANCE

WEDNESDAY MAY 22 <sup>ND</sup>		THURSDAY MAY 23 <sup>RD</sup>		FRIDAY MAY 24 <sup>TH</sup>	
		08h00	Registration	08h00	Registration
		08h30 - 10h00	Keynote Sessions	08h30 - 10h00	Keynote Sessions
		10h00 - 10h30	Coffee Break and Poster Viewing	10h00 - 10h30	Coffee Break and Poster Viewing
		10h30 - 12h30	Parallel Sessions	10h30 - 12h30	Parallel Sessions
11h00	Registration and Poster Display	12h30 - 13h30	Lunch break and poster viewing	12h30 - 13h00	Closing Ceremony
13h00 - 13h30	Welcome and Opening	13h30 - 15h00	Keynote Sessions		
13h30 - 15h00	Keynote Sessions	15h00 - 15h20	EAPHM Peter Høgedal Award and JPHM presentation		
15h00 - 15h30	Coffee Break and Poster Viewing	15h20 - 16h20	Parallel sessions		
15h30 - 17h30	Parallel Sessions	16h20 - 16h40	Coffee Break and Poster Viewing		
17h40 - 18h40	ECPHM - Annual General Meeting	16h40 - 18h00	Parallel Sessions		
18h00 - 19h30	Welcome Reception	18h10 - 19h10	EAPHM - Annual General Meeting		
20h00 - 23h00	Pub Crawl	20h00 - 23h00	Symposium Farewell Dinner		




## FLOOR PLANS

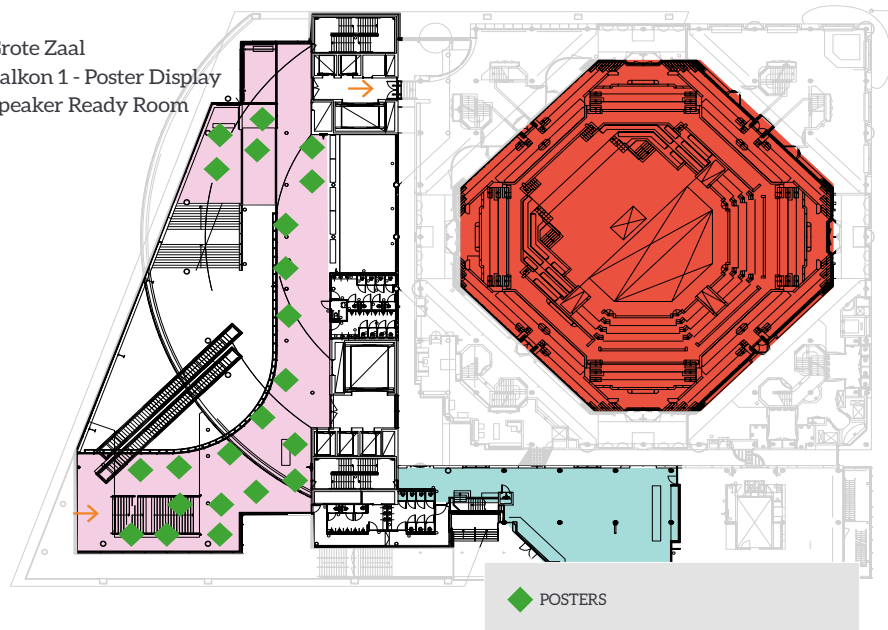
### FLOOR 0

-  Grote Zaal
-  Grote Zaal Foyer
-  Registration Desk
-  Wardrobe



### FLOOR 1

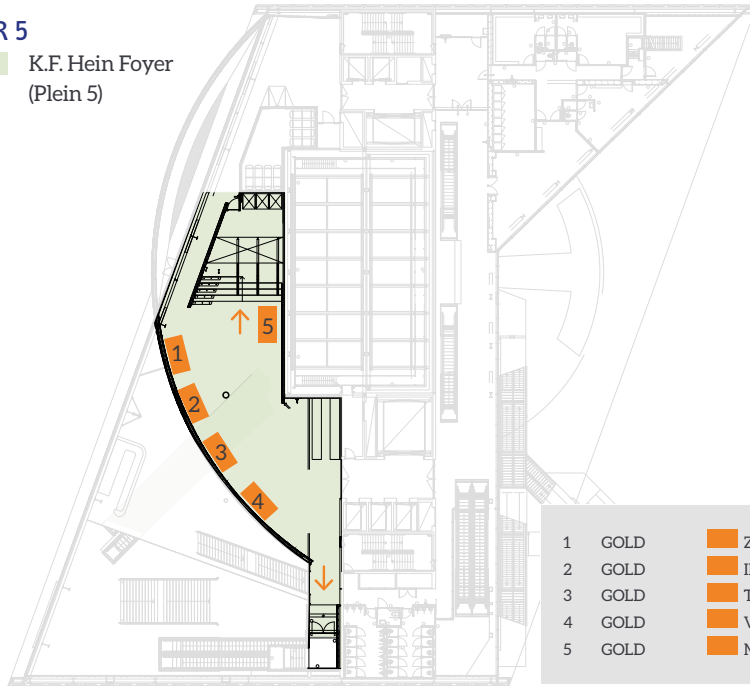
-  Grote Zaal
-  Balkon 1 - Poster Display
-  Speaker Ready Room





## FLOOR 5

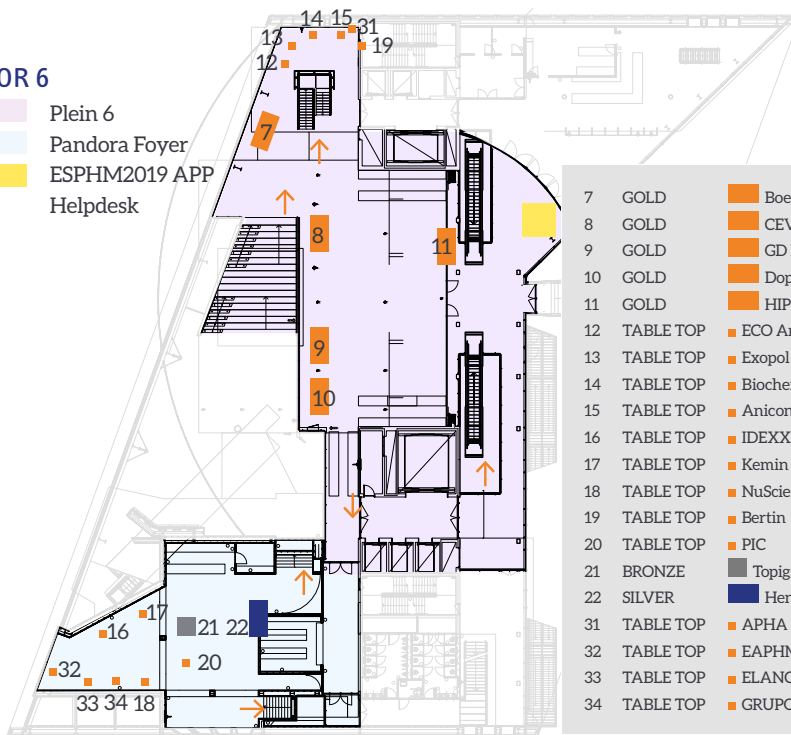
K.F. Hein Foyer  
(Plein 5)



- |   |      |                |
|---|------|----------------|
| 1 | GOLD | Zoetis         |
| 2 | GOLD | IDT Biologika  |
| 3 | GOLD | Trouwnutrition |
| 4 | GOLD | Vetoquinol     |
| 5 | GOLD | MSD            |

## FLOOR 6

Plein 6  
Pandora Foyer  
ESPHM2019 APP  
Helpdesk

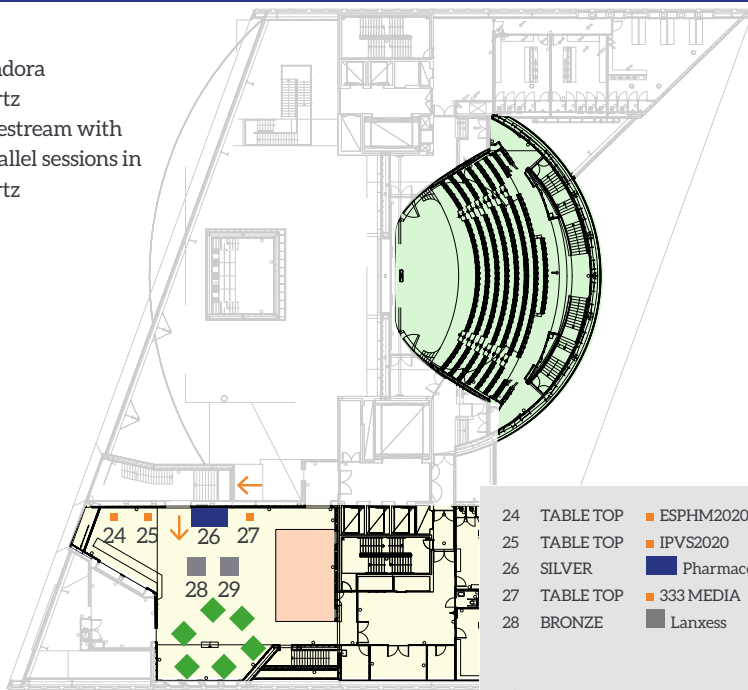


- |    |           |                      |
|----|-----------|----------------------|
| 7  | GOLD      | Boehringer Ingelheim |
| 8  | GOLD      | CEVA Sante Animale   |
| 9  | GOLD      | GD Deventer          |
| 10 | GOLD      | Dopharma             |
| 11 | GOLD      | HIPRA                |
| 12 | TABLE TOP | ECO Animal Health    |
| 13 | TABLE TOP | Exopol               |
| 14 | TABLE TOP | Biochem              |
| 15 | TABLE TOP | Anicon               |
| 16 | TABLE TOP | IDEXX                |
| 17 | TABLE TOP | Kemin                |
| 18 | TABLE TOP | NuScience            |
| 19 | TABLE TOP | Bertin               |
| 20 | TABLE TOP | PIC                  |
| 21 | BRONZE    | Topigs Norvin        |
| 22 | SILVER    | Henke Sass Wolf      |
| 31 | TABLE TOP | APHA SCIENTIFIC      |
| 32 | TABLE TOP | EAPHM                |
| 33 | TABLE TOP | ELANCO               |
| 34 | TABLE TOP | GRUPO ASIS           |

# FLOOR PLANS

## FLOOR 7

- Pandora
- Hertz
- Livestream with parallel sessions in Hertz

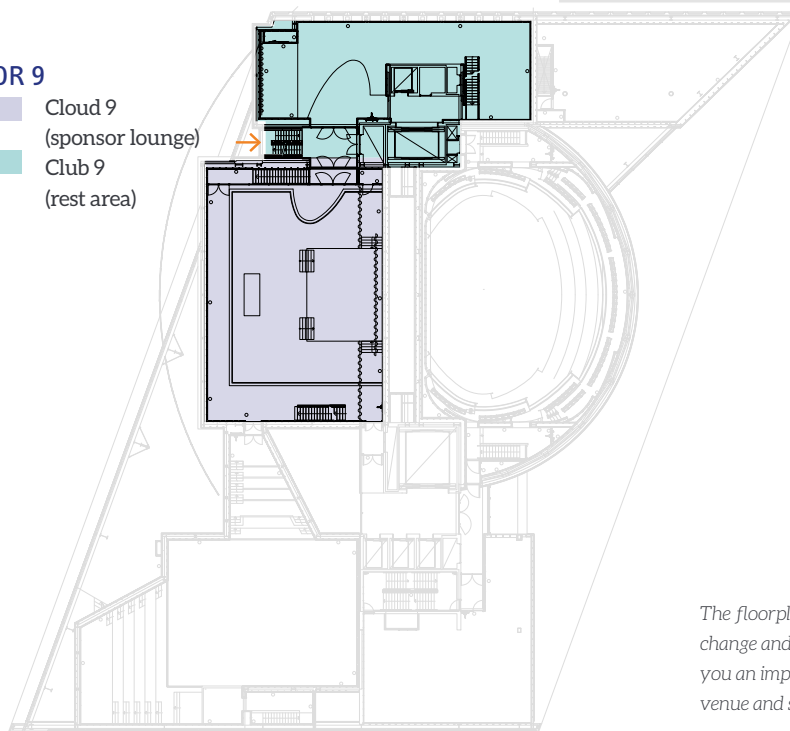


- 24 TABLE TOP ■ ESPHM2020
- 25 TABLE TOP ■ IPVS2020
- 26 SILVER ■ Pharmacosmos
- 27 TABLE TOP ■ 333 MEDIA
- 28 BRONZE ■ Lanxess

◆ POSTERS

## FLOOR 9

- Cloud 9 (sponsor lounge)
- Club 9 (rest area)



*The floorplan is subject to change and is meant to give you an impression of the venue and sponsor locations.*

## KEYNOTE LECTURES

### JOHN BEREZOWSKI

🕒 Wednesday May 22, 2019 / 13h30 - 14h00 📍 Grote Zaal  
“Big data in pig epidemiology”



John Berezowski is a Canadian born veterinarian who spent 18 years in food animal practice before completing his PhD in veterinary epidemiology in 2003. He then spent 8 years as a practicing epidemiologist in Canada where he focused much of his work on developing projects and programs aimed at creating information about livestock health, production and welfare for a variety of stakeholders. He currently works at the University of Bern in Switzerland where his research focus is on surveillance systems, big data and other methods for creating information that support decision-making by a wide variety of stakeholders in livestock production systems.

### DANIEL BERCKMANS

🕒 Wednesday May 22, 2019 / 14h00 - 14h30 📍 Grote Zaal  
“Smart data in health management”



Daniel Berckmans has a Master Degree and a Ph.D. in Bio-Science Engineering from the Katholieke Universiteit Leuven in Belgium. As full professor he headed for 25 years the Division M3-BIORES (Measure, Model and Manage Bioresponses), Department of Biosystems, Faculty of Bioscience Engineering at the Katholieke Universiteit Leuven. The main field of research consists of real time signal analysis of humans and animals, by using technology like wearables, cameras and microphones. The focus lies on the development of real time wearable algorithms to monitor and improve the life of individuals.

During the last 20 years, the research group permanently counted 25-30 researchers who prepare a Ph.D. Daniel is considered as the spiritual father of the concept of Precision Livestock Farming and the team is recognised as a worldwide leading team in this field that has become important in the whole world. He initiated the first European Masters in Human Health Engineering (technology for healthy people), organised by four collaborating faculties at KU Leuven. Today half of the research team is working on animal applications (health monitoring, welfare monitoring, etc.) and half on human applications like intensive care unit, stress monitoring, sleep monitoring etc.

Daniel is co-author of over 300 scientific articles in peer-reviewed journals and over 400 papers in conference proceedings. He is member of several international advisory boards, visitation commissions in several European countries, and six international professional organisations worldwide.

Daniel has been a member of more than 63 Ph. D commissions in nine different countries. Written research agreements have been signed with over 48 research teams worldwide. About 165 master students for bio-engineer have finished their master thesis in the team.

Since 1982, 17 products have been developed for the world market in co-operation with industrial partners. 20 patents have been submitted. He has coordinated several EU-projects with the last one counting 20 partners and a budget of 8 M euro. Daniel is co-founder of 3 spin-off companies: BioRICS NV in 2006 on monitoring humans, Soundtalks NV in 2011 on monitoring livestock and BioRICS INC in San Francisco in 2016.



#### **JAAP WAGENAAR**

🕒 Thursday May 23, 2019 / 08h30 – 09h00 📍 Grote Zaal  
**“Antimicrobial Stewardship in pig health management”**

Jaap Wagenaar was trained as veterinarian and completed his PhD study at Utrecht University and the USDA-National Animal Diseases Center, Ames, IA, US. In 1996 he started his research group at the Central Veterinary Institute (now: Wageningen Bioveterinary Research) in Lelystad, the Netherlands, on food safety and in particular on *Campylobacter*. From 2004-2006 he worked with WHO (Headquarters, Geneva, Switzerland, and for the Tsunami-relief operations with WHO Indonesia), the Centers for Disease Control and Prevention (Atlanta, US) and the USDA Western Regional Research Center (Albany, Ca, US).

In 2006 he was appointed as chair in Clinical Infectious Diseases at the Faculty of Veterinary Medicine, Utrecht University. His research group is focussing on *Campylobacter* and antimicrobial resistance. He was coordinator of a large EU-project on antimicrobial resistance (EFFORT) (2013-2018). He is member of the WHO-AGISAR-group (Advisory Group on Integrated Surveillance of Antimicrobial Resistance) and WHO-Global Foodborne Infections Network, a global capacity building network. He is member of the scientific panel of the Netherlands Veterinary Medicines Institute (SDa) and involved in the major reduction of antimicrobial use in livestock. He is member of the Technical Advisory Group of the Fleming Fund. He is director of the WHO Collaborating Center for *Campylobacter* and of the OIE-reference laboratory for *Campylobacteriosis*, and is acting frequently as expert for WHO, FAO and OIE

## ANDREAS PALZER

🕒 Thursday May 23, 2019 / 09h00 – 09h30 📍 Grote Zaal

### “AM reduction in practice”

Dr Andreas Palzer is partner and director of the Scheidegg Veterinary Practice in Bavaria, Germany, within which ten veterinarians treat all animals. Dr Palzer specialises in pigs; his wife Dr Brenda Babel-Palzer is a leading vet in the small animals section. Dr Palzer also lectures as associate professor in the veterinary faculty of the Ludwig Maximilian University (LMU) in Munich. He is a member of the presidium of the Federal Association of Practicing Veterinarians (bpt) in Germany and president of the European Association of Porcine Health management (EAPHM). EAPHM is a community of specialist pig veterinarians in Europe with the aim of providing European practitioners with a platform for sharing information and works closely with the FVE (the Federation of Veterinarians in Europe) and Union of European Veterinary Practitioners (UEVP).



## DESMOND MAGUIRE

🕒 Thursday May 23, 2019 / 13h30 – 14h00 📍 Grote Zaal

### “Pigs with long tails, the EU perspective”

Senior administrator working at the European Commission’s Directorate General for Health and Food Safety in the Directorate of Health, Food, Audits and Analysis. Project Leader of European Commission’s three year project to reduce the systematic tail docking of piglets in the EU. Working for 11 years in the field of animal welfare on farm, during transport, and at slaughter: primarily as an auditor but also as a desk officer leading campaigns on animal welfare during transport and now on pig welfare. I believe it is extremely important to bring enthusiasm and clarity to communicating the Commission’s goals and in achieving tangible outcomes for its ambitions.....



### **NICOLE KEMPER**

🕒 Thursday May 23, 2019 / 14h00 – 14h30 📍 Grote Zaal

**“Keeping pigs with long tails is possible”**



Nicole Kemper, Prof. Dr. med. vet., is director of the Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour at the Veterinary University of Hannover (TiHo) since August 2013. She achieved her license to practice in 2001 in Leipzig and obtained her doctoral degree in 2004. For the following years, she worked as PostDoc at the Institute of Animal Breeding and Husbandry, University Kiel, involved in many projects concerning Animal Health and Hygiene. She achieved her Habilitation in 2009 and was announced as Professor of Hygiene and Reproduction Physiology of Farm Animals at the Institute of Agricultural and Nutritional Science, University Halle in 2010.

Nicole is Certified Veterinary Specialist in Microbiology and in Animal Hygiene and Diplomate of the European College of Porcine Health. Nicole is co-author of more than 90 scientific publications in international peer reviewed journals.

### **PHILIPPE HOUDART**

🕒 Friday May 24, 2019 / 08h30 – 09h00 📍 Grote Zaal

**“ASF updates and review of applied measures; practical experiences”**



## ANDREA GAVINELLI

🕒 Friday May 24, 2019 / 09h00 – 09h30 📍 Grote Zaal

### “ASF political experiences”



PhD in Veterinary Medicine at the University of Milan.

Andrea has been dealing with several policy initiatives in the veterinary field and in particular in relation to animal health and welfare in the EU Commission since 1999.

After serving 5 years as veterinary official in the Italian Ministry of Health, Andrea has been responsible in the Commission for EU policies on animal welfare where he contributed to the major international achievements in this policy area.

Since 2016, he is responsible for Unit G3 that is in charge of the implementation of the new Regulation on official controls in the Food and Feed Safety area and to coordinate the control and eradication of infectious diseases in animals including the management of emergencies.

Andrea has been actively collaborating with a vast stakeholders` network in the AGRI Food sector. The network includes public and private institutions and international organisations such as the Council of Europe, the World Animal Health Organization (OIE) and the Food and Agriculture Organization of the United Nations (FAO).

Andrea has been member of several international working groups and co-chair of technical working groups with EU trading partners in the framework of bilateral veterinary trade or cooperation agreements such as Chile, Canada, Brazil, New Zealand. He also contributed to technical working groups at international level in relation to the application and the mutual understanding of regionalization measures for the control and eradication of animal diseases.

At present, he is coordinating the main EU actions in relation to the control of major animal diseases such as African swine fever or Avian influenza but also dealing with new emerging diseases. In the area of Official Controls he coordinated the preparatory work for all the derived legislation in particular in relation to the legislation concerning the imports in the European Union. In relation to e-commerce in 2017 Andrea coordinated the first EU Control plan on the commerce of food supplements.

He has contributed to several articles and publications on EU policies and animal health and welfare and in relation to the sustainability of livestock farming. He attended several international conferences and seminars to present the EU policies. In the last years he has been lecturing on animal health and welfare in postgraduate courses both in the EU (Milan, Barcelona) and abroad.

In 2015 Andrea has been awarded with the Royal Society for the Prevention of Cruelty to Animals (RSPCA) European Animal Welfare Award for outstanding service in this area.



## Products and services

- FTA cards for easy and fast submitting of samples for subsequent DNA and RNA analysis at GD.
- Sequence check tools for the interpretation of sequencing results or raw sequence data.
- Biomarkers: Fecal Calprotectin test to evaluate the presence of (bacterial) intestinal inflammation.



Learn more at  
[www.gdanimalhealth.com](http://www.gdanimalhealth.com)

GD IS AHEAD IN ANIMAL HEALTH  
WITH HIGH-QUALITY PRODUCTS AND SERVICES

## GUIDELINES FOR PRESENTERS

### ORAL PRESENTATIONS

Speakers are requested to bring their presentation files on a flash drive (USB memory stick) to the Speaker Ready Room at least 4 hours in advance of your scheduled presentation, or the day before if the presentation is in one of the morning sessions. All presentations will be sent directly to the correct lecture room through the internal computer network by specialized technicians. We kindly ask all authors not to come with their own computers into the lecture room at the last minute.

Please note that use of your own computer is not possible. All presentations must be downloaded in the Speaker Ready Room beforehand.

Speakers are entirely responsible for the presentation content (order, graphics etc). All presentations and questions must be delivered in English, as English is the official language of the symposium. Time reserved for scientific presentation is 20 minutes, 15 minutes presentation followed by 5 minutes of discussion. Speakers are requested not to exceed the allocated time. The time schedule will be strictly followed due to the nature of the symposium program.

#### **Presentation format**

All presentations should meet commonly compatible format, preferably using Power Point version 2010 or higher in 16:9 aspect ratio.

#### **Supported file types**

- Presentation: PPT, PPA, PPTA, PPTX, PDF
- Video: AVI, MPG, MKV, MOV, MP4, WMV
- Audio: WMA, MP3, WAV
- Pictures: JPG, GIF, BMP, TIF

If the presentation includes audio (sound or voice), animation or short movie file(s), speakers are advised to save each file separately and provide it to the technical staff of the Speaker Ready Room for testing, together with your presentation file. If you have any special requirements, please make sure to get in contact with the technical staff at the Speaker Ready Room in advance, ideally 1 day before.

#### **Opening hours of the Speaker Ready Room**

- Wednesday May 22, 2019: 09h00 – 18h00
- Thursday May 23, 2019: 08h00 – 18h30
- Friday May 24, 2019: 08h00 – 10h30



### **In the lecture room**

A lectern with microphone, beamer, screen and sound system will be available for all speakers. Using own computers in the lecture room is not supported to avoid delays during sessions.

### **POSTER PRESENTATIONS**

#### **Poster format**

The poster boards will be set up by the organization. The poster boards surface will be 100 x 125 cm (portrait format). The recommended size of the poster is A0 format.

The presentation number assigned to your poster should not be placed on your poster. The poster boards will be numbered by the organization.

#### **Set-up and dismantling schedule**

Poster presenting authors are responsible for setting-up and taking down their poster. Pushpins will be provided by the organization. Setting up and taking down the posters will take place as following:

Set-up: Wednesday May 22, 2019: 11h00 - 14h30

Dismantling: Friday May 24, 2019: 11h00 - 13h00

Posters which have not been removed before the due time shall be detached and dumped after the corresponding session. Unclaimed posters are not the responsibility of the symposium organizers and will be disposed.

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DETAILED PROGRAMME

WEDNESDAY  
22 MAY 2019







🕒 11H00 – 17H00 REGISTRATION AND POSTER DISPLAY

🕒 13H00 – 13H30 WELCOME AND OPENING

📍 GROTE ZAAL

- Welcome Note
- Pork Production in The Netherlands - *Anton Pijpers*

🕒 13H30 – 15H00 **KEYNOTE SESSION: PIG HEALTH MANAGEMENT 4.0**

📍 GROTE ZAAL

*Chaired by Heiko Nathues and Tineke van de Veerdonk*

- Big data in pig epidemiology - *John Berezowski*
- Smart data in health management - *Daniel Berckmans*
- Round table discussion

🕒 15H00 – 15H30 COFFEE BREAK AND POSTER VIEWING

*Coffee break: Grote zaal foyer, Plein 5 & 6, Pandora and Pandora foyer*

*Poster viewing: Balkon 1 and Pandora*

🕒 15H30 – 17H30 **PARALLEL SESSION: HERD HEALTH MANAGEMENT & ECONOMY**

📍 GROTE ZAAL

*Chaired by Arjan Stegeman and Kazimierz Tarasiuk*

### **HHM-OP-01**

**APPLICATIONS OF POPULATION-BASED METHODS FOR PRRS MONITORING AND SURVEILLANCE IN BREEDING HERDS UNDERGOING VIRUS ELIMINATION**

Giovani Trevisan<sup>1</sup>, Marcelo Almeida<sup>1</sup>, Will Alberto Lopez<sup>1</sup>, Daniel Linhares<sup>1</sup>

<sup>1</sup>*Iowa State University*

### **HHM-OP-02**

DEVELOPMENT AND INITIAL EVALUATION OF AN INTEGRATED SYSTEM UTILIZING LOW POWER BLUETOOTH BEACONS, SENSORS AND A CLOUD-BASED PLATFORM TO CONCURRENTLY MEASURE NEAR-REAL TIME MOVEMENT OF PIGS, SEMEN, FEED, SUPPLIES, ASSETS AND PERSONNEL THROUGHOUT A LARGE PIG PRODUCTION NETWORK IN THE UNITED STATES

Dale Polson<sup>1</sup>, Tyler Bates<sup>1</sup>, Greg Hartsook<sup>1</sup>, Erin Lowe<sup>1</sup>, Xavier de Paz Solanes<sup>2</sup>

<sup>1</sup> *Boehringer Ingelheim Vetmedica Inc.*

<sup>2</sup> *Boehringer Ingelheim Vetmedica GmbH*

### **HHM-OP-03**

DIFFERENCES BETWEEN DUTCH AND BELGIAN PIG FARMERS WITH RESPECT TO THEIR BIOSECURITY LEVEL AND ANTIMICROBIAL USAGE WITHIN THE I-4-1-HEALTH PROJECT

Nele Caekebeke<sup>1</sup>, Angelique van den Hoogen<sup>2</sup>, Moniek Ringenier<sup>1</sup>, Franca J. Jonquiere<sup>2</sup>, Tijs J. Tobias<sup>2</sup>, Merel Postma<sup>1</sup>, Manon Houben<sup>3</sup>, Francisca C. Velkers<sup>2</sup>, Nathalie Sleenckx<sup>4</sup>, J. Arjan Stegeman<sup>2</sup>, Jeroen Dewulf<sup>1</sup>

<sup>1</sup> *Faculty of Veterinary Medicine, Ghent University, Belgium*

<sup>2</sup> *Faculty of Veterinary Medicine, Utrecht University, the Netherlands*

<sup>3</sup> *GD Animal Health, the Netherlands*

<sup>4</sup> *Experimental Poultry Centre, Belgium*

### **HHM-OP-04**

MEASURING THE RESPIRATORY PATHOGEN BURDEN IN GROWING PIGS TO ESTIMATE THE IMPACT OF DISEASE

Rachel Stika<sup>1</sup>, Christa Goodell<sup>2</sup>, Erin Lowe<sup>2</sup>, Ed Kluber<sup>3</sup>, David Baum<sup>1</sup>, Jeremy Maurer<sup>3</sup>, Min Zhang<sup>1</sup>, Ran Bi<sup>1</sup>, Chong Wang<sup>1</sup>, Jeffrey Zimmerman<sup>1</sup>, Luis Gimenez-Lirola<sup>1</sup>, Christopher Rademacher<sup>1</sup>, Seth Playter<sup>2</sup>, Ethan Schmaling<sup>2</sup>, Derald Holtkamp<sup>1</sup>

<sup>1</sup> *Iowa State University College of Veterinary Medicine*

<sup>2</sup> *Boehringer Ingelheim Vetmedica, Inc.*

<sup>3</sup> *Smithfield Farms, LLC*

### **HHM-OP-05**

MODELLING THE EFFECT OF RESPIRATORY DISEASE ON PRODUCTION PERFORMANCE OF FARROW-TO-FINISH PIG HERDS

Maria Rodrigues da Costa<sup>1,2,3</sup>, Albert Rovira<sup>4</sup>, Montserrat Torremorell<sup>4</sup>, Rose Fitzgerald<sup>5</sup>, Josep Gasa Gasó<sup>2</sup>, Helen O'Shea<sup>5</sup>, Edgar Garcia Manzanilla<sup>1,3</sup>

<sup>1</sup> *Pig Development Department, Teagasc - Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland*

<sup>2</sup> *Departament de Ciència Animal i dels Aliments, Facultat de Veterinària, Universitat Autònoma de Barcelona, Bellaterra 08193, Barcelona, Spain*

<sup>3</sup> *School of Veterinary Medicine, University College Dublin, Belfield, Dublin 4, Ireland*

<sup>4</sup> *Department of Veterinary Population Medicine, College of Veterinary Medicine, Univer-*



sity of Minnesota, 1365 Gortner Ave., St. Paul, MN 55108, USA

<sup>5</sup> Bio-Explore, Department of Biological Sciences, Cork Institute of Technology, Rossa Avenue, Bishopstown, Co. Cork, Ireland

### HHM-OP-06

COLOSTRUM INTAKE IN PIGS: ANALYSIS OF THE VARYING FACTORS IN 10 COMMERCIAL FARMS

Philippe LENEVEU<sup>1</sup>, Benoît LAUNAY<sup>2</sup>, Agnès JARDIN<sup>1</sup>, Paul CREAC'H<sup>1</sup>, Verena SCHÜLER<sup>3</sup>, Anne LEHEBEL<sup>2</sup>, Mily LEBLANC-MARIDOR<sup>2</sup>, Catherine BELLOC<sup>2</sup>

<sup>1</sup> IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France

<sup>2</sup> BIOEPAR, INRA, Oniris, Université Bretagne Loire, 44 307 Nantes, France

<sup>3</sup> IDT-Biologika GmbH

🕒 15H30 – 17H30 PARALLEL SESSION: RESIDENT SESSION

📍 HERTZ

Chaired by Mari Heinonen and Tijs Tobias

### RES-OP-01

THE SUCCESSFUL ERADICATION OF MYCOPLASMA HYOPNEUMONIAE FROM NORWEGIAN PIG HERDS – 10 YEARS LATER

Stine Margrethe Gulliksen<sup>1,2</sup>, Bjørn Lium<sup>3</sup>, Tore Framstad<sup>4</sup>, Anne Jørgensen<sup>5</sup>, Audun Skomsøy<sup>6</sup>, Mona Gjestvang<sup>3</sup>, Oddbjørn Kjølsvik<sup>7</sup>, Carl Andreas Grøntvedt<sup>8</sup>

<sup>1</sup> Animalia

<sup>2</sup> Norwegian Pig Health Service

<sup>3</sup> Prev. Norwegian Pig health Service

<sup>4</sup> Norwegian University of Life Sciences

<sup>5</sup> Prev. Norwegian Pig Health Service

<sup>6</sup> Nortura

<sup>7</sup> Prev. Nortura

<sup>8</sup> The Norwegian Veterinary Institute

### RES-OP-02

UNDER THE SHADOW OF AFRICAN SWINE FEVER: A COLLECTION OF CASES OF PIGLETS WITH HAEMORRHAGES

Lucía Dieste-Pérez<sup>1</sup>, Linda Peeters<sup>1</sup>, Theo Geudeke<sup>1</sup>, Karin Junker<sup>1</sup>

<sup>1</sup> GD Animal Health, Deventer, The Netherlands

### RES-OP-03

IMPACT OF WASHING AND DISINFECTION OF MAMMARY GLANDS ON SOW AND PIGLET HEALTH AND PERFORMANCE

Alexandra Schoos<sup>1</sup>, Annelies Michiels<sup>1</sup>, Laura Stroobants<sup>1</sup>, Charlotte Brossé<sup>2</sup>, Jeroen Dewulf<sup>3</sup>, Dominiek Maes<sup>1</sup>

<sup>1</sup> Ghent University, Faculty of Veterinary medicine, Porcine Health Management Unit

<sup>2</sup> Animal Health Care Flanders (DGZ), Lier, Belgium

<sup>3</sup> Ghent University, Faculty of Veterinary medicine, Veterinary Epidemiology Unit

#### RES-OP-04

EDEMA DISEASE VACCINATION AS A TOOL FOR REDUCING ANTIBIOTIC USE AFTER WEANING IN A SHIGATOXIN 2E POSITIVE FARM

Susana Mesonero-Escuredo<sup>1</sup>, Joaquín Morales<sup>2</sup>, Carlos Casanovas<sup>1</sup>, Sergio Barrabés<sup>1</sup>, Joaquim Segalés<sup>3,4</sup>

<sup>1</sup> IDT Biologika SL, Gran Vía Carles III, 84, 3º, 08028 Barcelona, Spain.

<sup>2</sup> PigCHAMP Pro Europa, Calle Santa Catalina, 10, 40003 Segovia, Spain.

<sup>3</sup> Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.

<sup>4</sup> UAB, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.

#### RES-OP-05

CASE OF LISTERIOSIS IN FATTENING PIGS WITH HEMORRHAGIC DIARRHEA AND SUDDEN DEATH

Heiko Stein<sup>1,2</sup>, Beatrix Stessl<sup>3</sup>, Rene Brunthaler<sup>4</sup>, Igor Loncaric<sup>5</sup>, Herbert Weissenböck<sup>5</sup>, Ursula Ruczizka<sup>1</sup>, Andrea Ladinig<sup>1</sup>, Lukas Schwarz<sup>1</sup>

<sup>1</sup> University Clinic for Swine, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Austria

<sup>2</sup> Vetpraxis Hegerberg, Kasten, Austria

<sup>3</sup> Institute of Milk Hygiene, Milk Technology and Food Science, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine, Vienna, Austria.

<sup>4</sup> Institute of Pathology, Department of Pathobiology, University of Veterinary Medicine, Vienna, Austria.

<sup>5</sup> Institute of Microbiology, Department of Pathobiology, University of Veterinary Medicine, Vienna, Austria.

#### 17H40 – 18H40 ECPHM ANNUAL GENERAL MEETING

 HERTZ

*Diplomates and Residents only*

#### 18H00 – 19H30 WELCOME RECEPTION

 PLEIN 5 & 6

#### 20H00 – 23H00 PUB CRAWL



DETAILED PROGRAMME

THURSDAY  
23 MAY 2019





🕒 08H00 REGISTRATION DESK OPENS

🕒 08H30 – 10H00 **KEYNOTE SESSION: ANTIMICROBIAL STEWARDSHIP IN PIG HEALTH MANAGEMENT**

📍 GROTE ZAAL

*Chaired by Hetty Schreurs and Giovanbattista Guadagnini*

- Antimicrobial Stewardship in pig health management - *Jaap Wagenaar*
- AM reduction in practice - *Andreas Palzer*
- Round table discussion

🕒 10H00 – 10H30 COFFEEBREAK AND POSTER VIEWING

*Coffeebreak: Grote Zaal foyer, Plein 5 & 6, Pandora and Pandora foyer*

*Poster viewing: Balkon 1 and Pandora*

🕒 10H30 – 12H30 **PARALLEL SESSION: VIRAL DISEASES**

📍 GROTE ZAAL

*Chaired by Javier Martinez Lobo and Andreas Palzer*

### **VVD-OP-01**

**FREQUENCY OF PORCINE CIRCOVIRUS 3 DETECTION IN SERUM OF PIGS WITH RESPIRATORY AND DIGESTIVE DISORDERS**

Viviane Saporiti<sup>1</sup>, Taís F. Cruz<sup>2</sup>, Florencia Correa-Fiz<sup>1</sup>, José I. Núñez<sup>1</sup>, Marina Sibila<sup>1</sup>, Joaquim Segalés<sup>3,4</sup>

<sup>1</sup>IRTA, Centre de Recerca en Sanitat Animal (CRESA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>2</sup>Department of Immunology and Microbiology, Institute of Biosciences, College of Veterinary Medicine, São Paulo State University (UNESP), Botucatu, SP18618-000, Brazil

<sup>3</sup>Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.

<sup>4</sup>UAB, Centre de Recerca en Sanitat Animal (CRESA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.



#### **VVD-OP-02**

MUTATIONS IN ANTIGENIC SITES OF THE HEMAGGLUTININ PROTEIN FOLLOWING INFLUENZA VACCINATION

Pia Ryt-Hansen<sup>1</sup>, Inge Larsen<sup>2</sup>, Jesper Schak Krog<sup>3</sup>, Charlotte Sonne Kristensen<sup>4</sup>, Lars Erik Larsen<sup>1</sup>

<sup>1</sup> *National Veterinary Institute, Technical University of Denmark*

<sup>2</sup> *University of Copenhagen, Dpt. of Veterinary and Animal Sciences*

<sup>3</sup> *Statens Serum Institut*

<sup>4</sup> *SEGES Pig Research Centre*

#### **VVD-OP-03**

IMPACT OF PCV2 CO-INFECTION ON REPLICATION LEVEL OF A FIELD VACCINE-LIKE PRRSV-1 STRAIN

Julie ECLERCY<sup>1</sup>, Frédéric PABOEUF<sup>1</sup>, Lionel BIGAULT<sup>1</sup>, Cécilia BERNARD<sup>1</sup>, Béatrice GRASLAND<sup>1</sup>, Patricia RENSON<sup>1,2</sup>, Nicolas ROSE<sup>1</sup>, Olivier BOURRY<sup>1</sup>

<sup>1</sup> *Anses, Ploufragan-Plouzané-Niort Laboratory*

<sup>2</sup> *IFIP, France*

#### **VVD-OP-04**

MULTISYSTEMIC INFLAMMATION IN PIGLETS IN A HERD WITH CONGENITAL TREMOR AND CONCURRENT DEFORMITIES

Susanna Williamson<sup>1</sup>, Laura Wilson<sup>2</sup>, Rachael Collins<sup>2</sup>, Toby Floyd<sup>2</sup>, Sylvia Grierson<sup>2</sup>, Akbar Dastjerdi<sup>2</sup>

<sup>1</sup> *Animal and Plant Health Agency (APHA)*

<sup>2</sup> *APHA*

#### **VVD-OP-05**

IS ORF5 NUCLEOTIDE SEQUENCE ANALYSIS SUFFICIENT FOR TRACING PRRSV-1 STRAINS?

Jos Dortmans<sup>1</sup>, Rianne Buter<sup>1</sup>, Tom Duinhof<sup>1</sup>, Tomasz Stadejek<sup>2</sup>

<sup>1</sup> *GD Animal Health*

<sup>2</sup> *Department of Pathology and Veterinary Diagnostics, Faculty of Veterinary Medicine, Warsaw University of Life Sciences, Warsaw, Poland*

#### **VVD-OP-06**

ANALYSIS OF RESILIENCE MARKERS IN RELATION TO ABORTION RATE IN PIGS

Romi Pena<sup>1</sup>, Carlos Fernández<sup>2</sup>, Maria Blasco-Felip<sup>3</sup>, Lorenzo Fraile<sup>1</sup>, Joan Estany<sup>1</sup>

<sup>1</sup> *University of Lleida, Lleida, Spain*

<sup>2</sup> *INZAR SL, Zaragoza, Spain*

<sup>3</sup> *Free-lance veterinarian, Zaragoza, Spain*



Chaired by Peter van der Wolf and Helle Stege

### **VPH-OP-01**

EFFECT OF GROUP VACCINATION OF SOWS AND GILTS AGAINST SALMONELLA TYPHIMURIUM ON SALMONELLA SEROLOGY AND EXCRETION IN SOWS AND THEIR OFFSPRING

Linda Peeters<sup>1</sup>, Jeroen Dewulf<sup>1</sup>, Filip Boyen<sup>2</sup>, Charlotte Brossé<sup>3</sup>, Tamara Vandersmissen<sup>3</sup>, Geertrui Rasschaert<sup>4</sup>, Marc Heyndrickx<sup>4</sup>, Mickaël Cargnel<sup>5</sup>, Frank Pasmans<sup>2</sup>, Dominiek Maes<sup>1</sup>

<sup>1</sup>Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Herd Health, Ghent University, Belgium

<sup>2</sup>Faculty of Veterinary Medicine, Department of Pathology, Bacteriology and Avian Diseases, Ghent University, Merelbeke, Belgium

<sup>3</sup>Animal Health Care Flanders (DGZ), Lier, Belgium

<sup>4</sup>Flanders research institute for Agriculture, Fisheries and Food (ILVO), Melle, Belgium

<sup>5</sup>Sciensano, Brussel, Belgium

### **VPH-OP-02**

WELFARE ASSESSMENT OF FATTENING PIGS USING ROUTINELY COLLECTED AND EDITED PRODUCTION DATA

Julia Grosse-Kleimann<sup>1</sup>, Birte Wegner<sup>2</sup>, Ines Spiekermeier<sup>3</sup>, Elisabeth grosse Beilage<sup>4</sup>, Michaela Fels<sup>2</sup>, Hendrik Nienhoff<sup>3</sup>, Henning Meyer<sup>5</sup>, Heiko Plate<sup>5</sup>, Hubert Gerhardy<sup>6</sup>, Lothar Kreienbrock<sup>1</sup>

<sup>1</sup>Department of Biometry, Epidemiology and Information Processing, University of Veterinary Medicine Hannover, Germany

<sup>2</sup>Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour, University of Veterinary Medicine Hannover, Germany

<sup>3</sup>Swine Health Service, Chamber of Agriculture Lower Saxony, Oldenburg, Germany

<sup>4</sup>Field Station for Epidemiology, University of Veterinary Medicine Hannover, Germany

<sup>5</sup>VzF GmbH, Uelzen, Germany

<sup>6</sup>Marketing Service Gerhardy, Garbsen, Germany

### **VPH-OP-03**

AN INTERVENTION STUDY TO FOSTER ANTIMICROBIAL USAGE DECREASE IN FARROW-TO-FINISH PIG HERDS THROUGH VETERINARIAN ADVICE

Claire CHAUVIN<sup>1</sup>, Julie DAVID<sup>1</sup>, Angélique van den HOOGEN<sup>2</sup>, Manon HOU-BEN<sup>2</sup>, Pascal SANDERS<sup>1</sup>

<sup>1</sup>Anses

<sup>2</sup>porQ

#### **VPH-OP-04**

UNDERSTANDING HEPATITIS E VIRUS (HEV) DYNAMICS IN A FARROW-TO-FINISH PIG FARM USING EXPERIMENTAL, FIELD AND MODELLING DATA

Morgane Salines<sup>1</sup>, Mathieu Andraud<sup>1</sup>, Nicolas Rose<sup>1</sup>

<sup>1</sup> Anses Ploufragan-Plouzané-Niort Laboratory, Epidemiology, Health and welfare unit, PO Box 53, 22440 Ploufragan FRANCE

#### **VPH-OP-05**

APPLYING SALMONELLA VACCINATION AT THE TOP OF A UK PIG PRODUCTION PYRAMID

Judy Bettridge<sup>1</sup>, Martina Velasova<sup>1</sup>, Francesca Martelli<sup>1</sup>, Becky Gosling<sup>1</sup>, Rob Davies<sup>1</sup>, Richard Smith<sup>1</sup>

<sup>1</sup> APHA - Weybridge

#### **VPH-OP-06**

TRENDS IN ANTIMICROBIAL CONSUMPTION IN DANISH PIG PRODUCTION IN 2014-2017 AND THE FIRST SIX MONTHS OF 2018

Nicolai Weber<sup>1</sup>, Jan Dahl<sup>2</sup>

<sup>1</sup> SEGES Pig Research Centre

<sup>2</sup> Danish Agriculture and Food Council

#### 🕒 12H30 – 13H30 LUNCH BREAK AND POSTER VIEWING

Lunch break: Grote Zaal foyer, Plein 5 & 6, Pandora, Pandora foyer, Balkon 1

Poster viewing: Balkon 1 and Pandora

#### 🕒 13H30 – 15H00 KEYNOTE SESSION: PIGS WITH LONG TAILS

#### 📍 GROTE ZAAL

Chaired by Theo Geudeke and Thomas Würth

- Pigs with long tails, the EU perspective - Desmond Maguire
- Keeping pigs with long tails is possible - Nicole Kemper
- Round table discussion



🕒 15H00 – 15H20 EAPHM, PETER HØGEDAL AWARD AND JPHM PRESENTATION

📍 GROTE ZAAL

🕒 15H20 - 16H20 PARALLEL SESSION: BACTERIAL DISEASES

📍 GROTE ZAAL

Chaired by *Dominiek Maes and Isabel Hennig-Pauka*

### **BBD-OP-01**

SPATIAL SPREAD OF *M. HYOPNEUMONIAE* IN A WEAN-TO-FINISH BARN.

Maria Jose Clavijo<sup>1,2</sup>, Seth Krantz<sup>3</sup>, Marissa Rotolo<sup>1</sup>, Alexandra Henao-Diaz<sup>1</sup>, Thaire Marostica<sup>1</sup>, Alexander Tucker<sup>4</sup>, Eduardo Fano<sup>5</sup>, Dale Polson<sup>5</sup>, Deanne Hemker<sup>2</sup>, Robert Fitzgerald<sup>2</sup>, Edgar Tapia<sup>6</sup>, Silvia Zimmerman<sup>6</sup>, Jean Paul Cano<sup>2</sup>, Jeffrey Zimmerman<sup>1</sup>

<sup>1</sup> *Iowa State University College of Veterinary Medicine*

<sup>2</sup> *PIC North America*

<sup>3</sup> *Tosh Farms*

<sup>4</sup> *University of Cambridge*

<sup>5</sup> *Boehringer Ingelheim Vetmedica Inc.*

<sup>6</sup> *IDEXX*

### **BBD-OP-02**

EVALUATION OF THE EXTENT OF *MYCOPLASMA HYOPNEUMONIAE* (MHYO) SHEDDING FROM GILTS TO THEIR PROGENY IN SEVEN MHYO ENDEMIC PIGGERIES IN AUSTRALIA

Ruel Pagoto<sup>1</sup>, Hugo Dunlop<sup>2</sup>, Trish Holyoake<sup>3</sup>, Bernie Gleeson<sup>4</sup>, Tom Harrison<sup>2</sup>, Mark Eastaugh<sup>2</sup>, Tony Fahy<sup>5</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health - Australia*

<sup>2</sup> *Apiam Animal Health*

<sup>3</sup> *Holyoake Veterinary Consulting*

<sup>4</sup> *SunPork Solutions*

<sup>5</sup> *Arrow Animal Health Advisory*

### **BBD-OP-03**

PREVALENCE OF POST-WEANING DIARRHOEA IN DANISH HERDS NOT USING MEDICINAL ZINC AND ANTIMICROBIAL BATCH TREATMENT AT WEANING

Malene Kjelin Morsing<sup>1</sup>, Ken Steen Pedersen<sup>2</sup>, Inge Larsen<sup>1</sup>, Nicolai Rosager Weber<sup>3</sup>, Jens Peter Nielsen<sup>1</sup>

<sup>1</sup> *Department of Veterinary and Animal Sciences, University of Copenhagen, Grønnegårdsvej 2, 1870 Frederiksberg C, Denmark*

<sup>2</sup> *Ø-vet A/S, Køberupvej 33, 4700 Næstved, Denmark*

<sup>3</sup> *SEGES livestock Innovation, Axeltorv 3, 1609 Copenhagen V, Denmark*

🕒 15H20 – 16H20 PARALLEL SESSION: WELFARE AND NUTRITION

📍 HERTZ

Chaired by Leo van Leengoed and Marco Terreni

AWN-OP-01

TAIL BITES IN FREE-RANGE BASED FINISHER PIG SYSTEMS – PREVALENCE AND RISK FACTORS.

Hanne Kongsted<sup>1</sup>, Leslie Foldager<sup>1,2</sup>, Jan Tind Sorensen<sup>1</sup>

<sup>1</sup>Department of Animal Science, Aarhus University

<sup>2</sup>Bioinformatics Research Centre, Aarhus University

AWN-OP-02

THE INFLUENCE OF A 16-HOUR DELAY IN SOLID FEED PROVISIONING ON THE FEED INTAKE AND PERFORMANCE OF WEANLING PIGLETS

Sam Millet<sup>1,2</sup>, Hubèrt van Hees<sup>3,2</sup>, Marijke Aluwé<sup>2</sup>, Geert P.J. Janssens<sup>2</sup>, Sam De Campe-neere<sup>1</sup>, Sarah De Smet<sup>4</sup>

<sup>1</sup>ILVO (Flanders research institute for Agriculture, Fisheries and Food)

<sup>2</sup>Laboratory of Animal Nutrition, Ghent University, Ghent, Belgium

<sup>3</sup>Trouw Nutrition Research and Development

<sup>4</sup>Pig Information Center, Melle, Belgium

AWN-OP-03

DO WEANERS HAVE GASTRIC ULCERS?

Juan Miguel Peralvo Vidal<sup>1</sup>, Anni Øyan Pedersen<sup>1</sup>, Jens Peter Nielsen<sup>1</sup>, Svend Haugegaard<sup>2</sup>, Nicolai Weber<sup>2</sup>

<sup>1</sup>University of Copenhagen

<sup>2</sup>SEGES Pig Research Centre

🕒 16H20 – 16H40 COFFEE BREAK AND POSTER VIEWING

Coffee break: Grote zaal foyer, Plein 5 & 6, Pandora and Pandora foyer

Poster viewing: Balkon 1 and Pandora

🕒 16H40 – 18H00 PARALLEL SESSION: BACTERIAL DISEASES II

📍 GROTE ZAAL

Chaired by Dominiek Maes and Isabel Hennig-Pauka



#### **BBD-OP-04**

OUTBREAK OF “NEW” NEONATAL DIARRHEA IN A NORWEGIAN SWINE HERD - A CASE REPORT

Helene Wisløff<sup>1</sup>, Bjarne Bergsjø<sup>2,3</sup>, Marianne Gilhuus<sup>1</sup>, Stine Margrethe Gulliksen<sup>1</sup>

<sup>1</sup> Norwegian Veterinary Institute

<sup>2</sup> Animalia

<sup>3</sup> Norwegian Pig Health Service

#### **BBD-OP-05**

DEVELOPMENT OF A STREPTOCOCCUS SUIIS SEROTYPE 9 ANIMAL MODEL - DOSE FINDING STUDY

Jobke van Hout<sup>1</sup>, Erik van Engelen<sup>1</sup>, Manon Houben<sup>1</sup>, Karin Junker<sup>1</sup>, Ton Jacobs<sup>2</sup>

<sup>1</sup> GD Animal Health, Deventer, The Netherlands

<sup>2</sup> MSD Animal Health, Boxmeer, The Netherlands

#### **BBD-OP-06**

ASSESSMENT OF THE SALMONELLA STATUS IN 118 FARMS IN GERMANY FROM JANUARY 2015 TO JULY 2018

Kathrin Lillie-Jaschniski<sup>1</sup>, Judith Rohde<sup>2</sup>, Nicolas Mertens<sup>1</sup>, Monika Köchling<sup>1</sup>

<sup>1</sup> IDT Biologika GmbH, Dessau-Rosslau, Germany

<sup>2</sup> Institute for Microbiology, University of Veterinary Medicine, Foundation, Hannover, Germany

#### **BBD-OP-07**

FIRST DESCRIPTION OF CO-INFECTION WITH BRACHYSPIRA HYODYSENTERIAE AND ENTAMOEBIA POLECKI IN A FATTENING PIG WITH SEVERE DIARRHOEA

Maria Cuvertoret<sup>1</sup>, Christiane Weissenbacher-Lang<sup>2</sup>, Madeleine Lunardi<sup>2</sup>, René Brunthaler<sup>2</sup>, Mònica Coma<sup>3</sup>, Herbert Weissenböck<sup>2</sup>, Joaquim Segalés<sup>4,5</sup>

<sup>1</sup> Servei de Diagnòstic de Patologia Veterinària (SDPV), Departament de Sanitat i d'Anatomia Animals, Universitat Autònoma de Barcelona

<sup>2</sup> Institute of Pathology, University of Veterinary Medicine Vienna, Vienna, Austria

<sup>3</sup> Cooperativa Plana de Vic, Barcelona, Spain

<sup>4</sup> Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.

<sup>5</sup> UAB, Centre de Recerca en Sanitat Animal (CRESA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.

🕒 16H40 – 18H00 **PARALLEL SESSION: MISCELLANEOUS**

📍 **HERTZ**

Chaired by Leo van Leengoed and Marco Terreni

### **MIS-OP-01**

DENTAL AND PERIODONTAL DISEASE IN SOWS EUTHANISED OR FOUND DEAD ON CONVENTIONAL FINNISH FARMS

Camilla Munsterhjelm<sup>1</sup>, Eve Ala-Kurikka<sup>1</sup>, Paula Bergman<sup>1</sup>, Taina Laine<sup>2</sup>, Henna Pekkarinen<sup>2</sup>, Olli Peltoniemi<sup>1</sup>, Anna Valros<sup>1</sup>, Mari Heinonen<sup>1</sup>

<sup>1</sup> *University of Helsinki*

<sup>2</sup> *Finnish Food Safety Authority EVIRA*

### **MIS-OP-02**

NETWORK ANALYSIS OF PIGS MOVEMENTS IN ARGENTINA: BASIC REPRODUCTION RATE IN RELATION WITH OF FARMS BIOSECURITY

Laura Valeria Alarcón<sup>1,2</sup>, Pablo Ariel Cipriotti<sup>3</sup>, Mariela Monterubbianesi<sup>4</sup>, Carlos Perfumo<sup>5</sup>, Enric Mateu<sup>6</sup>, Alberto Allepuz<sup>6</sup>

<sup>1</sup> *Department of Swine Medicine, La Plata National University*

<sup>2</sup> *Universitat Autònoma de Barcelona*

<sup>3</sup> *Department of Quantitative Methods and Information Systems, School of Agriculture, University of Buenos Aires*

<sup>4</sup> *National Food Safety Service*

<sup>5</sup> *Laboratory of Special Pathology, La Plata National University*

<sup>6</sup> *Centre de Recerca en Sanitat Animal, Universitat Autònoma de Barcelona*

### **MIS-OP-03**

ECONOMIC IMPACT OF SWIAV OUTBREAK IN A 1000 SOW HERD

EVELYNE GAILLARD<sup>1</sup>, PAUL CREACH<sup>2</sup>, Philippe LENEVEU<sup>2</sup>, SILKE WACHECK<sup>3</sup>, Agnès JARDIN<sup>2</sup>

<sup>1</sup> *Cabinet vétérinaire de Pontrieux - Vetarmor, Rue de Briantel, 22 260 Ploëzal, France*

<sup>2</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>3</sup> *IDT Biologika, Am Pharmapark, 06861 Dessau-Roßlau, Germany*

### **MIS-OP-04**

ACTIVE SURVEILLANCE OF PRRSV IN BREEDING, NURSERY AND FINISHING FARMS FROM CARCASSES

Jordi baliellas<sup>1</sup>, Elena Novell<sup>1</sup>, Vicens Tarancon<sup>1</sup>, Carles Vilalta<sup>2</sup>, Lorenzo Fraile<sup>3</sup>

<sup>1</sup> *Grup de Sanejament Porci, Lleida, Spain*

<sup>2</sup> *Swine Health Monitoring Project, University of Minnesota, USA*

<sup>3</sup> *University of Lleida, Lleida, Spain*

🕒 18H10 – 19H10 EAPHM ANNUAL GENERAL MEETING

📍 HERTZ

*Open for all interested delegates*





DETAILED PROGRAMME

FRIDAY  
24 MAY 2019





🕒 08H00 REGISTRATION DESK OPENS

🕒 08H30H – 10H00 **KEYNOTE SESSION: ASF IN EUROPE**

📍 GROTE ZAAL

Chaired by Alex Eggen and Rick Janssen

- ASF updates and review of applied measures; practical experiences  
- *Philippe Houdart*
- ASF political experiences - *Andrea Gavinelli*
- Round table discussion

🕒 10H00 – 10H30 COFFEE BREAK AND POSTER VIEWING

Coffee break: Grote Zaal foyer, Plein 5 & 6, Pandora and Pandora foyer

Poster viewing: Balkon 1 and Pandora

🕒 10H30 – 12H30 **PARALLEL SESSION: IMMUNOLOGY AND VACCINOLOGY**

📍 GROTE ZAAL

Chaired by Paolo Martelli and Joaquim Segalés

### **IMM-OP-01**

CONTAMINATION LEVEL OF SYRINGES USED TO ADMINISTER PORCINE VACCINES IN BELGIUM AND THE NETHERLANDS

Sjouke Van Poucke<sup>1</sup>, Annelies Michiels<sup>1</sup>, Denise Meijer<sup>1</sup>, Daniel Angelats<sup>2</sup>, Lorena Nodar<sup>2</sup>

<sup>1</sup> *HIPRA Benelux*

<sup>2</sup> *HIPRA*

### **IMM-OP-02**

PRRS POST-VACCINAL IMMUNE RESPONSE TO MLV IN PRRS MULTIVACCINATED SOWS

Christelle FABLET<sup>1</sup>, Patricia RENSON<sup>1,2</sup>, Florent EONO<sup>1</sup>, Sophie MAHE<sup>1</sup>, Eric EVENO<sup>1</sup>, Mireille LE DIMNA<sup>1</sup>, Nicolas ROSE<sup>1</sup>, Olivier BOURRY<sup>1</sup>

<sup>1</sup> *Anses, Laboratoire de Ploufragan, France*

<sup>2</sup> *IFIP, France*

### **IMM-OP-03**

EFFECT OF EARLY PRRSV (PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS) VACCINATION ON PIG HEALTH AND PERFORMANCE: THE EARLIER THE BETTER?

Michele Drigo<sup>1</sup>, Giovanni Franzo<sup>1</sup>, Claudia Maria Tucciarone<sup>1</sup>, Andrea Manfreda<sup>2</sup>, Paola Zanardelli<sup>2</sup>, Fabrizio Solari Basano<sup>3</sup>, Roberto Nazzari<sup>3</sup>

<sup>1</sup> *Department of Animal Medicine, Production and Health (MAPS), University of Padua, Viale dell'Università 16, 35020 Legnaro (PD), Italy*

<sup>2</sup> *Zoetis Italia S.r.l., Via Andrea Doria, 41M, 00192, Roma, Italy*

<sup>3</sup> *3Arcoblu s.r.l., Via Milesi 5, 20133 Milano, Italy*

### **IMM-OP-04**

HUMORAL AND CELLULAR IMMUNE RESPONSES AFTER ADMINISTRATION OF INNOVATIVE MYCOPLASMA HYOPNEUMONIAE BACTERINS IN PIGS

Anneleen Matthijs<sup>1</sup>, Gaël Auray<sup>2</sup>, Dominiek Maes<sup>1</sup>, Christophe Barnier-Quer<sup>3</sup>, Virginie Jakob<sup>3</sup>, Filip Boyen<sup>1</sup>, Annelies Michiels<sup>4</sup>, Freddy Haesebrouck<sup>1</sup>, Artur Summerfield<sup>2</sup>

<sup>1</sup> *Faculty of Veterinary Medicine, Ghent University, Belgium*

<sup>2</sup> *Institute of Virology and Immunology, Switzerland*

<sup>3</sup> *Department of Biochemistry, University of Lausanne, Switzerland*

<sup>4</sup> *Hipra Benelux*

### **IMM-OP-05**

COLOSTRUM IMMUNE TRANSFER EVALUATION IN PIGS BY USING FLU HI TEST AT 3 WEEKS OF AGE

Philippe LENEVEU<sup>1</sup>, Benoît LAUNAY<sup>2</sup>, Agnès JARDIN<sup>1</sup>, Paul CREAC'H<sup>1</sup>, Verena SCHÜLER<sup>3</sup>, Stefan PESCH<sup>3</sup>, Mily LEBLANC-MARIDOR<sup>2</sup>, Catherine BELLOC<sup>2</sup>

<sup>1</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>2</sup> *BIOEPAR, INRA, Oniris, Université Bretagne Loire, 44 307 Nantes, France*

<sup>3</sup> *IDT Biologika GmbH*

### **IMM-OP-06**

ASSESSMENT OF THE REPLICATION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME MODIFIED LIVE VIRUS ATTENUATED VACCINES IN PORCINE ALVEOLAR MACROPHAGES

Monica Balasch<sup>1</sup>, Lucas Taylor<sup>1</sup>, Jay Calvert<sup>1</sup>

<sup>1</sup> *Zoetis*

🕒 10H30 – 12H30 PARALLEL SESSION: REPRODUCTION

📍 HERTZ

Chaired by Olli Peltoniemi and Johannes Kauffold



FRIDAY 24 MAY 2019

#### REP-OP-01

EFFECT OF IGF-1 LEVEL AT WEANING ON SUBSEQUENT LUTEAL DEVELOPMENT AND PROGESTERONE PRODUCTION IN PRIMIPAROUS SOWS

Taehee Han<sup>1</sup>, Stefan Björkman<sup>1</sup>, Nicoline Soede<sup>2</sup>, Claudio Oliviero<sup>1</sup>, Olli Peltoniemi<sup>1</sup>

<sup>1</sup>University of Helsinki

<sup>2</sup>Wageningen University & Research

#### REP-OP-02

EVOLUTION OF REPRODUCTIVE PERFORMANCE IN SPANISH FARMS IN THE LAST 10 YEARS AND PREDICTION FOR 2020. IMPACT OF FARMS' SIZE

M Angel de Andres<sup>1</sup>, Armando Ocon<sup>2</sup>, Celia Santiago<sup>2</sup>, Inmaculada Diaz<sup>2</sup>, Carlos Pineiro<sup>3</sup>, Maria Aparicio<sup>2</sup>

<sup>1</sup>Pig CHAMP Pro Europa SL

<sup>2</sup>Pig Champ Pro Europa SL

<sup>3</sup>Pig Champ Pro Europa S.L.

#### REP-OP-03

USE OF A PROGESTERONE ON-FARM KIT DETECTION (OVU-CHECK®) TO IMPROVE GILTS MANAGEMENT IN A COMMERCIAL FARM

Eva Ramells<sup>1</sup>, Rut Menjón<sup>2</sup>, Marcial Marcos<sup>2</sup>, Jiménez Marta<sup>2</sup>

<sup>1</sup>Inga Food

<sup>2</sup>MSD Animal Health

#### REP-OP-04

DIFFERENCES IN RETURN TO ESTRUS RATE AND NUMBER OF TOTAL BORN PIGLETS CAUSED BY VARIATIONS IN PEOPLES' ARTIFICIAL INSEMINATION TECHNIQUE

Alexander Grahofner<sup>1</sup>, Sara Joller<sup>1</sup>, Heiko Nathues<sup>1</sup>

<sup>1</sup>Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland

#### REP-OP-05

TRANSABDOMINAL ULTRASOUND EXAMINATION OF SOWS TO IMPROVE THE REPRODUCTION – A FIELD STUDY

István Makkai<sup>1</sup>, Péter Máté<sup>1</sup>, László Búza<sup>1,2,3,4</sup>, László Ózsvári<sup>4</sup>

<sup>1</sup>MSD AH CERG Swine Business Unit - HUNGARY

<sup>2</sup>Szent István University Doctorial School

<sup>3</sup>Hungarian Pig Health Management Association

<sup>4</sup>University of Veterinary Medicine, Budapest

**REP-OP-06**

PRE-FARROWING SUPPLEMENT THROUGH DRINKING WATER REDUCES STILL-BIRTH

Pieter Langendijk<sup>1</sup>, Jac Bergman<sup>1</sup>, Marleen Fleuren<sup>1</sup>

<sup>1</sup>Trouw Nutrition R&D

🕒 12H30 – 13H00 CLOSING CEREMONY/ESPHM 2020 IN BERN

📍 GROTE ZAAL







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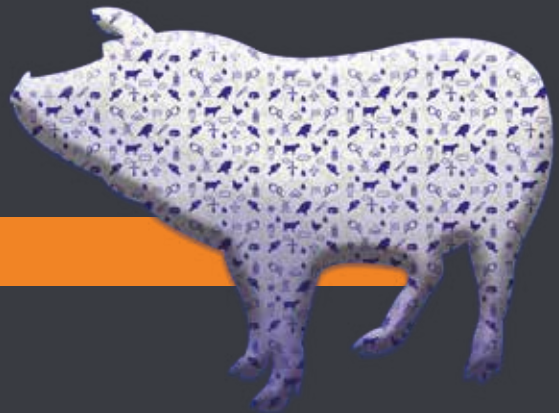
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# ORAL PRESENTATIONS





BACTERIAL DISEASES	BBD-01 - BBD-07
HERD HEALTH MANAGEMENT AND ECONOMY	HHM-01 - HHM-06
IMMUNOLOGY AND VACCINOLOGY	IMM-01 - IMM-06
MISCELLANEOUS	MIS-01 - MIS-04
REPRODUCTION	REP-01 - REP-06
RESIDENT SESSION	RES-01 - RES-05
VETERINARY PUBLIC HEALTH	VPH-01 - VPH-06
VIRAL DISEASES	VVD-01 - VVD-06
WELFARE AND NUTRITION	AWN-01 - AWN-03



# BACTERIAL DISEASES

ORAL PRESENTATIONS

## **BBD-OP-01**

### **TITLE**

SPATIAL SPREAD OF *M. HYOPNEUMONIAE* IN A WEAN-TO-FINISH BARN.

Maria Jose Clavijo<sup>1,2</sup>, Seth Krantz<sup>3</sup>, Marissa Rotolo<sup>1</sup>, Alexandra Henao-Diaz<sup>1</sup>, Thaire Marostica<sup>1</sup>, Alexander Tucker<sup>4</sup>, Eduardo Fano<sup>5</sup>, Dale Polson<sup>5</sup>, Deanne Hemker<sup>2</sup>, Robert Fitzgerald<sup>2</sup>, Edgar Tapia<sup>6</sup>, Silvia Zimmerman<sup>6</sup>, Jean Paul Cano<sup>2</sup>, Jeffrey Zimmerman<sup>1</sup>

<sup>1</sup> *Iowa State University College of Veterinary Medicine*

<sup>2</sup> *PIC North America*

<sup>3</sup> *Tosh Farms*

<sup>4</sup> *University of Cambridge*

<sup>5</sup> *Boehringer Ingelheim Vetmedica Inc.*

<sup>6</sup> *IDEXX*

### **CONTENT**

Slow transmission of *M. hyopneumoniae* (Mhp) and lack of sensitive diagnostics hinders early detection in negative swine populations and elimination programs. The objective was to assess the between-pen transmission in a commercial wean-to-finish population. Study completed in one room of a wean-to-finish site (1250-head) and 46 pens housing 28 pigs. Room stocked with 21 day-old Mhp negative barrows. At 9 weeks old, a central pen was selected and 10 seeders were inoculated with Mhp lung homogenate. The remaining 19 pigs served as contact pigs. Serum (SS), tracheal swabs (TS) and oral fluids (OF) collected weekly from all pigs in inoculated pen. A total of 4 SS, 1 TS and 1 OF were collected from the 45 contact pens biweekly after inoculation through marketing. Five SOMO+ Respiratory Distress Monitor devices were installed in the room. Seven dpi 10/10 seeders were TS PCR+ and by 42 dpi 100%ELISA+. At 24 dpi all contacts were TS PCR+ and at 56 dpi 17/19 tested ELISA+. At 24, 56, 84 dpi, 2%, 64% and 100% of contact pens were TS PCR+, respectively. The first 35 dpi OF were PCR- in the inoculated pen. Highest detection was at 98 dpi with 68% of OF PCR+. At 56, 81 and 98 dpi 13%, 71% and 98% of pens were ELISA+, respectively. Mhp infection in contact pens was first established downwind from the inoculated pen and over 70 days spread to all pens. Respiratory Distress Index alerts occurred at time points that coincided with TS+ and clinical detection of cough. Models will be carried out to generate estimates of the probability of detection by sample size and type, and within-barn prevalence. A combination of population based serology, clinical signs and TS will be part of novel protocols for sampling negative populations and measure exposure in gilt acclimation protocols.

## **BBD-OP-02**

### **TITLE**

EVALUATION OF THE EXTENT OF MYCOPLASMA HYOPNEUMONIAE (MHYO) SHEDDING FROM GILTS TO THEIR PROGENY IN SEVEN MHYO ENDEMIC PIGGERIES IN AUSTRALIA

Ruel Pagoto<sup>1</sup>, Hugo Dunlop<sup>2</sup>, Trish Holyoake<sup>3</sup>, Bernie Gleeson<sup>4</sup>, Tom Harrison<sup>2</sup>, Mark Eastaugh<sup>2</sup>, Tony Fahy<sup>5</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health - Australia*

<sup>2</sup> *Apiam Animal Health*

<sup>3</sup> *Holyoake Veterinary Consulting*

<sup>4</sup> *SunPork Solutions*

<sup>5</sup> *Arrow Animal Health Advisory*

### **CONTENT**

**Background and objectives:** Mhyo is the leading cause of porcine respiratory disease complex associated with significant economic losses throughout the pig industry. Gilts are thought to play a role in Mhyo transmission, however it is widely thought that gilts stop shedding 43?46 weeks after exposure. The aim of this study is to determine the extent of Mhyo shedding in gilts to their progeny to better understand the ecology and epidemiology of Mhyo in Australia.

**Material and methods:** Piggeries (n=7) were selected based on replacement gilt source, i.e. in-house multiplication (IHR) closed herds versus purchased from suppliers (age ~16?22 weeks). Laryngeal swabs from gestating gilts (10?20/farm) and 3?4 week old gilt piglets (11?35/farm including 5?10 piglets per Mhyo-positive gilt) were tested using a commercial Mhyo real-time PCR assay.

**Results:** For Farms A?E (IHR) all samples tested Mhyo-negative in both gilts and gilt piglets. For Farm F (IHR), 20% of gilts tested Mhyo-positive at farrowing, but no gilt piglets were Mhyo-positive. For Farm H (purchased gilts) 73% of gilts (~30 weeks post arrival) and 17% of gilt piglets tested Mhyo-positive.

**Discussion and conclusion:** Results suggest that IHR and purchasing gilts from positive sources allows adequate Mhyo exposure to replacement gilts. On Farm F (purchased gilts from a Mhyo-negative source) 20% of gestating gilts tested Mhyo-positive, however as no gilt piglets tested Mhyo-positive, it is possible that the replacement gilts were not shedding at farrowing. Alternatively, the absence of Mhyo-positive piglets may be due to undetectable Mhyo-DNA level. On Farm H, a high proportion of gestating gilts were Mhyo-positive which did not translate to the number of Mhyo-positive gilt piglets observed. Again this may be due to Mhyo DNA below the assay detection limit. Research is planned to validate these hypotheses, through collection of longitudinal data at different farms, and across different parities.



## **BBD-OP-03**

### **TITLE**

PREVALENCE OF POST-WEANING DIARRHOEA IN DANISH HERDS NOT USING MEDICINAL ZINC AND ANTIMICROBIAL BATCH TREATMENT AT WEANING

Malene Kjelin Morsing<sup>1</sup>, Ken Steen Pedersen<sup>2</sup>, Inge Larsen<sup>1</sup>, Nicolai Rosager Weber<sup>3</sup>, Jens Peter Nielsen<sup>1</sup>

<sup>1</sup> *Department of Veterinary and Animal Sciences, University of Copenhagen, Grønnegårdsvej 2, 1870 Frederiksberg C, Denmark*

<sup>2</sup> *Ø-vet A/S, Køberupvej 33, 4700 Næstved, Denmark*

<sup>3</sup> *SEGES livestock Innovation, Axeltorv 3, 1609 Copenhagen V, Denmark*

### **CONTENT**

Post-weaning diarrhoea (PWD) is a complex and common disease caused by enterotoxigenic *E. coli* (ETEC). In most Danish herds, PWD is prevented by addition of 2500 ppm medicinal zinc to the feed for the first two weeks post weaning. Because of the upcoming EU wide ban on medicinal zinc in 2022, it is likely that an increase in PWD will occur, which may result in an increased usage of antibiotics for treating and controlling PWD. The objective of this study was to estimate the prevalence of ETEC-related PWD in the few Danish herds, which have voluntarily stopped the use of medical zinc.

Seven herds not using medicinal zinc and antimicrobial batch treatment at weaning were included and the number of pigs with faecal soiling of the perineum were recorded in a batch of newly weaned pigs. 10 diarrhoeic pigs from each herd were then randomly selected and subjected to clinical examination and faecal sampling. The samples were subjected to laboratory analysis for dry matter content and bacterial culture. Isolates of haemolytic *E. coli* were characterised by PCR for fimbriae (F4, F18) and toxins (ST1, ST2, LT, Vt2e).

The herds were different with regard to health status, production system, weaning and disease management, feeding strategy and size. The prevalence of faecal soiling varied between 4 and 32 % and pigs from three of the herds were positive for ETEC (F18+LT, F18+ST2+LT and F18+ST1/F4+ST1+ST2). The sampled pigs from the remaining herds were negative for ETEC, however pigs from one herd was positive for F18 and Vt2e (oedema disease), without clinical signs of this disease.

The study showed that several of the Danish herds, which has voluntarily stopped the use of medical zinc, does not experience diarrhoea outbreaks post weaning. Further, clinical diarrhoea in the first weeks post weaning, is not always ETEC-related.

## **BBD-OP-04**

### **TITLE**

OUTBREAK OF “NEW” NEONATAL DIARRHEA IN A NORWEGIAN SWINE HERD - A CASE REPORT

Helene Wisløff<sup>1</sup>, Bjarne Bergsjø<sup>2,3</sup>, Marianne Gilhuus<sup>1</sup>, Stine Margrethe Gulliksen<sup>1</sup>

<sup>1</sup> *Norwegian Veterinary Institute*

<sup>2</sup> *Animalia*

<sup>3</sup> *Norwegian Pig Health Service*

### **CONTENT**

#### Background

Cases of neonatal porcine diarrhea (NPD) with unknown etiology have been reported from several countries during the past decade. Studies of this “New” neonatal porcine diarrhea (NNPD) in Sweden and Denmark have shown that NNPD seems to be associated with other pathogens than usually found in cases of NPD. In several cases, *Enterococcus hirae* has been cultured from the intestines, and abundant enteroadherent cocci have been demonstrated histologically. This case is part of a pilot study investigating if *E. hirae* could be a hitherto new cause of neonatal diarrhea in Norway.

#### Materials and Methods

In a multiplier herd in Telemark county, six 4-5 days old piglets with severe diarrhea were necropsied. Samples for histological examination were obtained from jejunum, ileum and colon. Swabs for microbiological examinations were obtained from jejunum and colon. In addition, rectal swabs were obtained from five diarrheic piglets and five healthy piglets from the same herd.

#### Results

Histological examinations revealed enteroadherent Gram positive cocci in jejunum and ileum in five of the six necropsied piglets. Another common finding was swollen enterocytes with vacuolated cytoplasm in the apical villi. Three piglets had multifocal necrosis in the jejunal and/or ileal mucosa, and two piglets had mucosal necrosis in colon.

Microbiological examination of jejunum and colon from the necropsied piglets revealed *E. hirae* and *E. coli* from five piglets. From the rectal swabs from diarrheic piglets, *E. hirae* was demonstrated in two samples. From the other three diarrheic piglets, the five healthy piglets and the sixth necropsied piglet, a mixture of bacteria was cultured.

#### Discussion

In accordance with studies from Sweden and Denmark, the results in this case indicate that *E. hirae* plays a role in NNPD. The knowledge about the pathogenesis of *Enterococcus*-associated diarrhea is sparse, and further studies are essential to elucidate the etiology of NNPD.

## **BBD-OP-06**

### **TITLE**

ASSESSMENT OF THE SALMONELLA STATUS IN 118 FARMS IN GERMANY FROM JANUARY 2015 TO JULY 2018

Kathrin Lillie-Jaschniski<sup>1</sup>, Judith Rohde<sup>2</sup>, Nicolas Mertens<sup>1</sup>, Monika Köchling<sup>1</sup>

<sup>1</sup> *IDT Biologika GmbH, Dessau-Rosslau, Germany*

<sup>2</sup> *Institute for Microbiology, University of Veterinary Medicine, Foundation, Hannover, Germany*

### **CONTENT**

#### Background and Objectives

Most Salmonella control programs focus on the assessment of serological prevalence at slaughter. To be able to implement an effective control program in the whole production chain, it is necessary to identify the Salmonella types circulating on farm. For this purpose sock and environmental swab samples were taken on 118 farms all over Germany.

#### Material & Methods

The number of socks and swabs taken on each farm depended on the size of the farm, with at least one sample taken in all stages of production. For each sample new gloves and overshoes were used in order to prevent cross contamination. The samples were analyzed for Salmonella spp. via microbiological culture. All detected Salmonella spp. strains were typed. An average of 12 socks and 10 swabs per farm resulted in a total of 1390 socks and 1214 swabs.

#### Results

On 106 farms (90%) Salmonella spp. was detected in at least one sample. 40% (n=554) of the socks and 28% (n=342) of the swabs were positive for Salmonella spp. In 53% of the farms only one serotype could be detected, in the other positive farms two or more serotypes could be found. Most frequently detected was Salmonella Typhimurium in 77%, followed by Salmonella Derby in 19% of all farms. The highest amount of positive samples could be detected in nursery (48%) compared to samples of farrowing units (18%) or fattening (27%).

#### Discussion & Conclusion

These results show that Salmonella control should start early in the piglet's life, as already farrowing units are positive for Salmonella. As in every disease, the nursery plays an important role in Salmonella control, as piglets of that age are very susceptible for infections. Each farm should know their Salmonella status based on the analysis of sock and environmental swabs via microbiological culture.

## **BBD-OP-05**

### **TITLE**

DEVELOPMENT OF A STREPTOCOCCUS SUIS SEROTYPE 9 ANIMAL MODEL – DOSE FINDING STUDY

Jobke van Hout<sup>1</sup>, Erik van Engelen<sup>1</sup>, Manon Houben<sup>1</sup>, Karin Junker<sup>1</sup>, Ton Jacobs<sup>2</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

<sup>2</sup> *MSD Animal Health, Boxmeer, The Netherlands*

### **CONTENT**

Background and objectives

Clinical *Streptococcus suis* serotype 9 (SSU9) infections occur frequently on pig farms and are difficult to prevent and control. Animal models are necessary to evaluate interventions to reduce/prevent clinical signs due to SSU9. The objective of this study was to define the most convenient inoculation dose with SSU9 in order to develop a SSU9 challenge model.

Material & Methods

Three Groups of pigs (7 pigs/group) were inoculated with SSU9 both orally (fixed dose; to achieve intestinal colonisation) and intra-tracheally (3 increasing doses), immediately upon arrival. Animals were observed for clinical signs and sampled frequently up to end of study (14 days after inoculation) for culture and PCR.

Results

After inoculation several animals showed locomotion or neurological disorders. 10 pigs were removed before end of study and 8 of them tested positive for SSU9 in blood culture before euthanasia. In only 4 pigs SSU9 could be demonstrated at post-mortem examination. The surviving pigs carried SSU9 in their tonsils, at various study days after inoculation but not in faeces. In 3-6 pigs per Group SSU9 was detected in jejunum, ileum, rectum. Group 3 (highest dose) did not show increased morbidity and mortality compared to lower doses.

Discussion & Conclusion

No clear dose-response effect was found. The mild response in the highest dose group emphasizes the great variability that can be encountered with SSU9 challenge models. In several pigs intestinal colonization was achieved. It is concluded that when using the selected SSU9 strain, the middle dose (at least 10<sup>9</sup> CFU/pig, orally and intra-tracheally) is required for clinical response in at least 50% of the pigs. As the lag phase until clinical signs and/or death due to SSU9 was at least two days in Group 1/2 in this study, a time window to evaluate interventions to reduce/prevent clinical signs is available.

## **BBD-OP-07**

### **TITLE**

**FIRST DESCRIPTION OF CO-INFECTION WITH BRACHYSPIRA HYODYSENTERIAE AND ENTAMOEBIA POLECKI IN A FATTENING PIG WITH SEVERE DIARRHOEA**

Maria Cuvertoret<sup>1</sup>, Christiane Weissenbacher-Lang<sup>2</sup>, Madeleine Lunardi<sup>2</sup>, René Brunthaler<sup>2</sup>, Mònica Coma<sup>3</sup>, Herbert Weissenböck<sup>2</sup>, Joaquim Segalés<sup>4,5</sup>

<sup>1</sup> *Servei de Diagnòstic de Patologia Veterinària (SDPV), Departament de Sanitat i d'Anatomia Animals, Universitat Autònoma de Barcelona*

<sup>2</sup> *Institute of Pathology, University of Veterinary Medicine Vienna, Vienna, Austria*

<sup>3</sup> *Cooperativa Plana de Vic, Barcelona, Spain*

<sup>4</sup> *Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.*

<sup>5</sup> *UAB, Centre de Recerca en Sanitat Animal (CRESA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.*

### **CONTENT**

**Introduction:** Enteric disease in pigs is usually of multifactorial aetiology, including infectious and non-infectious factors. In many cases of diarrhoea in weaner-to-finisher pigs, the combination of two or more microorganisms leads to an aggravation of clinical signs and intestinal lesions. In the present report, a case of swine dysentery in co-infection with *Entamoeba polecki* is described.

**Materials and methods:** A 4-month-old fattening pig from a farm with problems of diarrhoea was necropsied at the Veterinary Faculty (UAB). Necropsy findings were consistent with a severe fibrino-necrotizing typhlocolitis with abundant muco-haemorrhagic content. Further investigations were conducted, including histopathology, silver staining for detection of spirochetes, bacterial isolation, PCR for the detection of enteric bacterial and protozoal pathogens, and in situ hybridization to detect enteric protozoa.

**Results:** Histologically, severe diffuse necrosis of the mucosa was observed in colon and cecum together with spiral-shaped bacteria positive to Warthin-Starry. Numerous PAS positive amoebic trophozoites were observed free in the necrotic debris, lamina propria, submucosa, and within lymphatic vessels of cecum and colon. *Brachyspira hyodysenteriae* was detected in the colonic content by PCR. The trophozoites were identified as *Entamoeba* spp. by in situ hybridization. In addition, *Entamoeba polecki*, *Balantidium* spp., *Blastocystis* spp., and *Trichomonas* spp. were detected in the colonic content by PCR.

**Discussion and conclusion:** To our knowledge, this is the first description of *B. hyodysenteriae* co-infection with *E. polecki* associated with fibrinonecrotizing typhlocolitis in a pig. Severity of macroscopic and microscopic lesions observed was probably the result of the interaction between *B. hyodysenteriae* and *E. polecki*. However, it cannot be ruled out that *E. polecki* could be an opportunistic pathogen secondary to ulceration since it was found in the lamina propria and submucosa only in areas of erosion and ulceration. To date, the pathogenicity of *E. polecki* in domestic pigs has not been fully elucidated.



# HERD HEALTH MANAGEMENT AND ECONOMY

ORAL PRESENTATIONS

## HHM-OP-01

### TITLE

APPLICATIONS OF POPULATION-BASED METHODS FOR PRRS MONITORING AND SURVEILLANCE IN BREEDING HERDS UNDERGOING VIRUS ELIMINATION

Giovani Trevisan<sup>1</sup>, Marcelo Almeida<sup>1</sup>, Will Alberto Lopez<sup>1</sup>, Daniel Linhares<sup>1</sup>

<sup>1</sup> *Iowa State University*

### CONTENT

#### Background and Objectives

Population-based sampling methods in breeding herds have been developed, significantly aiding veterinarians to track activity of PRRSv and other pathogens more efficiently. The purpose of this abstract is to summarize key findings of applications of some of these new methods, including processing fluids (PF) for 3-5 days-old piglets, and family oral fluids (FOF) for due-to-wean pigs.

#### Material & Methods

Several bench-top, and field research studies have been done to assess the feasibility of PF and FOF for PRRSv monitoring in breeding herds. This report summarizes the major findings, highlighting the field applications of such tools.

#### Results

PF were first reported in 2016, and based on the November 2018 report from the Swine Disease Reporting System, PF represents 9.5% of specimen submissions for PRRS testing by RT-PCR in the US swine industry (50% from all suckling pigs submission).

When there was a single viremic pig in a room, there was 90%, 80%, and 60% probability to detect PRRSV by qPCR when pooling PF from 25, 47 and 70 litters respectively. PF-based monitoring is great to screen for PRRSv RNA or antibodies in piglets of 3-5 days of age that are tail-docked and castrated.

To confirm disease status prior to weaning, FOF-based sampling detects PRRSV even at low prevalence (<2%). Farrowing rooms testing PCR-negative on PF may not test negative on weaning pigs.

#### Discussion & Conclusion

PF and FOF sampling are easier, more practical, and offer better herd sensitivity than bleeding pigs. When PRRSV is at low prevalence in breeding herds, there is an intermittent pattern of detection of the virus with PF, FOF, or blood samples between farrowing rooms, and across weeks, demonstrating the need to sample as many rooms and crates as possible over time to increase confidence that PRRSv has been eliminated before re-introducing naïve gilts.

## **HHM-OP-02**

### **TITLE**

DEVELOPMENT AND INITIAL EVALUATION OF AN INTEGRATED SYSTEM UTILIZING LOW POWER BLUETOOTH BEACONS, SENSORS AND A CLOUD-BASED PLATFORM TO CONCURRENTLY MEASURE NEAR-REAL TIME MOVEMENT OF PIGS, SEMEN, FEED, SUPPLIES, ASSETS AND PERSONNEL THROUGHOUT A LARGE PIG PRODUCTION NETWORK IN THE UNITED STATES

Dale Polson<sup>1</sup>, Tyler Bates<sup>1</sup>, Greg Hartsook<sup>1</sup>, Erin Lowe<sup>1</sup>, Xavier de Paz Solanes<sup>2</sup>

<sup>1</sup> *Boehringer Ingelheim Vetmedica Inc.*

<sup>2</sup> *Boehringer Ingelheim Vetmedica GmbH*

### **CONTENT**

The pig and pork production industry is highly networked and mobile – with various types of movements occurring numerous times per day within farms, between farms, across production systems and throughout production networks. Production systems experience movements of pigs, semen, feed, supplies, assets and personnel – within farm sites, between farm sites, and among non-production sites (e.g., feed mills, truck washes, offices, warehouses). All movements inherently carry with them varying levels of disease introduction and transmission risk by animals, people and/or fomites within and among farm sites, with often serious consequences on animal productivity and business performance.

The objective of this project was to design, develop and evaluate an integrated measurement system to capture movement records to enable the more objective assessment of movement-related risks of disease introduction and transmission.

A large multi-farm system and production network was enrolled in the project. At each participating site, zones were outlined inside and outside of each barn. A risk level was assigned to each zone. Location beacons were installed within each zone. Significant assets (e.g., trucks, trailers, feed carts, robots, power washers, semen coolers) were tagged with asset beacons. All system personnel received beacon sensors. Cellular routers with attached gateways were installed at key sites. Sensor-captured data is automatically transmitted in real time to a cloud-based platform where data can be viewed and analytics done using available visualization components, dashboards and reports.

Internal farm site as well as site-to-site asset and personnel movement events were recorded. Also, pig, semen, feed, asset and personnel ex-site movement events were recorded among sites within the production system and movements ex-system within the production network.

This integrated system holds promise as a means for the simultaneous recording of various forms of relevant movements, enabling an improved understanding of disease introduction and circulation risks in near real-time.



## HHM-OP-03

### TITLE

DIFFERENCES BETWEEN DUTCH AND BELGIAN PIG FARMERS WITH RESPECT TO THEIR BIOSECURITY LEVEL AND ANTIMICROBIAL USAGE WITHIN THE I-4-1-HEALTH PROJECT

Nele Caekebeke<sup>1</sup>, Angelique van den Hoogen<sup>2</sup>, Moniek Ringenier<sup>1</sup>, Franca J. Jonquiere<sup>2</sup>, Tijs J. Tobias<sup>2</sup>, Merel Postma<sup>1</sup>, Manon Houben<sup>3</sup>, Francisca C. Velkers<sup>2</sup>, Nathalie Sleenckx<sup>4</sup>, J. Arjan Stegeman<sup>2</sup>, Jeroen Dewulf<sup>1</sup>

<sup>1</sup> Faculty of Veterinary Medicine, Ghent University, Belgium

<sup>2</sup> Faculty of Veterinary Medicine, Utrecht University, the Netherlands

<sup>3</sup> GD Animal Health, the Netherlands

<sup>4</sup> Experimental Poultry Centre, Belgium

### CONTENT

#### Objectives

To face the challenge of antimicrobial resistance in food-producing animals, the i-4-1-Health project aims to reduce antimicrobial usage (AMU) through increased infection prevention and antimicrobial stewardship in Belgium and the Netherlands in pig production.

#### Material & methods

In this study 30 sow farms were included (15 per country) with higher than average AMU in the nursery pigs. From each farm the following information was collected: farm characteristics, technical performances, vaccination strategies, diagnostics, management and level of biosecurity, measured by means of the Biocheck.UGent™ ([www.biocheck.ugent.be](http://www.biocheck.ugent.be)). The better biosecurity is established, the higher the score.

#### Results

The average number of sows in the included farms was 500 (range 95-1600). In the Netherlands, a continuous production system was the standard (n=10), whereas in Belgium a 4-week batch production system was the dominant system (n=7). The biosecurity score for the Netherlands (72%) was higher than that of Belgium (53%) on average (non-significant). Especially internal biosecurity was scored substantially higher in Dutch farms, with the highest score achieved in control of vermin and wild birds (93%). Measures concerning purchase of animals scored the highest in Belgium (81%). The antimicrobials used in the year preceding the farm visits differed greatly between both countries. Weaners received antimicrobials during 51% of their time in the nursery in the Belgian farms in comparison to the Netherlands where AMU was substantially lower with 11% on average during the same period.

#### Conclusion

These data indicate that there is room for improvement. Variation between both countries in AMU can be explained by cultural and historical differences. The Netherlands introduced reduction goals for AMU three years earlier than Belgium and additionally guidelines for antimicrobial treatment per indication differ occasionally between countries. With farm-specific interventions we aspire to a reduction in AMU on these farms during the further course of the project.

## HHM-OP-04

### TITLE

MEASURING THE RESPIRATORY PATHOGEN BURDEN IN GROWING PIGS TO ESTIMATE THE IMPACT OF DISEASE

Rachel Stika<sup>1</sup>, Christa Goodell<sup>2</sup>, Erin Lowe<sup>2</sup>, Ed Kluber<sup>3</sup>, David Baum<sup>1</sup>, Jeremy Maurer<sup>3</sup>, Min Zhang<sup>1</sup>, Ran Bi<sup>1</sup>, Chong Wang<sup>1</sup>, Jeffrey Zimmerman<sup>1</sup>, Luis Gimenez-Lirola<sup>1</sup>, Christopher Rademacher<sup>1</sup>, Seth Playter<sup>2</sup>, Ethan Schmaling<sup>2</sup>, Derald Holtkamp<sup>1</sup>

<sup>1</sup> Iowa State University College of Veterinary Medicine

<sup>2</sup> Boehringer Ingelheim Vetmedica, Inc.

<sup>3</sup> Smithfield Farms, LLC

### CONTENT

**Introduction.** Efforts to estimate the production and economic impact of concurrent respiratory pathogens are complicated by the multitude of factors that impact productivity and the inability to attribute losses specifically to disease. The objective of this study was to develop a way to measure and characterize respiratory pathogen burden to better estimate the impact of disease on the productivity of growing pigs.

**Methods.** Eleven biweekly, pen-based, oral fluids (OF) were collected from placement to marketing per lot of pigs. Each sampling had 6 ropes tested per lot by PCR for PRRSV, PCV2, Mhp and IAV-S. Close out data, biweekly mortality, and vaccination history were collected and analyzed. K-means clustering analysis was applied to partition the lots into “K” clusters based on the PCR results. Data was placed into a wean-to-finish economic model to determine net profit.

**Results.** There were 45 lots of pigs from 8 production systems enrolled in this study. Three distinct clusters of pathogen burden were estimated for each pathogen. Pathogen clusters were ranked according to mortality, as high (3), medium (2), and low (1). Differences between IAV-S cluster 1 and IAV-S cluster 3 was 0.12 Kg ADG decrease, 5.2% mortality increase and profit loss of .51/pig placed. Detrimental impact to productivity was greater when pathogens were combined: Lots of pigs in cluster 3 for both IAV-S and PRRSV compared to lots in IAV-S cluster 1 had 0.18 Kg ADG decrease, 13.3% mortality increase and profit loss of .53/pig placed.

**Conclusions.** Pen based, bi-weekly OF collections can be used to identify patterns of respiratory pathogen burden in groups of growing pigs that are associated with production. Measuring pathogen burden to estimate the production and economic impact of respiratory disease in growing pigs will help veterinarians and producers allocate resources better to improve animal health and maximize profits.

## HHM-OP-05

### TITLE

MODELLING THE EFFECT OF RESPIRATORY DISEASE ON PRODUCTION PERFORMANCE OF FARROW-TO-FINISH PIG HERDS

Maria Rodrigues da Costa<sup>1,2,3</sup>, Albert Rovira<sup>4</sup>, Montserrat Torremorell<sup>4</sup>, Rose Fitzgerald<sup>5</sup>, Josep Gasa Gasó<sup>2</sup>, Helen O'Shea<sup>5</sup>, Edgar Garcia Manzanilla<sup>1,3</sup>

<sup>1</sup> *Pig Development Department, Teagasc - Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland*

<sup>2</sup> *Departament de Ciència Animal i dels Aliments, Facultat de Veterinària, Universitat Autònoma de Barcelona, Bellaterra 08193, Barcelona, Spain*

<sup>3</sup> *School of Veterinary Medicine, University College Dublin, Belfield, Dublin 4, Ireland*

<sup>4</sup> *Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, 1365 Gortner Ave., St. Paul, MN 55108, USA*

<sup>5</sup> *Bio-Explore, Department of Biological Sciences, Cork Institute of Technology, Rossa Avenue, Bishopstown, Co. Cork, Ireland*

### CONTENT

The impact of respiratory disease on production performance in pigs is of worldwide relevance but its magnitude has been poorly researched. The objective of this study was to estimate the effect of respiratory disease on production performance in Irish pig herds.

Fifty-six farrow-to-finish pig herds enrolled in the study. Data on pluck (heart, lungs, liver) lesions and blood samples (32 finisher pigs/farm) were collected at slaughter. An average of 162 (range 55-308) plucks per herd were assessed for pleurisy, pneumonia, lung abscesses, pericarditis, and milk spots. Serology was performed for swine influenza virus, porcine reproductive and respiratory syndrome virus (PRRSv), *Mycoplasma hyopneumoniae* and *Actinobacillus pleuropneumoniae* using IDEXX ELISA kits. Vaccination data was obtained through phone calls. The production performance indicators studied included average daily feed intake (ADFI), average daily gain (ADG), feed conversion ratio (FCR), and age at slaughter (AGE). The effect of respiratory disease on performance was modelled using multivariable linear regression. A forward regression approach was used with a 0.10 cut-off for predictors' inclusion in the model. Predictors are presented as coefficient  $\pm$  standard error.

The respiratory disease models explained the variability of ADFI, ADG, FCR, and AGE by 47, 40, 19 and 41%, respectively. The results indicated that PRRSv status and prevalence of cranial pleurisy (CP) were common predictors for poor ADFI, ADG and AGE. ADFI decreased with PRRSv S/P values ( $-45.1 \pm 17.66$  g/day) and CP ( $-183.0 \pm 100.76$  g/day). ADG decreased with PRRSv positivity ( $-31.4 \pm 13.64$  g/day) and CP ( $-200.6 \pm 53.74$  g/day). AGE increased with PRRSv S/P values ( $4.5 \pm 1.78$  days) and CP ( $39.2 \pm 10.15$  days).

Respiratory disease could explain large proportions of the studied performance indicators. PRRSv status was confirmed as an important risk factor for poor herd performance, while CP emerged as another key indicator to be monitored.

## HHM-OP-06

### TITLE

COLOSTRUM INTAKE IN PIGS: ANALYSIS OF THE VARYING FACTORS IN 10 COMMERCIAL FARMS

Philippe LENEVEU<sup>1</sup>, Benoît LAUNAY<sup>2</sup>, Agnès JARDIN<sup>1</sup>, Paul CREAC'H<sup>1</sup>, Verena SCHÜLER<sup>3</sup>, Anne LEHEBEL<sup>2</sup>, Mily LEBLANC-MARIDOR<sup>2</sup>, Catherine BELLOC<sup>2</sup>

<sup>1</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>2</sup> *BIOEPAR, INRA, Oniris, Université Bretagne Loire, 44 307 Nantes, France*

<sup>3</sup> *IDT-Biologika GmbH*

### CONTENT

#### Background and Objectives

Sow prolificacy has been continuously increasing over the years and nevertheless the colostrum production of sows is independent from litter size. As piglets are completely dependent on colostrum intake for energy and maternal immune transfer, the issue of colostrum intake is critical. This study was carried out to assess the current levels of colostrum intake and management practices in French production farms.

#### Material & Methods

Ten production farms were selected regarding pre-weaning mortality (three < 11.5%; three > 15.5%; four in-between). Six litters per farm were studied (17.1 total live born on average) from birth to three weeks of age: 1009 piglets were identified at birth and weighed four times (at birth, end of farrowing, 24h and three weeks after farrowing). For each piglet, a 24h weight gain (WG24) was calculated. Blood samples of 496 piglets at 24h were analyzed for total IgG dosage. Farmers' practices and farrowing environment were also evaluated.

#### Results

Survival of piglets is dependent on their birth weight and on their WG24. Growth during the first hours of life influenced WG24 (mean: 87g in our study), which was correlated to ADG at 3 weeks (mean: 212g). 66% of live born losses occurred within three days. Cross-fostering before six hours after farrowing was associated with a lower immune transfer. Low WG24 (<50g; energy deficit) was more frequent than inadequate immune transfer (IgG < 20mg/ml; 31% vs 10%). A great diversity of farmers' practices has been observed and, despite available equipment, a lack of thermal comfort was noted in several farms.

#### Discussion & Conclusion

The colostrum intake is sufficient for 2/3 of piglets but management around farrowing needs to be improved especially regarding cross-fostering practices and thermal comfort.



# IMMUNOLOGY AND VACCINOLOGY

## **IMM-OP-01**

### **TITLE**

CONTAMINATION LEVEL OF SYRINGES USED TO ADMINISTER PORCINE VACCINES IN BELGIUM AND THE NETHERLANDS

Sjouke Van Poucke<sup>1</sup>, Annelies Michiels<sup>1</sup>, Denise Meijer<sup>1</sup>, Daniel Angelats<sup>2</sup>, Lorena Nodar<sup>2</sup>

<sup>1</sup> *HIPRA Benelux*

<sup>2</sup> *HIPRA*

### **CONTENT**

#### Background and objectives

Vaccines are produced in a sterile way. Under farm conditions however, they are not administered with sterile disposable syringes. It is likely that the contamination level of syringes influences the efficacy of the administered product and causes injection site reactions/abscesses (Langhoff, 2015). Therefore, the aim of this study was to monitor the contamination level of porcine vaccine syringes in Belgium and the Netherlands.

#### Material and methods

In total 61 syringes were investigated. Five ml sterile aqua ad iniectabilia was placed on the syringe and collected in a sterile recipient after flushing. Subsequently, bacterial counts at 37°C and yeast/fungi counts were performed after plating the liquids (CFU/ml). A check list with potential risk factors was also completed.

#### Results

Results were classified as limited, intermediate or heavily contaminated when  $\leq 10$ , 11-10.000 or  $> 10.000$  CFU/ml respectively were detected. Only 25% of the syringes had a low bacterial contamination, 32% was intermediately contaminated and 43% belonged to the most heavily contaminated group. The fungal/yeast contamination from the least to the heaviest level was detected in 51%, 38% and 11% of the syringes respectively.

#### Discussion and conclusion

Syringes used in the field to administer porcine vaccines are contaminated to a variable degree with bacteria as well as yeast and/or fungi. Bacterial counts seemed lower when syringes were rinsed and conserved in the fridge. Having a fixed extension increased the chance on fungi or yeast contamination. Overall, more farms need to be included to identify all risk factors and even more challenging will be to find a practical efficient cleaning protocol.

## **IMM-OP-02**

### **TITLE**

#### **PRRS POST-VACCINAL IMMUNE RESPONSE TO MLV IN PRRS MULTIVACCINATED SOWS**

Christelle FABLET<sup>1</sup>, Patricia RENSON<sup>1,2</sup>, Florent EONO<sup>1</sup>, Sophie MAHE<sup>1</sup>, Eric EVENO<sup>1</sup>, Mireille LE DIMNA<sup>1</sup>, Nicolas ROSE<sup>1</sup>, Olivier BOURRY<sup>1</sup>

<sup>1</sup> Anses, Laboratoire de Ploufragan, France

<sup>2</sup> IFIP, France

### **CONTENT**

#### **Background**

PRRS MLV vaccines are used to prevent reproductive disorders due to PRRSV in sows. Vaccine efficacy was proven only in sows vaccinated once or twice. In vaccinated herds, sows receive multiple vaccine boosters. To date, no data are available on the maintenance of PRRS immunity during these multiple revaccinations.

#### **Objectives**

Describe the post-vaccinal immune response to PRRS MLV in multivaccinated sows

#### **Material & Methods**

The study was conducted in a farrow to finish pig herd without PRRSV circulation in the breeding herd. A sample of 40 sows/gilts was followed after 2 MLV vaccine boosters (Reprocyt® PRRS EU, Boehringer Ingelheim). Blood samples were collected 2, 4, 8, 12 weeks post-vaccination (pv). PRRS vaccine was assessed by RT-PCR, whereas PRRSV specific immune response was monitored by Idexx ELISA, virus neutralization test (neutralizing antibodies) and ELISPOT IFN $\gamma$  (cell-mediated immunity: CMI). A hierarchical clustering was performed to identify clusters of sows according to the immune response following PRRS revaccination.

#### **Results**

After each vaccine booster, we detected: (i) no vaccine genome in blood, (ii) a mild increase of ELISA antibody level 4 weeks pv, and an increase in the number of seronegative sows 12 weeks pv, (ii) a mild rise in CMI overtime, (iii) an increase of neutralizing antibody levels 2 weeks pv followed by a progressive decrease until 12 weeks pv.

Three groups of sows were identified according to their response to vaccine booster: (i) sows with a high level of PRRS humoral immune response, (ii) sows with a high CMI level, (iii) sows with both weak humoral and cellular immune responses.

#### **Conclusion**

Our study shows that, according to the measured parameters, the dynamic of PRRS specific immunity after revaccination differ depending on the animal. Further studies are needed to identify factors influencing the sow responsiveness to vaccine boosters.

## **IMM-OP-03**

### **TITLE**

**EFFECT OF EARLY PRRSV (PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS) VACCINATION ON PIG HEALTH AND PERFORMANCE: THE EARLIER THE BETTER?**

Michele Drigo<sup>1</sup>, Giovanni Franzo<sup>1</sup>, Claudia Maria Tucciarone<sup>1</sup>, Andrea Manfreda<sup>2</sup>, Paola Zanardelli<sup>2</sup>, Fabrizio Solari Basano<sup>3</sup>, Roberto Nazzari<sup>3</sup>

<sup>1</sup> *Department of Animal Medicine, Production and Health (MAPS), University of Padua, Viale dell'Università 16, 35020 Legnaro (PD), Italy*

<sup>2</sup> *Zoetis Italia S.r.l., Via Andrea Doria, 41M, 00192, Roma, Italy*

<sup>3</sup> *3Arcoblu s.r.l., Via Milesi 5, 20133 Milano, Italy*

### **CONTENT**

**Background and Objectives:** Vaccination is a cornerstone of infectious disease control, especially in intensive swine farming systems with high infectious pressure. Despite being very vulnerable, newborn piglets are not commonly vaccinated because most vaccines are susceptible to interference from maternally derived antibodies (MDA). An effective early PRRS vaccination, overcoming MDA interference and administered at the time of other routine procedures would provide significant health and managerial benefits. This study evaluated the safety and efficacy of the vaccine Suvaxyn® PRRS MLV administered at processing in a PRRSv-positive and unstable farm.

**Material and Methods:** 636 piglets from two batches, were physically examined and randomly allocated to vaccination or negative control groups and housed in separate rooms from farrowing to post-weaning. Each pig was injected with either vaccine or saline after individual weighing at 1-4 days of age. Ten randomly selected piglets per group were longitudinally sampled (blood and nasal swab) at days 0, 7, 14, 21, 28, 35, 42, 56 and 70 to evaluate antibody levels, viremia, and nasal shedding of field (WT-PRRSv) and vaccine PRRSv strains. ADWG until day 70 was calculated.

**Results:** No adverse reactions/hyperthermia following vaccination were reported. Both groups had comparable MDA against PRRSv and became infected by WT-PRRSv, although at different time-points. The onset of humoral response was at day 21. Vaccinated animals showed shorter viremia (median 14 vs 28 days), lower maximum number of positive pigs (60% vs 100%) and a significantly reduced duration of WT-PRRSv nasal shedding. Vaccinated pigs showed significantly higher ADWG than controls (30 and 60g/day, respectively in the two batches studied).

**Conclusion:** Early vaccination using Suvaxyn PRRS MLV, in the presence of MDA, was safe and reduced the duration and frequency of PRRS viremia, thereby decreasing the risk of virus spread. The improved control of PRRSv infection resulted in significantly better productivity.



## **IMM-OP-04**

### **TITLE**

HUMORAL AND CELLULAR IMMUNE RESPONSES AFTER ADMINISTRATION OF INNOVATIVE MYCOPLASMA HYOPNEUMONIAE BACTERINS IN PIGS

Anneleen Matthijs<sup>1</sup>, Gaël Auray<sup>2</sup>, Dominiek Maes<sup>1</sup>, Christophe Barnier-Quer<sup>3</sup>, Virginie Jakob<sup>3</sup>, Filip Boyen<sup>1</sup>, Annelies Michiels<sup>4</sup>, Freddy Haesebrouck<sup>1</sup>, Artur Summerfield<sup>2</sup>

<sup>1</sup> Faculty of Veterinary Medicine, Ghent University, Belgium

<sup>2</sup> Institute of Virology and Immunology, Switzerland

<sup>3</sup> Department of Biochemistry, University of Lausanne, Switzerland

<sup>4</sup> Hipra Benelux

### **CONTENT**

Current vaccines against *Mycoplasma hyopneumoniae* only provide partial protection against clinical symptoms and lung lesions. New vaccine formulations that include novel strains of the micro-organism formulated with innovative adjuvants could improve vaccine efficacy. The aim of this experimental study was to screen innovative bacterin formulations based on the virulent and recently isolated *M. hyopneumoniae* field strain F7.2C for their ability to induce potent specific antibody and T-cell responses in pigs.

Seven groups (n=6) were primo- (D0; 39 days old) and booster (D14) vaccinated with five different experimental bacterin formulations, the commercial bacterin Hyogen® (Ceva) as a positive control or PBS as a negative control. The bacterin was either formulated with DPPC:DC-Chol liposomes + C-di-AMP (Lipo\_AMP), DPPC:DC-Chol liposomes + Toll-like receptor (TLR) ligands (CpG ODN, resiquimod and Pam3Cys-SK4) (Lipo\_TLR), PLGA:CTAB microparticles + TLR ligands (PLGA\_TLR), squalene-in-water emulsion + TLR ligands (SWE\_TLR) or DDA liposomes + mincle ligand TDB (Lipo\_DDA:TDB). *Mycoplasma hyopneumoniae*-specific antibody levels in serum by ELISA and the production of cytokines (IFN- $\gamma$ , TNF, IL-17) by T-cells following restimulation with bacterin (intracellular multi-color flow cytometry) allowed us to assess the *M. hyopneumoniae*-specific immune responses induced by each formulation.

On D28, 6/6 pigs from groups Lipo\_AMP, Lipo\_TLR, SWE\_TLR, Lipo\_DDA:TDB and Hyogen, and 2/6 pigs from group PLGA\_TLR were seropositive. Significant specific serum IgG responses were found in groups Lipo\_AMP, SWE\_TLR, Lipo\_DDA:TDB and Hyogen ( $p < 0.05$ ), and were the highest for Lipo\_DDA:TDB and Hyogen. In groups SWE\_TLR, Lipo\_DDA:TDB and Hyogen, three or more animals showed a Th1 response at D14. At D28, groups SWE\_TLR and Lipo\_DDA:TDB showed a significant Th1 response, while a significant IL-17 response was seen in group PLGA\_TLR ( $p < 0.05$ ).

Considering their potency to induce Th1 or Th17 responses, formulations PLGA\_TLR, SWE\_TLR and lipo\_DDA:TDB seem to be promising *M. hyopneumoniae* vaccine candidates and were selected for future testing in a vaccination-challenge study.

## **IMM-OP-05**

### **TITLE**

COLOSTRUM IMMUNE TRANSFER EVALUATION IN PIGS BY USING FLU HI TEST AT 3 WEEKS OF AGE

Philippe LENEVEU<sup>1</sup>, Benoît LAUNAY<sup>2</sup>, Agnès JARDIN<sup>1</sup>, Paul CREAC'H<sup>1</sup>, Verena SCHÜLER<sup>3</sup>, Stefan PESCH<sup>3</sup>, Mily LEBLANC-MARIDOR<sup>2</sup>, Catherine BELLOC<sup>2</sup>

<sup>1</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>2</sup> *BIOEPAR, INRA, Oniris, Université Bretagne Loire, 44 307 Nantes, France*

<sup>3</sup> *IDT Biologika GmbH*

### **CONTENT**

#### Background and Objectives

Immune transfer via the colostrum in the pig can be investigated using a total IgG test in early life. However, the effectiveness of the different types of IgG for the immune response remains unknown. This is the reasoning behind looking at antibodies specific for one particular disease. The purpose of this study is to evaluate the maternal transfer of Influenza specific antibodies.

#### Material & Methods

In 10 farms, piglets were blood sampled at one day of life (n=496) for total IgG dosage (RID) and at 3 weeks of life (n=495) for Hemagglutination Inhibition (HI) test for six different Influenza serotypes. The colostrum of 59 corresponding sows was also sampled and the same HI test was performed on them. All farms were either supposed positive for an infection with Influenza and/or were vaccinating the sows with a trivalent Influenza vaccine. HI test results are presented in 2-fold dilution (1=20 in HI test; 10 = 10240).

#### Results

First results regarding H1avN1 show that all but one colostrum sample were positive. Titers varied from three to 10; those of the piglets from zero to seven. HI titers of the piglets were not linked with total IgG level at day one. At day one, 10% of piglets have less than 20 mg/ml of total IgG and around 40% of these die before three weeks. At three weeks, 18% of piglets had a zero H1avN1 titer. The main criterion for the variation in the piglets' titer at 3 weeks was the colostrum titer of the sow. Piglets that were cross-fostered in the first 24 hours had lower values.

#### Discussion & Conclusion

These preliminary results reveal interesting details about the transfer of immunoglobulins from sows to piglets regarding six Influenza subtypes and its variation factors.

## **IMM-OP-06**

### **TITLE**

**ASSESSMENT OF THE REPLICATION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME MODIFIED LIVE VIRUS ATTENUATED VACCINES IN PORCINE ALVEOLAR MACROPHAGES**

Monica Balasch<sup>1</sup>, Lucas Taylor<sup>1</sup>, Jay Calvert<sup>1</sup>

<sup>1</sup> *Zoetis*

### **CONTENT**

**Introduction**The method of attenuation influences the properties of modified live virus (MLV) vaccines. PRRSV is typically attenuated on simian cells, but a new vaccine, Suvaxyn PRRS MLV (vaccine S), was attenuated on a hamster-origin engineered cell line expressing the porcine CD163 receptor. The ability of this vaccine and four other European PRRSV vaccines to infect porcine alveolar macrophages (PAMs) was compared in vitro and in vivo. **Materials and methods**For in vitro comparison vaccines were serially diluted and inoculated in PAMs. At different times a direct immunofluorescence assay was conducted to detect virus replication. For in vivo comparison forty-five 3-week-old PRRSV naïve pigs were divided into five groups and vaccinated with one of the five vaccines. Weekly, pigs were bled and three per group were euthanized for PAM collection by bronchoalveolar lavage (BAL). Virus in sera was quantified by virus isolation in PAMs and RT-qPCR, and in BAL samples by RT-qPCR. **Results**Vaccine viruses differed in their ability to infect PAMs in vitro. Virus from vaccine S grew readily and that from vaccines B and D at a reduced level. Virus in vaccines A and C had lost tropism for PAMs. In vivo, vaccine viruses were present in serum of almost all pigs at all timepoints. In vaccines S and B groups virus from serum could be re-isolated from PAMs but for A, C and D re-isolation was near or below the limit of detection. Viruses from vaccines S and B were consistently detected in BAL samples as was D at Days 14 and 21, but not Day 7. **Conclusions**Ability to replicate in PAMs post-vaccination could have implications for vaccine virus multiplication and immune system stimulation. A vaccine attenuated in a cell line expressing the porcine CD163 receptor showed more efficient replication than other PRRS MLV vaccine viruses tested.



# MISCELLANEOUS

## **MIS-OP-01**

### **TITLE**

DENTAL AND PERIODONTAL DISEASE IN SOWS EUTHANISED OR FOUND DEAD ON CONVENTIONAL FINNISH FARMS

Camilla Munsterhjelm<sup>1</sup>, Eve Ala-Kurikka<sup>1</sup>, Paula Bergman<sup>1</sup>, Taina Laine<sup>2</sup>, Henna Pekkarinen<sup>2</sup>, Olli Peltoniemi<sup>1</sup>, Anna Valros<sup>1</sup>, Mari Heinonen<sup>1</sup>

<sup>1</sup> *University of Helsinki*

<sup>2</sup> *Finnish Food Safety Authority EVIRA*

### **CONTENT**

#### Background and Objectives

The impact of dental and periodontal disease (DPD) on health and welfare of pigs is poorly understood. DPD may cause significant and long-lasting pain and infectious disease in other parts of the body. This study describes DPD in involuntarily culled sows.

#### Material & Methods

We investigated DPD as a part of standardized post-mortem examinations in 65 sows euthanised or found dead on 15 commercial Finnish indoor farms. Parity range was 0-10. DPD was defined as at least moderate 1) Periodontal disease (PD, gingivitis, gingival retraction, periodontitis, loose or missing teeth), 2) Tooth erosion (TE), 3) Dental calculus (DC) or Tooth fracture (TF). Associations between DPD and (categorised) parity, and body condition score (BCS), were investigated using the chi-squared test and the T-test, respectively.

#### Results

74% (n=48) of the animals had at least one type of DPD. Findings were often multiple. TE was present in 71% (n=46) and PD in 26% (n=17) of the sows. The prevalence of TF was 25%, including five sows with one, and 11 with multiple fractured teeth. DC was present in 11% (n=7) of the sows. Animals with TE were significantly thinner than animals without TE (BCS  $3.0 \pm 0.61$  [average  $\pm$  st.dev.] vs  $2.5 \pm 0.98$ ,  $p=0.022$ ,  $n=18/45$ , respectively). Age tended to affect TE ( $p=0.053$ ). According to the raw data young animals (parity 0-1) appeared less affected by DPD in general. Tooth wear and fractures showed numerical increases with parity.

#### Discussion & Conclusion

The study animals were unhealthy, leaving both the generalizability of our results and the causality of the significant BCS effect undisclosed. The fact that none of the animals were reported to have any symptoms indicative of DPD, despite significant pathology, raises concerns about dental and periodontal health in the general sow population.

## MIS-OP-02

### TITLE

NETWORK ANALYSIS OF PIGS MOVEMENTS IN ARGENTINA: BASIC REPRODUCTION RATE IN RELATION WITH OF FARMS BIOSECURITY

Laura Valeria Alarcón<sup>1,2</sup>, Pablo Ariel Cipriotti<sup>3</sup>, Mariela Monterubbianesi<sup>4</sup>, Carlos Perfumo<sup>5</sup>, Enric Mateu<sup>6</sup>, Alberto Allepuz<sup>6</sup>

<sup>1</sup> Department of Swine Medicine, La Plata National University

<sup>2</sup> Universitat Autònoma de Barcelona

<sup>3</sup> Department of Quantitative Methods and Information Systems, School of Agriculture, University of Buenos Aires

<sup>4</sup> National Food Safety Service

<sup>5</sup> Laboratory of Special Pathology, La Plata National University

<sup>6</sup> Centre de Recerca en Sanitat Animal, Universitat Autònoma de Barcelona

### CONTENT

The spread of an infectious disease within the livestock population is highly determined by the network of contacts between farms. Usually, a small fraction of the population contributes disproportionately to spread the infection and therefore targeted interventions aimed at those farms are highly effective. The aim of the present study was to identify the pig farms that would potentially have the highest contribution to the dissemination of infectious diseases in Argentina by transporting breeding pigs. The network was built with the movements originated in farms authorized for the sale of breeding animals and with destination to commercial farms during 2017. The farms were the nodes of the network and the movements of animals among them, the edges. We calculated farms-level network properties (in- and out-degree, and betweenness). Those values were used to calculate the basic reproductive rate (R0) according to Woordhouse et al. (2005). To examine the role of each farm in the potential transmission they were removed one by one, starting by those with the highest degree and/or betweenness; the R0 was calculated for each reduced network and divided by the R0 of the full network according to Marquetoux et al., (2016). The biosecurity score was calculated according to Alarcón et al. (2018) for all the farms. Results evidenced that just 2.7% of the nodes (i.e. 39 farms) accounted for most of the potential spread of the disease as the removal of those nodes resulted in a reduction of 80% of the R0 ratio. The biosecurity score of those “super-spreaders” was similar to the other farms (41% vs. 37%). The results of this study show that a targeted program for increasing the biosecurity of those farms and a continuous surveillance of their health status might be a cost/effective approach to prevent dissemination of diseases at country level.

## **MIS-OP-03**

### **TITLE**

ECONOMIC IMPACT OF SWIAV OUTBREAK IN A 1000 SOW HERD

EVELYNE GAILLARD<sup>1</sup>, PAUL CREACH<sup>2</sup>, Philippe LENEVEU<sup>2</sup>, SILKE WACHECK<sup>3</sup>, Agnès JARDIN<sup>2</sup>

<sup>1</sup> *Cabinet vétérinaire de Pontrieux – Vetarmor, Rue de Briantel, 22 260 Ploëzal, France*

<sup>2</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>3</sup> *IDT Biologika, Am Pharmapark, 06861 Dessau-Roßlau, Germany*

### **CONTENT**

#### Background and Objectives

Swine influenza (swIAV) is a highly contagious respiratory infection with substantial economic consequences due to medication costs, pigs' growth retardation and decrease of reproductive performance in affected sow herds.

The objective of this study was to evaluate the economic impact of a swine influenza outbreak in a breeding herd in France.

#### Material & Methods

From end of December 2017 to end of January 2018, a swIAV like infection occurred in a 1000 sow breeding herd in a low pig density area of Brittany. This herd was vaccinated with an inactivated trivalent vaccine (Respiorc® FLU3) that provides clinical protection against H1N1, H3N2 and H1N2 swIAV but not against pdmH1N1(2009) swIAV.

Gilts and pregnant sows of first and second parity showed acute respiratory problems, fever, loss of appetite and lethargy. Subsequently they received individual and collective medical treatments.

Influenza A virus was detected by M-gene RT-qPCR on supernatants from two dead sow's lungs. Molecular subtyping on corresponding ARN extracts revealed the involvement of a pdmH1N1(2009) swIAV : N1pdm glycoprotein encoding-gene (associated with H1av and N1av encoding-genes) was identified.

#### Results

The technical breakdown due to the Influenza outbreak was as follows (n=number of considered batches): reduction of fertility rate from 90.7% (n=22) to 86.8% (n=2), increase of the life piglets losses (%) from 10.6% (n=14) to 11.9% (n=2), 4 dead gilts and sows, 6 abortions. This led to a reduction of farm productivity and represented a shortfall of 8,445€. As medical treatments cost was 10,383€, the total economic impact of this Influenza outbreak was 18.80€ per sow.

#### Discussion & Conclusion

This study demonstrates the high economic impact of an influenza outbreak in a sow herd. The involved pdmH1N1(2009) swIAV was probably introduced in the farm by staff members (some of them reported flu infection in their families).

## **MIS-OP-04**

### **TITLE**

ACTIVE SURVEILLANCE OF PRRSV IN BREEDING, NURSERY AND FINISHING FARMS FROM CARCASSES

Jordi baliellas<sup>1</sup>, Elena Novell<sup>1</sup>, Vicens Tarancon<sup>1</sup>, Carles Vilalta<sup>2</sup>, Lorenzo Fraile<sup>3</sup>

<sup>1</sup> *Grup de Sanejament Porci, Lleida, Spain*

<sup>2</sup> *Swine Health Monitoring Project, University of Minnesota, USA*

<sup>3</sup> *University of Lleida, Lleida, Spain*

### **CONTENT**

#### Introduction

The use of processing fluids is a sensitive tool to monitorize PRRSV status in a cost-effective way. The use of removed parts of carcasses could be used as an aggregated sample to evaluate the presence of PRRSV. The main objective of this study is to evaluate the concordance of this new PRRSV diagnostic procedure versus oral fluid sampling and serum for active surveillance in swine farms.

#### Material & Methods

Three PRRSV negative and twenty PRRSV positive farms were included. Samples of dead pigs (in the nursery and finisher) and stillborn pigs (in the breeding herd) were collected daily and placed in a Ziploc bag in the freezer grouping the samples by farrowing batches, week of nursery phase and monthly for finishers, respectively. Samples were homogenized in a laboratory paddle blender (Stomacher®). The fluid was extracted and a PRRSV RT-PCR was carried out according to the manufacturer. All positive samples will be sequenced using Sanger technology for ORF5. The concordance between diagnostic procedures were carried out using kappa analysis.

#### Results

Four farms have been tested and the rest will be available at the meeting. All the samples coming from PRRSV negative farms were negative by RT-PCR. However, PRRSV was detected in 100% of the samples coming from PRRSV positive farms. The Kappa value was one, showing an excellent concordance between the detection of PRRSV in carcasses of any pig farm versus oral fluids and serum sampling. Finally, it was possible to sequence PRRSV in all positive samples from carcasses.

#### Discussion & Conclusion

Active surveillance of PRRSV from carcasses in breeding, nursery and finishing farms is a diagnostic procedure that is interchangeable with oral fluid and serum sampling. It allows monitoring PRRSV status in a cost-effective way. Moreover, it is possible to sequence the PRRSV strain for epidemiological molecular studies.





# REPRODUCTION

## REP-OP-01

### TITLE

EFFECT OF IGF-1 LEVEL AT WEANING ON SUBSEQUENT LUTEAL DEVELOPMENT AND PROGESTERONE PRODUCTION IN PRIMIPAROUS SOWS

Taehee Han<sup>1</sup>, Stefan Björkman<sup>1</sup>, Nicoline Soede<sup>2</sup>, Claudio Oliviero<sup>1</sup>, Olli Peltoniemi<sup>1</sup>

<sup>1</sup> *University of Helsinki*

<sup>2</sup> *Wageningen University & Research*

### CONTENT

Insulin-like growth factor-1 (IGF-1) is known to be related to follicle and oocyte development in sows. We hypothesized that a higher IGF-1 level at weaning may derive better luteal development during early pregnancy in primiparous sows. We retrospectively assigned 56 primiparous sows into high- (HI,  $> 255$  ng/ml,  $n = 14$ ), medium- (MI,  $150 - 255$  ng/ml,  $n = 28$ ) or low- (LI,  $< 150$  ng/ml,  $n = 14$ ) group based on their plasma IGF-1 level at weaning. Follicle diameter was measured at weaning, three days after and one day after estrus with transrectal ultrasonography. Blood sampling was performed on the same day as ultrasonography. At 21 day after insemination, corpus luteum (CL) size and plasma progesterone level were measured. MIXED and GLIMMIX models (SAS 9.4) were used for analyses. The IGF-1 level at three days after weaning and one day after estrus remained significantly different between the three groups. Follicle diameter at weaning of HI sows was larger than that of LI sows ( $p = 0.02$ ) but similar with that MI sows ( $3.5 \pm 0.1$  vs.  $3.6 \pm 0.1$  vs.  $3.8 \pm 0.1$  mm, for LI, MI and HI, respectively). However, further follicle development and pregnancy rate (93.3 %) were not different between the groups. In pregnant sows, LI sows tended to have larger CL at day 21 ( $p = 0.08$ ) compared to MI and HI sows ( $10.1 \pm 0.2$  vs.  $9.9 \pm 0.1$  vs.  $9.4 \pm 0.2$  mm, for LI, MI and HI, respectively). In addition, progesterone level tended to be positively correlated with CL diameter ( $r = 3.0$  (ng/ml)/mm,  $p = 0.09$ ). Thus, although post-weaning IGF-1 was not related with follicle development at ovulation, it was negatively related with subsequent CL development. Subsequent studies focusing on the relationship between post-weaning IGF-1 level and luteinizing hormone will be needed.

## REP-OP-02

### TITLE

EVOLUTION OF REPRODUCTIVE PERFORMANCE IN SPANISH FARMS IN THE LAST 10 YEARS AND PREDICTION FOR 2020. IMPACT OF FARMS' SIZE

M Angel de Andres<sup>1</sup>, Armando Occon<sup>2</sup>, Celia Santiago<sup>2</sup>, Inmaculada Diaz<sup>2</sup>, Carlos Pineiro<sup>3</sup>, Maria Aparicio<sup>2</sup>

<sup>1</sup> *Pig CHAMP Pro Europa SL*

<sup>2</sup> *Pig Champ Pro Europa SL*

<sup>3</sup> *Pig Champ Pro Europa S.L.*

### CONTENT

#### Background and Objectives

The objective of this study was to describe the evolution during the last 10 years for the reproductive KPIs including total born (TB), born alive (BA), still born (SB), mummifies (MM), weaning to first service interval (WFSI) and preweaning mortality (PWM) as well predict performance for 2020 based on this trend, assessing the impact of farm size.

#### Materials and methods

Data from 260 farms and a total of 255,386 sows were used obtained from the PigCHAMP Pro Europa SL database in the interval 2009-2018. Time series analysis was performed by R software and using Autoregressive Integrated Moving Average (ARIMA) model for forecasting . Data were distributed in three groups depending on the number of sows: G1 (farms>1500 sows), G2 (farms<500 sows) and G3 (all farms).

#### Results

In G3 TB increased from 12.4 to 15.3, BA from 11.4 to 13.7, SB from 0.9 to 1.2, MM from 1.0 to 2.3% and PWM from 11.5 to 13.2%. WFSI decreased from 6.7 to 5.8 d. The worst values were registered in winter for SB, summer for MM and autumn for WFSI. TB, BA and PWM were better in spring. TB and BA showed no differences between G1 and G2 until 2014 but since then, G1 showed a significant increase ( $P<0.05$ ) of 2.2 and 1.4 piglets per farrowing respectively. Percentage of SB and MM kept stable in G2 while G1 showed an increase of MM up to 2.25% ( $P<0.05$ ). For 2020, ARIMA model shows 85.2 FR, 88.3 AFR and 5.3 d WFSI.

#### Discussion & Conclusion

Reproductive performance of Spanish farms improved during the last 10 y. Big and small farms showed relevant differences for the main KPIs during that period.

## **REP-OP-03**

### **TITLE**

USE OF A PROGESTERONE ON-FARM KIT DETECTION (OVU-CHECK®) TO IMPROVE GILTS MANAGEMENT IN A COMMERCIAL FARM

Eva Ramells<sup>1</sup>, Rut Menjón<sup>2</sup>, Marcial Marcos<sup>2</sup>, Jiménez Marta<sup>2</sup>

<sup>1</sup> *Inga Food*

<sup>2</sup> *MSD Animal Health*

### **CONTENT**

#### Background

A correct gilt estrus stimulation and detection is key for the optimal reproductive performance of a farm. Gilts not showing estrus should be treated specifically, and to do it properly is necessary to know if animals are prepuberal or if there is a problem in heat detection. Levels of progesterone are variable depending on the physiological status and can be used to determine the phase of the reproductive cycle. The objective of this study was to demonstrate the efficacy of an on-farm commercial kit (Ovu-check®) to determine the level of progesterone in gilts, to determine if they have cycled or not.

#### Material & Methods

The study was conducted in 48 gilts located in 3 farms. All were coming from the same multiplier unit and introduced in different breeding farms at 6 months of age. From 7 months onwards, all animals were stimulated with direct contact with boars and heat detection was done once/day. One month later none of the study gilts had shown estrus. Individual blood samples were collected, and its level of progesterone was evaluated with Ovu-check®, an immunoenzymatic ELISA that determines progesterone level via colorimetric changes.

#### Results

Only 20,8% of the gilts (10/48) had high level of progesterone in serum samples (>5ng/ml), indicating the presence of active corpora lutea. The most probable situation was that these animals were in luteal phase, and therefore had cycled before, although heat hadn't been detected by the farmer. On contrary, 79,2% of the gilts shown very low levels of progesterone (<2,5 ng/ml), indicating absence of active corpora lutea, being the most probable situation that these animals had never cycled.

#### Discussion & Conclusion

Ovu-check® is a useful tool that can give information about the cycle status in an easy and quick way, allowing to take the most appropriate decision to improve reproductive performance.

## **REP-OP-04**

### **TITLE**

**DIFFERENCES IN RETURN TO ESTRUS RATE AND NUMBER OF TOTAL BORN PIGLETS CAUSED BY VARIATIONS IN PEOPLES' ARTIFICIAL INSEMINATION TECHNIQUE**

Alexander Grahofer<sup>1</sup>, Sara Joller<sup>1</sup>, Heiko Nathues<sup>1</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

### **CONTENT**

#### **Background**

Artificial insemination technology is widely used in pig breeding herds. Few information is available about the impact of the variation in peoples' artificial insemination technique on the reproductive performance in sows.

#### **Material & Methods**

A herd with 240 sows suffered from a high variation in the return-to-estrus rate (RET) in the different batches (0-100 %). In the last year, the RTE of sows was on average 16.8 %. A herd examination was conducted. In addition, the insemination management of 22 sows was analysed by video-recording the procedure.

#### **Results**

The sows in the breeding unit were in good general health condition and body condition scores were between 2.5 and 3.5. During the insemination one teaser boar was present in front of a group of 22 sows and the insemination procedure for every single sow lasted approx. 15 seconds. No manual stimulation was performed except dry cleaning of the vulva. In the course of the analysis, three sows showed vocalization while inserting the insemination catheter. During insemination, three sows showed defecation and five sows urinated.

Retrospectively, the influence of the inseminator on RTE in eight batches was analysed. The farm worker observed during the analysis achieved a RTE of 22.8 %, while the owner had a significant lower RTE of 7.1 %. In addition, the number of live born piglets per litter (farm worker: 14.0; owner: 13.1) were compared between the two inseminator, revealing no significant difference.

#### **Discussion & Conclusion**

In this case, success of insemination was significantly different between two inseminators. Interestingly, amongst pregnant sows there was no significant variation in the reproductive performance eventually associated with the inseminators. Therefore, it can be concluded that the optimal timing for insemination seems to be more crucial for a pregnancy than for number of born piglets.

## **REP-OP-05**

### **TITLE**

TRANSABDOMINAL ULTRASOUND EXAMINATION OF SOWS TO IMPROVE THE REPRODUCTION – A FIELD STUDY

István Makkai<sup>1</sup>, Péter Máté<sup>1</sup>, László Búza<sup>1,2,3,4</sup>, László Ózsvári<sup>4</sup>

<sup>1</sup> MSD AH CERG Swine Business Unit - HUNGARY

<sup>2</sup> Szent István University Doctorial School

<sup>3</sup> Hungarian Pig Health Management Association

<sup>4</sup> University of Veterinary Medicine, Budapest

### **CONTENT**

#### Introduction

The number of weaned piglets/sow/year is an important economic parameter. A lot of farms work with hyper prolific genetics. In many cases in the same batch we can find different genetic lines. The reproductive behavior (such as weaning-to-estrus interval, length of heat, ovulation time of these lines) maybe different.

#### Material and Methods

A Hungarian large-scale farm (1800 sows) uses a one-week-batch management: weaning on every Thursday, and heat detection and AI starts on Monday afternoon. The owner asked some support from MSD AH because of the increasing number of anestrus, inactive ovaries and „not-in-pig” sows. After data analysis, farm audit, slaughterhouse examinations of genital tract, laboratory investigation and on-farm progesterone tests we realized that there is no anestrus on the farm. After weaning we divided the sows into 3 groups, the old genetic line (12 sows, A), the new (17 sows, B) and the mix, F1 (18 sows, C). We started to checking the ovaries on Sunday morning by transabdominal ultrasound using a 4.5 MHz convex probe. The ovaries were checked every 4 hours until the ovulation.

#### Results

A decisive difference was found between the reproductive behavior of the diverse genetic lines. 76% of the sows from B ovulated on Monday morning (most of them already on Sunday afternoon) while A only 10% ovulated on Monday morning. By Tuesday morning, 100% of the sows from B ovulated while only 66% from the A had. The C was in the middle between A and B. The B had a shorter weaning to estrus interval.

#### Discussion and Conclusions

The traditional heat detection method worked for the A, but not for the B. Some changes are needed in the protocol and in the timing. Ultrasound check of the ovaries was a very useful, non-invasive on-farm tool to support the effectiveness of reproduction.

## REP-OP-06

### TITLE

PRE-FARROWING SUPPLEMENT THROUGH DRINKING WATER REDUCES STILLBIRTH

Pieter Langendijk<sup>1</sup>, Jac Bergman<sup>1</sup>, Marleen Fleuren<sup>1</sup>

<sup>1</sup> *Trouw Nutrition R&D*

### CONTENT

**Background and Objectives.** The majority of stillborn piglets are potentially viable, but die due to asphyxia during birth. Data from our research centre have shown that oxygenation of piglets deteriorates and stillbirth rate increases with duration of parturition.

**Material and Methods.** In this study, multiparous sows (Hendrix Genetics, Netherlands, n=56) were allocated to receive either normal water, or to receive a supplement dosed through their drinking water from 5 days before the average due date, until they had finished farrowing. The supplement (patent pending) was designed to increase oxygen levels in the piglets at birth. Assistance during farrowing was restricted to a minimum (7% of sows). Sows were monitored continuously during farrowing, and piglets were weighed immediately at birth, and 24 h later to estimate colostrum intake. Total born was 15.7±0.6. Number of born alive was analysed using total born as a covariate, to provide comparison between treatments as if total born was equal.

**Results.** Water intake before farrowing (10 to 15 L/d) was not affected by the supplement. Number of piglets born alive was increased from 14.1±0.3 to 14.7±0.3 (P<0.05). Intake of colostrum was increased in piglets from sows that received the supplement (P<0.05). Numbers of piglets surviving after equalising the litters was increased by 0.4 for sows that received the supplement (not significant).

**Discussion and Conclusions.** A pre-farrowing supplement designed to overcome the underlying causes of stillbirth, increased the number of piglets born alive by 0.6 piglets in unassisted farrowings. Moreover, colostrum intake was increased, suggesting piglets were more vigorous, ensuring that extra piglets born alive survived to weaning.



# RESIDENT SESSION

ORAL PRESENTATIONS



## **RES-OP-01**

### **TITLE**

**THE SUCCESSFUL ERADICATION OF MYCOPLASMA HYOPNEUMONIAE FROM NORWEGIAN PIG HERDS – 10 YEARS LATER**

Stine Margrethe Gulliksen<sup>1,2</sup>, Bjørn Lium<sup>3</sup>, Tore Framstad<sup>4</sup>, Anne Jørgensen<sup>5</sup>, Audun Skomsøy<sup>6</sup>, Mona Gjestvang<sup>3</sup>, Oddbjørn Kjølsvik<sup>7</sup>, Carl Andreas Grøntvedt<sup>8</sup>

<sup>1</sup> *Animalia*

<sup>2</sup> *Norwegian Pig Health Service*

<sup>3</sup> *Prev. Norwegian Pig health Service*

<sup>4</sup> *Norwegian University of Life Sciences*

<sup>5</sup> *Prev. Norwegian Pig Health Service*

<sup>6</sup> *Nortura*

<sup>7</sup> *Prev. Nortura*

<sup>8</sup> *The Norwegian Veterinary Institute*

### **CONTENT**

Background and objectives

*Mycoplasma hyopneumoniae* (Mhyo) is the causative agent of enzootic pneumonia which causes considerable economical losses, in addition to adversely affecting animal health and welfare. *M. hyopneumoniae* was previously common in the Norwegian pig population. In 1994, The board of The Norwegian Pig Health Service decided on conducting a national eradication program for Mhyo.

The present study describes the implementation of the national eradication program, the subsequent surveillance and provides documentation on the current freedom of Mhyo in the Norwegian pig population.

Materials and methods

The eradication program aimed for population wide freedom from Mhyo, based on serological surveillance. A partial depopulation program was initiated in all Mhyo positive farrow-to-feed and farrow-to-finish herds. Total depopulation was performed in all positive finishing farms. All units were cleaned and disinfected, and restocked with pigs from herds documented free from Mhyo.

Results

From 1994 to 2009, a total of 138 635 pigs in 3215 herds were serologically tested for the presence of antibodies against Mhyo. Of these, 5538 (4%) individual samples and 398 (12.4%) of the herds were defined as positive.

Fifteen years later, in 2009, the Norwegian pig population was declared free from Mhyo, and has been since then.

From 2009 through 2017, a total of 35 202 individual blood samples have been analyzed for the presence of antibodies against Mhyo; all tested negative.

Discussion and Conclusion

Eradication of Mhyo infections has resulted in significant savings for pig farmers, and improved health and welfare of the Norwegian pig population. The success of the strategy is based on numerous factors, such as negligible import of live pigs, a well-structured commercial pig population, relatively small herds, low herd density in most of the population, and finally, the loyalty and significant effort of farmers, slaughterhouse employees and veterinarians.

## **RES-OP-02**

### **TITLE**

**UNDER THE SHADOW OF AFRICAN SWINE FEVER: A COLLECTION OF CASES OF PIGLETS WITH HAEMORRHAGES**

Lucía Dieste-Pérez<sup>1</sup>, Linda Peeters<sup>1</sup>, Theo Geudeke<sup>1</sup>, Karin Junker<sup>1</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

### **CONTENT**

In the last years an increase in cases suspicious of ASF/CSF has been observed in piglets submitted for necropsy at GD Animal Health. Primarily due to extensive haemorrhages, some of these cases were notified to the Dutch authority (NVWA) with subsequent inconveniences for the farmer, veterinarian and authorities. Understanding the causes of these haemorrhages would help to improve the approach in similar cases. For this, a retrospective collection of cases involving piglets with haemorrhages submitted for necropsy at GD Animal Health was performed. Cases from 2014-2018 were included based on keywords “haemorrhagic diathesis” (HD) or “thrombocytopenia purpura” (TP). Adult pigs were excluded. In this period 35 animals (17 submissions) were submitted. The majority of the submissions involved piglets around 2 weeks old. Sudden death, in many cases accompanied by extensive haemorrhages and/or bloody diarrhoea, was the most common clinical sign. Common macroscopic findings were extensive haemorrhages and petechiae in several tissues and organs, marbled lymph nodes and bloody intestinal contents. Extensive haemorrhages and/or platelet disorder (by exclusion) without a known cause were the diagnosis in 63% of the piglets. From the rest, a pathogen was isolated and the diagnosis was septicaemia due to infection with *Streptococcus dysgalactiae* ssp. *equisimilis*, *E. coli*, *S. suis*, *S. aureus*, *S. hyicus* or a combination of them, often together with HD. Bleeding disorders may be caused by damage to the blood vessels by e.g. sepsis, platelet deficiency or dysfunction, derangement of coagulation or a combination of these. In most of the piglets included in this review, no pathogens were identified. Also, when pathogens were isolated, it is not clear if these pathogens were the primary cause of the haemorrhages. These results reflect the need of further diagnostic protocols to find the primary cause of haemorrhages and eventually to ease the approach in those cases.

## RES-OP-03

### TITLE

#### IMPACT OF WASHING AND DISINFECTION OF MAMMARY GLANDS ON SOW AND PIGLET HEALTH AND PERFORMANCE

Alexandra Schoos<sup>1</sup>, Annelies Michiels<sup>1</sup>, Laura Stroobants<sup>1</sup>, Charlotte Brossé<sup>2</sup>, Jeroen Dewulf<sup>3</sup>, Dominiek Maes<sup>1</sup>

<sup>1</sup> Ghent University, Faculty of Veterinary medicine, Porcine Health Management Unit

<sup>2</sup> Animal Health Care Flanders (DGZ), Lier, Belgium

<sup>3</sup> Ghent University, Faculty of Veterinary medicine, Veterinary Epidemiology Unit

### CONTENT

Cleaning pregnant sows before entering the farrowing stable is commonly practiced for biosecurity reasons. However, the usefulness of it is debated as it may only decrease but not eliminate pathogens and it could even favor spread and survival of pathogens. The present study aimed to investigate whether disinfecting the mammary glands of sows after they have been washed has a beneficial effect on the health and performance of the sow and the offspring.

Rodac plates were taken in advance to evaluate bacterial contamination of the farrowing crates. 45 sows were randomly allocated in three groups: no washing and disinfection of the mammary gland, only washing with warm water and washing and disinfection with a iodine solution. Clinical and performance parameters of sows (temperature, backfat, appetite, weaned piglets/sow, medication) and piglets (weight, dead piglets/litter, diarrhea, medication) were recorded until weaning.

General bacterial contamination of farrowing crates was the same for all groups (41-400 colonies/plate). Swabs taken of the teats right after treatment showed no difference of number of bacteria between the groups (>100000 CFU; Enterobacteriaceae, Streptococcus sp., Staphylococcus sp.). Rectal temperature of sows around farrowing, appetite and medication use in the sows were not different between groups. Moreover, no difference could be observed in piglet mortality, average daily weight gain or piglet health (diarrhea, medication) between groups. Washing or washing and disinfection had no significant effect on the number of weaned piglets per sow.

Under the present farm conditions, neither washing nor washing followed by disinfection of the mammary glands provided an additional benefit on sow and/or piglet health and performance during lactation period compared to non-washed sows. Further research is needed to confirm the present results and to investigate whether beneficial effects can be obtained in herds with lower hygiene standards and more health problems in the farrowing unit.

## RES-OP-04

### TITLE

EDEMA DISEASE VACCINATION AS A TOOL FOR REDUCING ANTIBIOTIC USE AFTER WEANING IN A SHIGATOXIN 2E POSITIVE FARM

Susana Mesonero-Escuredo<sup>1</sup>, Joaquín Morales<sup>2</sup>, Carlos Casanovas<sup>1</sup>, Sergio Barrabés<sup>1</sup>, Joaquim Segalés<sup>3,4</sup>

<sup>1</sup> IDT Biologika SL, Gran Vía Carles III, 84, 3º, 08028 Barcelona, Spain.

<sup>2</sup> PigCHAMP Pro Europa, Calle Santa Catalina, 10, 40003 Segovia, Spain.

<sup>3</sup> Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.

<sup>4</sup> UAB, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.

### CONTENT

**Introduction** The objective of this study was to explore the use of a commercial vaccine against edema disease (ED) in nursery piglets from a farm with history of ED as a tool to eliminate the use of colistin. **Material and Methods** A total of 1824 nursery pigs were monitored. Group A (n=480) received feed supplemented with zinc oxide, colistin and amoxicillin. The following batch, Group B (n=1344), received feed with zinc oxide and amoxicillin, and was divided into 2 sub-groups (n=672 each): vaccinated (group V, Ecoporc SHIGA© administered at 7 days of age) and non-vaccinated (group NV). All pen-group weights were recorded on days of life 28 (weaning), 42 and 63. Average daily gain (ADG), average daily feed intake (ADFI) and feed conversion ratio (FCR) were calculated. Mortality rate (MR) during the study was recorded. Growth performance was analyzed by ANOVA (SAS, v9.0). Means were separated by the test of Tukey-Kramer. MR was analyzed as binary variable, using chi-square test. **Results** Group A: ADG and ADFI for the 28-63 and 42-63 day-periods, and FCR for the whole study period were 294.4/390.7 g/d, 413.6/554.6 g/d and 1.408, respectively. MR was 0.42% in these batches. Group V: 293.7/377.6 g/d, 411.6/553.2 g/d and 1.413, respectively, while the MR was 0.80%. Group NV: 287.9/355.4 g/d, 394.9/523.7 g/d and 1.407, respectively, with a MR of 3.80%. ADG and ADFI for the whole study period were not significantly different among groups; the ADG and ADFI of the 42-63 day-period was significantly higher in the A and V groups. FCR was not significantly different among groups. MR was significantly lower in A and V compared to the NV groups. **Discussion and conclusions** Based on the present results, vaccination against ED seems a useful tool to facilitate the antibiotic use reduction in farms with historical cases of ED. **Keywords** Edema diseases, colistin, vaccine, ADG, ADFI, mortality rate

## RES-OP-05

### TITLE

CASE OF LISTERIOSIS IN FATTENING PIGS WITH HEMORRHAGIC DIARRHEA AND SUDDEN DEATH

Heiko Stein<sup>1,2</sup>, Beatrix Stessl<sup>3</sup>, Rene Brunthaler<sup>4</sup>, Igor Loncaric<sup>5</sup>, Herbert Weissenböck<sup>5</sup>, Ursula Ruczizka<sup>1</sup>, Andrea Ladinig<sup>1</sup>, Lukas Schwarz<sup>1</sup>

<sup>1</sup> *University Clinic for Swine, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Austria*

<sup>2</sup> *Vetpraxis Hegerberg, Kasten, Austria*

<sup>3</sup> *Institute of Milk Hygiene, Milk Technology and Food Science, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine, Vienna, Austria.*

<sup>4</sup> *Institute of Pathology, Department of Pathobiology, University of Veterinary Medicine, Vienna, Austria.*

<sup>5</sup> *Institute of Microbiology, Department of Pathobiology, University of Veterinary Medicine, Vienna, Austria.*

### CONTENT

#### Background and Objectives

Listeriosis in swine is mainly found in suckling piglets with septicaemia. In sows, listeriosis may result in abortion and in suckling piglets rarely in encephalitis. This case report highlights *Listeria (L.) monocytogenes* as a clinically relevant pathogen causing haemorrhagic enteritis and septicaemia in fattening pigs of swine farm.

#### Material & Methods

In a farrow-to-finish farm, an episode of bloody diarrhoea with a mortality rate of 7.8% was observed in fattening pigs (40-100 kg bodyweight). The herd veterinarian decided to send two characteristically sick fatteners and maize silage to the University Clinic for Swine for further diagnostics. Silage was produced under inappropriate conditions, since it was contaminated with mould and 3000ppb deoxynivalenol. Necropsy, histopathological and bacteriological investigations were performed on the two pigs to find out the causative agent of haemorrhagic enteritis and peracute deaths in the farm.

#### Results

In both pigs necropsy showed a severe diffuse fibrinonecrotic typhlocolitis and *L. monocytogenes* could be isolated from both serosa samples and in the silage sample. *L. monocytogenes* was detected in high amount in the gut associated lymphatic tissue by immunohistochemistry. Furthermore, molecular epidemiological analysis resulted in identical sequence types of ST21. The ST21 isolates were susceptible to a broad range of antimicrobials.

Consequently, antimicrobial therapy using amoxicillin led to a fast recovery of residual affected fatteners.

#### Discussion and Conclusion

Since listeriosis in pigs is a rarely diagnosed disease, clinical symptoms of pigs in this case were initially assumed to be a case of swine dysentery. Swine practitioners usually do not consider listeriosis in pigs. Hence, this case report highlights the importance of adequate diagnostics in order to start an appropriate therapy to prevent further deaths.

To conclude, *L. monocytogenes* can cause clinical disease in fattening pigs transmitted via silage resulting in bloody diarrhoea and an increased mortality rate.



# VETERINARY PUBLIC HEALTH

ORAL PRESENTATIONS

## **VPH-OP-01**

### **TITLE**

**EFFECT OF GROUP VACCINATION OF SOWS AND GILTS AGAINST SALMONELLA TYPHIMURIUM ON SALMONELLA SEROLOGY AND EXCRETION IN SOWS AND THEIR OFFSPRING**

Linda Peeters<sup>1</sup>, Jeroen Dewulf<sup>1</sup>, Filip Boyen<sup>2</sup>, Charlotte Brossé<sup>3</sup>, Tamara Vandersmissen<sup>3</sup>, Geertrui Rasschaert<sup>4</sup>, Marc Heyndrickx<sup>4</sup>, Mickaël Cargnel<sup>5</sup>, Frank Pasmans<sup>2</sup>, Dominiek Maes<sup>1</sup>

<sup>1</sup> *Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Herd Health, Ghent University, Belgium*

<sup>2</sup> *Faculty of Veterinary Medicine, Department of Pathology, Bacteriology and Avian Diseases, Ghent University, Merelbeke, Belgium*

<sup>3</sup> *Animal Health Care Flanders (DGZ), Lier, Belgium*

<sup>4</sup> *Flanders research institute for Agriculture, Fisheries and Food (ILVO), Melle, Belgium*

<sup>5</sup> *Sciensano, Brussel, Belgium*

### **CONTENT**

Introduction Vaccination might be effective to control Salmonella infections at farm level. The present study evaluated the effect of group vaccination of sows and gilts against *S. Typhimurium* (ST) on Salmonella serology in sows and their offspring and the excretion in the offspring in three pig farms. Materials & Methods In each farm (A-B-C), all sows and gilts were vaccinated twice with an attenuated live vaccine (Salmoporc®, IDT Biologika) (3 weeks apart, subcutaneously, 1 mL/dose). From 3 months after the group vaccination onwards, all sows were given a booster dose 3 weeks before every farrowing. The farms were monitored serologically (sows and their offspring at slaughter age) and bacteriologically (fattening pigs of 18 and 26 weeks of age) one year before and one year after the group vaccination. Results After group vaccination, the mean S/P-ratios of the sows increased from 1.60 to 2.97 in farm A, from 1.58 to 1.85 in farm B and from 1.31 to 2.14 in farm C. The mean S/P-ratios of the offspring at slaughter age decreased from 0.99 to 0.72 in farm A, from 1.48 to 0.83 in farm B and from 2.69 to 1.57 in farm C. In the combined analysis of all farms, the increase in the S/P-ratios of sows and the decrease in the S/P-ratios of their offspring at slaughter age were both significant ( $p < 0.001$  and  $p = 0.001$ , respectively). After group vaccination, the percentage ST-field strain positive fecal and overshoe samples decreased from 17% to 11% ( $p = 0.242$ ) and from 15% to 7% ( $p = 0.092$ ) in the fattening pigs of 18 and 26 weeks of age, respectively. Discussion & Conclusion Group vaccination of sows and gilts induced a serological response in sows and resulted in significantly lower S/P-ratios in their offspring at slaughter age, although the excretion of ST-field strain in the offspring of the sows did not significantly decrease.

## **VPH-OP-02**

### **TITLE**

**WELFARE ASSESSMENT OF FATTENING PIGS USING ROUTINELY COLLECTED AND EDITED PRODUCTION DATA**

Julia Grosse-Kleimann<sup>1</sup>, Birte Wegner<sup>2</sup>, Ines Spiekermeier<sup>3</sup>, Elisabeth grosse Beilage<sup>4</sup>, Michaela Fels<sup>2</sup>, Hendrik Nienhoff<sup>3</sup>, Henning Meyer<sup>5</sup>, Heiko Plate<sup>5</sup>, Hubert Gerhardy<sup>6</sup>, Lothar Kreienbrock<sup>1</sup>

<sup>1</sup> *Department of Biometry, Epidemiology and Information Processing, University of Veterinary Medicine Hannover, Germany*

<sup>2</sup> *Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour, University of Veterinary Medicine Hannover, Germany*

<sup>3</sup> *Swine Health Service, Chamber of Agriculture Lower Saxony, Oldenburg, Germany*

<sup>4</sup> *Field Station for Epidemiology, University of Veterinary Medicine Hannover, Germany*

<sup>5</sup> *VzF GmbH, Uelzen, Germany*

<sup>6</sup> *Marketing Service Gerhardy, Garbsen, Germany*

### **CONTENT**

#### **Background/Objectives**

In recent years farm animal welfare has sufficiently attracted political and social attention. However, in Germany, there is no governmental pig welfare monitoring. One reason for this is that the assessment by farm visits needs many personnel and economic resources. Hence, the aim of this study is to investigate the usability of routinely collected production data as welfare indicators.

#### **Material/Methods**

The MulTiViS project examines recent consolidated production data of 205 commercial fattening pig farms in the northeast of Lower Saxony (Germany). Facts about the usage of antibiotics, findings at the abattoir, performance data and farm characteristics (feeding/housing/management) were gathered. Data was linked, aggregated and analyzed to identify association structures.

#### **Results**

After a plausibility check and analyses of association, 36 out of 70 variables were selected as usable for modelling welfare. The average number of antimicrobial treatments per pig space was 0.85 (34 of 205 farms did not use any antibiotics at all) and the prevalence of severe lung lesions was 0.04. The mean mortality was 2.23 per 100 per half year and 178 farms got their piglets from only one breeder.

#### **Discussion/Conclusion**

Animal welfare is a rather complex term and the assessment of data from the production process only may give a restricted picture of it. Still the interconnection of these data sources is unique in Germany and will be evaluated as a practical method for a national welfare monitoring. As next step, the status quo of the animal welfare in the study farms will be validated by a personal investigation performed by two study veterinarians who examine the pigs and their environment.

The project is supported by funds of the Federal Ministry of Food and Agriculture (BMEL) based on a decision of Parliament of Federal Republic of Germany via Federal Office for Agriculture and Food (BLE).



## **VPH-OP-03**

### **TITLE**

**AN INTERVENTION STUDY TO FOSTER ANTIMICROBIAL USAGE DECREASE IN FARROW-TO-FINISH PIG HERDS THROUGH VETERINARIAN ADVICE**

Claire CHAUVIN<sup>1</sup>, Julie DAVID<sup>1</sup>, Angélique van den HOOGEN<sup>2</sup>, Manon HOUBEN<sup>2</sup>, Pascal SANDERS<sup>1</sup>

<sup>1</sup> *Anses*

<sup>2</sup> *porQ*

### **CONTENT**

**Background and Objectives:** Antimicrobial usage reduction is strongly encouraged in pig production. National dispositive and regulation can support and drive efforts towards a decrease of antimicrobial usage. But to consider farm specific situation and context, diverse alternatives and solution have to be implemented. The objective of this study was to investigate the specific effect of audit and tailored action plans proposed by veterinarians and agreed by farmers on the farm antimicrobial usage and performances.

**Material & Methods:** In two participating countries (The Netherlands and France), a long lasting intervention study was implemented in 50 farrow-to-finish pig farms between March 2015 and January 2018. A tailor-made intervention was proposed by veterinarian to reduce antimicrobial usage. Data on antimicrobial usage and performance were retrospectively collected for 2014 and regularly collected during the follow-up, as well as information on actions implementation, pertinence and feed-back. Generalized mixed models were applied to take into account repeated measurements in farms, the underlying time trend driven by general context, assessing country and intervention effects.

**Results:** A high diversity of actions was proposed and implemented in farms (from 1 to 18 different measures per farm) on the different animal categories, with post-weaning and sows being the predominant targets. A significant trend toward a decrease in antimicrobial usage was observed during the studied period ( $p=0.001$ ), the decrease being significantly magnified by the intervention process ( $p=0.01$ ). Performance analyzed, such as mortality in weaners and fatteners were not significantly impacted by the intervention.

**Discussion & Conclusion:** A significant decrease of antimicrobial usage was observed in the studied farrow-to-finish pig farms between 2014 and 2017. Additional reduction could be significantly achieved through herd-specific various actions implementation without impairment of performances. Combination of general and herd-specific measures advised by veterinarians might allow antimicrobial usage reduction in farrow-to-finish pig farms.

## **VPH-OP-04**

### **TITLE**

**UNDERSTANDING HEPATITIS E VIRUS (HEV) DYNAMICS IN A FARROW-TO-FINISH PIG FARM USING EXPERIMENTAL, FIELD AND MODELLING DATA**

Morgane Salines<sup>1</sup>, Mathieu Andraud<sup>1</sup>, Nicolas Rose<sup>1</sup>

<sup>1</sup> *Anses Ploufragan-Plouzané-Niort Laboratory, Epidemiology, Health and welfare unit, PO Box 53, 22440 Ploufragan FRANCE*

### **CONTENT**

#### Objectives

Hepatitis E virus is a zoonotic pathogen for which pigs have been recognised as the major reservoir in industrialised countries. High variability of HEV dynamics has been described in pig farms and may be related to the influence of other pathogens, particularly viruses modulating immune response. This study aimed to understand the conditions for HEV spread and persistence in farrow-to-finish herds in which pigs may be co-infected with an intercurrent pathogen using a multi-pathogen modelling approach relying on experimental and field data.

#### Material & methods

A stochastic individual-based model was developed to represent the population dynamics of a farrow-to-finish pig herd, coupled with a multi-pathogen model combining two epidemiological models: the first one represented the dynamics of an immunomodulating virus (e.g. PRRSV) in a simplified way, whereas the second one was designed as a MSEIRS HEV model, accounting for partial passive immunity protection in piglets. On an individual and daily basis, epidemiological parameters of the HEV model were modified according to the pig's status as regard the immunosuppressive virus. Parameters were derived from experimental and field data. The minimal conditions for virus spread and persistence between batches were evaluated by simulations.

#### Results

Co-infection with an immunomodulating pathogen was found to favour HEV persistence and to increase the prevalence of contaminated livers at slaughter. Herd structure, driven by the batch-rearing system, and some farming practices, such as the type of housing for gestating sows, cross-fostering and mingling practices, were also evidenced as pivotal factors impacting HEV spread dramatically.

#### Conclusions

Based on an innovative multi-pathogen approach, our model has provided insights on HEV infection dynamics and has given the opportunity to evidence effective control strategies. Taken together, modelling and field data would make it possible to design a comprehensive HEV control plan and to support public health policies on this issue.

## **VPH-OP-05**

### **TITLE**

APPLYING SALMONELLA VACCINATION AT THE TOP OF A UK PIG PRODUCTION PYRAMID

Judy Bettridge<sup>1</sup>, Martina Velasova<sup>1</sup>, Francesca Martelli<sup>1</sup>, Becky Gosling<sup>1</sup>, Rob Davies<sup>1</sup>, Richard Smith<sup>1</sup>

<sup>1</sup> APHA - Weybridge

### **CONTENT**

#### Background and Objectives

Salmonella is a widespread pathogen that infects a variety of animals, including man. Reducing prevalence in pig farms contributes to minimising contamination at slaughter, improving the safety of meat and offal for human consumption, as the slaughter process cannot effectively remove high levels of contamination. UK studies have shown sow vaccination has been significantly effective in reducing Salmonella prevalence. However, most interventions, including vaccination, are unlikely to be cost-effective on most pig farms. Additionally, the flow of pigs onto farms can continuously reintroduce Salmonella, mitigating the benefits of interventions. It has been proposed that applying interventions at the top of a production pyramid might improve cost-effectiveness.

#### Material & Methods

This study used a single production pyramid, following a closed multiplier farm and 2-3 representative farms at each of the following levels: gilt mating unit and surplus breeding stock, breeding, rearing, and finishing farms. Following baseline visits to each farm, sows and piglets in the multiplier herd were vaccinated against *S. Typhimurium*. All farms were then followed for 18 months with between 2-5 sampling visits, depending on farm type. Pooled and individual floor faeces and environmental samples were collected at each visit, ensuring representation of prevalence and serovars present in each pig stage.

#### Results

At the initial visit to the multiplier farm, Salmonella prevalence in pooled samples was 38.2%, with mainly monophasic Salmonella Typhimurium (MST) detected, with a few *S. Rissen* isolates. The prevalence of MST steadily reduced to <10% and the predominant serovar became *S. Rissen*. Similar results were seen in the farms directly supplied by the multiplier, and some reduction in MST was observed in other farms in the pyramid.

#### Discussion & Conclusion

This study indicates that of multiplier farm vaccination was effective as a Salmonella reduction strategy and also provided substantial benefits to the pyramid.

## **VPH-OP-06**

### **TITLE**

TRENDS IN ANTIMICROBIAL CONSUMPTION IN DANISH PIG PRODUCTION IN 2014-2017 AND THE FIRST SIX MONTHS OF 2018

Nicolai Weber<sup>1</sup>, Jan Dahl<sup>2</sup>

<sup>1</sup> *SEGES Pig Research Centre*

<sup>2</sup> *Danish Agriculture and Food Council*

### **CONTENT**

#### Background and Objectives

Antimicrobial consumption can either be measured in doses or in tonnes active compounds as the total consumption for the whole pig production or as relative consumption by considering changes in the composition of the production.

The purpose of this study was to elucidate the importance of different methods to determine the trend in antimicrobial consumption in Danish pig production.

#### Material & Methods

Data on antimicrobial consumption were collected from the national medicine database VetStat. Doses were defined as the amount of antimicrobial product for treatment of one kg of live weight pig. Data on the composition of pig production were collected from the Danish Pig Levy Fund. Antimicrobial consumption and pig production was calculated on three age groups; sows & piglets, weaners, and finishers.

#### Results

The total consumption measured in tonnes active compounds decreased by 12% from 2014 to 2017 but increased by 2% in the first six months of 2018. The total consumption measured in doses active compounds decreased by 11% from 2014 to 2017 and decreased by 2% in the first six months of 2018.

Doses consumed to produce a pig from birth to slaughter decreased by 13% from 2014 to 2017 and decreased by 6% in the first six months of 2018. Mg active compound consumed to produce a pig from birth to slaughter decreased by 15% from 2014 to 2017 and decreased by 3% in the first six months of 2018.

#### Discussion & Conclusion

The most suitable method to describe the trends in antimicrobial consumption are the number of doses consumed to produce a pig from birth to slaughter. This method makes it possible to consider increase in production and the change in the composition of the production as well as changes in types of antimicrobials used.



# VIRAL DISEASES

## VVD-OP-01

### TITLE

FREQUENCY OF PORCINE CIRCOVIRUS 3 DETECTION IN SERUM OF PIGS WITH RESPIRATORY AND DIGESTIVE DISORDERS

Viviane Saporiti<sup>1</sup>, Taís F. Cruz<sup>2</sup>, Florencia Correa-Fiz<sup>1</sup>, José I. Núñez<sup>1</sup>, Marina Sibila<sup>1</sup>, Joaquim Segalés<sup>3,4</sup>

<sup>1</sup> IRTA, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>2</sup> Department of Immunology and Microbiology, Institute of Biosciences, College of Veterinary Medicine, São Paulo State University (UNESP), Botucatu, SP18618-000, Brazil

<sup>3</sup> Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.

<sup>4</sup> UAB, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.

### CONTENT

**Introduction.** In 2015 a novel porcine circovirus (PCV), named as PCV-3, was found by next generation sequencing methods from animals with different disease conditions. Although its pathogenicity has not been clearly established yet, it has been linked with reproductive and respiratory disorders. Therefore, the objective of the present study was to assess the frequency of PCV-3 in cases of respiratory and digestive disorders compared to healthy animals.

**Material and Methods.** A total of 315 swine serum samples from different farms were analyzed for PCV-3 detection by conventional PCR. The samples were obtained from 4 week- to 4 month-old pigs clinically affected by respiratory disorders (n=129) and diarrhea (n=126). A group of healthy age-matched animals (n=60) served as negative control. Pigs with respiratory clinical signs had a wide variety of pulmonary lesions including catarrhal-purulent bronchopneumonia, interstitial pneumonia, fibrinous-necrotizing pneumonia and/or pleuritis. Animals with enteric clinical signs had histopathological findings of villi atrophy and fusion, catarrhal enteritis and/or catarrhal colitis.

**Results.** The presence of PCV-3 DNA was confirmed in 19 out of 315 analyzed samples (6%). Such percentages of detection were 6.2% (8 out of 129) and 5.6% (7 out of 126) in pigs displaying respiratory and digestive disorders, respectively. No apparent association was observed between frequency of infection and type of histopathological lesion. The frequency of PCV-3 PCR positive among healthy pigs was 6.7% (4 out of 60).

**Discussion and conclusion.** PCV-3 was found in serum of the three groups of animals in similar percentages. The lack of different frequency of detection of this virus at a systemic level does not point out a potential association of PCV-3 with respiratory or enteric disorder occurrence.

**Acknowledgments:** This work was performed by a researcher with financial support from FAPESP. Contract number: 2017/26649-4.

## VVD-OP-02

### TITLE

MUTATIONS IN ANTIGENIC SITES OF THE HEMAGGLUTININ PROTEIN FOLLOWING INFLUENZA VACCINATION

Pia Ryt-Hansen<sup>1</sup>, Inge Larsen<sup>2</sup>, Jesper Schak Krog<sup>3</sup>, Charlotte Sonne Kristensen<sup>4</sup>, Lars Erik Larsen<sup>1</sup>

<sup>1</sup> *National Veterinary Institute, Technical University of Denmark*

<sup>2</sup> *University of Copenhagen, Dpt. of Veterinary and Animal Sciences*

<sup>3</sup> *Statens Serum Institut*

<sup>4</sup> *SEGES Pig Research Centre*

### CONTENT

Background and Objectives:

In Europe, the most widespread method for controlling influenza A virus infections in piglets is implementation of sow vaccination programs to secure delivery of maternal derived antibodies to the new born piglets.

However, recent studies have questioned the effect and benefit of maternal derived antibodies. The objective of the study was therefore to investigate the effect of mass sow vaccination in a herd experiencing an outbreak with a new subtype.

Materials and Methods:

Four batches of pigs were included before implementation of mass sow vaccination. Each batch consisted of 4 sows and 5 ear tagged piglets from each sow. Blood samples and nasal swabs were collected from both sows and piglets, along with recordings of clinical signs. The same setup of four batches was included after implementation of mass sow vaccination with RespiPorc Flu@3. Virus was isolated and sequenced before and after vaccination. Furthermore, hemagglutinin inhibition test was performed on the sow sera before and after vaccination.

Results:

The results revealed that the mass sow vaccination delayed the infection time and decreased the viral load in piglets. However, no effect on the number of infected animals or clinical signs was observed, and the number of long term shedders was significantly increased. Furthermore, a decrease in the number of seroconverted pigs was discovered at the end of the study. Sequencing results revealed that the circulating strain had gained 3 mutations in the antigenic sites of the hemagglutinin protein after vaccination, which resulted in lower hemagglutinin inhibition titers in the sow sera.

Discussion and Conclusion:

The results of this study present an explanation for the occasional lack of effect of sow vaccination. Moreover, the results reveal that the use of influenza vaccination may result in selection pressure and lead to emergence of escape variants.

## VVD-OP-03

### TITLE

IMPACT OF PCV2 CO-INFECTION ON REPLICATION LEVEL OF A FIELD VACCINE-LIKE PRRSV-1 STRAIN

Julie ECLERCY<sup>1</sup>, Frédéric PABOEUF<sup>1</sup>, Lionel BIGAULT<sup>1</sup>, Cécilia BERNARD<sup>1</sup>, Béatrice GRASLAND<sup>1</sup>, Patricia RENSON<sup>1,2</sup>, Nicolas ROSE<sup>1</sup>, Olivier BOURRY<sup>1</sup>

<sup>1</sup> Anses, Ploufragan-Plouzané-Niort Laboratory

<sup>2</sup> IFIP, France

### CONTENT

#### Introduction

In pig herds, PRRSV is often associated with PCV2, this co-infection being one key factor leading to post-weaning multisystemic wasting syndrome (PMWS). Worryingly, association of a PRRSV modified live vaccine of Type 2 (MLV2) with PCV2 infection was also shown to induce PMWS.

In a French pig farm presenting a clinical presentation of PMWS, we identified a MLV1-like strain in co-infection with PCV2. Through an in vivo experiment, we aimed at evaluating the impact of PCV2 co-infection on virulence level of these MLV1-like and parental MLV1 strains.

#### Material & Methods

Five groups of 6 SPF piglets were respectively inoculated with one of the 2 PRRSV strains or with PCV2 (MLV1; MLV1-like; PCV2 groups) or co-inoculated with both virus at the same time (MLV1/PCV2; MLV1-like/PCV2 groups). One day after inoculation, 6 contact piglets were added to each inoculated groups. All animals were clinically monitored daily. Blood and nasal swabs were collected twice a week to monitor PRRSV seroconversion and PRRSV genomic viral load. During necropsy, tissues samples were collected for viral quantification.

#### Results

No clinical signs were detected, whatever the group. Viral loads from MLV1-like and MLV1-like/PCV2 groups were higher in sera, nasal swabs and tonsils in comparison with MLV1 and MLV1/PCV2 groups. No difference was found between MLV1 and MLV1/PCV2 groups; whereas co-infected animals with MLV1-like/PCV2 showed increased viremia and shedding compared to pigs from MLV1-like group. Accordingly, seroconversion was detected early for single or co-infected animals with MLV1-like strain. Finally, PRRSV transmission from inoculated to contact pigs was faster in MLV1-like and MLV1-like/PCV2 groups.

#### Discussion

Our study showed that the MLV1-like PRRSV-1 strain was able to replicate at a higher level, presenting increased excretion and transmission in comparison to the MLV1 strain. No impact of PCV2 was demonstrated on MLV1 viremia, whereas PCV2 seemed to promote MLV1-like replication.



## VVD-OP-04

### TITLE

MULTISYSTEMIC INFLAMMATION IN PIGLETS IN A HERD WITH CONGENITAL TREMOR AND CONCURRENT DEFORMITIES

Susanna Williamson<sup>1</sup>, Laura Wilson<sup>2</sup>, Rachael Collins<sup>2</sup>, Toby Floyd<sup>2</sup>, Sylvia Grierson<sup>2</sup>, Akbar Dastjerdi<sup>2</sup>

<sup>1</sup> *Animal and Plant Health Agency (APHA)*

<sup>2</sup> *APHA*

### CONTENT

#### Background and Objectives

An episode of congenital tremor (CT) with concurrent increase in piglet deformities in a breeding herd was investigated.

#### Material & Methods

Clinical and herd details were obtained and postmortem examinations undertaken by the Animal and Plant Health Agency (APHA) on laboratory submissions of tremor-affected (n=7) or deformed piglets (n=7). Histopathology (special stains, immuno-histochemistry) and virological examinations (PCRs, sequencing, virus microarray) were performed.

#### Results

Both conditions were present for a four-month period; maximum incidence was 8% of litters in a weekly batch. Litters with CT-affected piglets were born to gilts, while deformed piglets were mostly born dead to sows of any parity with occasional pigs in these litters developing tremors post-natally. Deformities included a range regularly seen at low levels in breeding herds, more unusual were piglets with arthrogryposis. Widespread multisystemic inflammation, mainly of lymphoplasmacytic infiltrates, was detected in tissues from the deformed stillborn and post-natal tremor piglets. These infiltrates suggested a chronic systemic antigenic stimulus, likely reflecting in utero viral infection. No PRRSV or PCV2 involvement was detected. Atypical porcine pestivirus (APPV) was detected by RT-PCR in blood and nervous tissue of all tremor-affected piglets examined but not in deformed piglets. Virus microarray detected only APPV in CT-affected piglets, while porcine circovirus 3 was detected in deformed piglets and confirmed by RT-PCR with low Ct values.

#### Discussion & Conclusion

The unusual combination of clinical signs prompted submissions to APHA. Findings support the presence of CT type A2 associated with APPV in some piglets. However, the multisystemic inflammation in other piglets was inconsistent, APPV has not been described causing deformities, and was not detected in deformed piglets. At this stage, findings suggest that more than one viral aetiological agent may be involved with the presence of APPV and PCV3 confirmed. Further investigations still in progress will be presented.

## VVD-OP-05

### TITLE

IS ORF5 NUCLEOTIDE SEQUENCE ANALYSIS SUFFICIENT FOR TRACING PRRSV-1 STRAINS?

Jos Dortmans<sup>1</sup>, Rianne Buter<sup>1</sup>, Tom Duinhof<sup>1</sup>, Tomasz Stadejek<sup>2</sup>

<sup>1</sup> *GD Animal Health*

<sup>2</sup> *Department of Pathology and Veterinary Diagnostics, Faculty of Veterinary Medicine, Warsaw University of Life Sciences, Warsaw, Poland*

### CONTENT

PRRSV causes the most significant swine disease worldwide and shows remarkable genetic variation. PRRSV genotyping is being performed mostly based on ORF5 and/or ORF7 sequence analysis. Recent papers indicate that recombination between PRRS viruses may have a high impact of the virus' molecular epidemiology in Europe. Based on the sequence of ORF5 alone the identity of the strain of interest would be misinterpreted and wrong conclusions may be drawn in a diagnostic and epidemiological perspective. Unfortunately, unlike in PRRSV-2, the knowledge about PRRSV-1 recombination frequency and recombination hot spots is largely missing. The objective of this study is to investigate PRRSV-1 recombination based on ORF2-ORF7 sequences.

Thirty-eight PRRSV-1 sequences of ORF2-ORF7 from the Netherlands, as well as 84 PRRSV-1 sequences from Europe, Asia and America, available in GenBank were aligned and analyzed using the RDP4 program to detect potential recombinant viruses in the dataset.

Analysis showed 57 sequences with some recombination evidence. Recombination in 30 sequences was detected by most algorithms incorporated in RDP4 programs. The majority of the detected recombination events were unique and at random positions. In some cases the analysis showed that the position in the phylogenetic tree topologies was ORF dependent, supporting genetic recombination in their emergence. Interestingly, Dutch sequence NL/GD-5-18/2015 clustered with the highly virulent Austrian strain AUT/15-33/2015 in phylogenetic trees constructed from complete ORF2, ORF3, ORF4 and ORF5 nucleotide sequences, whereas in the ORF6 and ORF7 trees it clustered with Lelystad virus. More examples will be presented at the conference.

Our results provide new insights into the role of genetic recombination in PRRSV-1 evolution. Furthermore, it will allow to better assess the value and limitations of ORF5 sequence analysis in epidemiological investigations.

## VVD-OP-06

### TITLE

ANALYSIS OF RESILIENCE MARKERS IN RELATION TO ABORTION RATE IN PIGS

Romi Pena<sup>1</sup>, Carlos Fernández<sup>2</sup>, Maria Blasco-Felip<sup>3</sup>, Lorenzo Fraile<sup>1</sup>, Joan Estany<sup>1</sup>

<sup>1</sup> *University of Lleida, Lleida, Spain*

<sup>2</sup> *INZAR SL, Zaragoza, Spain*

<sup>3</sup> *Free-lance veterinarian, Zaragoza, Spain*

### CONTENT

#### Introduction

The concept of Resilience is used to define the ability of animals to overcome internal and external stressors, such as pathogen challenges. In pigs, a number of genetic markers have been studied in relation to the response to infection with the porcine reproductive and respiratory syndrome virus (PRRSV), but their relationship with abortion rate during PRRSV outbreaks has not been described.

#### Material & Methods

Genomic DNA was isolated from 180 Landrace x Large White sows from a PRRSV negative farm that suffered a PRRSV epidemic outbreak in December 2017 that lasted for six weeks. The abortion rate during the outbreak was 30%. Animals were genotyped for markers in the GBP1 (rs80800372), GBP5 (rs340943904), CD163 (c.3534C>T), MX1 (-1520ins275) and USP18 (-1533G>A) genes. The effect of each marker on the abortion rate was analyzed with a logistic regression model.

#### Results

All the sows were homozygous GG for the marker of the USP18 gene. In the other four polymorphisms, the allelic frequency of the minor allele ranged between 0.20 and 0.32. The percentage of abortions was significantly lower in the homozygotes for the minor allele of the GBP1, GBP5 and MX1 markers, whereas the CD163 genotype did not affect abortion rate. The abortion rate in heterozygous sows for GBP1 and GBP5 was similar to that of sows homozygous for the minor allele, whereas for MX1 the opposite situation occurred. The likelihood of abortion was 2-fold (GBP1 and GBP5) or 5-fold higher (MX1) between alternative homozygous sows.

#### Discussion & Conclusion

These results are a first step in the selection of resilient sows which can successfully cope with an epidemic PRRSV infection. These results are currently being validated in other populations in both endemic and epidemic phases of the disease.



# WELFARE AND NUTRITION

ORAL PRESENTATIONS

## **AWN-OP-01**

### **TITLE**

**TAIL BITES IN FREE-RANGE BASED FINISHER PIG SYSTEMS – PREVALENCE AND RISK FACTORS.**

Hanne Kongsted<sup>1</sup>, Leslie Foldager<sup>1,2</sup>, Jan Tind Sorensen<sup>1</sup>

<sup>1</sup> *Department of Animal Science, Aarhus University*

<sup>2</sup> *Bioinformatics Research Centre, Aarhus University*

### **CONTENT**

#### Background and Objectives

Free-range pig production systems offer low stocking densities and access to open air, straw and rooting materials. Nevertheless, in some free-range finisher pig herds (where tail docking is prohibited), tail biting is a serious problem. The study aimed to identify housing and management related risk factors in both the weaning and the growing period associated with tail bites.

#### Materials and methods

Thirteen free-range finisher herds (7 organic and 6 conventional) supplied with weaners from six sow herds were visited during cold periods in 2017-18. Owners in supplier and finisher herds were interviewed about management routines. Pen-related risk factors were registered and pigs at 20-50 kg were examined for light and severe tail lesions. Risk factors were evaluated in univariable logistic models including pen-ID as random effect.

#### Results

84% of the examined conventional pigs and 93% of organic pigs had intact tails. Severe lesions were seen in 3% of organic and 10% of conventional pigs. Conventional production system (OR: 9.9, 95% CI: [1.4; 68.8], P= 0.02), high stocking density at weaning (OR: 0.44 per 0.1 m<sup>2</sup>/ pig, 95% CI: [0.28; 0.7], P< 0.001) and feeding space at weaning (OR: 19.1 per 2 cm less space/ pig, 95% CI: [3.4; 108.2], P< 0.001) were pointed out as significant risk factors for tail lesions.

#### Discussion and Conclusion

The study showed that tail lesions were low-prevalent in the early rearing phase of free-range pigs. However, since we saw associations between weaning environment and tail lesions it seems evident, that management conditions in this phase of life matter. The study emphasized the importance of a low stocking density - even in systems with a markedly lower density than traditional indoor systems. We suggest to further scrutinize the background of conventional systems constituting a risk factor for tail biting.

## **AWN-OP-02**

### **TITLE**

**THE INFLUENCE OF A 16-HOUR DELAY IN SOLID FEED PROVISIONING ON THE FEED INTAKE AND PERFORMANCE OF WEANLING PIGLETS**

Sam Millet<sup>1,2</sup>, Hubert van Hees<sup>3,2</sup>, Marijke Aluwé<sup>2</sup>, Geert P.J. Janssens<sup>2</sup>, Sam De Campeneere<sup>1</sup>, Sarah De Smet<sup>4</sup>

<sup>1</sup> *ILVO (Flanders research institute for Agriculture, Fisheries and Food)*

<sup>2</sup> *Laboratory of Animal Nutrition, Ghent University, Ghent, Belgium*

<sup>3</sup> *Trouw Nutrition Research and Development*

<sup>4</sup> *Pig Information Center, Melle, Belgium*

### **CONTENT**

A large proportion of newly weaned piglets starts consuming solid feed only after weaning is complete. Moreover, weaning day is stressful. Piglets may associate this stress with ingesting pelleted feed, thus reducing consecutive feed intake. An experiment was therefore designed to study the effect of delayed provisioning of solid feed on feed intake and performance of piglets. In total, 144 piglets ( $8.1 \pm 1.1$  kg, mean  $\pm$  SD), weaned at 4 weeks of age, were tested. They were assigned to 24 pens, blocked per sex (castrated male or female) and weight group. Littermates were assigned to different pens. Prior to weaning, piglets received a commercial creep feed. Per body weight class and per sex, each pen was randomly assigned to one of the 2 treatments: control (C) and delay in feed provisioning (F). For the control treatment, the pelleted (6 mm) feed was already present in the feeders when the piglets arrived in their pens (13:00-14:00). In the F pens, the feed was provided the next morning (08:00). Feed and water were provided ad libitum. They received natural daylight and supplemental artificial light between 7h30 and 15h30. The F pigs showed a higher feed intake the first three weeks of the experiment (455 vs 430 g/day,  $P=0.003$ ), which was still apparent for the entire experiment (4-9 weeks: 594 vs 569 g/day,  $P=0.046$ ). This resulted in higher bodyweights 3 weeks after weaning in the F vs C pigs (16.1 vs 15.6 kg,  $P=0.005$ ). However, at the end of the experiment at 9 weeks, no significant difference was observed (23.9 vs 23.4 kg,  $P=0.285$ ). Feed efficiency did not differ significantly between the groups ( $P=0.456$  for the entire experiment). Further research is needed to elucidate the causative factors for the observed differences and to further explore the practical implications of our findings.

## **AWN-OP-03**

### **TITLE**

DO WEANERS HAVE GASTRIC ULCERS?

Juan Miguel Peralvo Vidal<sup>1</sup>, Anni Øyan Pedersen<sup>1</sup>, Jens Peter Nielsen<sup>1</sup>, Svend Haugegaard<sup>2</sup>, Nicolai Weber<sup>2</sup>

<sup>1</sup> *University of Copenhagen*

<sup>2</sup> *SEGES Pig Research Centre*

### **CONTENT**

#### Background and Objectives

Investigation of gastric ulceration (GU) are primary performed in abattoir studies of finisher pigs and slaughter sows. GU is often associated with an increased fluidity of the gastric content due to finely grounded and pelleted diets. Although weaners are normally fed pelleted diets ad libitum, little is known about the prevalence of ulceration in this age group. The purpose of this study was to investigate if healthy weaners feed pelleted diets ad libitum have GU.

#### Material & Methods

The study consisted of 200 clinically healthy weaners from ten Danish farms with weaners fed ad libitum on finely grounded commercial diets (geometric mean diameter = 554,2 µm). In each farm, 20 weaners with an average weight of 22 kg (min-max: 12-37 kg) were randomly selected and euthanized. GU assessment was based on the Danish score system, with scoring of alterations in the pars oesophagea. A healthy stomach was scored with index 0; index 1-5 present minor to severe parakeratosis and minor to severe erosions; ulcer-index 6-8 present minor to severe ulcers, scar-index 6-8 present minor to severe scars and scar-index 9-10 present oesophageal stenosis.

#### Results

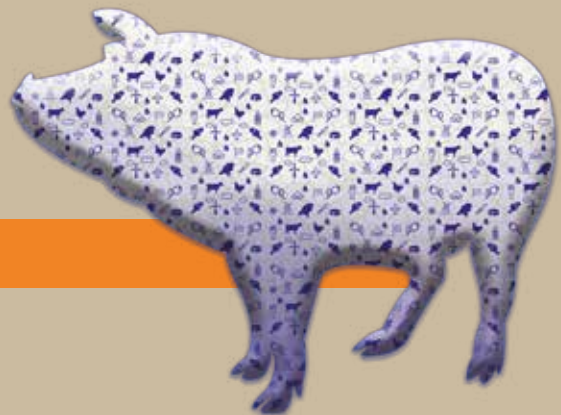
We observed that 35.5 % of weaners had ulceration, scar or stenosis in the pars oesophagea with a large between-farm variation (min-max: 0,0%-85%). The prevalence of ulcers, scars and stenosis was; 20%, 32% and 3,5%. Minor ulcers and scars was the main observed alternation observed in this study.

#### Discussion & Conclusion

We have demonstrated that ulceration of the pars oesophagea is present in some Danish herds with weaners fed commercial diets ad libitum. These results demonstrate that pigs can develop alterations in the pars oesophagea prior to the fattening period. The herds used in this study are considered high risk herds for GU and are not representative for all Danish herds.

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# POSTER ABSTRACTS







BACTERIAL DISEASES	BBD-01 - BBD-56
HERD HEALTH MANAGEMENT AND ECONOMY	HHM-01 - HHM-94
IMMUNOLOGY AND VACCINOLOGY	IMM-01 - IMM-94
MISCELLANEOUS	MIS-01 - MIS-21
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VIRAL DISEASES	VVD-01 - VVD-54
WELFARE AND NUTRITION	AWN-01 - AWN-29



# BACTERIAL DISEASES

POSTER ABSTRACTS

## **BBD-PP-01**

### **TITLE**

OPTIMIZATION OF ANTIMICROBIAL TREATMENTS USING PHARMACODYNAMIC PARAMETERS FOR SWINE RESPIRATORY PATHOGENS UNDER FIELD CONDITIONS

Lorenzo Fraile<sup>1</sup>, Anna Vilaro<sup>2</sup>, Elena Novell<sup>2</sup>, Jordi Balielles<sup>2</sup>, Vicens Tarancon<sup>2</sup>

<sup>1</sup> *University of Lleida*

<sup>2</sup> *Grup de Sanejament Porcí (GSP)*

### **CONTENT**

#### Introduction

Antimicrobials (AB) are essential tools to control clinical outbreaks involving swine respiratory pathogens. The selective pressure exerted by these compounds could contribute to the emergence of antimicrobial resistant (AR) bacteria that may be decreased by choosing of the most suitable AB. There are many guidelines about AB but a more practical approach is urgently needed to put these recommendations into practice. The aim of this research work is to describe a method based on pharmacodynamic determination to select the most suitable AB for swine respiratory pathogens.

#### Material & Methods

Samples coming from respiratory clinical cases were cultured on suitable medium cultures. After 2-3 days of culture, colonies were selected and cultured again for identification and further analysis using VITEK 2 COMPACT system. Antimicrobial susceptibility tests for MIC determination were performed for a battery of twelve AB, using the broth microdilution method, according to CLSI guideline M31-A3 with modifications to automate the procedure (Thermofisher scientific proposal). This MIC value was used to select the most suitable antimicrobial taking into account also pharmacokinetic information, clinical breakpoints and recommendations published by the European Union about the different antimicrobial categories.

#### Results

The MIC value for 65 *Actinobacillus pleuropneumoniae* (APP) and 24 *Pasteurella multocida* strains was determined from January to October 2018. Both bacteria were highly susceptible to many families of antimicrobials with the exception of tetracyclines for both pathogens and amoxicillin for APP. This prediction was checked with clinical information from the field after applying the treatments.

#### Discussion & Conclusion

These results highlight the relevance of determining pharmacodynamic parameters (MIC) to optimize antimicrobial treatments in pig medicine. The generated information can justify an antimicrobial treatment for the present and future clinical cases if this epidemiological information is linked with the sow origin.

## **BBD-PP-02**

### **TITLE**

**REDUCTION OF NASAL LESIONS AND PRODUCTIVE LOSSES AFTER VACCINATION AGAINST NON-PROGRESSIVE ATROPHIC RHINITIS.**

ALMUDENA SÁNCHEZ MATAMOROS<sup>1</sup>, ORIOL BOIX MAS<sup>1</sup>, JOAN MOLIST BADIOLA<sup>1</sup>, ALBA MARTOS RAICH<sup>1</sup>

<sup>1</sup> *HIPRA*

### **CONTENT**

**Background and Objectives** The primary agent of non-progressive atrophic rhinitis (NPAR), *Bordetella bronchiseptica* (Bb), has a high prevalence worldwide. Nowadays, vaccination is regarded as one of the alternative methods for the prevention of bacterial diseases. The aim of the study was to demonstrate the efficacy of an inactivated vaccine against NPAR based on the reduction of nasal lesions and production losses in piglets during lactation and in the nursery period. **Material & Methods** A French farrow-to-finish pig herd with respiratory symptoms caused by Bb in the nursery was selected for a controlled clinical trial. Six pregnant sows were primo-vaccinated with RHINISENG® (Group V) following the manufacturer's instructions, while another six received PBS (Group NV). The parameters evaluated in the piglets of these sows were the NPAR nasal lesions at 6.1 weeks of age and individual body weight during the lactation and nursery period. **Results** The Bb agent was confirmed at the selection of the herd and during the trial. Piglets from Group NV presented significantly higher mean nasal lesion scores than Group V (3.17 vs 1.67). Regarding the productive parameters, the mean body weight per piglet tended to be higher in Group V both at weaning (6.35 kg vs. 6.03 kg) and at the end of the nursery period (28.19 kg vs. 27.31 kg). **Discussion & Conclusion** These results show that immunization of pregnant sows with RHINISENG® prior to farrowing allowed the protection of piglets against NPAR by reducing the nasal lesions associated with the disease. Moreover, vaccination showed a tendency to improve body weight; a larger size of the studied population might have improved the statistical significance of results. These results confirm similar experiences with the vaccine in previous trials. **Acknowledgements** The authors wish to thank Guilhem Poudevigne, Olivier Maniaval and UCAM staff for their technical support.

## **BBD-PP-03**

### **TITLE**

**STUDY OF ANTIBIOTIC RESISTANCE GENES AND VIRULENCE FACTORS IN PASTEURELLA MULTOCIDA STRAINS ISOLATED IN SPAIN**

Maximo Petrocchi<sup>1</sup>, César B. Gutiérrez Martín<sup>1</sup>, Juan Ignacio Méndez Hernández<sup>1</sup>, Elías F. Rodríguez Ferri<sup>1</sup>, Sonia Martínez Martínez<sup>1</sup>

<sup>1</sup> *University of León*

### **CONTENT**

**Background and objectives:** The study of the antibiotic resistance genes and the virulence factors on *Pasteurella multocida* isolates from porcine lungs recovered in Spain has been carried out.

**Material and methods:** The detection of the resistance genes to antibiotics was determined using PCR. A total of eight genes were tested. The resistance mechanisms induced by the expression of these genes were directed against three families of different antibiotics: tetracyclines,  $\beta$ -lactams and macrolides. The detection of genes codifying virulence factors was also conducted by PCR. A total of nine genes were analyzed.

**Results:** tetA and tetB are genes codifying resistances to tetracyclines. tetB was found in 51.3% of isolates but tetA was not found in any isolate. blaROB1 and blaTEM resistance genes to  $\beta$ -lactams were expressed in 35.9% and 10.3% of isolates, respectively. Finally, the expression of four resistance genes to macrolides was investigated. ermC, with 51.3%, and msrE, with 30.8% were the most broadly isolated genes. ermA was amplified in 20.5% of the isolates, while mphE was only found in 2.6% of them.

Two of the virulence genes, nanH and Oma87, were found in all isolates. ompH, ptfA and sodA were amplified in 94.9% of isolates, while hgbA was found in 92.3% of them. However, pfhA and toxA were only found in 28.2% and 15.4%, respectively, but tbpA was not detected in any isolate.

**Discussion and conclusion:** Most of the *P. multocida* tested in this study were resistant to tetracyclines because of tetA gene, while more than a third were to  $\beta$ -lactams because of blaROB1 gene. On the other hand, nanH, oma87, ompH, ptfA, sodA and hgbA virulence genes were amplified in all or most isolates.

## **BBD-PP-04**

### **TITLE**

ERADICATION OF TIAMULIN-RESISTANT SWINE DYSENTERY IN A 500 SOW HERD SELLING GROWERS TO FIVE HERDS

Per Wallgren<sup>1,2</sup>, Benedicta Molander<sup>3</sup>, Carl-Johan Ehlorsson<sup>4</sup>

<sup>1</sup> *National Veterinary Institute, SVA, Uppsala, Sweden*

<sup>2</sup> *Dept of Clinical Sciences, Sw Univ Agri Sci, Uppsala, Sweden*

<sup>3</sup> *Farm & Animal Health, Staffanstorp, Sweden*

<sup>4</sup> *Farm & Animal Health, Ängelholm, Sweden*

### **CONTENT**

#### Background

Tiamulin-resistant Swine dysentery (SD) developed in a herd with 500 sows in the summer of 2016, following a failing eradication attempt.

#### Materials & methods

SD was still sensitive to tylosin and tylvalosin. A new eradication attempt with extended biosecurity was made. Sows with low appetite or in poor condition were slaughtered. Each sow was estimated to weight 337 Kg and received 1.8 g tylvalosin (Aivlosin®) per os daily for seven days in a previously cleaned unit. Thereafter they were transferred to another cleaned and disinfected unit and treated for another 5 days

Dry sows were treated batchwise (n=7) from week 46 to week 51 in 2016. Units for dry sows, mating and farrowing were sanitised week 45-50. The first piglets born to sanitised sows were weaned week 1:2017. The last non-sanitised growers were sold (30 kg) week 6:2017. Weaner units were sanitised week 1-7.

Tiamulin-resistant SD was diagnosed in all 5 fattening herds that had received growers from the herd. These herds were sanitised after slaughter. All herds were monitored for SD with focus on diarrhoeic pigs.

#### Results

SD has not been diagnosed in the index herd for two years, nor in four of the five fattening herds. The fifth herd did was closed down.

#### Conclusion and discussion

SD was initially sensitive to tiamulin in the index herd. Tiamulin-resistant SD was probably induced by underestimating the weight of sows during the first eradication attempt and/or of growers for sale. SD was still sensitive to tylosin, but also known to rapidly develop tylosin-resistance. Therefore, an extended eradication program in which it was ensured that every sow would get a high dose of tylvalosin was rapidly effectuated. At present, SD has not been diagnosed for two years, and the eradication appear successful. Thus, Sweden again hopefully is free from tiamulin-resistant SD.

## **BBD-PP-05**

### **TITLE**

COMPARISON OF THE EFFICACY BETWEEN A ONE SHOT VACCINE AND A TWO-SHOT VACCINE AGAINST MYCOPLASMA HYOPNEUMONIAE ON THE RESPIRATORY DISORDERS AND THE GROWTH PERFORMANCES IN A FIELD TRIAL IN FRANCE.

DOMINIQUE MARCHAND<sup>1</sup>, ALEXIS NALOVIC<sup>1</sup>, NATHALIE CAPDEVIELLE<sup>2</sup>, SOPHIE BRILLAND<sup>2</sup>

<sup>1</sup> RESEAU CRISTAL 16 bd denis papin 35500 Vitré

<sup>2</sup> CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE

### **CONTENT**

Enzootic pneumonia (EP) caused by *Mycoplasma hyopneumoniae* (Mhyo) remains one of the major respiratory diseases of pigs leading to a degradation of the growth performances. Vaccination is commonly used around weaning and considered as the most efficient strategy to control EP. The aim of this trial was to compare the effect of a single shot vaccine with a two-shot vaccine against *Mycoplasma hyopneumoniae* in farm condition.

A farrow-to-finish farm of 300 sows, located in the West of France in a 5-batches management and with chronic coughs in fattening was selected for the trial. 530 piglets were randomly assigned into the two groups at one week of age and vaccinated either at four weeks of age (G1 = 229) with a one shot vaccine (Hyogen) or at one and four weeks of age (G1 = 239) with a two-shot vaccine. All pigs were kept under the same conditions. The efficacy of vaccination was evaluated through zootechnical parameters such as the Average Daily Gain (ADG) and mortality, associated with lung scoring using the CLP methodology.

The percentage of losses was 5.5% (13 pigs in each group). There was no statistical difference between the average Madec lung score (G1 = 1.9 versus G2 = 1.7). The percentage of healthy lungs was 52% and 56 % for G1 and G2 respectively (no statistical difference). Hyogen group showed less scars: 18% of lung affected against 26 % for the two-shot group (p-value = 0,07). The growth performances were similar between the two groups with an ADG of 791g.

In a challenging context, facing high pressure of pathogens (*Actinobacillus pleuropneumoniae* and Influenza virus) in the fattening period, the vaccination with a one shot vaccine (Hyogen) provides similar benefits in terms of respiratory health and growth performances than a two-shot vaccine while reducing the number of injections.

## **BBD-PP-06**

### **TITLE**

FIELD STUDY COMPARING AIVLOSIN® PREMIX WITH DENAGARD 80% IN BRAZILIAN PIGS NATURALLY INFECTED WITH MYCOPLASMA HYOPNEUMONIAE AND LAWSONIA INTRACELLULARIS.

Ronie W Pinheiro<sup>1</sup>, Bruno Zinato Carraro<sup>1</sup>, Jose Antonio Caon Ferreira<sup>2</sup>, Jordi Mora<sup>2</sup>

<sup>1</sup> *Integrall Soluções em Produção Animal Ltda. Rua Tenente Bino, 22 /303. Patos de Minas, MG. Brazil;*

<sup>2</sup> *ECO Animal Health Ltd, Southgate, London, UK*

### **CONTENT**

This study compared treatment with a novel, macrolide premix with a pleuromutilin premix in a Brazilian pig unit with respiratory problems in grower/finisher pigs. Pigs were positive for *Mycoplasma hyopneumoniae* and secondary respiratory pathogens. Material and methods 1,200 weaners (22 days of age) were allocated randomly to one of two treatment groups: T1 - Aivlosin® Premix (42.5 mg/g Premix for Medicated Feeding Stuff for Pigs, ECO Animal Health Ltd.) - 42.5 ppm in-feed (to provide 2.125 mg tylvalosin/kg BW/day) T2 - Denagard® 80% Premix (Elanco) - 150 ppm in-feed (to provide 7.5 mg tiamulin/kg BW/day) Treatments were given at 30-44, 65-79 and 120-134 days of age. Health and performance parameters were measured over two periods, 22-56 (nursery) and 22-154 (nursery and finishing) days of age. Coughing scores, percentage mortality, percentage pigs sent to the infirmary, Weight Gain, Average Daily Gain and Feed Conversion Ratio (FCR) were measured. Lung scores (Goodwin method) were performed on 240 pigs randomly chosen at slaughter. Results In the nursery, pigs in T1 had significantly ( $p < 0.05$ ) better weight gain than pigs in T2, gaining 413 grams/12.1 grams/day more. There were no differences ( $p > 0.05$ ) for FCR. Pigs in T1 gained 1.82 kgs more ( $p = 0.04$ ) than pigs in T2 in nursery and finishing. Pigs in T1 had lower percentage pneumonic lungs (43% vs 54%), lower lung lesion scores (7.31 vs 9.17) and significantly lower percentage of lung abscesses (0 vs 4.17%). There were no other significant differences. Conclusion Pigs in T1 had lower lung scores, percentage of pneumonic lungs and significantly lower prevalence of lung abscesses than pigs in T2. Pigs in T1 had lower FCR and gained more weight in the nursery and wean to finish stages, while using 28% of the amount of antimicrobial of pigs in T2. ®Aivlosin is a registered trademark of ECO Animal Health Ltd., London, United Kingdom® Denagard is a trademark of Elanco, Indianapolis, USA



## **BBD-PP-07**

### **TITLE**

EVALUATION OF THE EFFICACY OF A PRE-FARROWING TREATMENT WITH AIVLOSIN® ORAL POWDER TO PREVENT VERTICAL TRANSMISSION OF MYCOPLASMA HYOPNEUMONIAE

Jose Antonio Pecero<sup>1</sup>, Carlos Lasa<sup>2</sup>, Josep Homedes<sup>2</sup>, Jordi Mora<sup>3</sup>, Francisco Javier Gomez<sup>2</sup>

<sup>1</sup> NUGEST, *Nutrición y Gestión S.L*

<sup>2</sup> ECUPHAR *Veterinaria S.L.U*

<sup>3</sup> ECO *Animal Health Ltd, Southgate, London, UK*

### **CONTENT**

#### Objective

It is widely accepted that sows, mainly first and second parity, play a major role in the transmission of *Mycoplasma hyopneumoniae* (M. hyo) to piglets. This trial's objective was to evaluate pre-farrowing sow treatment with Aivlosin® 42.5 mg/g Oral Powder for Pigs (ECO Animal Health, Ltd.) on vertical transmission of M. hyo.

#### Material and methods

The trial was conducted on an 850-sow farrow-to-finish unit with a history of M. hyo. Thirty-three pregnant, first and second parity sows were separated into two groups:

1: Aivlosin® 42.5 mg/g Oral Powder, top-dressed onto feed (intended to deliver 2.125mg tylvalosin/kg BW) per day for 7 days pre-farrowing (17 sows)

2: Control: no medication (16 sows)

Oropharyngeal swabs were collected from each sow seven days pre-farrowing, immediately after farrowing and at weaning for rtPCR of M. hyo.

Cross-fostering of piglets was minimised and only allowed within each treatment group.

Nasal swabs from piglets were collected at weaning for rtPCR of M. hyo. Swabs were pooled into 5-6 piglets per litter; if positive, each swab was analysed individually.

#### Results

Aivlosin®-treated sows had M. hyo prevalence of 21.43% at farrowing and 14.29% at weaning. The untreated sows had M. hyo prevalence of 18.75% at both farrowing and weaning.

At weaning, M. hyo prevalence in piglets from Aivlosin®-treated sows was 16.67% while in piglets from untreated sows 36.48%. This difference was statistically significant using the Chi-square test ( $p < 0.001$ ).

#### Conclusion

This trial demonstrates that Aivlosin® Oral Powder pre-farrowing reduced M. hyo prevalence in sows at farrowing and weaning compared to untreated controls. The M. hyo prevalence in the offspring of the Aivlosin®-treated sows was reduced by more than 50% at weaning compared to the untreated control sows, suggesting reduced vertical transmission of M. hyo.

®Aivlosin is a registered trademark of ECO Animal Health Ltd., London, United Kingdom

## **BBD-PP-08**

### **TITLE**

ANTIMICROBIAL SUSCEPTIBILITY MONITORING OF RESPIRATORY TRACT PATHOGENS ISOLATED FROM DISEASED SWINE ACROSS EUROPE BETWEEN 2015 AND 2016

Ulrich Klein<sup>1</sup>, Anno de Jong<sup>1</sup>, Pascal Butty<sup>1</sup>, Markus Rose<sup>1</sup>, Hilde Moyaert<sup>1</sup>, Pieter Jan Serreyn<sup>1</sup>, Shabbir Simjee<sup>1</sup>, Myriam Youala<sup>1</sup>, Farid El Garch<sup>1</sup>, Thais Vila<sup>1</sup>, Beata Truszkowska<sup>1</sup>, Ian Morrissey<sup>2</sup>

<sup>1</sup> *VetPath Study Group, CEESA, 168 Av. de Tervueren, 1150 Brussels, Belgium*

<sup>2</sup> *IHMA Europe Sarl, Monthey/VS, CH*

### **CONTENT**

**Background:** VetPath is an ongoing pan-European antimicrobial susceptibility monitoring program for veterinary pathogens isolated from diseased cattle, swine and poultry. Results for swine respiratory pathogens are presented hereafter.

**Material & Methods:** Lung or nasal samples were collected from animals with acute clinical signs of respiratory disease, not recently treated with antibiotics, in 8 EU countries. Among other bacterial species, *Actinobacillus pleuropneumoniae* (Ap), *Bordetella bronchiseptica* (Bb) and *Pasteurella multocida* (Pm) were isolated (one isolate per species/farm/outbreak). Susceptibility to 21 commonly used antibiotics was determined in a central laboratory by broth micro-dilution as per CLSI standards. Results were interpreted using CLSI clinical breakpoints (VET08, 2018) where available.

**Results:** Overall 415 isolates were recovered.

The majority of the 164 Ap isolates were susceptible to antibiotics for which a CLSI clinical breakpoint is available. Susceptibilities were as follows: tetracycline 70.1%, tilmicosin 80.5%, tiamulin 95.1%, enrofloxacin 97.6%, tulathromycin 98.8%, ceftiofur 100% and florfenicol 100%. Similar MIC ranges (0.008 to 8mg/l) were determined for the tested fluoroquinolones with mono-modal MIC distribution patterns.

Susceptibility of the 171 Pm isolates to ceftiofur and tilmicosin was 100%, while susceptibility to penicillin, enrofloxacin, florfenicol and tulathromycin ranged from 96.5 to 99.4%. Tetracycline resistance was 10.5%. Similar MIC ranges with mono-modal distribution patterns were observed for the tested fluoroquinolones (0.004 to 2mg/l).

The susceptibility of the 80 tested Bb isolates to tulathromycin was 100%. Resistance of Bb to florfenicol (52.5%) was identified. MIC<sub>90</sub> ranges of 1.0 to 4.0 mg/l were determined for danofloxacin, doxycycline, enrofloxacin, gamithromycin, marbofloxacin and tetracycline.

**Conclusions:** These results show a low prevalence of antimicrobial resistance among the major respiratory tract pathogens isolated from diseased non-treated swine across the EU.

## **BBD-PP-09**

### **TITLE**

ANTIMICROBIAL SUSCEPTIBILITY MONITORING OF SYSTEMIC PATHOGENS AND ENTERIC TRACT PATHOGENS ISOLATED FROM DISEASED SWINE ACROSS EUROPE BETWEEN 2015 AND 2016

Ulrich Klein<sup>1</sup>, Anno de Jong<sup>1</sup>, Pascal Butty<sup>1</sup>, Markus Rose<sup>1</sup>, Hilde Moyaert<sup>1</sup>, Pieter Jan Serreyn<sup>1</sup>, Shabbir Simjee<sup>1</sup>, Myriam Youala<sup>1</sup>, Farid El Garch<sup>1</sup>, Thais Vila<sup>1</sup>, Beata Truszkowska<sup>1</sup>, Ian Morrissey<sup>2</sup>

<sup>1</sup> *VetPath Study Group, CEESA, 168 Av. de Tervueren, 1150 Brussels, Belgium*

<sup>2</sup> *IHMA Europe Sarl, Monthey/VS, CH*

### **CONTENT**

**Background:** VetPath is an ongoing pan-European antimicrobial susceptibility monitoring program for veterinary pathogens isolated from diseased cattle, swine and poultry. Results for swine systemic and enteric pathogens are presented hereafter.

**Materials & Methods:** Lung, central nervous system, joint fluid, nasal or enteric samples were collected from animals with acute clinical signs, not recently treated with antibiotics, in 8 EU countries. Among other bacterial species, *Haemophilus parasuis* (Hp), *Streptococcus suis* (Ss) and *Escherichia coli* (Ec) were isolated (one isolate per species/farm/outbreak). Susceptibility to 21 commonly used antibiotics was determined in a central laboratory by broth micro-dilution as per CLSI standards. Results were interpreted using CLSI clinical breakpoints (VET08, 2018) where available.

**Results:** Overall 448 isolates were recovered.

The majority (78%) of the antibiotics tested against the 49 Hp isolates showed MIC<sub>90</sub> values of 0.06 to 2.0 mg/l with mono-modal MIC distribution patterns. For Hp no clinical breakpoints are available. The MIC<sub>90</sub> values ranged from 0.06 to 0.25 mg/l for ceftiofur, danofloxacin, enrofloxacin, marbofloxacin, cefquinome and penicillin/streptomycin. MIC<sub>90</sub> values of 1.0 to 4.0 mg/l were determined for amoxicillin, gamithromycin, tetracycline, trimethoprim/sulfamethoxazole (TMS), tulathromycin, tiamulin and tilmicosin.

Susceptibilities of the 131 tested Ss isolates were determined for enrofloxacin (93.1%), florfenicol (88.6%) and penicillin (89.3%). MIC<sub>90</sub> ranges of 0.06 to 1.0 mg/l were determined for amoxicillin, amoxicillin/clavulanic acid (AMC), cefquinome, ceftiofur, danofloxacin, enrofloxacin, marbofloxacin, penicillin and penicillin/streptomycin.

268 Ec isolates showed susceptibility to AMC of 91.8% and 86.2% for gentamicin. Resistance of Ec isolates to TMS (60.8%) and tetracycline (69.8%) were determined. MIC<sub>90</sub> ranges of 4.0 to 16.0 mg/l were determined for AMC, colistin, danofloxacin, enrofloxacin, marbofloxacin and gentamicin.

**Conclusions:** The results show a low prevalence of antimicrobial resistance among the major systemic and enteric tract pathogens isolated from diseased non-treated swine across the EU.

## **BBD-PP-10**

### **TITLE**

**SURVEY ON MYCOPLASMA HYOPNEUMONIAE GILT ACCLIMATION PRACTICES IN GERMANY**

Elisabeth Streckel<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim Vetmedica GmbH*

### **CONTENT**

#### **Background and Objectives**

Gilts play a key role in the infection chain of *Mycoplasma hyopneumoniae* (M.hyo), as an adequate gilt acclimation is necessary for a comprehensive control approach. The aim should be to decrease M. hyo shedding by the gilt at first farrowing and thereby decrease M. hyo colonisation in piglets at weaning as well as subsequent respiratory symptoms in fattening pigs. The objective of this study was to understand the gilt acclimation process for M. hyo in Germany.

#### **Materials and Methods**

A survey of 24 questions was answered by 61 veterinarians with regard to a representative farm of their region. These 61 farms represent approximately 42600 sows from 9 German regions.

#### **Results**

- Most farms (49%) have 201-500 sows and a replacement rate of 30-35% (in 44%) or 36-40% (in 30%). There is only a minority with a replacement rate below 30% (7%) or above 40% (19%).
- 75% purchase gilts from an external source, 2% have a mixed replacement and 23% have an own replacement.
- Even though almost all farms are M. hyo positive, 36% are purchasing M. hyo negative gilts. 45% purchase gilts from M. hyo positive sources, and the remaining 19% do not know the status of the gilts. Only 6% control the status of incoming gilts.
- 57% have a special M. hyo acclimation strategy, while 43% do not. The most common strategy is vaccination and the contact to naturally M. hyo infected pigs.

#### **Discussion**

The survey identified important factors that should be considered regarding M. hyo control. M. hyo positive farms that introduce negative gilts need special care. Vaccination can be a crucial factor in the improvement of M. hyo gilt acclimation. Acclimation strategies are irreplaceable for a comprehensive M. hyo control approach.

## **BBD-PP-11**

### **TITLE**

**SURVEY OF THE SOUTH AFRICAN SWINE INDUSTRY ON MYCOPLASMA HYOPNEUMONIAE GILT ACCLIMATION**

Bianca Voigts<sup>1</sup>, Michelle Benade<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim*

### **CONTENT**

#### **BACKGROUND /OBJECTIVES**

The introduction of replacement gilts and their management is considered a risk factor in the control of M.hyo. The objective of this survey was to understand the replacement gilt acclimation process for M.hyo in swine farms in South Africa.

#### **MATERIALS /METHODS**

A survey comprising of 14 questions was developed by Boehringer Ingelheim to identify risk factors for M.hyo control and current methods used in gilt acclimation. The survey was completed by 9 veterinarians of M.hyopneumoniae positive sow farms, representing 68 198 sows (approximately 62% of the mentioned sow inventory) from all nine provinces of South Africa. The average herd size was 897 sows.

#### **RESULTS**

The most important findings were:

- 67% of respondents felt that an appropriate acclimation protocol is very important to control M.hyo
- 66% of replacements are M.hyo positive on arrival
- 41% of the producers introduce replacement animals after 16 weeks of age.
- 54% use vaccines against M.hyo during the acclimation process
- 18% use young pigs and 7% use cull sows during the acclimation process.
- 85% of acclimation sites are continuous flow
- 89% feel that acclimation is started on time
- 49% use antibiotics during the acclimation process
- In 82% of farms, the stability is assessed based on the evaluation of clinical signs and lung lesion scores
- 38% of veterinarians feel that their gilt acclimation protocol is ideal.

#### **DISCUSSION**

67% of veterinarians felt that a proper gilt acclimation program is important in the control of M.hyo and the stability of their farms. Although 80% of veterinarians believe their acclimation protocol keeps the herd stable for M.hyo, verification of adequate acclimation is not performed by diagnostics. Therefore, some opportunities for further work would include developing protocols for early and efficient exposure methods as well as exposure validation techniques.

## **BBD-PP-12**

### **TITLE**

CASE REPORT: AN OUTBREAK OF FIBRINO-HEMORRHAGIC AND NECROTIZING PLEUROPNEUMONIA DUE TO PASTEURELLA MULTOCIDA IN A FATTENING BREEDING FARM

Giorgia De Lorenzi<sup>1</sup>, Gianni Barbieri<sup>2</sup>, Yuri Gherpelli<sup>1</sup>, Lucia Gibelli<sup>1</sup>, Chiara Magistrali<sup>3</sup>, Giovanni Pangallo<sup>1</sup>, Andrea Luppi<sup>1</sup>

<sup>1</sup> *Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna, Italy*

<sup>2</sup> *PROGEO, Reggio Emilia, Italy*

<sup>3</sup> *Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche, Italy*

### **CONTENT**

#### Background and Objectives

Respiratory diseases cause important economic losses in pig farms and *Pasteurella multocida* is one of most commonly isolated agent from pulmonary lesions in pigs. Generally *P. multocida* is considered a secondary opportunistic agent of enzootic pneumonia, but in addition it can cause fibrino-hemorrhagic and necrotizing pleuropneumonia (*A. pleuropneumoniae*-like lesions). This case report describes the anatomo-pathological presentation and the investigation performed in 3 pigs with fibrino-hemorrhagic and necrotizing pleuropneumonia.

#### Material & Methods

In August 2017 an outbreak of a respiratory disease was observed in a fattening farm (1870 pigs), located in Northern Italy, and involved pigs from 40 kg BW until the slaughter weight. The main clinical sign was cough with 100% of morbidity. Three pigs dead with respiratory symptoms were sent to the IZSLER lab (Reggio Emilia) for diagnostic investigations (necropsy, gross lesions evaluation, bacteriology and histopathology and PCRs for PRRSV and SIV).

#### Results

At necropsy fibrino-hemorrhagic and necrotizing pleuropneumonia was observed and *Pasteurella multocida* strains were isolated from all lungs. The strains were characterized by multiplex PCR to detect capsular type and virulence factors. *P. multocida* capA, positive for filamentous haemoagglutinin (pfhA+) was detected. PCRs for PRRSV and SIV resulted negative.

Histopathology showed a fibrino-hemorrhagic and necrotizing pleuropneumonia with hyperemia, edema and abundant necrotic cell debris with "oat cells" in the alveoli.

#### Discussion & Conclusion

The present case report describes an outbreak of fibrino-hemorrhagic and necrotizing pleuropneumonia due to *P. multocida* in a fattening breeding farm. As described in other studies *P. multocida* capA strains are most frequently involved in respiratory disease, while pfhA is related to the pathogenicity of *P. multocida*, with some strains associated to *A. pleuropneumoniae*-like lesions. The different outcome of *P. multocida* infection may indicate possible genetic and virulence differences between isolates, suggesting the need of further investigations about this subject.

## **BBD-PP-13**

### **TITLE**

ANALYSIS OF THE SUBMISSION FOR DIAGNOSTIC INVESTIGATION OF DIARRHOEA SAMPLES FROM SUCKLING PIGLETS IN THE NETHERLANDS IN THE PERIOD FROM SEPTEMBER 2015 TO OCTOBER 2018

Peter van der Wolf<sup>1</sup>, Verena Schüler<sup>2</sup>, Emile Libbrecht<sup>1</sup>, Marlies Olde Monnikhof<sup>1</sup>

<sup>1</sup> *IDT-Biologika Benelux*

<sup>2</sup> *IDT-Biologika GmbH*

### **CONTENT**

We present the analysis of diarrhoea samples from new born piglets gathered by veterinarians and analysed at IVD GmbH, Innovative Veterinary Diagnostics, Seelze, Germany. IDT-sampling kits containing 3 swabs and 3 sample tubes were used.

Analysis was done for Rotavirus type-A and from October 2017 also type-C, Coronaviruses ( PED, TGE) Escherichia (E.) coli, Clostridium perfringens type A (CpA) and C, Clostridium difficile and alpha-haemolytic Streptococci, differentiated by PCR to Enterococcus (E.) durans and E. hirae. Viruses and attachment factors and toxins of E. coli were detected by PCR, as were the toxin genes of Clostridium. Production of toxins of CpA was detected by immunoblot.

345 samples in a total of 114 submissions came from piglets aged less than 5 days old: 0 days: 0.9%, 1 day: 12%, 2 days: 26%, 3 days: 38%, 4 days: 18% and 0 – 7 days: 1.8%. No PED, nor TGE was found.

532 E. coli were isolated: 14.3% haemolytic and 85.7% non-haemolytic. 265 were typed and 50 were pathogenic E.coli (19%): 16 EPEC, 20 ETEC and 14 UPEC.

Rotavirus A was found in 12 (14%) out of 85 submissions. 28 submissions were tested for A and C and 22 (79%) were positive either for type A and/or type C: 5 A+/C-, 3 A-/C+, 14 A+/C+.

Out of 114 submissions, Cp was found in at least one sample in 103 submissions (90%). Of 322 samples tested 224 were positive (70%). 174 isolates were typed: 173 CpA and 1 CpC were found. 116 CpA were tested for alfa- and beta2-toxins: 21 alfa-/beta2-, 34 alfa-/beta2+, 20 alfa+/beta2- and 41 alfa+/beta2+.

74 submissions were tested for alpha-haemolytic Streptococci: in 24 samples of 23 submissions large numbers of E. hirae were found.

Often, more than one pathogenic organism can be found in diarrhoea samples from new borne piglets.

## **BBD-PP-14**

### **TITLE**

COMPARISON OF METABOLIC ADAPTATION AND BIOFILM FORMATION OF ACTINOBACILLUS PLEUROPNEUMONIAE FIELD ISOLATES FROM THE UPPER AND LOWER RESPIRATORY TRACT

Doris Aper<sup>1</sup>, Janna Frömbling<sup>2</sup>, Murat Bagcioglu<sup>2,3</sup>, Monika Ehling-Schulz<sup>2</sup>, Isabel Hennig-Pauka<sup>1</sup>

<sup>1</sup> *Field Station for Epidemiology, University of Veterinary Medicine Hannover, Bakum, Germany*

<sup>2</sup> *Institute of Microbiology, Department of Pathobiology, University of Veterinary Medicine Vienna, Austria*

<sup>3</sup> *Institute for Food Safety and Hygiene, Vetsuisse Faculty, University of Zurich, Switzerland*

### **CONTENT**

#### Background and Objectives

Most outbreaks of porcine pleuropneumonia in swine populations are triggered by additional abiotic or biotic factors in already colonized pigs. It can be hypothesized, that most of the older pigs carry the pathogen in their tonsils, at which stressors might activate infection. As it was shown before, *Actinobacillus pleuropneumoniae* strains of the same genotype develop a metabolic adaptation depending upon the sampled tissue either in the lower or in the upper respiratory tract in the early stage of infection, at which the oxygen availability might be decisive.

#### Material & Methods

In this study, pairs of *A. pleuropneumoniae* isolates were recovered from tonsillar as well as lung tissue from 20 pigs suffering from acute clinical signs of pleuropneumonia and showing characteristic pathological lung alterations. Metabolic adaptation of the isolates to the porcine upper and lower respiratory tract was investigated using Fourier-Transform Infrared (FTIR-) spectroscopy as a high resolution metabolic fingerprinting method. The *A. pleuropneumoniae* isolates were also tested for biofilm production using a microtiter plate assay.

#### Results

The 32 strains belonging to serotype (ST) 2 showed metabolically adaptations to the organ tissue similar to those previously observed under experimental conditions (Sassu et al., 2017). Almost all strains showed biofilm formation, but no difference in the biofilm production was found between the lung and tonsillar isolates. However, isolates belonging to ST 2, 5, 6 and 9/11 showed differences in biofilm production.

#### Discussion & Conclusion

Our study supported, that *A. pleuropneumoniae* field isolates are generally able to form biofilms, although in a serotype specific manner.



## **BBD-PP-15**

### **TITLE**

**ANALYSIS OF 719 STREPTOCOCCUS SPECIES STRAINS GAINED FROM DISEASED PIGS SHOWING STREPTOCOCCUS SUIIS-LIKE SYMPTOMS IN 2017**

Carina Helmer<sup>1</sup>, Henning Lindhaus<sup>1</sup>, Klaus Teich<sup>1</sup>, Maria Hoegemann<sup>1</sup>, Theresa Menke<sup>1</sup>, Jennifer Haneke<sup>1</sup>, Martin Liman<sup>1</sup>

<sup>1</sup> *AniCon Labor GmbH, Muehlenstrasse 13, 49685 Hoeltinghausen, Germany*

### **CONTENT**

#### Background & Objectives

The Streptococcus (Strep.) genus comprises several pathogens that pose a serious threat to human and animal health. Among these, Strep. suis is the most important species affecting swine worldwide. The infection can result in meningitis, pneumonia, arthritis, endocarditis, septicaemia, abscesses and sudden death. However, several other Strep. species can infect swine and cause similar severe clinical manifestations.

#### Material & Methods

A total of 719 Strep. suis-like isolates obtained from pigs with clinical signs of meningitis, arthritis, pneumonia, pleuritis, peritonitis, dermatitis, pericarditis, metritis, urinary tract infections and septicaemia were studied originating from 10 different countries. Swabs taken from affected organs were spread out on blood agar plates and incubated for 24h at 37°C. Species confirmation was performed by MALDI-TOF mass spectrometry (MS). Serotyping of Strep. suis was performed by PCR. Additionally, species differentiation of Strep. canis and Strep. dysgalactiae was performed by 16S rDNA sequencing.

#### Results

The MALDI-TOF MS analysis identified 567 isolates (79%) as Strep. suis followed by Strep. dysgalactiae (15%, n=110) and Strep. alactolyticus (2%, n=15). Moreover, the following Strep. species were detected in descending order: Strep. porcinus (n=7), Strep. hyovaginalis (n=6), Strep. gallolyticus (n=5), Strep. orisratti (n=4), Strep. hyointestinalis (n=2), Strep. thoraltensis (n=2), Strep. epidermidis (n=1). The predominant Strep. suis serotypes identified were serotypes 2 or 1/2 (30%), 9 (23%), 7 (9%), 1 or 14 (7.5%) and 4 (5%).

#### Discussion & Conclusion

This study confirms that Strep. suis is the most dominant Strep. species found in diseased pigs in 2017. Of these, serotype 2 was found to be the most prevalent, followed by serotype 9 and 7. However, other Strep. species as Strep. dysgalactiae could also frequently be isolated from diseased pigs. Hence, a broad range of Strep. species should be taken into account as possible differential diagnosis in case of S. suis-like symptoms.

## **BBD-PP-16**

### **TITLE**

**HIGH FREQUENCY OF SWINE HEMOTROPHIC MYCOPLASMAS IN SOWS IN SOUTHERN BRAZIL**

Igor Renan Honorato Gatto<sup>1</sup>, Karina Sonálio<sup>1</sup>, Renan Bressiani do Amaral<sup>1</sup>, Kayo José Garcia de Almeida Castilho Neto<sup>1</sup>, Nelson Morés<sup>2</sup>, Osmar Antônio Dalla Costa<sup>2</sup>, Marcos Rogério André<sup>1</sup>, Luís Guilherme de Oliveira<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

<sup>2</sup> *Brazilian Agricultural Research Corporation, Embrapa Swine & Poultry, Concórdia, Santa Catarina, Brazil*

### **CONTENT**

Background and objective: *Mycoplasma suis* and *Mycoplasma parvum* are the two hemotrophic mycoplasmas species described in pigs. Therefore, the present study aimed to investigate the prevalence of *M. suis* in sows in southern Brazil. Material & Methods: In total, 429 whole blood samples were sampled from 53 different herds in Santa Catarina State. DNA extraction was performed from whole blood samples using a manufactured protocol. DNA samples were submitted to a quantitative real-time (q)PCR for *M. suis* based on 16S rRNA gene. DNA samples exhibiting positive results in qPCR for the 16S rRNA gene were submitted to cPCR for *M. suis* based on 16S rRNA gene targeting two fragments (~800bp each fragment). Amplified products were purified and sequenced using the Sanger method. Results: Briefly, *M. suis* was detected in 79.72% of the samples and all herds were positive. Three amplicons were selected by sequencing. The identity ranged from 99 to 100% with *M. suis* and *M. parvum* by BLASTn. Discussion & Conclusion: The prevalence of *M. suis* in Brazil raised in the last 10 years. Regarding our results, it is possible that most of the tested animals were chronic carriers of the agent, and may act as sources of infection for arthropod vectors, as well as fomites. In conclusion, the prevalence of *M. suis* is high in sow herds in southern Brazil, and this is the first molecular detection of coinfection with *M. suis* and *M. parvum* in Brazil.

## **BBD-PP-17**

### **TITLE**

**BRACHYSPIRA HYODYSENTERIAE; A GERM IN TRANSITION?**

Eveline Willems<sup>1</sup>, Marc Martens<sup>1</sup>, Manon Houben<sup>2</sup>, Karien Koenders<sup>3</sup>

<sup>1</sup> *Topigs Norsvin International B.V., Vught, The Netherlands*

<sup>2</sup> *GD Animal Health, Deventer, The Netherlands*

<sup>3</sup> *Topigs Norsvin Nederland B.V., Vught, The Netherlands*

### **CONTENT**

#### Background and Objectives

Brachyspira hyodysenteriae infections are internationally known for their substantial economic losses in the pig industry. Topigs Norsvin tests fecal samples via PCR in their health monitoring system in addition to the observance for clinical signs. As some unexpected positive PCR results, in herds with no clinical signs, were found in the last years in Western Europe, it was decided to gather more information to better understand these non-clinical a modern Brachyspira hyodysenteriae infections.

#### Material & Methods

To confirm a positive PCR result in the monitoring additional samples were collected in a multiplication farm with 300 sows. Thirty samples we tested by an in-house NOX gene based RT-PCR (cut-off level CT-value 40), at GD Animal Health. Four individual animals were selected for postmortem examination. Four intestinal samples from post mortems and five additional fecal samples from other animals from the herd were send to TIHO (Germany) for culture. Positive culture samples were send for full genome sequencing to APHA-lab in Weybridge (UK).

#### Results

The initial positive monitoring sample had a CT-value of 38. Eight out of thirty additional samples were positive in the PCR. CT-values varied between 34 and 39. Macroscopic and histologic examination of four selected animals (by PCR result) showed no typical lesions for Brachyspira infections. In intestinal samples of two animals and in one fecal sample weakly hemolytic Brachyspira hyodysenteriae was detected by culture. Results of the full-genome sequence are not yet available.

#### Discussion & Conclusion

Whether this Brachyspira infection without disease or lesions is related to the herd circumstances or this infection is caused by a different subtype of Brachyspira hyodysenteriae appearing to be less pathogenic is not known yet. Further clarification of non-clinical Brachyspira hyodysenteriae infections could come from full genome sequencing currently being performed.

## **BBD-PP-18**

### **TITLE**

**IN VIVO EFFECTIVENESS OF INJECTABLE ANTIBIOTICS ON THE RECOVERY OF ACUTE ACTINOBACILLUS PLEUROPNEUMONIAE INFECTED PIGS**

Vasileios Papatsiros<sup>1</sup>, Eleni Tzika<sup>2</sup>, Panagiotis Tassis<sup>2</sup>, Labrini Athanasiou<sup>1</sup>, Serafeim Chaintoutis<sup>3</sup>, Georgios Christodouloupoulos<sup>1</sup>

<sup>1</sup> *Clinic of Medicine, Faculty of Veterinary Medicine, School of Health Sciences, University of Thessaly,*

<sup>2</sup> *Farm Animal Clinic, School of Veterinary Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki, Thessaloniki, Greece*

<sup>3</sup> *Diagnostic Laboratory, School of Veterinary Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki, Thessaloniki, Greece*

### **CONTENT**

#### **Background and Objectives**

*Actinobacillus pleuropneumoniae* (App) is one of the most important bacterial respiratory pathogens in pig, involving in porcine respiratory disease complex (PRDC). The aim of this trial was to evaluate the in vivo effectiveness of one and two shot injectable antibiotics on recovery of acute App infected pigs.

#### **Material & Methods**

The study was performed on a commercial 400-sow farrow-to-finish farm, with a previous history of PRDC outbreak due to acute App infection. The App infection was confirmed by PCR in nasal swabs and lung tissue samples before the beginning of the trial. Ninety post-weaners showing severe clinical signs of PRDC were divided in two groups: a) T1: one shot of gamithromycin, and b) T2: two shot of florfenicol. D0 was the same day for pigs in the same block. Morbidity/mortality, clinical scores (clinical appearance score-CAS, clinical respiratory score-CRS, clinical cough score-CCS, general respiratory clinical score-CRS, general clinical score-GCS) and body temperature score (BTS) were recorded from D0 to D3, as well as on D7 and D14. The post-treatment interval (PTI), carcass weight and lung scoring (pleurisy evaluation system score -SPES, lung lobes score-LLS, pneumonia area-PA) were also estimated, based on slaughterhouse

#### **Results**

Both tested antibiotics were efficacious for the recovery of acute App affected pigs. Quicker improvement of BTS in sick pigs (D1 and D2) and quicker recovery of clinical signs, based on the improvement of clinical parameters (CAS, CCS, GCRS, GCS at D2 and D3 and CRS at D2), were noticed in T1 group. No difference was observed on D7 and D14, as well on PTI, carcass weight and lung scoring.

#### **Discussion & Conclusion**

The tested two antibiotics are efficacious, with treatment success more than 90%. In conclusion, the use of tested antibiotics in acute App affected pigs is an effective control strategy.

## **BBD-PP-19**

### **TITLE**

PCR DETECTION OF MYCOPLASMA HYOPNEUMONIAE ASSOCIATED WITH PROCESSING FLUIDS: A NEW MONITORING TOOL?

Carles Vilalta<sup>1</sup>, Juan Sanhueza<sup>1</sup>, Deb Murray<sup>2</sup>, Maria Pieters<sup>1</sup>

<sup>1</sup> *Veterinary Population Medicine Department, University of Minnesota, USA*

<sup>2</sup> *New Fashion Pork, Jackson, MN, USA*

### **CONTENT**

#### Background and objectives

*Mycoplasma hyopneumoniae* (Mhp) has economic implications for the swine industry, mostly in the growing finisher stage. The breeding herd and more specifically transmission in the farrowing room play a role in Mhp prevalence of the growing phase. Young parity sows are usually major shedders of the bacterium.

The use of processing fluids (PF) to detect and monitor viruses in the breeding herd is increasing among producers and veterinarians due to the ease of collection and low costs compared to other sampling types. However, the use of PF for detection of bacterial infectious agents endemic to the sow farm, such as Mhp, has not been investigated. Here we investigate the unusual report of detection of Mhp in the PF in a Mhp positive breeding herd.

#### Material & Methods

A sow farm with a history of Mhp infection in the downstream flow pigs and a RT-PCR positive in PF was selected. Twenty one litters due to process were conveniently selected. Testicles and tails of each litter were collected separately. In addition, the interior of the scrotum was swabbed. Laryngeal swabs were collected from dams of all selected litters.

#### Results

Mhp was identified in 38% PF (8/21) using a species-specific real-time PCR. The farm in which positive samples were obtained is positive for Mhp, but considered subclinical, as no clinical signs are evident. Furthermore, in our results the odds of a PCR positive PF tended to be higher in gilts compared to multiparous sows (OR = 3.2).

#### Discussion & Conclusions

These initial results may contradict the common knowledge of Mhp restriction to the respiratory tissue and certainly challenge the understanding of this microorganism. Therefore, studies are underway to evaluate whether Mhp can be accurately detected in PF or whether these are results of environmental contamination, or lack of diagnostic accuracy.

## **BBD-PP-20**

### **TITLE**

**RESULTS OF THE SEROLOGICAL MONITORING OF SWINE PROLIFERATIVE ENTEROPATHY (ILEITIS) IN SWINE BREEDING FARMS OF UKRAINE**

Olena Ayshpur<sup>1</sup>, O. Yermolenko<sup>1</sup>, I. Mushtuk<sup>1</sup>

<sup>1</sup> *Institute of Veterinary Medicine of National Academy of Agrarian Sciences, Kyiv, Ukraine*

### **CONTENT**

**Background and Objectives:** Swine proliferative enteropathy (SPE) is understudied in our country. Detecting this disease is problematic for veterinary professionals, resulting in economic losses. For SPE early diagnostics and differentiation the possibility of using different test systems is relevant. The objective of our work is to study SPE spread in swine breeding farms in Ukraine.

**Material & Methods:** For serological test, we used a bioScreen Ileitis Antibody ELISA – kit for demonstration of specific antibodies against *Lawsonia intracellularis* in porcine sera. Totally, we made 167 studies of swine blood serum samples of all ages from 13 farms of 7 regions of Ukraine (Donetsk, Kyiv, Dnipropetrovsk, Poltava, Kirovohrad, Cherkasy, Kharkiv) during the period 2010 –2011.

**Results:** The experiment revealed that the disease affects mainly piglets aged from 35 to 100 days. For the first time in Ukraine the presence of antibodies to the ileitis agent has been serologically confirmed using ELISA methodology, and, therefore, the circulation of the pathogen among swine population in Ukraine. 36.5% of samples of blood serum of pigs (mostly sows, breeding pigs and pigs for fattening) gave a positive reaction for antibodies against *Lawsonia intracellularis*.

In swine breeding farms the infection tends to be widespread among pigs for fattening (28.9%). Source of infection is the main herd (boars - 90.0% seropositive, breeding pigs - 65.9%, sows - 42.1%).

**Discussion & Conclusion:** Studies have shown that the disease is widespread among swine population. For the first time in Ukraine the presence of antibodies to the ileitis agent has been serologically confirmed using ELISA methodology, and, therefore, the circulation of the pathogen among swine population in Ukraine.

## **BBD-PP-21**

### **TITLE**

VACCINATION AGAINST MYCOPLASMA HYOSYNOVIAE REDUCED CASES OF ARTHRITIS IN GILTS

Adrian Luehrs<sup>1</sup>, Torsten Pabst<sup>2</sup>

<sup>1</sup> *Vaxxinoa GmbH, Anton-Flettner-Str. 6, 27472 Cuxhaven, Germany*

<sup>2</sup> *Veterinary Practice Dr. Pabst, Gewerbestr. 21, 48249 Buldern, Germany*

### **CONTENT**

#### Background and Objectives:

*Mycoplasma* (*M.*) *hyosynoviae* is ubiquitous in the pig production worldwide and can cause arthritis in growing-finishing pigs and particularly in gilts after introduction to a new farm or during early stages of pregnancy.

Whether clinical arthritis occur is depending on differences in genetics, body conditions, management practices, differences in virulence and environment. Predisposing factors are osteochondrosis and injuries. Once clinical signs are present it will lead to reduced animal welfare, increased antimicrobial usage and treatment costs and decreased performance. Since no commercial vaccine is available autogenous vaccines are more and more used to prevent disease.

#### Material & Methods:

In a German farrow-to-finish farm with a high number of *Mycoplasma*-associated arthritis *M. hyosynoviae* was isolated from the tarsal joint of a developing gilt at 3 months of age. The pig was showing acute lameness prior necropsy. With the isolated strain an autogenous vaccine based on an oil-in-water emulsion was produced.

Replacement gilts were vaccinated twice with a 2 ml dose at 12 and 15 weeks of age. With 160 days gilts were placed in a separate stable within the breeding unit. After 6-7 weeks the exclusion rate due to lameness were recorded. This was carry out on non-vaccinated and vaccinated groups per quarter from 2016 to mid-2018. In total, more than 5000 gilts were evaluated.

#### Results:

Without antimicrobial treatment and without vaccination 2.2% of gilts were culled because of arthritis. In the vaccinated groups the culling rate decreased significantly on average to 1.4% ( $p=0.038$ ). Especially in the first two quarter of 2018 only 0.76% of gilts were excluded due to lameness.

#### Discussion & Conclusion:

Vaccination against *M. hyosynoviae* with an autogenous vaccine was shown to be an effective tool in preventing *Mycoplasma*-associated arthritis. Reduced cases of lameness resulted in a decreased antibiotic use and improved gilt selection.

## **BBD-PP-22**

### **TITLE**

IDENTIFICATION OF ILEAL MALABSORPTION USING CONCENTRATIONS OF SERUM HOMOCYSTEINE IN PIGS WITH LAWSONIA INTRACELLULARIS-INFECTION

Niels Grützner<sup>1,2</sup>, Andrea Möllers<sup>3</sup>, Ton Jacobs<sup>4</sup>, Wolfram Woltersdorf<sup>3</sup>, Rika Jolie<sup>5</sup>, Heiko Nathues<sup>2</sup>

<sup>1</sup> IAEW, Martin Luther University, Halle-Wittenberg, Germany

<sup>2</sup> Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland

<sup>3</sup> MVZ Labor Dr. Reising-Ackermann und Kollegen, Leipzig, Germany

<sup>4</sup> MSD Animal Health, 5831 Boxmeer, The Netherlands

<sup>5</sup> Merck Animal Health, Madison, NJ, United States of America

### **CONTENT**

#### Background & Objectives

About 96% of the herds worldwide are infected with *Lawsonia intracellularis* and resulting lesions originating from the ileum. The majority of vitamin B12 is absorbed at the ileum and a lack on the cellular level leads to increased serum homocysteine (HCY) concentrations in pigs. The aim was to investigate the potential utility of serum HCY concentrations for the identification of ileal malabsorption in pigs with *L. intracellularis*-infection.

#### Material & Methods

Forty pigs were randomly assigned to two groups: vaccinated or not against *L. intracellularis* (3 weeks of age), challenged with *L. intracellularis* (7 weeks of age) and necropsied (10 weeks of age). Serum samples (week 3, 7, and 10) and fecal and tissue samples (10 weeks of age) were collected. For all pigs, variables (diarrhea score, fecal *L. intracellularis*, *L. intracellularis* antibody titer, ileum mucosa-PCR, ileum post-mortem score, immunohistochemistry score and average daily weight gain [ADWG]) were evaluated or determined. Serum HCY concentrations were compared between the two groups of pigs. Correlation analyses were performed between serum HCY concentrations and the seven variables for all pigs and separately for vaccinated and unvaccinated pigs.

#### Results

Serum HCY concentrations differed significantly after the challenge between the two groups of pigs ( $p < 0.05$ ), with higher serum HCY concentrations for the vaccinated pigs. All variables, except serum *L. intracellularis* antibody titer, showed a correlation when compared to HCY concentrations (for all:  $p < 0.05$ ). Unvaccinated pigs showed a positive correlation between diarrhea score, fecal *L. intracellularis*, ileum post-mortem score, and ADWG when compared to HCY concentrations (for all:  $p < 0.05$ ).

#### Discussion & Conclusion

Serum HCY concentrations differ in vaccinated and unvaccinated pigs after a challenge with *L. intracellularis*. The decrease of serum HCY concentrations in unvaccinated pigs could be explained by incorporated HCY into proteins as shown in humans and animals with protein-losing-enteropathy.



## **BBD-PP-23**

### **TITLE**

**PREVALENCE AND GENOMIC CHARACTERISTICS OF ERYSIPELOTHRIX RHUSIOPATHIAE IN HEALTHY SWEDISH PIGS**

Mate Zoric<sup>1</sup>, Helena Eriksson<sup>1</sup>, Per Wallgren<sup>1</sup>, Robert Söderlund<sup>1</sup>

<sup>1</sup> *National Veterinary Institute, SE-75189 Uppsala, Sweden*

### **CONTENT**

#### **Introduction**

The gram-positive bacterium *Erysipelothrix rhusiopathiae* (ER) may cause erysipelas in a wide range of animals. ER can persist for long periods in the environment and be carried asymptotically by animals. The aim of this study was to investigate the prevalence of ER among healthy Swedish pigs and characterize recovered isolates by whole-genome sequencing.

#### **Material & Methods**

Tonsils were collected from 200 apparently healthy pigs at slaughter, from 10 abattoirs in Sweden. Only one pig per herd was sampled. Samples were cultured using selective media. Growth of ER was confirmed by MALDI-TOF MS.

All recovered isolates were whole-genome sequenced on an Illumina MiSeq instrument. The isolate sequence data were compared to each other and 100 previously sequenced isolates from various sources using an in-house whole-genome SNP analysis pipeline.

#### **Results**

ER was isolated from six samples, corresponding to a prevalence of 3.0% (95% CI 1.2-6.5%). None of the six recovered isolates were identical by whole-genome SNP analysis and there was no clear link between genotype and geography. Of the investigated isolates, four belonged to clade 1, a subgroup that has been recovered from multiple sources and particularly from marine animals. The remaining two isolates belonged to clade 2.

#### **Discussion & Conclusion**

The lower prevalence of ER than earlier reported was assumed to mirror rearing of pigs indoors and improved biosecurity (age segregated rearing). To our knowledge, ER clade 1 has never been recovered from pigs. Clade 1 isolates are distinct from the other clades in terms of carriage of virulence genes and carry distinct variants of the Spa gene which is known to be involved in *Erysipelothrix* pathogenesis. Thus, it is an intriguing possibility that clade 1 is widespread among wild and domestic animals but has been overlooked due to limited sampling of asymptomatic animals.

## **BBD-PP-24**

### **TITLE**

SUSCEPTIBILITY OF SRD PATHOGENS COLLECTED IN ITALY TO GAMITHROMYCIN AND OTHER ANTIMICROBIAL SUBSTANCES

Giorgio Leotti<sup>1</sup>, Andrea Luppi<sup>2</sup>, Carlo Rosignoli<sup>2</sup>, Marianna Merenda<sup>2</sup>, Denis Vio<sup>3</sup>, Martina Ustolin<sup>3</sup>, Michele Dottori<sup>2</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health Italy*

<sup>2</sup> *IZSLER, Italy*

<sup>3</sup> *IZS Veneto, Italy*

### **CONTENT**

#### Background

To maximize treatment efficacy, prudent use of antibiotics requires susceptibility testing to justify the antimicrobial substance choice. The present study was conducted to determine the susceptibility of major SRD bacterial respiratory pathogens to gamithromycin as well as other prescribed antimicrobials in Italy.

#### Material and methods

Three diagnostic laboratories located in the most important swine-producing areas in Italy participated to the study. A total of 40 *Pasteurella multocida* (Pm), 34 *Actinobacillus pleuropneumoniae* (App), 10 *Bordetella bronchiseptica* (Bb) and 5 *Haemophilus parasuis* (Hps) strains, isolated from pig pathological samples, were tested by microbroth dilution method as per CLSI recommendations. The same reagents including microdilution plates and growth medium batch were used in the three labs. Susceptibility to gamithromycin tests were duplicated using disk diffusion technique. Results were interpreted using CLSI resistance breakpoints where available.

#### Results

Gamithromycin MIC<sub>50</sub> and MIC<sub>90</sub> against App were respectively 4.0 and 8.0 µg/mL. Only 2/34 (6%) isolates showed an elevated MIC value of 32 µg/mL or higher. Susceptibility of the 34 App were 74% for tilmicosin, 76% for tulathromycin and 94% for florfenicol. The two isolates with elevated MIC to gamithromycin were resistant to the other tested macrolides.

Low gamithromycin MIC values of maximum of 4.0 mg/L were determined for Pm, Bb and Hps isolates.

Susceptibility of Pm, Bb, Hps to tilmicosin (excluding Bb), tulathromycin and florfenicol was very high (98%-100%) as well.

Resistance rate of App and Pm to tetracycline was respectively 56% and 35%.

The correlation observed between MIC values and inhibition diameters allowed to consider good agreement between the two techniques for diagnostic purpose: The App isolates showing the most elevated MICs showed the lowest inhibition diameters. None showed an elevated MIC and a large inhibition diameter.

#### Conclusion

This study confirmed, under Italian field conditions, the susceptibility values of SRD pathogens to gamithromycin.

## **BBD-PP-25**

### **TITLE**

DEVELOPMENT ASSESSMENT OF CRANIOVENTRAL CONSOLIDATION LESIONS IN LUNGS OF PIGS EXPERIMENTALLY INFECTED WITH MYCOPLASMA HYOPNEUMONIAE STRAIN 232

Henrique Meiroz de Souza Almeida<sup>1</sup>, Marina Lopes Mechler-Dreibi<sup>1</sup>, Karina Sonálio<sup>1</sup>, Gabriel Yuri Storino<sup>1</sup>, Maria Eugênia Silveira Ferraz<sup>1</sup>, Igor Renan Honorato Gatto<sup>1</sup>, Marcela Manduca Ferreira<sup>1</sup>, Luís Guilherme de Oliveira<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

### **CONTENT**

Background and Objectives - *Mycoplasma hyopneumoniae* (mhp) is the causative agent of Porcine enzootic Pneumonia (PEP). PEP lesions in lungs are described as cranioventral lobes consolidation of lungs, however development of such lesion still quite unclear. This study assessed the development of consolidation lesions in lungs of experimentally infected pigs' over time. Material and Methods - Four groups of four mhp free piglets (28 days old) were inoculated intracheally with 5mL of 107 CCU/μL of mhp. Animals were clinically evaluated daily and serum samples collected weekly for antibody detection (ELISA). Every 14 days a group of piglets was euthanized and necropsied (GI-14dpi, GII-28dpi, GIII-42dpi and GIV-56 dpi). Lungs were visually assessed and the lesion score (%) for each lobe was summed for the total lung score. Results - Clinical signs of PEP started around 10 dpi and lasted the whole study. Animals of GII, GIII and GIV seroconverted and were positive at the ELISA. GI group presented the lowest mean lesion score (8.92%) and GII had the highest (23.98%). GIII and GIV and 14.17% and 20.31%, respectively. Scar tissue in lungs was noted at GIII and GIV (42 dpi and 56 dpi, respectively). Discussion and Conclusions - Animals of GI did not present antibodies due to the late seroconversion in mhp infections (around 28 days). Cranioventral consolidation lesions caused by mhp showed a sharp increase between GI and GII and dropped in GIII and GIV, being present in all groups. The period of 28 dpi is reported to be the apex of lesion score in experimental infections with mhp. The scar tissue observed in GIII and GIV was probably due to the recovery process started between 28dpi and 42 dpi, corroborating with lesion score decrease. Grant #2016/18697-6, São Paulo Research Foundation (FAPESP).

## **BBD-PP-26**

### **TITLE**

**MYCOPLASMA HYOPNEUMONIAE STRAIN GENOTYPING USING SANGER SEQUENCING OF FOUR OR TWO LOCI**

Laura Garza<sup>1,2</sup>, Joaquim Segalés<sup>1,3</sup>, Virginia Aragon<sup>1</sup>, Florencia Correa-Fiz<sup>1</sup>, Marta Carmona<sup>2</sup>, Roman Krejci<sup>4</sup>, Marina Sibila<sup>1</sup>

<sup>1</sup> IRTA, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>2</sup> CEVA Salud Animal, Avenida Diagonal, 609-615, 9<sup>a</sup> planta, Barcelona, Spain

<sup>3</sup> Departament de Sanitat i Anatomia Animals, Facultat de Veterinària, UAB, 08193 Bellaterra, Spain

<sup>4</sup> CEVA Santé Animale, La Ballastiere, Libourne Cedex-France

### **CONTENT**

*Mycoplasma hyopneumoniae* (Mhyo) genetic variability has been described by different molecular techniques. Most methods are based on the characterization of different loci containing variable number of tandem repeats (VNTRs). Nevertheless, there is no information reporting if the number of analyzed loci can affect the variability detected. Therefore, this study aimed to describe Mhyo genetic variability analyzing four or two loci by Sanger sequencing.

Forty-six Mhyo real time PCR positive lung samples were selected. Additionally, two lungs spiked with reference strains (RF) 11 (ATCC® 25095™) and J (ATCC® 25934™) were included as controls. Samples with cycle threshold (Ct) >30 were selected to be genotyped by Sanger sequencing and defining the VNTR of loci P97, P146, H1 and H5. Obtained sequences per each loci were aligned with MUSCLE v3.8.31. Afterwards, sequences from the four loci were concatenated to obtain a unique typing profile (TP, TP4). The same analysis was done using two loci (P97, P146) obtaining a TP2.

From the 48 tested samples (including the two reference strains), 45 (94%) had Ct >30 and were positive to all studied loci. P97 and P146 loci were successfully sequenced from 40 (88%) samples, but only in 33 of them (73%) all locus sequences were obtained. From the aligned sequences, a total of 26 and 19 different TP4 and TP2 were obtained, respectively.

Obtained TPs from lung samples were different from RF using 2 or 4 loci. Mhyo genetic variability varied according to the number of loci analyzed. This suggests that Mhyo characterization using four loci, or even more, can detect higher variability than when only two loci are studied. Further research is needed to investigate the optimal number of loci needed to ascertain Mhyo variability.

## **BBD-PP-27**

### **TITLE**

DETECTION OF MYCOPLASMA HYOPNEUMONIAE BY RT-PCR IN ENVIRONMENTAL SAMPLES

Laura Garza<sup>1</sup>, Carles Vilalta<sup>2</sup>, Maria Pieters<sup>2</sup>

<sup>1</sup> IRTA, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>2</sup> Departament of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, St. Paul, MN, United States.

### **CONTENT**

**Background and Objectives.** *Mycoplasma hyopneumoniae* (Mhyo) causes enzootic pneumonia, one the most important diseases for the swine industry worldwide. Although Mhyo transmission occurs mainly by direct contact, other indirect transmission routes have been described. However, the role of indirect transmission via environmental contamination remains poorly understood. Therefore, this study attempted to detect Mhyo in environmental samples in farrowing rooms.

**Material and Methods.** Three Mhyo positive herds (A, B and C) with different status were selected: farms A and C were subclinically infected, whereas farm B was clinically affected. At each farm, the following samples were collected: 1) Air: using a cyclonic collector (CC) for 30 minutes; 2) Deposition particles (DP) from 1 meter of aluminum foil during 1 hour; 3) Nose, udder and vagina skin from dams using an impregnated gauze with PBS (GD); and 4) Stalls (feeders, stall rods, flooring) using wipes with PBS (WS). This sampling was repeated in three rooms per farm (n=51), obtaining a total of 153 samples which were tested for Mhyo by real time (rt)-PCR. Those with cycle threshold<sup>37</sup> were considered positive.

**Results.** Forty out of 153 (26%) samples resulted Mhyo positive by rt-PCR. The highest percentage of positive samples was obtained by CC 33% (3/9), followed by 30% in WS (16/54), 28% in GD (15/54) and 17% in DP (6/36). Farm B showed the majority of positive samples (10%, 36/51) corresponding to different samples types (3/3 CC; 6/12 DP; 12/18 GD and 15/18 WS). Detection in farm C was 6% (2/18 GD and 1/18 WS), whereas 2% of samples were positive (1/51 GD).

**Discussion and conclusion.** Results showed Mhyo can be detected from different environmental samples within positive farms. Further research is needed to identify the role of environmental contamination in Mhyo transmission and its potential usage as sampling method to monitor Mhyo.

## **BBD-PP-28**

### **TITLE**

TREATMENT OF CLINICAL BRACHYSPIRA HYODYSENTERIAE INFECTIONS WITH CHELATED ZINC IN A PIG INFECTION MODEL AND UNDER FIELD CONDITIONS.

Gerwen Lammers<sup>1</sup>, Robbert van Berkel<sup>1</sup>, Daisy Roijackers<sup>1</sup>, Carly Vuldere<sup>1</sup>, Peter van der Wolf<sup>2</sup>, Henriette Brouwer-Middelesch<sup>2</sup>, Karin Junker<sup>2</sup>, Jobke van Hout<sup>2</sup>

<sup>1</sup> *Intracare BV*

<sup>2</sup> *GD Animal Health*

### **CONTENT**

**Background and Objectives** Due to antimicrobial resistance and zinc oxide related ecotoxicity, there is a need for new, effective intervention methods to improve animal health and welfare, and to reduce economic losses resulting from swine dysentery. The goal of this study was to evaluate the effect of low levels of a novel zinc chelate on the clinical signs, pathology, and shedding of *Brachyspira hyodysenteriae* (BHYO) in a pig infection model and under field conditions. **Material & Methods** Two pens with 4 boars were inoculated with BHYO and subsequently received either feed containing product, or control feed for 9 consecutive days. In a randomised controlled GCP trial on 2 commercial farms experiencing swine dysentery, 58 BHYO-positive pigs from 16 different pens received drinking water containing either product, or placebo for 6 consecutive days. In both studies, faeces were scored for shape, consistency, colour, and additions and analysed for the presence of BHYO by PCR. Post-mortem analysis of dead animals included macro- and microscopic evaluation of the colon. **Results** In both studies treatment positively affected faecal quality, clinical signs and daily growth. At the last treatment day, BHYO was not detectable in the faeces of any of the treated animals, while all controls remained BHYO positive. All treated animals recovered, while 6 controls had to be euthanized/were found dead and 12 controls required additional treatment before end of study. Post-mortem macro- and microscopic evaluation of cured, inoculated animals showed normal colons without abnormalities, recovery of the colon wall and the absence of spirochetes, while untreated controls showed swelling, inflammation, abnormal thick wall, cell necrosis, and the presence of spirochetes. **Discussion & Conclusion** Dosed at environmental-friendly levels through the feed or drinking water, a novel non-antibiotic treatment ceases the clinical signs and shedding of BHYO in both experimentally and naturally infected pigs.

## **BBD-PP-29**

### **TITLE**

COMPARISON OF LUNG LESIONS AT SLAUGHTERHOUSE USING DIFFERENT VACCINES PROTOCOLS FOR MYCOPLASMA HYOPNEUMONIAE

William Costa<sup>1</sup>, Juliana Calveyra<sup>2</sup>, Roman Krejci<sup>3</sup>

<sup>1</sup> *Ceva Animal Health Brazil*

<sup>2</sup> *Ceva Animal Health Latin America*

<sup>3</sup> *Ceva Animal Health France*

### **CONTENT**

#### Introduction

Respiratory diseases continue to have a great relevance in the herd health, being a cause of concern for the performance of the animals. Scoring of lung lesions in slaughter pigs together with other tools can contribute to determine the appropriate vaccination protocol and monitor the results of vaccination.

#### Materials and Methods

The evaluation was carried out with 171 batches distributed in 8 Brazilian states, including the largest swines producers in the country.

Evaluations occurred throughout the year 2017 Lung scoring at slaughterhouse was performed following Ceva Lung Program. The results were classified according to the use of other Mhyo vaccines(G1), farms that use Hyogen®(Mhyo vaccine, Ceva) for less than 1 year(G2) and farms that use Hyogen® for more than 1 year(G3).

#### Results

The average percentage of bronchopneumonic lungs was 55,39 with the split into G1, G2 and G3 65,68; 55,52 and 40,47 respectively ( $p < 0,005$  between groups) with the average of 6,32 . The percentage of affected surface out of pneumonic lungs was 7,18; 6,78 and 4,45 respectively. Percentage of lungs with scars was 10,89; 6,56 and 4,74 respectively ( $p < 0,005$  between groups) and the average 7,80.

#### Conclusions and Discussion

The evaluation of the lungs in the slaughterhouse showed a variation in the percentage of lesions found throughout the studied period and with differences in relation to the protocol used for the control of *M. hyo*. Lungs from farms vaccinated with Hyogen® showed less EP-like lesions, scar scoring, affected surface of all lungs and pneumonic lungs than the average of farms vaccinated with other vaccine. Slaughter check results are increasingly accepted as valuable indicators of herd health by farmers and their veterinarians. These results can be used as basis for herd health improvement programs by farmers and their consulting veterinarians.

## **BBD-PP-30**

### **TITLE**

QUESTIONABLE DIAGNOSTIC VALUE OF CLOSTRIDIUM DIFFICILE TOXIN DETECTION IN NEW-BORN PIGLETS

Anna Aspan<sup>1,2</sup>, Sofia Lindström<sup>1</sup>, Magdalena Jacobson<sup>1</sup>, Jenny Larsson<sup>3</sup>

<sup>1</sup> *Swedish University of Agricultural Sciences*

<sup>2</sup> *SVA, Uppsala, Sweden*

<sup>3</sup> *Medical Products Agency, Uppsala, Sweden*

### **CONTENT**

**Introduction:** Clostridium difficile (CD) is claimed to be a common cause of diarrhoea in young piglets. Since the bacterium also is present in healthy pigs, the diagnosis is recommended to be based on detection of CD-toxins. The aim of this study was to investigate the presence of toxin-producing CD and free CD-toxin in faecal samples from healthy piglets.

**Material and methods:** Rectal swabs and faecal samples were collected from 25 neonatal piglets (<1-week-old) from five different herds, with no recent history of neonatal diarrhea. The presence of CD-antigen and toxins in stool was investigated with the C. diff quik chek complete test (CDqc). Rectal swabs were cultured anaerobically on selective agar (CCFAT) for 48-96h. Also, spore enrichment culture was performed. Species confirmation was performed by MALDI TOF and presence of CD-toxin (tcdA, tcdB) by CDqc and toxin genes by qPCR.

**Results:** 19 pigs were positive for the presence of CD-antigen in stool by CDqc; three piglets were clearly positive for CD-toxins and another three showed weak positive signals. On direct culture, nine pigs displayed moderate to profuse growth, seven sparse growth, whereas nine were negative for CD. Following enrichment and spore selection, CD could be detected in 21 pigs. All in all, 31 isolates of CD were obtained. At least one isolate from all piglets possessed the toxin genes and produced toxin as assessed by qPCR and CDqc respectively.

**Discussion & Conclusion:** The presence of toxin-producing CD from healthy piglet from all five farms investigated, and the finding of free toxins in faeces of healthy neonatal piglets questions the diagnostic value of CD-toxin detection in neonatal piglets. Considering the extent of the problem with neonatal diarrhoeas in the pig industry globally, the need for improved diagnostics and guidelines for diagnosing CD-infection in piglets is urgent.



## **BBD-PP-31**

### **TITLE**

VARIATIONS IN THE ASSOCIATION OF NASAL MICROBIOTA WITH VIRULENT AND NON-VIRULENT STRAINS OF HAEMOPHILUS PARASUIS IN WEANING PIGLETS

Yasser Mahmmod<sup>1,2</sup>, Florencia Correa-Fiz<sup>1</sup>, Virginia Aragon<sup>1</sup>

<sup>1</sup> IRTA, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>2</sup> Universitat Autònoma de Barcelona, 08193-Bellaterra, Cerdanyola del Vallès, Barcelona, Spain

### **CONTENT**

#### Background and Objectives

Haemophilus parasuis causes Glässer's disease, which results in high economic losses in the swine industry. To understand the polymicrobial interactions of H. parasuis and the nasal microbiota, the statistical association patterns of nasal colonizing bacteria with virulent and non-virulent strains of H. parasuis, were studied accounting for the farm management practices as potential risk factors for the occurrence of Glässer's disease in weaning piglets.

#### Material & Methods

The bacterial communities inhabiting the nares were characterized from 51 weaned-piglets (3–4 weeks of age) randomly selected from seven farms from Spain; four of them with Glässer's disease (A-B-C-D) and three with no respiratory diseases, as control (E-F-G). Production system was either multi-sites (A-C-D-F-G) or farrow to finish (B-E). Presence of virulent and/or non-virulent H. parasuis strains in the nasal cavities was determined by PCR. Multivariate logistic regression models were performed with "glm" function in R, between the various members of nasal microbiota based on the relative abundance values of operational taxonomic units (family and genus levels), and H. parasuis strains (virulent and non-virulent).

#### Results

Several families such as Ruminococcaceae, Clostridiaceae<sup>1</sup>, and Peptostreptococcaceae together with some genera i.e. Clostridium, XI, Oscillibacter and Escherichia/Shigella, were significantly associated with H. parasuis virulent strains. Whereas, Ruminococcaceae, Bacteroidaceae, Porphyromonadaceae, Enterococcaceae families and Corynebacterium, Bacteroides, Barnesiella, Odoribacter, Leuconostoc, Flavonifractor, Bordetella, Neisseria and Acinetobacter genera were significantly associated with H. parasuis non-virulent strains.

#### Discussion & Conclusion

Our findings showed a wide variation in the association of nasal microbiota communities with virulent and non-virulent strains of H. parasuis in weaning piglets. The multi-site production system and disease status of the farm were both significantly associated with virulent strain at the explored taxa levels. The findings of this study boost our understanding of Glässer's disease development and could be a base for innovative non-antimicrobial alternatives for Glässer's disease control.

## **BBD-PP-32**

### **TITLE**

POSSIBLE ASSOCIATION BETWEEN THE USE OF ZINC OXIDE ON PRE-STARTER FEED AND VEROCHECK RESULTS IN EDEMA DISEASE CLINICAL FARMS.

Irene Galé Ansó<sup>1</sup>

<sup>1</sup> *HIPRA*

### **CONTENT**

#### Background and Objectives

Edema disease (ED) is an enterotoxaemia caused by the Verotoxin 2e (Vt2e) of *E. coli*. Zinc oxide (ZnO) is an inorganic compound commonly used in piglets feed for the prevention and control of post-weaning diarrhea and ED. VEROCHECK is a new diagnostic tool for Vt2e DNA detection in oral fluids by a quantitative PCR. The aim of this study was to evaluate the association between the use of ZnO as a treatment and the VEROCHECK results in farms with clinical ED.

#### Material & Methods

Samples from 57 farms with clinical ED from 9 European countries were analyzed. Information about ZnO on feed as a prophylactic treatment, and clinical signs of the disease was provided with the VEROCHECK samples sent by the veterinarians in charge of the farms. A positive-farm diagnostic base on VEROCHECK was considered when at least one of the samples was positive. Possible association between production system type and piglets weaning age, and positive-farm diagnostic was studied by Chi-squared.

#### Results

From 57 farms, 32 were using ZnO, 56,3% of those farms showed positive results base on VEROCHECK. From the non-using ZnO farms, 25, 88% were diagnosed as ED positive by VEROCHECK, p-value 0.021.

#### Discussion & Conclusion

Statistical significant differences in the ED diagnosis base on VEROCHECK results were found depending on the use or not-use of zinc oxide. The use of zinc oxide reduces the positivity detection by VEROCHECK in animals with clinical signs of ED.

## **BBD-PP-33**

### **TITLE**

THE EFFECT OF TWO DIFFERENT COMBINATIONS OF VACCINES AGAINST MYCOPLASMA HYOPNEUMONIAE AND ACTINOBACILLUS PLEUROPNEUMONIAE IN PIGS' LUNG HEALTH AND PRODUCTION PARAMETERS

Angeliki Katsafadou<sup>1</sup>, Lisandros Kalogeropoulos<sup>1</sup>, Aristotelis Nanos<sup>2</sup>, Roman Krejci<sup>3</sup>, Marina Lisgara<sup>1</sup>

<sup>1</sup> Ceva Hellas, Athens, Greece

<sup>2</sup> Evia farm, Kymi, Greece

<sup>3</sup> Ceva, Libourne, France

### **CONTENT**

#### Background and Objectives

*Mycoplasma hyopneumoniae* (Mhyo) and *Actinobacillus pleuropneumoniae* (A.p) are very common in swine farms worldwide and cause severe respiratory diseases with great economic impact. The control of both pathogens, which very often co-exist, can be accomplished by the use of antimicrobials, by vaccination, and by improvements of management practices and housing conditions. In this study, the effect of two different combinations of vaccines against Mhyo and A.p in pigs' lung health and production parameters was investigated in comparison to each other, in a Greek farm.

#### Materials and Methods

A farrow to finish herd with 250 sows was selected for the study. 500 animals were vaccinated against Mhyo and A.p with Hyogen® and Coglapix® (group 1), respectively, and 500 with vaccines A and B (group 2). Per farmer's request, both Mhyo vaccines were administered twice, in 7th and 28th day of life. Blind lung evaluation was applied at slaughter by using the Ceva Lung Program and ADG and slaughter weight were recorded.

#### Results

312 and 352 lungs were examined in groups 1 and 2, respectively. The odds of having Enzootic pneumonia-like lesions were 2.1 times lower ( $P < 0.05$ ) for lungs belonging to group 1 compared to group 2. 7.05% and 9.94% lungs in groups 1 and 2 ( $P > 0.05$ ), respectively, had dorsocaudal pleurisy. The production parameters were measured for 248 pigs in group 1 and 342 in group 2. ADG was 0.71kg ( $\pm 0.021$ ) in group 1 and 0.69kg ( $\pm 0.034$ ) in group 2 ( $P < 0.05$ ). Also, animals from the first group were on average 2.81kg heavier at slaughter ( $P < 0.05$ ) compared to the second one (adjusted for slaughter-age effect).

#### Conclusions

Under the conditions of this study, the use of Hyogen® and Coglapix® together had a beneficial effect in pigs' lung health and production parameters compared to the other combination of vaccines.

## **BBD-PP-34**

### **TITLE**

**CURRENT SITUATION OF ACTINOBACILLUS PLEUROPNEUMONIA IN SPAIN ACCORDING TO LUNG LESIONS SCORED AT SLAUGHTERHOUSE USING THE CEVA LUNG PROGRAM (CLP) METHODOLOGY.**

Pablo Del Carmen<sup>1</sup>, Mayte Lasierra<sup>1</sup>, Marta Carmona<sup>1</sup>, Sonia Cárceles<sup>1</sup>, Salvador Oliver-Ferrando<sup>1</sup>, David Espigares<sup>1</sup>

<sup>1</sup> *Ceva Salud Animal, Barcelona, Spain*

### **CONTENT**

#### Background and Objectives

In Spain vaccination against *Actinobacillus pleuropneumonia* (Ap) is still at a relative low level, approximately 5% of the pigs, and antimicrobials (AMs) are often used to prevent or control bacterial diseases, but over the last years, pig producers are demanded to reduce AM use, particularly as a prophylactic measure to control infections in swine as Ap. Evaluating Ap-like lung lesions scores (LLS) at the slaughterhouse is an efficient method of estimating the incidence of pleuropneumonia. Such evaluations can help us understanding how the changing scenario of AM use can affect Ap control. The aim of this study was to compare the incidence of Ap-like lesions at slaughterhouses from January 2016 until October 2018.

#### Material & methods

A total of 382,481 lungs from pigs in 2,573 batches (505 in 2016; 1,071 in 2017; and 952 in 2018) from different farms located around Spain were evaluated on Ap-like LLS using the CLP methodology described previously. The incidence of dorsocaudal pleurisy (DP) and the Ap pleurisy index (APPI) combining the incidence and the extension were determined. Results were analyzed by a non-parametric test Mann-Whitney.

#### Results

The 2018 incidence of DP (22%) increased significantly compared to 2016 (12%) and 2017 (13%) ( $p < 0.001$ ). Also, the APPI of 2018 (0.58) had a significant increase over 2017 (0.36) and 2016 (0.34) ( $p < 0.001$ ).

#### Discussion and conclusion

It is demonstrated that the incidence and severity of Ap-like LLSs are significantly increasing in 2018, as compared to previous years. This survey indicates, the reduction of AM use as a contributing factor, and that more appropriate prophylactic measures, like vaccination, should be included in future Ap-control programs.

## **BBD-PP-35**

### **TITLE**

ERADICATION PROGRAM FOR PROGRESSIVE ATROPHIC RHINITIS (PAR) IN A SPANISH FARM

Marcial Marcos<sup>1</sup>, Jiménez Marta<sup>1</sup>, Rut Menjón<sup>1</sup>, JAVIER FERNÁNDEZ<sup>2</sup>, J. QUIRINO CABANES<sup>2</sup>

<sup>1</sup> *MSD Animal Health*

<sup>2</sup> *AGROCESA S.A.*

### **CONTENT**

#### Introduction

PAR is a respiratory disease caused by toxigenic strains of *Pasteurella multocida* (Pm), alone or in combination with *Bordetella bronchiseptica*, which can result in total disappearance of the nasal turbinates and stunted nasal development. PAR reduces growth rate and feed conversion efficiency and may facilitate the entrance of other pathogens through the nasal cavity. Pm may be transmitted directly from infected sows to piglets or horizontally between piglets during growing period.

#### Material & Methods

The program was implemented in a multisite farm. Site 1, with 2,900 productive sows, buys replacement females at 20 kg (PAR negative), and raises them in the sow farm but in separated buildings. Site 2, located 500 meters away, is a continuous flow (9,000 piglets 6 to 20 kg). Site 3, located 1 km away, is an AI/AO production system (12,800 pigs 20 to 110kg). PAR was diagnosed by clinical signs, lesions, Pm toxigenic PCR (nasal swabs) and nasal turbinates check (slaughterhouse). The program included vaccination (Porcilis® AR-T DF, MSD A.H.) of replacements with two doses at 5 and 6 months of age (off label use) and two additional doses to all pregnant sows (7 and 3 weeks prior to farrow) for 2 years. After that period, only one dose in multiparous sows (pre-farrowing) and three doses for gilts were maintained (last one pre-farrowing).

#### Results

Five years after the start of the program, vaccination was stopped. Since then, clinical signs, Pm toxigenic positive PCR (30 piglets of 9 weeks of age have been sampled, 3 times three months separated) or turbinate lesions at slaughter check were no longer found.

#### Discussion & Conclusion

PAR can be eradicated from pig production units with the correct vaccination protocol, introduction of negative replacements at the correct time, in order to acclimatize them, and establishment of good biosecurity practices.

## **BBD-PP-36**

### **TITLE**

ASSESSMENT OF EP-LIKE LESIONS IN SLAUGHTERED PIGS FROM FARMS WITH DIFFERENT MYCOPLASMA HYOPNEUMONIAE VACCINE PROGRAMS.

Mayte Lasierra<sup>1</sup>, Pablo Del Carmen<sup>1</sup>, Marta Carmona<sup>1</sup>, Sonia Cárceles<sup>1</sup>, Salvador Oliver-Ferrando<sup>1</sup>, David Espigares<sup>1</sup>

<sup>1</sup> *Ceva Salud Animal, Barcelona, Spain*

### **CONTENT**

#### Background and Objectives

Enzootic pneumonia (Ep) causes economic losses in swine production due to its negative impact on productive parameters. Vaccination of piglets against *Mycoplasma hyopneumoniae* (Mh) is an effective way to reduce lungs lesions induced by Mh infection, and lung scoring at slaughterhouse is a valuable tool for the assessment of the respiratory health status. The aim of this study was to investigate the prevalence and extension of lungs with Ep-like lesions observed at slaughter in pigs vaccinated with either Hyogen®, Ceva, other 6 commercial *Mycoplasma hyopneumoniae* vaccines or unvaccinated pigs.

#### Material and Methods

Between January 2016 and October 2018, 1.413 batches within 212.519 lungs from different farms from Spain were scored at the slaughterhouse using the Ceva Lung Program (CLP) score methodology, to assess the incidence and severity of Enzootic pneumonia (EP)-like lesions.

For each batch the following parameters were calculated:

- Percent of affected lungs with Ep-like lesions
- Average percent of affected surface out of all lungs
- Average percent of affected surface of pneumonic lungs
- Average percent of scarring lungs
- Percent of cranial pleurisy

#### Results

Lungs from vaccinated pigs showed statistically ( $p < 0.001$ ) lower lungs with EP like lesions and affected surface out of all lungs than lungs from unvaccinated pigs.

Lungs from farms vaccinated with Hyogen® had less lungs with EP like lesions ( $p < 0.001$ , vs vaccines 1,3,5,6) and statistically lower affected surface ( $p < 0.001$  (Vaccine 1,3,5) and  $p < 0.05$  (Vaccine 2,4,6)) than average of the set of others vaccines.

#### Conclusions

Vaccination of piglets against *Mycoplasma hyopneumoniae* reduced the severity of Ep-like lesions in slaughtered pigs.

Lungs from farms vaccinated with Hyogen® showed less EP-like lesions than the average of farms vaccinated with other vaccines.

In this study the vaccine Hyogen® showed its superiority in the reduction of lung lesions over the rest of the vaccines included in the study.

## **BBD-PP-37**

### **TITLE**

POSITIVE EFFECTS OF VACCINATION AGAINST ACTINOBACILLUS PLEURO-PNEUMONIA (AP) AND OPTIMISED CO-INFECTION VACCINATION MEASURED ON AP RELATED LESIONS.

Eduardo Velazquez<sup>1</sup>, Christina Gale<sup>1</sup>

<sup>1</sup> *Ceva UK*

### **CONTENT**

#### Background and objectives

Vaccination scheduling forms an integral part of pig herd health plans and contributes largely to the reduction of antimicrobial use on farms in the United Kingdom.

The aim of this study was to reduce Ap related slaughterhouse pleurisy as the indicators of reduced growth and decreased feed efficiency in an Ap endemic farm co-infected with *Mycoplasma hyopneumoniae* (Mhp) via optimal vaccination. The study design comprises two steps: 1) implementing Ap prophylaxis, 2) optimizing Mhp vaccination, to reveal the contribution of each intervention.

#### Materials and methods

A 350 sow unit, not previously vaccinating against Ap, implemented a vaccination protocol with Coglapix®, vaccinating pigs at seven and nine weeks of age. Seven months later the farm changed from a competitor Mhp two shot vaccine at one and three weeks of age, to Hyogen® once at four weeks of age. The Ceva Lung Program (CLP) was used to assess Ap related lung lesions measured on extension by the pleurisy level and severity on the Ap Pleurisy Index, APPI, as previously described, during each of the vaccination protocols and a minimum of three analysis of ? 100 pigs each were completed for each period.

Kruskal-Wallis one-way analysis of variance used for statistical evaluation amongst groups.

#### Results

The pre-Ap prophylaxis plus competitor Mhp two shot period: pleurisy levels 64.3(a)% and APPI 1.72(a).

The Coglapix® addition plus competitor Mhp two shot period: pleurisy level 33.0(b)% and APPI 0.84(b).

The Hyogen® substitution plus Coglapix® period: pleurisy level 21.7(b)% and APPI 0.53(b).

(P<0.001 a, b in both pleurisy levels & APPI)

#### Discussion and conclusion

The results of this study demonstrate the significant importance of optimal control of both Ap and Mhp infections in co-infected farms, due to their mutually increased impact. Here demonstrated significant reductions on Ap induced lesions.

## **BBD-PP-38**

### **TITLE**

CLOSTRIDIA, AN OVERLOOKED HEALTH HAZARD FOR PIGLETS?

Susanne Kirwan<sup>1</sup>, Mauro Di Benedetto<sup>1</sup>, Valentine Van Hamme<sup>1</sup>

<sup>1</sup> *Kemin Europa nv*

### **CONTENT**

Piglets are under immense disease pressure from birth. Long farrowing intervals of large litters combined with low birth weights leave them susceptible to diseases. Antibiotic used to be widely applied in pre-weaning diets. With the increased pressure of de-medicalisation this will no longer be possible in most European countries. The present study highlighted clostridia as a potential health hazard to pre-weaning piglets which might have previously been masked by the preventative use of antibiotics.

A farm with 550 sows in production with an average weaning age of 20 days experienced sudden, severe, early onset diarrhoea in most litters affecting entire litters. Diarrhoea was most severe in gilts' litters with antibiotics failing to resolve the issue. Mortality was moderate in the piglets, loss of condition, however lack of homogeneity and overall lack of welfare could be observed. Laboratory analysis ruled out the original E.coli hypothesis, additionally confirming the presence of PRRS in the herd. Clostridia was suspected to act as an opportunistic pathogen infecting the immunosuppressed piglets.

As *Bacillus subtilis* PB6 (ATCC PTA-6737) has been described as a management tool for clostridia in poultry, it was administered to both sows and piglets in a trial to manage clostridia proliferation in the herd. 15 days after the start of the experimental treatment an almost complete disappearance of clinical signs in new born piglets could be observed. Diarrhoea incidence reduced to 5% of the litters, mortality had returned to normal farm levels; litter uniformity and welfare reestablished.

Clostridial modulation is a main activity of *B. subtilis* PB6. The success of this experimental trial suggests that clostridia could be an emerging pathogen in neonatal piglets in systems with low use of antibiotics. Further systematic studies are needed to confirm this hypothesis.



## **BBD-PP-39**

### **TITLE**

A POSITIVE SAMPLE FOR *M. HYOPNEUMONIAE* IN REARING GILTS: WHEN TO START VACCINATION?

Tom Verbrugge<sup>1</sup>, Sonja Agten<sup>2</sup>, Wikke Kuller<sup>1</sup>, Bas Kolpa<sup>1</sup>

<sup>1</sup> *University Farm Animal Practice, Harmelen, The Netherlands*

<sup>2</sup> *MSD-AH Nederland, Boxmeer, The Netherlands*

### **CONTENT**

**Background and objectives-** A 600 sow partly closed breeding herd experienced a sudden rise in mortality and respiratory problems in one group of fatteners. Pathology and cross sectional bloodsampling of the herd led to the diagnosis APP. One of the rearing gilts was also sampled positive for *M. hyopneumoniae*, but based on pathological findings this result was ignored initially. After 4 months of no respiratory problems, an acute outbreak of *M. hyopneumoniae* was seen in weaner pigs. What to do with one positive sample, when it seems to be a coincidence?

**Material and methods-** When respiratory problems occurred in the fatteners, pathology was performed at the slaughterhouse and cross sectional blood sampling was done at the farm. Four months later, pathology and blood sampling was repeated in weaners with acute respiratory problems.

**Results-** Based on pathology and blood sampling the first group of fatteners were diagnosed with APP. No lesions of *M. hyopneumoniae* were found. Low antibody titres were found for PRRS and Influenza. One of eight rearing gilts sampled was also positive on *M. hyopneumoniae*. After treatment for APP no respiratory problems were seen on the farm. Four months later, weaners had acute respiratory problems. Positive antibody titres were found for *M. hyo* at 5 and 10 weeks of age, but only at 14 weeks of age for PRRS. Pathology showed no signs of APP. No signs of PRRS were seen in sows or newborn piglets.

**Conclusion and discussion-** The second outbreak of respiratory problems seems to be a result of *M. hyopneumoniae*. After intensive vaccination of all animals, no respiratory problems were seen on this farm. Could problems have been prevented by vaccination 4 months earlier? What to do with a positive sample in a cross sectional when clinical signs and pathology tell you something else?

## **BBD-PP-40**

### **TITLE**

**CASE REPORT: STREPTOCOCCUS SUIS AS A CAUSE OF KERATOMALACIA AND ENDOPHTHALMITIS IN A GROWER PIG**

Anna Werinder<sup>1</sup>, Elina Andersson<sup>2</sup>, Ingrid Hansson<sup>2</sup>, Magdalena Jacobson<sup>1</sup>

<sup>1</sup> *Swedish University of Agricultural Sciences, Dept of Clinical Sciences*

<sup>2</sup> *Swedish University of Agricultural Sciences, Dept of Biomedical Sciences and Veterinary Public Health*

### **CONTENT**

#### **Background**

*Streptococcus suis* is an important zoonotic agent with an impact on pig and public health as well as the economy of the swine industry. Common signs of infection in pigs are meningitis, arthritis, endocarditis, and pneumonia.

#### **Materials & Methods**

A five-week-old newly weaned pig with a major eye lesion was euthanized on the farm and sent for necropsy. As is common practice on Swedish conventional pig farms, the pig was weaned at five weeks of age and had not been given any antimicrobial substances. It was kept in a large peer group on deep straw bedding. The farm has a previous history of eye lesions in grower pigs.

At necropsy, a swab was taken from the eye lesion and cultured on blood agar (5% bovine blood) and lactose purple agar incubated at 37 °C aerobically overnight, and on COBA medium incubated at 37 °C in 5% carbon dioxide overnight. Isolated bacteria were identified by MALDI-TOF MS.

#### **Results**

At necropsy, the main gross finding was a perforating corneal ulceration and keratomalacia of the left eye. Histological examination revealed a central ulceration of the cornea, with abundant neutrophils, fibrin and bacteria, and malacia of the corneal stroma. Purulent inflammation of the anterior, posterior and vitreous chamber (endophthalmitis) was also evident. Other findings were an acute mucoïd rhinitis, an acute interstitial pneumonia, and small abscesses in the umbilical area and in the musculature surrounding the right mandibula. Bacteria cultured from the eye lesion displayed alpha hemolysis on blood agar and COBA and were identified by MALDI-TOF MS as *S. suis*, with a score of 2.15.

#### **Discussion & Conclusion**

This case report shows that *S. suis* can cause keratomalacia and endophthalmitis in pigs. Endophthalmitis caused by *S. suis* has rarely been described in pigs; however, it is occasionally reported in humans.

## **BBD-PP-41**

### **TITLE**

M. HYORHINIS – UNDERESTIMATED PATHOGENICITY?

Miriam Viehmann<sup>1</sup>, Kerstin Fiebig<sup>2</sup>

<sup>1</sup> *Tieraerztliche Praxis Dr. W. Viehmann, Schrozberg*

<sup>2</sup> *MSD Animal Health, Intervet, Germany*

### **CONTENT**

#### Background and Objectives

*Mycoplasma hyorhinis* (MHR), a commensal found in the upper respiratory tract of pigs, is on the other hand also associated with respiratory disease, polyserositis and lameness in affected animals. Herd-specific vaccines are frequently successfully used. Hence, the pathological impact of MHR, is still controversially discussed. This case report describes Enzootic Pneumonia-like lung lesions provoked by MHR infection in young piglets with acute signs of respiratory disease.

#### Material & Methods

In a 150-sow piglet producing farm, current dry and non-productive coughing and reduced productivity emerged in piglets ~5 wk of age onwards. Sows are vaccinated against PRRSV and *E. rhusiopathiae* and Parvovirus. Piglets are vaccinated against PCV2 and PRRSV. For diagnostics, untreated weaners were submitted for necropsy. Serosal swabs and lung tissue were collected for bacteriology and PCR (*M. hyopneumoniae* (MHP), PRRSV, SIV) (IVD, Hanover, Germany).

#### Results

Gross pathology yielded lung lesions indicative for Enzootic Pneumonia: grey to purple areas of tissue consolidation in the cranio-ventral lung lobes. While MHP-, PRRSV- and SIV-PCR turned out negative, bacteriological culture offered high-grade of *M. hyorhinis* (MHR) growth. Subsequent histopathology displayed a moderate acute fibrin-purulent bronchopneumonia with perivascular and peribronchiolar monocytes.

#### Discussion & Conclusion

MHR can frequently be isolated from lungs of pigs suffering from respiratory disease complex (PRDC). Various authors hypothesized MHR as secondary invader of pneumonic lungs. Though, MHR was the only isolated pathogen in our case and closely associated with respiratory disorders and gross pathological enzootic pneumonia-like lesions. However, number of cases was low. Histology can wisely complement diagnostics, particularly in pretreated animals where culture turn out negative. For effective pneumonia control, we recommend considering MHR likewise as potential pathogen in the pathogenesis of PRDC.

## **BBD-PP-42**

### **TITLE**

COMPARISON OF THE VARIOUS COMBINED OR SIMULTANEOUSLY ADMINISTERED VACCINES AGAINST MYSOPLASMA HYOPNEUMONIAE INFECTION

Vilmos Palya<sup>1</sup>, Istvan Kiss<sup>1</sup>, Balazs Felfoldi<sup>1</sup>, Edit Kovacs<sup>2</sup>, Roman Krejci<sup>3</sup>

<sup>1</sup> *Ceva Phylaxia, Budapest, Hungary*

<sup>2</sup> *Ceva Phylaxia, Budaoest, Hungary*

<sup>3</sup> *CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

### **CONTENT**

#### Introduction

PCVD and Enzootic pneumonia remain two of major economically most important diseases in pig farms. Vaccination against PCV2 and Mycoplasma hyopneumoniae (M.hyo) helps to reduce clinical manifestation of those infections and corresponding losses. Several commercial mono- or bi-valent vaccines are available. The aim of this study was to evaluate the efficacy of combined ready-to-mix (RTM), ready-to-use (RTU) or simultaneously administered vaccines against experimental M.hyo infection in a standardized challenge model.

#### Material and Methods

Three week-old piglets were vaccinated either with Circovac® plus Hyogen®(CH) - both Ceva simultaneously, or Hyogen® (H) only, or PCV2+M.hyo RTM vaccine or one of two RTU (RTU A, RTU B) vaccines. At 7 WOA the animals were inoculated intratracheally with two different M.hyo strains consecutively. Five weeks later the pigs were slaughtered and the lung lesions scored, samples from affected lungs were collected for histopathology. Blood samples were collected for serology before vaccination, before challenge and before slaughter and tested by two M. hyo antibody ELISA kits (BioChek and IDEXX).

#### Results

Group mean lung lesion scores (LLS) in groups CH, H, RTM, RTU A, RTU B and positive control were as follows: 0.3; 0.3; 0.9; 1.1; 0.7 and 0.8. Circovac® plus Hyogen® and Hyogen® groups were significantly lower than any other vaccine groups or positive control. They were not significantly different from the negative control. The scores in other vaccine groups didn't differ significantly from the positive control, with RTU A being also different from RTU B. Histopathology confirmed the macroscopic scores.

#### Conclusion

This study demonstrated that some of the combined PCV2 and M.hyo vaccine may provide sub-optimal protection against M.hyo infection. Hyogen® administered either alone or simultaneously with Circovac® protected lungs the best against the development of the lesions.

## **BBD-PP-43**

### **TITLE**

PREVALENCE OF MYCOPLASMA HYOPNEUMONIAE EARLY INFECTIONS IN PIGS

ROMAN KREJCI<sup>1</sup>, Sophie Brilland<sup>2</sup>, David Espigares<sup>3</sup>, Michael Albin<sup>4</sup>, Andrea Luppi<sup>5</sup>, Vilmos Palya<sup>6</sup>, Zalan Homonnay<sup>6</sup>

<sup>1</sup> CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE

<sup>2</sup> CEVA 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE

<sup>3</sup> Ceva Salud Animal

<sup>4</sup> Ceva, Denmark

<sup>5</sup> Istituto Zooprofilattico Sperimentale della Lombardia e dell

<sup>6</sup> Ceva Phylaxia, Budapest, Hungary

### **CONTENT**

#### Introduction

The aim of this survey was to describe the prevalence of Mhyo and infection patterns in farms from Spain, France and Denmark. A special attention was paid to the early infections in young piglets at- and early after weaning. At the same time the homogeneity and level of maternal immunity was studied.

#### Methods of sampling and lab examinations

In total 20 farms in France, 13 in Spain and 18 in Denmark were examined. Laryngeal swabs from sows and piglets at 3,6 and 8 WOA were tested by PCR. Serum was examined by specific ELISA. Oral fluids were collected from pigs at 6,8,12,16,20,24 weeks of age and tested by PCR.

#### Results

The overall farm positivity was 9% in Denmark, 60% in France and 76,9% in Spain. The percentage of farms with positive sows was 9%, 20% and 38,5% respectively with 0,6%, 3,8% and 4,5% positive sows respectively. The prevalence of Mhyo in weaned piglets was 0%, 15% and 0% respectively with 0%, 4,5% and 0% of positive piglets. The dynamic of M.hyo infections in farms was demonstrated on increasing number of positive farms when elder categories of pigs were sampled. The average levels of Mhyo antibodies in sows was heterogenous with 83,3%, 85% and 69% of farms with clearly positive mean values. MDAs were relatively low with 33,3%, 45% and 38,4% of farms having clearly positive mean values. It was also demonstrated that gilt vaccination positively influenced the titers of antibodies in piglets at weaning.

#### Conclusion

This survey revealed that the level of M.hyo circulation among the breeding animals differs highly among different countries. The rate of transmission to piglets seems to be minimal. Mhyo infections started to be found in the mid nursery and significantly increased at the age of 16-20 weeks of age.

## **BBD-PP-44**

### **TITLE**

**WEANED PIGLET MORTALITY AND ANTIBIOTIC TREATMENT REDUCTION IN A BELGIAN PIG FARM BY VACCINATION WITH VEPURED**

Sjouke Van Poucke<sup>1</sup>, Annelies Michiels<sup>1</sup>, Irene Galé Ansó<sup>2</sup>

<sup>1</sup> *Hipra Benelux*

<sup>2</sup> *HIPRA*

### **CONTENT**

Background and objectives

Edema Disease (ED) is an enterotoxaemia caused by certain *Escherichia coli*'s colonizing the small intestine and producing verotoxin (VT2e). This enterotoxaemia might result in acute mortality, nervous symptoms, respiratory distress and growth retardation. In this study, the effect of piglet vaccination on mortality and antibiotic treatment was monitored in a Belgian multi-site farrow to finishing farm.

Material and methods

The study was performed in a 5-week batch system farm with 300 sows. Historically mortality in this farm was high (5% or more), especially the first week after weaning at 21 days of age. The mortality and antibiotic treatment was compared for 2 non-vaccinated groups with 2 vaccinated groups and 1 group in between where 50% of the animals were vaccinated and 50% served as controls. Vaccination of 1ml Vepured occurred between 3-5 days of age.

Results

In the group of 2254 non-vaccinated piglets, spread over 3 consecutive groups, the average mortality was 8,76%. In the group of 2120 vaccinated piglets, equally spread over 3 consecutive groups, the average mortality dropped to 0,66% in the nursery period. Both groups received Tylan at 15 mg/during 14 days after weaning. The non-vaccinated piglets however also were treated with amoxicilline 20mg/kg for 14 days, paramomycine sulfate 25 mg/kg for 8 days and Zinkoxide.

Discussion and conclusion

The mortality on this farm was statistically significant reduced by vaccination of the piglets with Vepured. Apart from reducing mortality, the vaccination could also be a useful tool to reduce high antibiotic consumption in farms with clinical oedema disease outbreaks.

## **BBD-PP-45**

### **TITLE**

PROTOCOLLED APPROACH OF MULTIFACTORIAL PRE-WEANING DIARRHEA: A CASE STUDY

Victor Geurts<sup>1</sup>, Martijn Hoogeslag<sup>2</sup>, Pieter van Rengen<sup>2</sup>, Sonja Agten<sup>1</sup>

<sup>1</sup> *MSD-AH Nederland, Boxmeer, The Netherlands*

<sup>2</sup> *Veterinary Clinic Lintjeshof, Nederweert, The Netherlands*

### **CONTENT**

#### Background and Objectives

Several pathogens can induce pre-weaning diarrhea. E.coli, Clostridia and Rota virus have the highest prevalence. Hygiene and colostrum intake are very important for prevention besides effective vaccination of sows. The legal cascade rule opens the opportunity to use not registered- or autogenous vaccines when registered vaccines are not available or not effective to prevent animal suffering. In this study a structural approach is described to solve complex pre-weaning diarrhea on a 1400 sows farm, where, also efficacy differences between the autogenous- and registered E.coli vaccination were investigated.

#### Materials and Method

Pathogenic E.coli, Rota-virus and C. perfringens type A(?2+) were diagnosed via faeces. An autogenous vaccine containing E.coli, C.perfringens (type A) and Rota was used with a limited effect. This motivated the farmer to implement advised approach:

1. Diagnosis via culture/pcr diarrhea.
2. Estimate and improve colostrum intake by piglets (comparing sow titers with piglet titers).
3. Limited cross fostering.
4. Proper cleaning, drying and disinfection. Dry surface via usage of lime powder.
5. Monitor effect via diarrhea prevalence on litter level, age of diarrhea, causative agent and sow E.coli titers.

#### Results:

The sow E.coli antibodies against adhesion antigens and LT were low at farrowing.

On 3-2018 the prevalence of pre-weaning diarrhea on litter level was 60%. Symptoms were present after 2-3 days up to weaning. After implementing step 1 to 4 the diarrhea on litter level dropped from to 40% (6-2018). The pre-weaning diarrhea was mainly caused by E.coli.

The autogenous sow vaccination was replaced by Porcilis Porcoli. This increased all sow E.coli-titers 4-8 times which resulted in further decrease of the pre-weaning-diarrhea prevalence to 5 %.

#### Discussion and Conclusion:

Complicated multifactorial pre-weaning piglet diarrhea can be solved by always following the logical steps of diagnose, measure colostrum intake, limit cross fostering, hygiene and effective passive immunization via sow vaccination. Porcilis Porcoli was more effective than the autogenous vaccination.

## **BBD-PP-46**

### **TITLE**

ANTIBIOTIC RESISTANCE IN ESCHERICHIA COLI FROM DISEASED PIGS IN THE NETHERLANDS FROM 2015 - 2017: RELIABILITY AND REPRESENTATIVENESS OF PASSIVELY ACQUIRED DATA

Jobke van Hout<sup>1</sup>, Maaïke Gonggrijp<sup>1</sup>, Theo Geudeke<sup>1</sup>, Annet Heuvelink<sup>1</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

### **CONTENT**

#### Background and objectives

To further reduce and refine the use of antibiotics in livestock, monitoring of antibiotic resistance (ABR) of veterinary pathogens is of utmost importance. Therefore a project is running to develop a nationwide, representative, reliable system for monitoring of ABR in livestock pathogens in the Netherlands. As part of this project, reliability and representativeness of passively acquired *Escherichia coli* (ECO) isolates from diseased pigs in the Netherlands were evaluated.

#### Material & Methods

Antibiotic susceptibility testing results (broth microdilution) of enteropathogenic ECO from pigs were obtained from the Laboratory Information Management System of GD Animal Health (GD AH). Data were analysed using Stata.

#### Results

972 ECO isolates from 616 unique, commercial pig farms were available from 2015 – 2017 for further analysis. 752 isolates originated from post-mortem examinations carried out at GD AH and 220 isolates were cultured from faecal samples submitted to the GD AH laboratory. For 575 isolates the age category (suckling, weaned, grow/finish) was known.

The 972 isolates provide a reliable estimation of ABR levels of ECO for different antibiotics and allow for detection of changes in ABR percentages of 5% or more. Considering province and farm size of origin, collected ECO isolates are a fairly representative sample. Several ABR levels were significantly affected by age of the pigs - with lower ages generally showing higher ABR levels - and by farm of origin.

#### Discussion & Conclusion

The passively acquired data on ECO resistance in pigs can well be used within a national framework monitoring ABR in livestock pathogens. It is recommended to collect additional data per isolate, including antibiotic treatment history and age of the pigs to further evaluate whether these factors impact the resulting ABR levels and whether, for example, treatment advices for ECO should be further differentiated regarding the age of the pigs.



## **BBD-PP-47**

### **TITLE**

COMPARATIVE PROTEOMIC ANALYSIS OF THREE MYCOPLASMA HYOPNEUMONIAE STRAINS USED AS BACTERINS IN COMMERCIAL VACCINES

Laura Garza<sup>1,2</sup>, Joaquim Segalés<sup>3,4</sup>, Virginia Aragon<sup>1</sup>, Montserrat Carrascal<sup>5</sup>, Vanesa Casas<sup>5</sup>, Han Smits<sup>6</sup>, Marina Sibila<sup>1</sup>

<sup>1</sup> IRTA, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>2</sup> CEVA Salud Animal, Avenida Diagonal, 609-615, 9<sup>a</sup> planta, Barcelona, Spain

<sup>3</sup> Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.

<sup>4</sup> UAB, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.

<sup>5</sup> CSIC/UAB Proteomics Laboratory, Instituto de Investigaciones Biomedicas de Barcelona–Consejo Superior de Investigaciones Científicas, Institut d'investigacions Biomèdiques August Pi i Sunyer, Barcelona, Spain

<sup>6</sup> CEVA Santé Animale, La Ballastiere, Libourne Cedex-France

### **CONTENT**

**Background and Objectives.** Commercial vaccines against *M. hyopneumoniae* (Mhyo) are bacterins based on different strains. Although proteomic variability among Mhyo strains has been described, comparison between the strains used in bacterins has not been performed. Therefore, this study aimed to describe and compare the proteomic profiles of three Mhyo strains used in commercial vaccines.

**Material & Methods.** Three Mhyo isolates corresponding to commercial vaccines were cultured: 1) strain 2940 (isolated in the late 1990s), 2) the reference strain (RS) J (SJ, ATCC©25934<sup>TM</sup>) and 3) strain 11 (S11, ATCC©25095<sup>TM</sup>), both isolated in the early 1960s. Bacterial pellets were obtained from cultures by centrifugation. A triplicate of each extract was digested with trypsin by FASP and analyzed by LC-MS/MS in a high resolution LTQ-Orbitrap XL mass spectrometer. Proteins were identified by database search using Proteome Discoverer and a quantitative label-free study was done using Progenesis Q1 and DanteR. A statistical analysis from normalized data was carried out taking the most recent isolated strain (2940) as control condition. Proteins with p-value<0.05 and ratio (reporter ion value in study condition/reporter ion value in control) >1.2 or <0.8 were considered differentials.

**Results.** Around 400 proteins were identified per strain. From these proteins, 143 and 180 were found differentially in the comparison S11/2940 and SJ/2940, respectively. Such data defined a group of 235 differentially detected proteins with 92 common proteins in both comparisons. The ten most differentially identified proteins in S11/2940 were predicted as unknown (5), cytoplasmic (4) and extracellular (1) proteins. Similarly, SJ/2940 comparison showed unknown (6), cytoplasmic (3) and extracellular (1) proteins.

**Discussion & conclusion.** Differences on proteomic profiles from the studied vaccine strains were detected. Further investigations are needed to elucidate the role of such proteins differentially present in the three strains.

## **BBD-PP-48**

### **TITLE**

#### **ANTIMICROBIAL SUSCEPTIBILITY OF FINNISH BRACHYSPIRA PILOSICOLI ISOLATES**

Mirja Raunio-Saarnisto<sup>1</sup>, Taina Laine<sup>1</sup>, Suvi Nykäsenoja<sup>1</sup>

<sup>1</sup> *Finnish Food Safety Authority Evira*

### **CONTENT**

#### **Background and Objectives**

Brachyspira pilosicoli is the etiologic agent of porcine colonic spirochetosis, a diarrheal disease in growing pigs. Colitis associated with Brachyspira pilosicoli is less severe than swine dysentery caused by Brachyspira hyodysenteriae, however, antimicrobial therapy is needed on some farms to treat diarrhea in weaners and in young finishing pigs. According to principles of prudent use of antimicrobials, only effective drugs should be used. Resistance to lincomycin and especially to tylosin was very widespread in Finnish Brachyspira pilosicoli isolates already during 1996-1998. Decreased susceptibility to tiamulin was reported in some porcine B. pilosicoli isolates in Finland in the 1990's. This study reports the in vitro susceptibility of Finnish B. pilosicoli isolated from the year 2008 to 2018 (November).

#### **Material & Methods**

Altogether 231 B. pilosicoli isolates were obtained from diagnostic samples (porcine faecal samples or intestinal contents) from years 2008-2018. The samples were submitted to the laboratory by herds that were experiencing diarrhoea problems in growing pigs. Minimum inhibitory concentrations (MIC) for tylosin, lincomycin, tiamulin and valnemulin were tested by VetMICBrachy method.

#### **Results**

Decreased susceptibility to tylosin was detected in 134 isolates (58,0 %), (MIC > 2 µg/ml) and to lincomycin in 59 isolates (25,5 %)(MIC > 4 µg/ml). In 2017 one isolate had decreased susceptibility to tiamulin (0,4 %)(MIC > 1 µg/ml). All isolates were sensitive to valnemulin (MIC ? 1 µg/ml).

#### **Discussion & Conclusion**

The Finnish Brachyspira pilosicoli isolates from years 2008-2018 showed no trend of increased antimicrobial resistance. All isolates were susceptible to valnemulin and all except for one to tiamulin. Widespread tylosin resistance and resistance to lincomycin in many isolates indicates that especially the use of tylosin or lincomycin for treatment of porcine colonic spirochetosis should be based on antimicrobial susceptibility testing of B. pilosicoli recovered from growing pigs with diarrhoea.

## **BBD-PP-49**

### **TITLE**

LUNG LESION SURVEY USING CEVA LUNG PROGRAM IN RUSSIA AND UKRAINE: COMPARISON OF PERIODS 2017 AND 2018

Daniel Sperling<sup>1</sup>, Vladimir Pruglo<sup>2</sup>, Evgeny Stolbov<sup>2</sup>, Olha Bekh<sup>3</sup>, Roman Krejci<sup>1</sup>, Philippe Mazerolles<sup>1</sup>

<sup>1</sup> Ceva, France

<sup>2</sup> Ceva, Russia

<sup>3</sup> Ceva, Ukraine

### **CONTENT**

#### Background and Objectives

Slaughter house lung scoring is effective way for assessment of respiratory health and efficiency of control programs on swine farms including the estimation of economic impact of respiratory infections on production. Ceva Lung program (CLP) is standardized tool allowing for rapid scoring and was successfully used for evaluation of real prevalence of EP and A.p like lesions on farm at national level.

The aim of the study is to provide the regular update on prevalence and severity of lesions caused by EP and A.p in the Russia (RU) and Ukraine (UA) and compare main parameters with the status in 2017.

#### Materials & Methods

In the period of 2018 a total number of 253 batches and 22825 lungs were scored. 215 batches (19398 lungs) were scored from RU and 38 batches (3427 lungs) from UA. Broncho-pneumonic lesions (EP like lesions) and Percent of Dorsocaudal Pleurisy (A.p- like lesions) were evaluated beside other parameters and compared with 2017.

#### Results

The decrease % of affected lungs by EP was observed in RU – from 28.81 % to 21.00 % and the same trend was observed in UA- 31.15 % to 22.76 % in period of 2018.

Decreasing trend was observed in % of lungs affected by A.p like lesions in Ru in comparison with 2017- 10.42 % to 7.00 %. Slight increase of A.p like lesions was on the opposite confirmed in UA- from 18.75 % to 19.40 %. All expressed as median.

#### Conclusion & Discussion

The prevalence of EP- like lesions has decreasing tendency in both countries. One of the explanations is introduction of new farms with M. hyo negative status together with improvement of control of EP due to the effective vaccination. A.p.- like lesions increased in UA where infection by A.p and its control deserve high attention.

## **BBD-PP-50**

### **TITLE**

**OCCURRENCE OF EP-LIKE-LESIONS IN GERMAN FATTENING PIGS FROM FARMS WITH RECURRING RESPIRATORY DISEASE**

Christine Renken<sup>1</sup>, Mathias Ritzmann<sup>1</sup>, Lisa Beffort<sup>1</sup>, Christine Weiß<sup>1</sup>, Andrea Luppi<sup>2</sup>, Christoph Wähler<sup>3</sup>, Matthias Eddicks<sup>1</sup>

<sup>1</sup> *Clinic for Swine, LMU Munich, Germany*

<sup>2</sup> *Istituto zooprofilattico sperimentale della Lombardia e dell'Emilia Romagna (IZSLER), Reggio Emilia, Italy*

<sup>3</sup> *CEVA Animal Health, Duesseldorf, Germany*

### **CONTENT**

#### **Backgrounds and Objectives**

Examination of lungs at slaughter can be an efficient tool to monitor incidence and severity of respiratory diseases. *Mycoplasma hyopneumoniae* (M.hyo), as primary pathogen of porcine enzootic pneumonia (EP), is associated with cranio-ventral pulmonary consolidation. Uncomplicated EP-like-lesions can heal though interlobular scar retractions might remain. The present study investigated the frequency of EP-like-lesions and scar lesions in German fattening pigs from farms with recurring respiratory disease.

#### **Materials & Methods**

In total 4611 entire lungs from 51 German fattening farms with recurring respiratory disease were macroscopically examined for the occurrence of cranio-ventral pulmonal consolidation (EP-like-lesions) during slaughter process (on avg. 90.4 lungs per farm). According to farmer statements 98% (49/51) of the farms housed M.hyo vaccinated pigs. Extent of EP-like-lesions was quantified using a modified Madec Score. Therefor all seven pulmonary lobes were examined individually and scored according to the extent of the lesions from 0 to 4 (maximal EP-lung score per pig (EP-LS) is 28). Furthermore, presence of scar lesions was recorded.

#### **Results**

EP-like-lesions were found in 49.4% (2278/4611) of all examined lungs. The average EP-LS out of all investigated lungs was 2.1 (min: 0.1; max: 8.8; SD: 1.9) and out of all affected lungs 3.6 (min: 1.1; max: 9.4; SD: 1.8). Classification of the extension of EP-like-lesions showed that 34.1% of the lesions were of medium size (score 1 to 4), while 15.4% of the lesions can be considered to be severe lung lesions (score ? 5). In total 17.7% (814/4611) of all lungs showed scar lesions.

#### **Discussion & Conclusion**

EP-like-lesions of various severity are highly prevalent in German fattening pigs with recurring respiratory disease. Besides lesions probably resulting from current M.hyo infection, many animals showed scar lesions resulting from older, healed EP-like-lesions.

## **BBD-PP-51**

### **TITLE**

**CLINICAL OUTBREAKS OF KLEBSIELLA PNEUMONIAE SUBSPECIES PNEUMONIA IN THE NETHERLANDS**

Linda Peeters<sup>1</sup>, Jobke van Hout<sup>1</sup>, Tom Duinhof<sup>1</sup>, Sylvia Greijdanus-Van der Putten<sup>1</sup>, Manon Houben<sup>1</sup>

<sup>1</sup> *GD Animal Health, Arnsbergstraat 7, 7418 EZ Deventer, the Netherlands*

### **CONTENT**

*Klebsiella pneumoniae* subspecies pneumonia (Kpp) outbreaks, causing septicemia in neonatal piglets, have previously been reported in England and Australia. In the Netherlands, the first Kpp outbreak, with comparable clinical findings, was confirmed by laboratory diagnosis in March 2015.

Kpp outbreaks in 14 farms in the Netherlands have been reported to GD Animal Health from 2015-2018.

Clinical signs mainly consisted of acute death in well grown piglets from 8-21 days of age. Mortality was variable, ranging from 1-2 piglets to 90% of the piglets in a litter. Generally, 5-10% mortality related to Kpp was reported. Different antimicrobial treatments have been applied with variable results. In most cases, the clinical signs decreased, or completely stopped, within a few weeks. At necropsy, fibrin in the body cavities and petechiae on the intestinal wall were the most common findings. Septicemia was confirmed by culture of the spleen. In several cases, Kpp was isolated from joints affected with purulent arthritis.

All outbreaks occurred in indoor farms, varying in size between 250-1700 sows, located in the Southern part of the Netherlands. Most cases were reported between March and October, but outbreaks have also been reported in February and November. Until now, no clear on-farm risk factors were identified; outbreaks occurred in farms feeding fermented, liquid feed or dry feed and no relation with specific bedding material or treatments in the sows or piglets could be detected.

Next to the isolation of Kpp in case of outbreaks in pre-weaned piglets, Kpp has been isolated from several weaned to adult pigs sent in for necropsy at GD Animal Health with other clinical signs.

The characteristics of Kpp outbreaks in the Netherlands resemble previously reported outbreaks in different countries, although the affected farms in the Netherlands, as opposed to most affected farms in England, are all indoor farms.

## **BBD-PP-52**

### **TITLE**

COMPARATIVE STUDY OF ANTIMICROBIAL ACTIVITY OF OREGANO OIL AND CARVACROL AGAINST STREPTOCOCCUS SUIIS

Fabiana Carolina de Aguiar<sup>1</sup>, Ana Lucía Solarte<sup>1</sup>, Lidia Gómez-Gascón<sup>1</sup>, Carmen Tarradas<sup>1</sup>, Alfonso Maldonado<sup>1</sup>, Fernando Cardoso-Toset<sup>2</sup>, Rafael Astorga<sup>1</sup>, Belén Huerta<sup>1</sup>

<sup>1</sup> *Animal Health Department, University of Córdoba, International Excellence Agrifood Campus 'CeIA3', 14071, Córdoba, Spain*

<sup>2</sup> *CICAP – Food Research Centre, 14400, Pozoblanco, Córdoba, Spain*

### **CONTENT**

#### Background and Objectives

*Streptococcus suis* is an important pig pathogen and a serious professional zoonosis. The control of this disease should focus on the correct use of traditional antimicrobials, as well as new alternatives such as the use of natural products, including oils and extracts derived from plants. The objective of this study was to compare the antimicrobial activity and bactericidal dynamics of oregano essential oil and its main active component (carvacrol) against strains of *S. suis*.

#### Material & Methods

The distribution of the MIC and MBC was determined against 60 *S. suis* isolates. The MIC<sub>50-90</sub> and MBC<sub>50-90</sub> and the microcidal index (MBC/MIC) were also calculated and compared (Friedman and Wilcoxon tests,  $P < 0.05$ ). Finally, the time-kill curve of European reference strain (*S. suis* P1/7) was determined at different times (0, 1, 5, 15 and 30 min and 1, 2, 4, 8 and 24 h).

#### Results

Carvacrol showed an inhibitory activity (MIC<sub>50-90</sub> of 156.25  $\mu$ g/ml) and bactericidal activity (MBC<sub>50-90</sub> = 156.25 - 312.5  $\mu$ g/ml) significantly higher than oregano (MIC and MBC 50-90 = 312.5  $\mu$ g/ml). In addition, to inhibit and eliminate more than 66% of the strains, a two-fold higher concentration of oregano was required, although we could verify the bactericidal character (microcidal index = 1 or 2) of both products. A concentration-dependent antimicrobial activity for oregano and carvacrol was showed, achieving a rapid bactericidal effect at supra-inhibitory doses (2 and 4 fold MIC), with virtual eradication of the bacterial population after 1-5 minutes of exposure.

#### Discussion & Conclusion

The results of this work suggest a greater antimicrobial potential of carvacrol than the oregano against *S. suis*. We consider that to potentiate the action and reduce the effective concentration of these products, one of the alternatives would be its combined use with antibiotics.

## **BBD-PP-53**

### **TITLE**

ASSESSMENT OF THE SITUATION OF THE PORCINE ENZOOTIC PNEUMONIA AND PORCINE PLEURO-PNEUMONIA IN PORTUGAL USING SLAUGHTERHOUSE LUNG EVALUATION DURING 2017 AND 2018

Francisco Costa<sup>1</sup>, Tiago Nunes<sup>1</sup>

<sup>1</sup> *Ceva Portugal, Lda*

### **CONTENT**

Lung lesion scoring is a useful tool to evaluate the importance of the respiratory disease in swine farms, being bronchopneumonia (BP) and dorsocaudal pleurisy (DCP) amongst the most frequent/relevant lesions observed. Although these lesions are not pathognomonic, their occurrence is usually associated with two agents: *Mycoplasma hyopneumoniae* and *Actinobacillus pleuropneumoniae*.

The objective of this study was to assess the prevalence of these two types of lesions in slaughter pigs in Portugal. At the time of production of this paper, no similar published data was found regarding Portuguese swine herds.

Between January 2017 and October 2018, 321 batches of pigs from Portuguese farms (with an average of 108,5 monitored pigs per batch) were scored at slaughter using the CEVA Lung Program methodology (which includes Modified Madec System and Modified SPES).

In average, each batch had 27,08% of BP lungs (Q1 – 12,26%; Median – 25,00%; Q3 – 39,13%), resulting in a 1,16 Madec Index (Q1 – 0,28; Median – 0,85; Q3 – 1,72). The average prevalence of cranial pleurisy was 5,75% (Q1 – 0,00%; Median – 3,53%; Q3 – 8,18%) and the average prevalence of scarring was 2,29% (Q1 – 0,00%; Median – 1,08%; Q3 – 3,68%).

Regarding DCP, the average prevalence was 18,22% (Q1 – 4,00%; Median – 10,00%; Q3 – 29,55%), resulting in a 0,49 APP Index (Q1 – 0,12; Median – 0,31; Q3 – 0,76).

These results suggest a relevant prevalence of *Mycoplasma hyopneumoniae* and *Actinobacillus pleuropneumoniae* infections in the Portuguese swine herds and that controlling the Porcine Respiratory Disease Complex remains a challenge in these commercial farms.

## **BBD-PP-54**

### **TITLE**

## **IMPLEMENTATION AND EVALUATION OF DIFFERENT ERADICATION STRATEGIES FOR SWINE DYSENTERY**

Willem Neiryneck<sup>1,2,3</sup>, Filip Boyen<sup>4,2,3</sup>, Tamara Vandersmissen<sup>5</sup>, Philip Vyt<sup>6</sup>, Freddy Haesebrouck<sup>4,2,3</sup>, Jeroen Dewulf<sup>7,2,3</sup>, Dominiek Maes<sup>1,2,3</sup>

<sup>1</sup> *Unit of Porcine health management*

<sup>2</sup> *Faculty of Veterinary Medicine*

<sup>3</sup> *Ghent University*

<sup>4</sup> *Department of Pathology, Bacteriology and Poultry diseases*

<sup>5</sup> *Animal health care Flanders*

<sup>6</sup> *Dialab*

<sup>7</sup> *Veterinary Epidemiology Unit*

### **CONTENT**

**Background and Objectives:**

Brachyspira infections are causing major losses to the pig sector and lead to high antimicrobial use. The present study aimed to implement and evaluate farm-specific elimination programs for *B. hyodysenteriae* in different infected pig farms.

**Materials and Methods:**

Eight pig farms infected with *B. hyodysenteriae* volunteered to implement an elimination program. The program was farm-specific and depended on the farm structure, the susceptibility of the isolated *B. hyodysenteriae* strain towards pleuromutilins, the housing and biosecurity conditions and the punctuality of the farmer. Monitoring for *B. hyodysenteriae* was performed by sampling pigs (PCR on pooled feces) every three months for one year after eradication.

**Results:**

The elimination program was successful in four farms. Two of them (single-site farrow-to-finish herd and finishing herd) had applied total depopulation. A third farm (sow farm) practised partial depopulation (stables remained empty for 4 weeks) and subsequently changed the source of the breeding pigs (purchased at 14 weeks). The fourth farm practised partial depopulation by temporarily selling the nursery piglets (stables remained empty for three weeks) combined with antibiotic treatment for 5 – 6 weeks.

Elimination failed in four farms. Two of them (farrow-to-finish and sow herd) tested positive already at the first monitoring. They had implemented antibiotic treatment for four weeks, but not all animals were treated and suggested measures were not implemented properly. The other farms (finishing herds) tested positive at the second monitoring. The purchased piglets might have been the infection source. There was a problem with rodents on one farm, and the other farm had a commercial installation to process manure from different sources.

**Conclusions:**

Taylor-made elimination programs for *B. hyodysenteriae* can be implemented successfully in different types of pig herds. Failures were mainly due to improper partial depopulation and/or not implementing the suggested biosecurity measures properly.



## **BBD-PP-55**

### **TITLE**

#### **PAN-EUROPEAN SUSCEPTIBILITY OF SWINE RESPIRATORY DISEASE PATHOGENS TO GAMITHROMYCIN AND OTHER ANTIMICROBIAL SUBSTANCES**

Olivier Merdy<sup>1</sup>, Gerty Vanantwerpen<sup>2</sup>, Jutta Verspohl<sup>3</sup>, Marie-Hélène Bayon-Auboyer<sup>4</sup>, Andrea Luppi<sup>5</sup>, Carlo Rosignoli<sup>5</sup>, Denis Vio<sup>6</sup>, Mateo Del Pozo<sup>7</sup>, Roberto Arena<sup>1</sup>, Michele Dottori<sup>5</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health, Germany*

<sup>2</sup> *DGZ, Belgium*

<sup>3</sup> *TIHO, Germany*

<sup>4</sup> *LABOCEA, France*

<sup>5</sup> *IZSLER, Italy*

<sup>6</sup> *IZS Veneto, Italy*

<sup>7</sup> *Labopat Imasd, Spain*

### **CONTENT**

#### **Background**

Prudent use of antibiotics requires susceptibility testing to justify the antimicrobial substance choice and helping in the maximization of treatment efficacy. This study was conducted to determine the susceptibility of swine respiratory pathogens to gamithromycin as well as other prescribed antimicrobials.

#### **Material and methods**

Seven diagnostic laboratories from 5 different European countries (France, Spain, Italy, Belgium, Germany) participated to the survey. A total of 162 *Actinobacillus pleuropneumoniae* (App), 81 *Pasteurella multocida* (Pm), 43 *Bordetella bronchiseptica* (Bb) and 35 *Haemophilus parasuis* (Hps) isolates from unknown anamnesis were tested by microbroth dilution method as per CLSI recommendations. The same batch of microdilution plates were used in all laboratories. Susceptibility to gamithromycin tests were duplicated using disk diffusion technique. Results were interpreted using CLSI resistance breakpoints where available.

#### **Results**

Gamithromycin MIC<sub>50</sub> and MIC<sub>90</sub> were 2.0/8.0 µg/mL for App, 0.5/2.0 µg/mL for Pm, 2.0/4.0 µg/mL for Bb and 0.5/1.0 µg/mL for Hps.

Only 2% (3/162) isolates (3 App) showed an elevated gamithromycin MIC value of 32 µg/mL or higher. Resistance rates of App were 20% for tilmicosin (n=32), 17% for tulathromycin (n=27), 29% for tetracycline (n=46) and 2% for florfenicol (n=3).

Low gamithromycin MIC values of maximum of 8.0 µg/mL were determined for Pm, Bb and Hps isolates.

Excluding one isolate with elevated MIC, other Bb (42/43) showed MIC values clearly identified as a wild-type distribution (2.0 µg/mL).

Multi-resistance to the tested antibiotics including other macrolides were observed for the four isolates with elevated MIC to gamithromycin (3 App, 1 Bb).

The correlation observed between MIC values and inhibition diameters allowed to consider good degree of agreement between the two techniques for diagnostic purpose: None of the tested isolates showed an elevated MIC and a large inhibition diameter.

#### **Conclusion**

This study confirmed, under Pan-European field conditions, the susceptibility values of SRD pathogens to gamithromycin.

## **BBD-PP-56**

### **TITLE**

#### **ORGANIC DISSEMINATION OF MYCOBACTERIUM TUBERCULOSIS COMPLEX AND TUBERCULOSIS LIKE LESIONS IN FREE-RANGE PIGS**

Fernando Cardoso-Toset<sup>1</sup>, Jaime Gómez-Laguna<sup>2</sup>, Lidia Gómez-Gascón<sup>3</sup>, Librado Carrasco<sup>4</sup>, Angela Galán-Relaño<sup>3</sup>, Francisco Jurado-Martos<sup>1</sup>, Irene Magdalena Rodríguez-Gómez<sup>5</sup>, Inmaculada Luque<sup>3</sup>

<sup>1</sup> *CICAP – Food Research Centre, 14400, Pozoblanco, Córdoba, Spain*

<sup>2</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Cordoba, Spain*

<sup>3</sup> *Animal Health Department, University of Córdoba, International Excellence Agrifood Campus ‘CeIA3’, 14071, Córdoba, Spain*

<sup>4</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Spain*

<sup>5</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Cordoba, Spain.*

### **CONTENT**

#### **Background and Objectives**

Tuberculosis like lesions (TBL) remains as one of the main causes of condemnation in swine reared in outdoor systems with mycobacteria belonging to Mycobacterium Tuberculosis Complex (MTC) as one of the principal etiologic agents. Therefore, the incidence and organic dissemination of these microorganisms in TBL from free-ranged pigs was evaluated in this study.

#### **Material and methods**

Two-hundred-sixty-two samples from 37 totally condemned pigs were analysed: submandibular (SLN, 37), superficial inguinal (SILN, 37), gastrohepatic (GHLN, 36), and popliteal (PLN, 36) lymph nodes, lungs (37), liver (34), spleen (24) and tonsils (21). Histopathological analysis was carried out and granulomas were classified into four stages (I-IV). MTC was tested from tissue by duplex qPCR.

#### **Results**

A total of 172 samples from 27 animals were subjected to histopathological examination. Two different patterns were evidenced with lack or occasional lesions in SILN and PLN and advanced lesions detected in SLN (26/27) and GHLN (23/25) (stages III and IV). Early stage granulomas (stage I and II) were the predominant lesions in lungs (13/16), liver (12/22) and spleen (7/14).

MTC was detected in 31 out of 37 animals and 90 (90/262) samples. In 26 out of the 31 pigs, MTC was detected from two or more organs. SLN (24/31) and GHLN (19/31) were the MTC+ organs most frequently detected, with 29 out of 31 MTC+ pigs detected as positive in one or both of these samples. MTC were also detected from spleen (9/31), SILN (11/31), liver (8/31), lungs (8/31) and tonsils (4/31).

#### **Discussion and conclusion**

Our results point out that both SLN and GHLN must be included in the sampling of surveillance programs. The detection of MTC in different body locations highlights the risk of excretion by different routes and the potential role of this species in the maintenance of this disease.



# HERD HEALTH MANAGEMENT AND ECONOMY

POSTER ABSTRACTS

## HHM-PP-01

### TITLE

INFLUENCE OF TWO DIFFERENT AMOUNTS OF IRON INJECTIONS ON THE HEMOGLOBIN CONCENTRATION IN BLOOD IN PIGS

Gerben Hoornenborg<sup>1</sup>

<sup>1</sup> *Vet-Team ApS Holstebro, Denmark*

### CONTENT

**Background and objectives** In the first three weeks of life piglets produce a lot of red blood cells. The congenital iron depot (~ 50 mg) is exhausted after approx. 1 week. To avoid iron deficiency, the piglets must have an additional supplement of iron. To determine whether a pig has an iron deficit, the hemoglobin concentration in the blood can be measured. Normally, a hemoglobin concentration above 90-110 g/l is deemed sufficient. Measurements in several farms in our veterinary practice showed a low average hemoglobin concentration at around 10-12 days of age and just before weaning. The aim of this study was to measure if 1.5 ml of iron dextran could give a higher hemoglobin concentration than 1.0 ml. **Materials and methods** 202 piglets were randomly distributed in two groups within 24 hours after birth. The pigs were individually ear tagged. Each group got an injection of either 1.0 ml (Low) or 1.5 ml (High) iron, between 30 and 60 hours after birth. Hemoglobin concentration was measured 12 days after injection with the Hemocue 201+ in blood from an ear vein. For statistical analysis, a t-test was used. **Results** 175 pigs were tested (eight pigs died before iron injection, 15 died after iron injection and four pigs were not located at testing). The mean hemoglobin concentration in the "low" group was 91.9 g/l whereas the "high" group had a significantly higher concentration of 95.3 g/l ( $p=0.027$ ). **Discussion and conclusion** Although the hemoglobin concentration was raised significantly, the value was still below 110 g/l. Results from other measurements in our practice shows that there is considerable difference between pigs and farms. Measurements in 40 different farms show a range of 61 to 120 g/l. Further studies will have to investigate what causes the difference between farms and if this difference influences growth and/or survival.

## **HHM-PP-02**

### **TITLE**

IMPROVED FEED CONVERSION RATIO IN FINISHERS BY VACCINATION AGAINST PCV2

Tine Frandsen<sup>1</sup>, Hasse Poulsen<sup>1</sup>

<sup>1</sup> *Danvet K/S*

### **CONTENT**

#### Introduction

The negative impact of PCV2 in the swine industry is well documented, and so are the benefits of vaccination against the infection. Most controlled trials have investigated the effect of vaccination on average daily gain and mortality. This field trial examine the effect of PCV2 vaccination on feed conversion ratio (FCR) in finishers. FCR is considered one of the most important expenses in pork production.

#### Materials and methods

The trial was performed in a wean-to-finish herd including close to 1500 pigs. At weaning the pigs were evenly divided in 3 groups with the same mean weight. 3 different treatments were applied:

- 1: Commercial Vaccine A 1 ml
- 2: Commercial Vaccine B ½ ml
- 3: Control Saline 1 ml

At approximately 25 kg liveweight the pigs were moved to the finishing unit, weighed in the treatmentgroups and placed in pens of 16 pigs with liquid feeding. At an average liveweight of 115 kg the finishers were weighed in groups and slaughtered. Feed intake, dead and culled pigs per pen was measured and recorded during finishing. PCV2 challenge was confirmed by PCR analysis on blood and oral fluid.

#### Results

Both vaccinated groups had FCR that was lower than the non-vaccinated control group. Group 1 had a consumption of 0,12 kg feed per kg weight gain less than the control group. Group 2 had a consumption that was 0,09 kg feed less than the control group. The differences were not statistically significant. Group 2 (Vaccine B) had a significantly higher mortality and culling rate than group 1 (Vaccine A). The mortality and culling rate of the non-vaccinated control group was not significantly different from any of the vaccinated groups.

#### Conclusion

This study shows a benefit from vaccinating with commercials PCV2 vaccines to improve FCR.

## **HHM-PP-03**

### **TITLE**

ELIMINATION OF MYCOPLASMA HYOPNEUMONIA IN A SOWHERD USING ZACTRAN® (GAMITHROMYCIN) IN A SWISS-ELIMINATION MODEL

Jens Elkjaer Bach<sup>1</sup>

<sup>1</sup> *Danvet K/S*

### **CONTENT**

#### Introduction

Infection of *M. hyopneumonia* in the pig production has a high impact on performance, antimicrobial consumption and economic yield. As a consequence elimination or vaccination has been highly recommended over the last decades. In this casereport a medicated partly depopulation - Swiss-depopulation was performed using Zactran®.

#### Materials and methods

Prior to the elimination program all replacement-gilts, pregnant gilts and sows above 120 kg was housed in a separate barn (Site I). Replacement gilts from 80 kg -120 kg was transferred to an off-site facility (Site II). This was planned to occur at a farrowingstop lasting for 8 weeks. All animals less than 80 kg were sold. All animals in both facilities were vaccinated twice with a commercial *M. hyopneumonia*-vaccine.

Within the last 3 weeks before farrowing the sows and gilts (Site I) was injected with Zactran® 6 mg per kg bodyweight 3 times with 5 days intervals.

Within the last 3 weeks before moving the replacement gilts from Site II to Site I they were injected with Zactran® 6 mg per kg bodyweight 3 times with 5 days interval.

#### Results

4 month after end medication the first tests was conducted to evaluate the results. 6 set of ELISA tests was performed on 20 offspring animals each time over a period of 6 month. Hence the last tests was performed 12 month after initiating the elimination. None of the tests came out positive for *M. hyopneumonia*.

#### Conclusion

In this case using Zactran® as the antibiotic agent in a medicated Swiss-model elimination with partly depopulation proved to be effective. By using injections to all animals instead of infeed medication the likelihood of medicating all animals is high. In this case Zactran® proved to be effective on mycoplasma elimination.

## HHM-PP-04

### TITLE

ANALYZING THE GROWTH ON 50 FATTENING FARMS; THE ROLE OF PIGLET GROWTH, HYGIENE AND SEROLOGICAL DISEASE STATUS.

Godfried Groenland<sup>1</sup>

<sup>1</sup> *G.J.R. Groenland*

### CONTENT

#### - Background and Objectives

De Heus Feed company developed a monitoring program for fattening farms which (besides checking feed requirement) gathers various data like piglet history, health and hygiene. This study determines their influences on growth.

#### - Material & Methods

Included were 50 farms monitored between 2014 and 2018. To determine health status blood was taken at the age of 10, 15, 20 and 25 weeks old and as age-sample serologically tested on antibodies to APP, Influenza, M. hyo, PRRS, PCV2, Lawsonia and Salmonella. Ascaris suum was tested at 25 weeks. For each pathogen on each age, results counted as positive if probably due to circulation of field strains. The number of positive serology at 10 weeks (PS10) and the period 10-25 weeks (PS25) was counted. Hygiene(HY) was judged as sufficient(1) or not-sufficient (2). Data were compared with growth and analyzed in SPSS statistics.

#### - Results

'Fattener-growth 10-25 weeks' (FG) varied from 669 to 1012 g/day. At 10 weeks old FG could be predicted with the following model:  $FG = 589.1 + 0.831 * PG - 23.9 * PS10 - 30.8 * HY$  ( $R^2 = 0.785$ ).

Number of 'positive serology at 10 weeks old' was well correlated with 'total number of positive serology in the period 10-25 weeks' ( $R^2 = 0.652$ ,  $P = 0.000$ ). Looking at total 'positive serology 10-25 weeks', FG could be explained with the following model:  $FG = 768,5 + 0,591 * PG - 7,818 * PS25 - 39,3 * HY$  ( $R^2 = ,840$ ). Significant correlations of serology with FG were 'total numbers of positive serology in the period 10-25 weeks' ( $R^2 = -0.579$ ), and for individual pathogens the total serological positives for APP, Influenza, Mhyo, PRRS and Salmonella ( $R^2$  resp. -0.370, -0.322, -0.367, -0.311, -0.358).

#### - Discussion & Conclusion

Piglet growth, serological health status and hygiene were important indicators for fattener growth. Total number of positive serology on 8 pathogens can be used to estimate the negative influence on fattener growth.

## HHM-PP-05

### TITLE

PROBIOTIC SUPPLEMENTATION (CLOSTRIDIUM BUTYRICUM) VIA DRINKING WATER AS A SALMONELLA CONTROL MEASURE

Lars Kunstmann<sup>1</sup>, Leif Meedom<sup>1</sup>, Veerle Hautekiet<sup>2</sup>, Wouter Van der Veken<sup>2</sup>

<sup>1</sup> *Huvepharma N.V., Denmark*

<sup>2</sup> *Huvepharma N.V., Belgium*

### CONTENT

A producer with five Danish fattening farms buying pigs at 30 kg had reoccurring high Salmonella antibody levels in slaughterhouse meat juice readings, causing economic fines despite all in – all out practices (batches). Pigs were fed a commercial pelleted feed. The piglet supply farm was Salmonella positive, tested in pen floor samples. To counter the challenge two farms received probiotics via the drinking water, with the other three as negative controls (no treatment).

Pre-treatment meat juice OD% titers were compared to blood (pre-slaughter, right before slaughterhouse transport) and meat juice (post-slaughter) OD% titers from treated batches. 95 pre-treatment meat juice samples were used from the first experimental herd and 56 from the second, compared to 70 serum samples from each respectively. The official Danish ELISA Salmonella test protocol was used, calibrated to be able to compare results from either substrate. Treated herds received  $2.5 \times 10^6$  CFU/pig/day Clostridium butyricum (Top Gut®) via the drinking water (dosatron), from arrival to slaughter. Meat juice prevalence and relative risk (RR) of Salmonella positive classification were calculated based on statistic values.

For both treated farms the prevalence of Salmonella was reduced: from 0.32 to 0.1 and from 0.42 to 0.21 (pre-treatment compared to pre-slaughter OD% titers). Due to half-life times these numbers decreased further when Salmonella titers were determined post-slaughter, with values of 0.16 and 0.17. At the same time the three control herds had meat juice prevalence values of 0.25, 0.52 and 0.79 at slaughter. As such treatment decreased the risk of being classified Salmonella positive significantly (lower relative risk of 0.31 (P=0.003) and 0.51 (P=0.01), respectively).

Clostridium butyricum supplementation via the drinking water significantly reduced the risk of pigs being classified Salmonella positive, and is thus a useful tool for Salmonella control in pigs fed pelleted feed.



## HHM-PP-06

### TITLE

#### EVALUATING DIFFERENT SEROLOGICAL TESTS FOR PRE-SLAUGHTER SALMONELLA SURVEILLANCE

Lars Kunstmann<sup>1</sup>, Leif Meedom<sup>1</sup>, Veerle Hautekiet<sup>2</sup>, Wouter Van der Veken<sup>2</sup>, Gerben Hoornenborg<sup>3</sup>

<sup>1</sup> *Huvepharma N.V., Denmark*

<sup>2</sup> *Huvepharma N.V., Belgium*

<sup>3</sup> *Vet-Team Denmark*

### CONTENT

Three commercial ELISA tests are evaluated as prognostic tools to anticipate Salmonella detection in meat juice in a farrow-to-finish herd under a Salmonella control program (based on probiotics; Clostridium butyricum, Miya-Gold®). Salmonella classification depends on detection of antibodies in the meat juice, and thus estimates of serum antibody half-lives combined with OD% levels may serve as a guide during production.

Two batches of 10 pigs each were ear tagged and bled at 11, 15 and 20 weeks of age. A sample from each bleeding was sent to three different labs. Two of those labs used the commercially available Herdcheck Swine Salmonella test by IDEXX (based on three antigens), whilst the third lab used an in-house ELISA (DTU, based on two antigens) test. The latter is the reference Salmonella test for meat juice surveillance of slaughter pigs in Denmark. Results were tested for difference in variance (F-test) and means (T-test). For pigs showing an incline in OD% between bleeding 1 and 2 but a decline in OD% between bleeding 2 and 3,  $t_{1/2}$  was estimated fitting a model of exponential decay between OD%-2 and OD%-3

The DTU test and IDEXX tests differed significantly in variance ( $P < 0.05$ ) and means (compared to DTU: IDEXX-1 =  $P < 0.03$ ; IDEXX-2 =  $P < 0.003$ ). IDEXX-1 and IDEXX-2 means did not differ significantly ( $P > 0.47$ ) from each other. Mean Salmonella half-lives were calculated in weeks. For the DTU test this resulted in  $t_{1/2} = 7.0 \pm 1.9$  weeks, for IDEXX-1 in  $t_{1/2} = 11.0 \pm 1.6$  weeks and for IDEXX-2 in  $t_{1/2} = 10.9 \pm 2.5$  weeks.

Depending on which lab and which tests are used results can differ significantly. As such comparison of results originating from different labs/from different methods should not be accepted.

## HHM-PP-07

### TITLE

CASE REPORT: PIGLET PRRS-VACCINATION IN COMBINATION WITH PIG FLOW IMPROVEMENTS GIVE BETTER FINISHING RESULTS

Valentijn Thuring<sup>1</sup>, Martijn Steenaert<sup>2</sup>

<sup>1</sup> *Coöperatie VARKESEN, The Netherlands*

<sup>2</sup> *Boehringer Ingelheim AH Netherlands bv*

### CONTENT

#### Background and Objectives

At a 5000 heads finisher site in the Netherlands problems due to *Actinobacillus pleuropneumoniae* (APP) were observed. PRRS was diagnosed as primary infection. This case report describes the finishing production results of variable interventions consecutively implemented to improve the health of the pigs, under field conditions.

#### Materials and methods

Over a 2 year period four strategies were used in the sow-farm from which the piglets at 9-11 weeks of age were sourced. The strategies were evaluated at the finishing farm. In chronological order:

1. Porcilis PRRS piglet vaccination at 23 days of age (doa)
2. PRRSFLEX piglet vaccination at 23 doa
3. PRRSFLEX piglet vaccination at 23 doa combined with improved pig-flow and stocking density reduction
4. Improved pig-flow and reduced stocking density without PRRS vaccination

All data were calculated as averages per room.

#### Results

Feeding conversion rate (FCR) kg/ kg, Average daily gain (ADG) gr/ day, Antibiotic use (DDD)

Period 1: 6527 pigs, mortality 1.3%, FCR 2.40, ADG 810 g/d, DDD 7.8

Period 2: 5434 pigs, mortality 0.7%, FCR 2.50, ADG 813 g/d, DDD 5.4

Period 3: 3498 pigs, mortality 0.7%, FCR 2.41, ADG 853 g/d, DDD 7.2

Period 4: 2469 pigs, mortality 1.6%, FCR 2.53, ADG 806 g/d, DDD 15.1

#### Discussion & Conclusion

Controlling APP problems by controlling PRRS-infection was the main focus in this case. Additional management improvements next to PRRS vaccination of the piglets gave the best finishing results. After stopping PRRS vaccination, there was a remarkable increase in antibiotic use. In combination with the reduced production results this suggests a return to poorer pig health.

The combined interventions of management and vaccination proved only sufficient to control disease, not to eradicate PRRS. For that, a total and integrated PRRS approach for both the sow herd and the finishing farm is needed.

**HHM-PP-08**

**TITLE**

IMPROVING COMPLIANCE WITH BIOSECURITY USING GEOFENCING TECHNOLOGY

Claudio Trombani<sup>1</sup>, Frédéric Colin<sup>2</sup>, Maëliiss Brunon<sup>3</sup>, Jean-Pierre Vaillancourt<sup>4</sup>

<sup>1</sup> *BREIZHPIG SCOP SAS, 01 Rue Georges Guynemer, 22190 Plérin, France*

<sup>2</sup> *ZOETIS, Bâtiment VIVA, 10 Rue Raymond David, 92240 Malakoff, France*

<sup>3</sup> *EVELUP, ZA du Vern, 29400 Landivisiau, France*

<sup>4</sup> *Faculté de médecine vétérinaire, Université de Montréal, 3200 Sicotte, St-Hyacinthe, Québec J2S 2M2*

**CONTENT**

Poor compliance with biosecurity recommendations has been shown to be a main cause of the lack of control of most infectious diseases at farm level. A computer program and smartphone application have been developed that aim at registering targeted human movements on a given farm: the app is installed in a smartphone carried by each stockperson, and beacons are placed in and between all production units of the farm. These devices are linked by blue tooth, and all detected movements are recorded in real time in a database in the Cloud (geofencing). On the web, the application (Move & Improve) analyses and processes data in order to present them in an easy-to read and user-friendly graphic format.

In order to assess its interest under real field conditions, this system was installed on a 600-sow farrow-to-finish French farm with three stock persons (the farmer and two employees). Move & Improve successfully recorded all stock person movement over a 4-week period, showing that the vast majority of movements (84%) were made within facilities of the same production phase. On average, 8% of movements did not comply with the appropriate pig flow (from low to high infectious risk). It also allowed comparing movement profiles for each person, evidencing that one stock person was more prone to neglect the expected pig flow (13% of his movements were against the low-to-high infectious risk order). This first study paves the way for multiple applications, such as tailoring biosecurity training of the stock persons, but also tracking equipment (if tagged with a beacon) such as high-pressure washer or care toolbox. In particular, Move & Improve might prove helpful in improving biosecurity compliance in PRRS herd stabilisation programs.

## HHM-PP-09

### TITLE

IMMUNOCRIT ASSAY IS A TOOL TO EVALUATE THE MANAGEMENT OF MATERNALLY DERIVED IMMUNITY IN SOW FARMS

Almudena Sanchez-Matamoros<sup>1</sup>, Massimiliano Baratelli<sup>1</sup>, Ignacio Bernal Orozco<sup>1</sup>, Antonio Vela<sup>2</sup>, Luis Sanjoaquin<sup>2</sup>, Elena Caballer<sup>2</sup>, Inma Martin Gil<sup>2</sup>, Lorenzo Fraile<sup>3</sup>

<sup>1</sup> HIPRA, Amer (Girona)

<sup>2</sup> Thinkinpig, Asesoria porcina Zaragoza

<sup>3</sup> Universitat de Lleida, Lleida, Spain

### CONTENT

Background and Objectives

Colostrum intake is crucial for piglet survival and a critical point in the health management of swine farms because it is the main known transmission mechanism of maternal derived immunity (MDI). The immunocrit assay has been suggested as a cost effective method to quantitatively evaluate maternal antibodies in piglets after colostrum intake. Therefore, this assay might be a tool to support veterinary practitioners' investigation of MDI failures to decipher its role in lactation performance. The objective of this study was to evaluate the immunocrit values of farms classified as having good, intermediate and bad pre-weaning mortality.

Material & Methods

Twenty four Spanish farrow-to-weaning pig farms were recruited and classified by swine practitioners as farms with theoretically good, intermediate and bad MDI status based on its pre-weaning mortality. One piglet per sow was bled after colostrum intake (n=27-42/per farm). The immunocrit assay was performed and calculated as previously described in literature and an immunocrit value below of 10% was considered as a marker of deficient colostrum ingestion at piglet level.

Results

The average and coefficient of variation of farm immunocrits were ranging 13.2-23.9% and 19.4-38.26% respectively and no significant differences were observed between the experimental groups. The percentage of piglets with immunocrit values below 10% (PI<10) ranged 0-23.5% and it was significantly lower in those farms with good (95%CI: 6% (3.7-8.3)) and intermediate (95%CI: 5.3% (3.3-7.4)) than bad MDI status (95%CI: 17.9% (12.5-23.2)).

Discussion & Conclusion

The size of subpopulations of piglets with very low MDI (PI<10) was the only parameter associated with pre-weaning mortality but only discriminating good and intermediate from bad farms. In conclusion, immunocrit might be a useful tool for swine practitioners to investigate immunization failures and its relationship with pre-weaning mortality.

## HHM-PP-10

### TITLE

ETIOLOGICAL CAUSE TO PLEURITIS IN HEALTHY PIG HERDS WITH HIGH INCIDENCES OF PLEURITIS RECORDED AT SLAUGHTER

Carl-Johan Ehlorsson<sup>1</sup>, Erik Nörregård<sup>2</sup>, Per Wallgren<sup>3,4</sup>

<sup>1</sup> *Farm & Animal Health, Ängelholm, Sweden*

<sup>2</sup> *Farm & Animal Health, Löderup, Sweden*

<sup>3</sup> *National Veterinary Institute, SVA, Uppsala, Sweden*

<sup>4</sup> *Dept of Clin Sci, Sw Univ Agri Sci, Uppsala, Sweden*

### CONTENT

#### Background

Apparently healthy herds may experience up to 50% pleuritis at slaughter.

#### Materials & methods

A farrow-to-finish herd with 500 sows; 36±8% pleuritis registered at slaughter. Ten pigs were sampled at transfer to a fattening unit plus 3, 6 and 9 weeks thereafter. Tracheal swabs were analysed by PCR. Serum samples analysed with ELISAs. Lung lesions were recorded at slaughter with extended lung inspection of 34 pigs.

#### Results

Healthy pigs with high DWG, but pleuritis in 50% of the pigs at slaughter. The extended inspection confirmed chronic lesions in the diaphragm lobes, but of low magnitude.

Tracheal swabs: Influenza-negative. *M hyopneumoniae* in one pig at the last sampling occasion. *M hyorhinis* repeatedly demonstrated but declined with time (90-70-80-60%). *Actinobacillus* in 50-0-90-70%, and *Pasteurella* in 10-0-80-70% of the samples.

Antibody-ELISAs: Negative to influenza, *M. hyopneumoniae*, and App3. *H parasuis*-antibodies remained at a constant level. All pigs were seropositive to App2 on arrival (A450=1,0), which decreased to 0,6 after three weeks, and remained at that level. All pigs were also seropositive to *Pasteurella* on arrival (A450=1,6), which decreased to 1,3 after 3 weeks but thereafter increased to 1,8.

#### Conclusion and discussion

Pigs probably had pleuritis already on arrival, when App frequently was found in trachea and all pigs were seropositive to App2. These pleuritis may healed somewhat as App-antibody levels decreased and App not was demonstrated in trachea week three. *Pasteurella* may have preserved pleuritis at the end of the rearing, since a simultaneous increase in tracheal presence of *Pasteurella* and of antibodies was observed week 6 and 9. Correspondingly, the tracheal presence of App increased week 6-9. However, serum-antibody concentrations did not increase, which made the true influence of App uncertain. No correlation to Influenza, *M hyopneumoniae*, App3 or *H parasuis* was seen.

## **HHM-PP-11**

### **TITLE**

A FARM CLASSIFICATION TOOL TAKING INTO ACCOUNT THE LUNG LESIONS AND THEIR EVOLUTION WITH CEVA LUNG PROGRAM

BERTRAND MAYNARD<sup>1</sup>, NATHALIE CAPDEVIELLE<sup>1</sup>, SOPHIE BRILLAND<sup>1</sup>, YOHAN PIEL<sup>2</sup>

<sup>1</sup> CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE

<sup>2</sup> UNIVET SANTE ELEVAGE 22600 LOUDEAC

### **CONTENT**

#### Background and Objectives

Enzootic pneumonia (EP) caused by *Mycoplasma hyopneumoniae* (M.hyo) remains one of the most important respiratory infections in current swine production. Ceva Lung program (CLP) is a useful tool to assess the presence, incidence and impact of EP thanks to lung lesions controls in the slaughterhouse. In France, CLP is a powerful database with more than 1.6 million of lung scored. The aim of the study was to classify farms according to their lung scores and its evolution.

#### Materials and methods

The analysis was carried out in 703 farms, including 164 368 lungs scored between September 2016 and September 2018. Each selected farm had at least 3 lung controls and at least one result on the first quarter of 2018.

Each farm has been placed on a 2-size graph taking into account 2 criteria:

On the horizontal axis: the average of its lung score compared to a threshold score of 2 (position above or below this threshold)

On the vertical axis: the evolution of the average score of the 2 latest controls and its position according to a deterioration or an improvement of its lung score of +/- 0.4 points.

#### Results

Four classes of farms have been identified according to their respiratory health status:

- 34% of farms for which the level of control is insufficient with a tendency to degradation
- 2% of farms for which the level of control is good but with a tendency to degradation
- 2% of farms for which the level of control is insufficient with an improvement tendency
- 63% of farms for which the level of control is long-term good.

#### Conclusion

Through the analysis of lung scores, classifying the level of control of the respiratory health status of farms provides valuable information for veterinarians in monitoring the health.

## **HHM-PP-12**

### **TITLE**

**STATISTICAL ANALYSIS OF THE CORRELATION BETWEEN THE LUNG LESIONS SCORES AND SEASONALITY USING THE CLP DATABASE**

NATHALIE CAPDEVIELLE<sup>1</sup>, BERTRAND MAYNARD<sup>1</sup>, SOPHIE BRILLAND<sup>1</sup>

<sup>1</sup> *CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

### **CONTENT**

#### Background and Objectives

Ceva Lung Program (CLP), the lung score application to monitor the enzootic pneumonia (EP) lesions at the slaughterhouse has been set up in France since 2014. Therefore a significant number of data is available. The aim of the study is to determine if there is a correlation between the evolution of lung lesions scores and the seasons.

#### Materials and methods

Lung control results from January 2015 until September 2018 have been analysed. For each lung control, two quantitative parameters have been studied: the percentage of healthy lungs and the Madec lung score. The season, a risk factor for respiratory disorders, was declined into Winter (January to March), Spring (April to June) and Autumn (October to December). Results were analysed using ANOVA test.

#### Results

For the first time, taking into account a database of 3 years, the correlation between lung lesions score and the season was studied. The statistical analysis demonstrated an absence of seasonality with no significant variation of the lung lesions scores between the seasons.

#### Conclusion

One of the objectives of this study was to describe the risk period and to adapt the preventive measures that should be taken by farmers. Consequently, due to the absence of seasonality, the measures of monitoring of lung lesions' notations must be done all year long.

## HHM-PP-13

### TITLE

TOLFENAMIC ACID (TOLFINE®, VETOQUINOL) INCREASES THE WEIGHT GAIN OF PIGLETS BORN FROM GILTS

Juan Manuel Albáñez<sup>1</sup>, Paul Renaud<sup>2</sup>, Érik Grandemange<sup>3</sup>, Jose Luis Pablos Hach<sup>4</sup>, Silvia Elena Buntinx<sup>5</sup>

<sup>1</sup> *Vetoquinol Mexico*

<sup>2</sup> *Vetoquinol N.-A. Inc. Canada*

<sup>3</sup> *Vetoquinol SA France*

<sup>4</sup> *Independent Statistical Consultants*

<sup>5</sup> *Departamento de Nutrición Animal y Bioquímica, Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México*

### CONTENT

Background and Objectives:

Tolfenamic acid (4%, Tolfine®, Vetoquinol) is a non-steroidal anti-inflammatory drug, that could help ease the pain and discomfort (e.g., nipple soreness) after farrowing. The objective of this field trial was to evaluate its effect in sows and gilts.

Material & Methods:

Tested animals were randomly assigned to one of two groups: 1) Tolfine®, 70 sows, 33 gilts, all receiving one IM injection (1 mL/20 kg BW) post-farrowing, 2) control, 62 sows, 16 gilts, no anti-inflammatory treatment. The response variables were rectal temperature (RT), litter size (LS) during the first three days postpartum, piglet weight gain from birth to weaning (WG), and mean litter weight at weaning (LW). Variables were tested for homogeneity of variances and normality. RT and LS were analyzed using a Generalized Estimation Equation model, and WG and LW were analyzed using ANOVA and the covariates initial weight and litter size, respectively.

Results:

RT: the animals on Tolfine® had a lower ( $P = 0.007$ ) RT than the control animals (39.3 vs 39.7C) and sows had a lower ( $P = 0.04$ ) RT than gilts (39.4 vs 39.5). LS: the effects of day ( $P = 0.000$ ) and parity x day interaction ( $P = 0.044$ ) were significant. WG: the treatment x parity interaction was significant ( $P = 0.041$ ). Piglets from the Tolfine®-treated gilts gained more weight than the piglets from the control gilts: 5.21 vs 4.93 kg ( $P = 0.026$ ). LW: sows had heavier ( $P = 0.000$ ) litters than gilts (83.23 vs 76.08 kg).

Discussion & Conclusion:

Farrowing causes stress and pain. However, Tolfine®-treated gilts benefited the most, piglet weight gain was improved (294 g/d) compared to "control" gilt piglets. These results potentially due to less nipple soreness and Tolfine®'s anti-pyretic effects, likely improving feed intake. Tolfine® had a positive effect on gilt well-being and piglet performance.



## **HHM-PP-14**

### **TITLE**

BIOCHECK.UGENT: A RISK BASED TOOL TO QUANTIFY THE LEVEL OF BIOSECURITY

Merel Postma<sup>1</sup>, Bo Vanbeselaere<sup>1,2</sup>, Nele Caekebeke<sup>1</sup>, Moniek Ringenier<sup>1</sup>, Elise Bernaerdt<sup>1</sup>, Bert Damiaans<sup>1</sup>, Philip Joosten<sup>1</sup>, Steven Sarrazin<sup>1</sup>, Jeroen Dewulf<sup>1</sup>

<sup>1</sup> Ghent University, Faculty of Veterinary medicine, Veterinary Epidemiology Unit

<sup>2</sup> CID Lines, Belgium

### **CONTENT**

**Objectives:** A positive association between antimicrobial usage (AMU) and selection of antimicrobial resistance (AMR) has been proven in several studies. Antimicrobial stewardship in combination with optimal animal health will be key to slow down the resistance development. A perceived highly effective and feasible alternative to improve overall animal health and reduce the necessity of AMU is the improvement of the level of biosecurity. Biosecurity is as well an important measure to reduce the introduction and spread of epidemic and endemic diseases.

**Materials & methods:** To quantify the level of biosecurity Ghent University developed the online free available risk based tool Biocheck.UGent. From this system herds receive a score for their internal, external and overall level of biosecurity and areas for improvement are highlighted.

**Results:** At the moment almost 10000 registrations have been collected and the tool has been used in over 50 countries worldwide. The Biocheck.UGent is currently available for poultry and pig production and is soon for cattle production as well. Large variation between and within herds and countries, as well as room for improvement in the level of biosecurity has been seen in several studies making use of the biosecurity quantification capabilities of Biocheck.UGent. Associations of improved biosecurity levels with reduced AMU and increased production results were published in several publications. Improving the level of biosecurity can be economically beneficial as well, resulting in a net benefit of around 2 euro per finisher per year.

**Conclusion:** Improvement of the level of biosecurity fits into a holistic approach to tackle the world wide problem of antimicrobial usage and resistance and can help us to reduce the risk of introduction of epidemic diseases.

## HHM-PP-15

### TITLE

THE IMPACT OF VACCINATION WITH INGELVAC PROVENZA™ AGAINST IAV-S ON MORTALITY IN A KNOWN PRRS-UNSTABLE POPULATION

Cara Dykhuis Haden<sup>1</sup>, Brent Sexton<sup>1</sup>, Kellie Cicconi-Hogan<sup>2</sup>, Christa Goodell<sup>2</sup>

<sup>1</sup> *Pipestone Systems*

<sup>2</sup> *Boehringer Ingelheim Vetmedica, Inc.*

### CONTENT

#### Introduction

Influenza A virus in swine (IAV-S) is significant and costly to the swine industry. Ingelvac Provenza™ (Boehringer Ingelheim Vetmedica, Inc., St. Joseph, MO) is an intranasally administered live attenuated influenza vaccine that can be given to pigs as early as one day of age. The objective of this study was to assess Ingelvac Provenza™ in pigs co-infected with PRRSV and IAV-S in the nursery, compared to pigs not vaccinated for IAV-S in a known PRRS-unstable population.

#### Materials and methods

An Upper Midwest US growing pig flow sourced from five commercial sow farms was assessed. Expected wean to finish mortality was 3.0% - 4.5%. Historically, all pigs received a commercial PRRS MLV vaccination at weaning. Cough due to IAV-S typically began in September annually. All 5 farms were confirmed IAV-S positive in September 2017. In November 2017, two farms broke with abortions storms and respiratory PRRS. Despite implementing PRRSV stabilization through mass vaccination, farms continued to leak wild type PRRSV to downstream pigs. Pigs were placed sequentially from December 2017-February 2018, into Sites A-E. PRRSV 1-7-4 was detected at all sites throughout the study timeframe. Sites A, B and D were unvaccinated for IAV-S. Site C contained pigs vaccinated with Ingelvac Provenza™ at processing, while Site E was vaccinated at weaning. Mortality was summarized by week in the nursery for each treatment group.

#### Results and discussion

There were 17,934 Ingelvac Provenza™ vaccinated and 31,113 non IAV-S vaccinated pigs in this study. By week 7, average cumulative nursery mortality for the unvaccinated sites (Site A, B, D) was 3.75% compared to average cumulative mortality of 2.47% in vaccinated sites (Sites C and E). These results demonstrated that Ingelvac Provenza™ was a valuable tool to improve the health and performance of pigs co-infected with both IAV-S and PRRSV in the nursery.

## **HHM-PP-16**

### **TITLE**

**ASSOCIATIONS BETWEEN ANTIMICROBIAL PRESCRIPTION PATTERNS, PURCHASES OF VACCINES AND PREVALENCE OF LESIONS FOUND AT SLAUGHTER IN DANISH SOW HERDS**

Amanda Brinch Kruse<sup>1</sup>, Charlotte Sonne Kristensen<sup>2</sup>, Helle Stege<sup>1</sup>

<sup>1</sup> *University of Copenhagen*

<sup>2</sup> *SEGES Pig Research Centre*

### **CONTENT**

Antimicrobial resistance is a global concern and many countries pursue approaches to reduce antimicrobial use (AMU) in livestock, including pig production. In Denmark, the Yellow Card Initiative were introduced in 2010, setting limits for AMU for each age group at herd-level. Since then, the limits have been reduced several times. The lowest AMU limit was set for the age group sows incl. piglets, why a further reduction in AMU limits for this age group has challenged sow herd owners. The pig producers and livestock associations are worried that complying with official AMU restrictions could jeopardize animal health.

The objective of this study was to investigate the associations between AMU, vaccination and lesions found at slaughter in Danish sow herds.

Conventional sow herds with more than 100 sows in the years from 2013 to 2017 were included in the study.

Register data on antimicrobial prescription and purchases of vaccines were extracted from the Danish VetStat database. Records of lesions found at slaughter were extracted from the Danish meat inspection database.

Multivariable linear regression models were used to test the associations between variables representing AMU and vaccination, as well as the herd prevalence of different types of lesions found at slaughter. Herd size, herd type, herd health status and year were included as potential confounders.

The results from the study will be presented at the conference. The expected impact of the study is to contribute with knowledge about the use of register data to explain animal health at herd-level and to provide information about ways to comply with official AMU restrictions without jeopardizing animal health.

## HHM-PP-17

### TITLE

EFFECT OF VACCINATION AGAINST GNRH IN DIFFERENT PRODUCTION SYSTEMS: A PRACTICAL ALTERNATIVE TO PHYSICAL CASTRATION AND ENTIRE MALE PRODUCTION IN EUROPE

Alvaro Aldaz<sup>1</sup>, Choew Kong Mah<sup>1</sup>, Ilse Van Vlaenderen<sup>2</sup>, Barbara Poulsen Nautrup<sup>3</sup>, James Allison<sup>1</sup>

<sup>1</sup> Zoetis, Parsippany, NJ, USA

<sup>2</sup> CHESS, Bonheiden, Belgium

<sup>3</sup> EAH-Consulting, Aachen, Germany

### CONTENT

#### Background and Objectives

Physical castration (PC) of male piglets is common practice to prevent boar taint in meat from entire males (EM), but is increasingly controversial. The European industry is looking for effective, practical, economical and acceptable alternatives to interest groups. Vaccination against gonadotropin releasing factor (GnRH) with Improvac®, Zoetis (IM) is a proven alternative to PC and EM production. The objective was to compare the performance of IM, PC and EM pigs using a meta-analysis approach.

#### Materials and Methods

Extensive literature review of Improvac® publications (305) found 46 studies suitable for inclusion, covering 11,889 pigs and reporting average daily gain (ADG), feed conversion ratio (FCR), and live weights at slaughter (LW). Analyses were grouped by hot carcass weights (light <90.9kg, medium 90.9-97.7kg, heavy >97.7kg) to reflect different pork production systems. Calculations were conducted with Comprehensive Meta-Analysis V. 2.2 (Biostat, Englewood, NJ)

#### Results

In comparison with PC, light, medium and heavy pigs, IM had significantly better ADG (32.43, 15.78 and 56.37 g/day), improved FCR (-0.232, -0.212 and -0.262 kg/kg), and higher LW (1.373, 2.138 and 2.618 kg – light difference not significant). Carcasses of IM and PC had similar very low risk for boar taint (androstenone and skatole, P>0.05). In comparison with EM, light and medium IM pigs (heavy EM data not available) had significantly better ADG (65.86 and 51.06 g/day), slightly worse FCR (0.067 and 0.065 kg/kg) and higher LW (2.623 and 8.076 kg). EM carcasses had a significantly higher risk of boar taint than IM (P<0.0001).

#### Conclusions

Male pigs managed with Improvac® perform better than PC and produce meat free of boar taint, without piglet mutilation. IM grow faster than EM with a low negative impact in feed efficiency, giving the opportunity to raise more profitable heavier pigs without risk of boar taint or use of PC.

## HHM-PP-18

### TITLE

EVOLUTION OF MEDICATION COSTS FROM 2006-2016 FROM THE FRENCH NATIONAL TECHNICAL AND ECONOMIC DATABASE

Isabelle Correge<sup>1</sup>, Alexandre Poissonnet<sup>1</sup>, Brigitte Badouard<sup>1</sup>, Anne Hemonic<sup>1</sup>

<sup>1</sup> IFIP, Le Rheu, France

### CONTENT

#### Introduction

Manage medication costs, especially the use of antibiotics, is a major challenge for the pork industry. In fact, this allows for optimizing production costs and monitor the use of antibiotics in order to reduce their contribution to bacterial resistance.

#### Materials and methods

The evolution of expenses for veterinary medication for the last 11 years was analysed in farrow-to-finish (n > 349 farms) and fattening pig farms (n > 101 farms) using the French national technical and economic database (GTE). Total expenses for veterinary medication were divided into four categories: vaccine and livestock management medication (i.e. preventive medication), antibiotic injections, anti-inflammatories and orally administered medication (i.e. curative medication). The evolution of expenses for medication from pig farms inside vs. outside the Brittany region was compared.

#### Results

In farrow-to-finish farms, total medication costs decreased from 2006-2016. Curative medication expenses decreased by 38%, but those for preventive medication increased because vaccine expenses increased by 30%. In fattening farms, total expenses for medication and expenses for orally-administered medication, antibiotic injections and anti-inflammatories also decreased. From 2006-2016, expenses for curative medication decreased by 58%. Since 2013, expenses for preventive medication increased by 28%, especially because vaccine expenses increased by 42%. In 2016, farmers of fattening herds spent more on preventive medication than on curative medication. Farrow-to-finish herds and fattening herds in the Brittany region spent more for preventive and curative medications than those of the same type of herd outside of Brittany. In 2016, differences in expenses for medication on farrow-to-finish farms increased between Brittany and outside Brittany. In contrast, differences in expenses for medication on fattening farms decreased between Brittany and outside Brittany.

#### Discussion & Conclusion

This study confirm the trend observed since 1999: increase of vaccine medication but a strong reduction of curative medication, especially the antibiotics.

## HHM-PP-19

### TITLE

EFFECT OF DIFFERENT DOSES OF FLORFENICOL FOR PREGNANT SOWS

Giovani Marco Stingelin<sup>1</sup>, Diego de Ávila Martins Braga<sup>2</sup>, Marina Lopes Mechler-Dreibi<sup>1</sup>, Luís Guilherme de Oliveira<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

<sup>2</sup> *Federal University of Viçosa – UFV, Viçosa, Minas Gerais, Brazil*

### CONTENT

Background and objectives: Florfenicol is a common bacteriostatic drug used in animal production, known by causing early embryonic death in hens treated with its recommended dose (10 mg/kg), but information about its effects on swine reproductive system is scarce. The objective of this study was to evaluate the effect of different doses of florfenicol on the reproductive performance of pregnant sows in the first third of gestation. Material and methods: In a Brazilian pig farming, 54 sows with different birth orders (from zero to six) were grouped in three randomized blocks (n=18), and received different treatments in feed during 14 days after insemination. The first was the control, the second received the recommended dose of 2 mg/kg, and the third received a high dose of and 4.6 mg/kg. All sows were subjected to the same conditions of humidity and temperature. Rates of return to estrus (RE) were evaluated until the 42nd day of gestation. Data were submitted to the Tukey test and to an analysis of variance at 5% level of significance using PROC GLM of the SAS program. Results: Room temperature reached  $26.08 \pm 2.68^{\circ}\text{C}$ , and humidity  $73.95 \pm 8.61\%$ . There was significant influence of the different concentrations of florfenicol on the return to estrus (RE) ( $p < 0.05$ ). Sows that received a diet containing 4.6 mg/kg of florfenicol presented a statistically significant increase in RE (14.81%), differently of sows that received 0 and 2 mg/kg of the drug (0% and 1.85%, respectively). Discussion and conclusion: Return to estrus occurred near the thirtieth day of gestation, ranging from 25 to 36 days. This work allows us to infer that the administration of 4.6 mg/kg of florfenicol in the first third of gestation is a predisposing factor for increasing rates of return to estrus of sows in different stages of reproductive life.

## **HHM-PP-20**

### **TITLE**

#### **EPIDEMIOLOGY OF PRRS IN THE FILTERED SOW FARM POPULATION**

Carles Vilalta<sup>1</sup>, Juan Sanhueza<sup>1</sup>, Emily Geary<sup>1</sup>, Paulo Fioravante<sup>1</sup>, Cesar Corzo<sup>1</sup>

<sup>1</sup> *Veterinary Population Medicine Department, University of Minnesota, USA*

### **CONTENT**

#### **Background and Objectives**

The Porcine Reproductive and Respiratory Syndrome virus (PRRSv) is one of the major diseases causing economic losses in the swine industry. Different routes of transmission between farms have been documented including incoming breeding-stock, semen and fomites. The airborne route has been implicated and currently air filtration is the only current option available to reduce the risk of airborne transmission between farms.

The Morrison Swine Health Monitoring Program (MSHMP) is a voluntary initiative, in which US producers and veterinarians share sow farm PRRSv status weekly to contribute to the understanding of PRRSv dynamics. Additionally, information on whether the farm filters the incoming air and date of filtration is recorded. The goal of this study was to characterize the breeding-herd filtered farm population and assess whether PRRS incidence decreased after air filtration started being used in farms within the MSHMP database.

#### **Material & Methods**

Data from the MSHMP was used for this study. A Poisson regression model was used to compare PRRS incidence rate in the same farm before and after filtration. A second analysis compared the incidence of PRRS in filtered farms.

#### **Results**

The percentage of filtered farms in the MSHMP increased from 7.44 % in 2009 to 16.65% in 2018. Filtered herds are located in nine states. In a cohort of 58 farms, PRRS incidence rate decreased by half after installing the filters and implementing other biosecurity measures.

#### **Discussion & Conclusion**

Throughout the different years of the project, unfiltered farms had a higher PRRS incidence from the season 2009/2010 to the season 2016/2017 compared to filtered farms. However, it is important to remember that filtered farms also modify their biosecurity procedures leading to a filter and compliance effect contributing to this success.

## HHM-PP-21

### TITLE

IMPROVEMENT IN HERD HEALTH AND PRODUCTIVITY IN HERDS WITH SWINE RESPIRATORY DISEASE WITH TILMICOSIN AQUEOUS CONCENTRATE IN LACTATING SOWS

J. Mark Hammer<sup>1</sup>, Emily Beyers<sup>2</sup>, Jason Barga<sup>1</sup>, Joseph Gooding<sup>1</sup>

<sup>1</sup> Elanco, Greenfield (IN), USA

<sup>2</sup> Prestage Farms, Clinton (NC) USA

### CONTENT

#### Background & Objectives

Pulmotil® (tilmicosin) has been shown to effectively control respiratory disease in sows. The effect of administering tilmicosin aqueous concentrate (PAC) via drinking water to sows during lactation is unreported. The study objective is to evaluate the health impact of the PAC lactation medication program on sow and piglet health and performance.

#### Material & Methods

Four 2,600 sow farrow-to-wean farms reporting sow and piglet respiratory disease caused by *Mycoplasma hyopneumoniae* and *Pasteurella multocida* and exacerbated by Porcine Reproductive and Respiratory Syndrome virus infection were enrolled. Three treatment and control groups were included per farm totaling approximately 1,200 sows per treatment. Treatment groups received PAC via drinking water at a rate of 2 grams/sow/day beginning 3 days prior to expected farrowing date which continued for the entire lactation period. Control groups received fresh water only.

#### Results

Variable percent combined stillborn and mummies within the data confirmed PRRSV activity. Percent combined stillborn and mummies ranged from 7.46% to 12.17% for controls and 5.76% to 13.15% for treatments. Least-square mean estimates of pre-wean death loss were 13.1% for treatment vs 14.6% for controls ( $P < 0.01$ ). An interaction between treatment and percent combined stillborn and mummies ( $P = 0.001$ ) and significant treatment effects ( $P = 0.004$ ) were observed. Overall pre-wean death loss advantage was 1.3%. At 10% combined stillborn and mummies, the treatment vs control advantage increased to 1.95%. At 12% combined stillborn and mummies, the treatment advantage was 4.88%.

#### Discussion & Conclusion

The study demonstrated that PAC at 2 grams/sow/day during lactation lowered death loss. In this study, when percent combined stillborn and mummies increased, application of PAC lowered pre-wean death loss. Application of PAC during periods of high combined stillborn and mummies (? 9.5%) can lower pre-wean death loss. Further studies will substantiate these findings and define the impact on weaning weight.



## HHM-PP-22

### TITLE

USE OF ANTIBIOTICS AT EARLY AGE CAN AFFECT THE GUT MICROBIOTA COMPOSITION AND DIVERSITY IN ONE-WEEK OLD PIGLETS

Shah Hasan<sup>1,2</sup>, Olli Peltoniemi<sup>1</sup>, Juhani Vuorenmaa<sup>2</sup>, Claudio Oliviero<sup>1</sup>

<sup>1</sup> *University of Helsinki, Finland*

<sup>2</sup> *Hankkija Oy, Finland*

### CONTENT

In modern pig production, large litters are often affected by neonatal diarrhea and piglets get antibiotic treatment at their very early stage of life. Widespread resistance to antibiotic is a current issue of high relevance. Therefore, we studied the effect of two common antibiotics (amoxicillin and florfenicol) on gut microbiota composition of neonatal piglets. The study was conducted in a commercial piggery. Piglets were marked if they received antibiotic treatment within first three days of their life (n=34; 6 litters) and equal number of piglets were selected from non-treated nearest litters as control (n=34; 6 litters). Fecal samples collected at one week of age were assessed to check microbial composition by 16S rRNA gene sequencing. Intestinal microbiota population Diversity (Shannon index) and Richness were significantly lower in antibiotic treated piglets (P=0.023, P=0.003; 2.5 Vs 2.2; 55 Vs 60 respectively). Overall, the antibiotic treatment at an early age not only decreased the relative abundance of some opportunistic pathogenic bacteria (Campylobacter, Pasteurella; P < 0.01), but it also reduced some beneficial bacteria like Prevotella and Butyrimonas (P < 0.01). Moreover, individual assessment of each of the antibiotic revealed that treatment at an early age in piglets significantly decreased the relative abundance of Colostridium sensu stricto, Butyricimonas, Flavonifractor, Romboutsia, Bacteroides and Roseburia (P < 0.01).

In conclusion, this study found that early age antibiotic treatment in neonatal piglets can affect not only pathogenic bacteria in the gut, but it can also have an impact on beneficial bacterial colonization, significantly reducing the diversity of the gut microbiota. Reduced intestinal microbiota diversity has been connected with favorable growth conditions for opportunistic pathogenic bacteria.

## HHM-PP-23

### TITLE

#### QUANTIFICATION OF RISK FACTORS FOR SWINE DYSENTERY

Friederike Zeeh<sup>1</sup>, Beatriz Vidondo<sup>2</sup>, Heiko Nathues<sup>1</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Veterinary Public Health Institute, University of Bern, Switzerland*

### CONTENT

**Introduction:** Swine dysentery (SD), caused by *Brachyspira hyodysenteriae*, is an important disease in pig production worldwide but quantitative data on risk factors are rare.

**Material & Methods:** Twenty herds with SD (cases) and 60 herds without SD (controls) were analysed by means of a questionnaire and a herd examination. Herds with previous eradication of SD were excluded. Statistical analysis comprised univariable and multivariable tests.

**Results:** Analysis revealed that a SD positive or suspicious source herd, a frequent treatment with antimicrobials, purchasing more than four batches/year, contact to foxes, diagnostics during last 12 months, liquid feeding system, rats on farm, and >250 fattening places were associated with higher likelihood of a herd to have SD. On the contrary, having different sources of grower pigs within one batch, the presence of raptor birds and the presence of martens in the farm's environment were associated with a lower likelihood of having SD. The final multivariable logistic regression model identified 'more than 4 batches/ year purchased' (odds ratio (OR) = 7.5, 95% confidence interval (CI): 1.8-54.3) and 'contact to foxes' (OR = 5.9; CI: 1.2-34.6) as the two main risk factors in our study.

**Discussion & Conclusion:** 'More than 4 batches/ year' implies continuous herd management supporting persistence of *B. hyodysenteriae* in an infected herd, but also increased the number of purchases each enhancing the risk of *B. hyodysenteriae* introduction. Foxes might be infected with *B. hyodysenteriae* by feeding on positive piglets or rodents. Besides, contact to foxes might represent a lack in biosecurity. In conclusion, the risk factors detected underline the importance of biosecurity in SD prevention and control and identify the need for further research.

## HHM-PP-24

### TITLE

#### PIG FARMERS' PERCEPTION OF THE SUCCESS OF ERADICATION OF SWINE DYSENTERY

Rebekka S. S. Cadetg<sup>1</sup>, Beatriz Vidondo<sup>2</sup>, Heiko Nathues<sup>1</sup>, Gertraud Schüpbach<sup>2</sup>, Friederike Zeeh<sup>1</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Veterinary Public Health Institute, University of Bern, Switzerland*

### CONTENT

**Introduction:** *Brachyspira hyodysenteriae* infection can cause swine dysentery (SD), increased use of antimicrobials and economic losses. Eradication of SD on farm level is a powerful intervention strategy, but few field studies in a larger number of herds on the success of intervention, including motivation and satisfaction of the farmers have been performed.

**Material & Methods:** Swiss pig farmers whose herds had undergone an SD eradication were interviewed, and answers were assessed employing a digital questionnaire. The data were analysed descriptively. Selected parameters were examined in-depth with various statistical methods.

**Results:** In the 68 herds with complete datasets, mainly total depopulations (73.5%) had been performed. Reasons for the eradication were both intrinsic (57.4%; e.g. financial aspects) and extrinsic motivation (42.6%; e.g. official infection status). Several parameters (e.g. duration or costs) differed significantly between total and partial eradication. The majority of the pig farmers had been motivated to sanitize (85.3%) and were satisfied both of having performed the eradication (97.1%) and with the result (89.7%). Both economic performance and general health of the herd were subjectively rated as improved after the eradication (54.4% and 63.2%, respectively). The drug usage was assessed being lower (47.1%). Efforts and costs of eradication were rated between 'justifiable' and 'too high', depending on farm type.

**Discussion & Conclusion:** In summary, the eradication of SD was positively evaluated in at least one out of nine aspects of satisfaction by 67/ 68 of the pig farmers concerned (median: 4). However, efforts and costs are substantial, and should be addressed in order to ensure the pig farmers' compliance.

**TITLE**

PERFORMANCE AND HEALTH CHARACTERISTICS OF PIG HERDS AFTER ERADICATION OF SWINE DYSENTERY

Friederike Zeeh<sup>1</sup>, Rebekka S. S. Cadetg<sup>1</sup>, Beatriz Vidondo<sup>2</sup>, Gertraud Schüpbach<sup>2</sup>, Heiko Nathues<sup>1</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Veterinary Public Health Institute, University of Bern, Switzerland*

**CONTENT**

**Introduction:** *Brachyspira hyodysenteriae* infection (swine dysentery, SD) can cause economic losses, health problems and increased antimicrobial usage. Eradication of SD is one potential intervention strategy and hence expected to improve the three factors mentioned before. However, data on these improvements are rare and often limited to individual herds.

**Material & Methods:** Performance data and parameters indicative for health (e.g. number of treatments per pig) were collected from 68 Swiss pig farms having undergone an SD eradication. Three time frames, if available, were included: one year before eradication, and one and two years after eradication, respectively. To balance the influence of individual farm characteristics, the percentage changes in respect to 'before eradication' were calculated and used in the further analyses.

**Results:** Of the 68 farmers, 19 provided data for performance and 11 data for health of sufficient quality for analyses. Performance data from one wean-to-finish herd were analysed separately for weaned and for grower-finisher pigs. The medians of the percentages of 'daily weight gain' (n=19, median: +1%), 'cost for feed per kg weight gain' (n=13, median: -2.9%) and 'losses' (n=19, median: -15.6%) were improved in the first year after eradication. A further improvement of these parameters was present in the second year (n=13, median: +4.6%; n=10, median: -5.1%; n=13, median: -27.3%). The median of 'feed conversion' did not differ (n=11, median: +/-0). In the 11 herds with data for 'health' (e.g. veterinary costs or treatments), the median was decreased by 44.4% in the first year and by 38.3% in the second year, representing a significant improvement.

**Discussion & Conclusion:** Pigs' performance and health (including antimicrobial usage) of most of the herds had improved in the two years after the eradication. The study also demonstrated that retrospective analysis of performance, health and antimicrobial use is challenging due to lacking or incomplete data.

## **HHM-PP-26**

### **TITLE**

**RAISING PIGS WITHOUT ANTIBIOTICS - A COHORTE STUDY**

Julie Lynegaard<sup>1</sup>, Inge Larsen<sup>1</sup>, Charlotte Amdi<sup>1</sup>, Jens Peter Nielsen<sup>1</sup>

<sup>1</sup> *Department of Veterinary and Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark*

### **CONTENT**

In Denmark, about 40% of the antimicrobials used for animal production are used in pigs. This has led to the development of the concept "Raised without antibiotics" (RWA), where pigs are ear-tagged at birth and the ear-tag is removed if the pig receive any antibiotic (AB) treatment. The aim of the study was to investigate when piglets were treated with AB in an RWA herd, in order to identify risk periods relevant for timing of preventive interventions. In one Danish sow herd all piglets (n=518) from 29 sows born within two days were individually ear-tagged for study identification within 12 hours of farrowing. All piglets also received a herd RWA ear-tag in the opposite ear 4 days after birth. The pigs were individually weighed at birth, at 14 days, at weaning and at 12 weeks of age. Additionally, piglets were identified and RWA ear-tag were checked at 2, 4, 5, 6, 7, 8 and 12 weeks of age. At weaning 72% pigs remained RWA whereas 17% of piglets was treated with AB and 7% died in the suckling period. At 12 weeks of age, 65% of the pigs remained RWA, while 17% were treated with AB and 10.6% were dead. The average weight at birth, weaning and 12 weeks was 1.2 kg, 5.9 kg and 30.8 kg respectively. Treated pigs had a reduced bodyweight compared with untreated pigs at day 14 (3.1 kg, 5.1 kg), at weaning (4.8 kg, 6.2 kg) and at 12 weeks of age (27.0 kg, 31.7 kg). The preliminary results from this herd demonstrated that most first-time AB treatments of RWA pigs occurred during the suckling period and that pigs receiving AB treatment had reduced daily weight gain.

## **HHM-PP-27**

### **TITLE**

**GASTRIC ULCERS IN SOWS IN DENMARK**

Lola Tolstrup<sup>1</sup>, Charlotte Sonne Kristensen<sup>2</sup>

<sup>1</sup> *SEGES Pig Research Center*

<sup>2</sup> *SEGES Pig Research Centre*

### **CONTENT**

#### **Background and Objectives**

Since 2014, the pig industry in Denmark has focused on decreasing the occurrence of gastric ulcers in the Danish sows. The prevalence of severe gastric ulcers was in 2011 approximately 25%. Therefore, the aim has been to decrease the prevalence of especially the severe ulcers, focusing on preventive measures and research related to correct feeding and treatment of gastric ulcers. The objective of the current study was to monitor the prevalence of gastric ulcers in slaughtered sows by a mandatory national screening pro-gram running from 2017 to 2019.

#### **Material & Methods**

Stomachs were collected from 20 sows, randomly selected at slaughter in 5 different slaughterhouses. All the stomachs were evaluated pathologically at the Laboratory for Pig Diseases (SEGES Pig Research Center). Pathological scores for the severity was scored on a scale from 0-10, with 0 being no ulcer and 10 being the highest possible score. Score 8-10 were denoted severe ulcers.

#### **Results**

In total, the screening has so far included 14,460 stomachs from 723 different herds, distributed all over Denmark. The size of the herds, from where the stomach originated, had a median of 700 [min 200; max 3600] sows. Out of the 14,460 stomachs, 2,725 (19%) had no ulcers (score 0) and 1324 stomachs (9%) had severe ulcers (score 8-10).

#### **Discussion & Conclusion**

The last 5-7 years, preventive measures for lowering the prevalence of gastric ulcers has focused especially on providing sows with large particle feed and roughage (e.g. hay and straw). As a result, the prevalence of sows with severe ulcers has decreased with almost 2/3 (from 25% to 9%). However, there is still a need for a continuing focus on reducing the risk for gastric ulcers in sows to ensure proper animal welfare and productivity.

## **HHM-PP-28**

### **TITLE**

**EVALUATION OF PARITY AS A DELAYING FACTOR TO REACH PRRSV STABILITY IN SOW FARMS**

Juan Sanhueza<sup>1</sup>, Cesar Corzo<sup>1</sup>, Carles Vilalta<sup>1</sup>

<sup>1</sup> *Veterinary Population Medicine Department, University of Minnesota, USA*

### **CONTENT**

#### **Objectives & Background**

The time required to wean RT-PCR negative pigs from a sow farm after a porcine reproductive and respiratory syndrome (PRRS) outbreak is an important measure to plan herd closure and manage economic expectations. This time is usually referred to as time-to-stability (TTS). Preliminary data looking at piglet serum and litter processing fluids (PF) testing showed a tendency for lower parity litters to have a higher percentage of PRRS virus positive results. Therefore, this study evaluated whether parity 1 (P1) sow piglets remain PRRS virus RT-PCR positive for longer during herd closure compared to parities 2 (P2) and 3+ (P3+) sow piglets.

#### **Material & Methods**

Nine farms that experienced a recent PRRS outbreak were purposely selected. Litters of P1 (n=15), P2 (n=15) and P3+ (n=15) sows were sampled at processing weekly after a PRRSV outbreak. Processing tissues of each litter were collected in Ziploc bags and sent to the laboratory for testing. Pooled samples per parity per farm were RT-PCR tested.

#### **Results**

The percentage of positive P1 RT-PCR PF remained at around 20% after the week 30 after a PRRS outbreak in contrast to a decreasing percentage of positive P2 and P3+ PF.

#### **Discussion & Conclusion**

The proportion of positive RT-PCR decreased as weeks after the outbreak increased. However, the RT-PCR positive proportion decrease was more pronounced in P2 and P3+ litters compared to P1 litters. First parity sows may play a role maintaining PRRSv infection, prolonging time-to-stability in some breeding herds.

## **HHM-PP-29**

### **TITLE**

INVESTIGATION OF SUBACUTE EDEMA DISEASE IN FRANCE. SAMPLING METHOD AND PREVALENCE

Philippe LENEVEU<sup>1</sup>, Julien COLLET<sup>2</sup>, Jean-Luc SEVIN<sup>2</sup>, Anne DURAND<sup>3</sup>, Thierry SOLIGNAC<sup>2</sup>, Agnès JARDIN<sup>1</sup>, Paul CREAC'H<sup>1</sup>, Pierre-Yves MOALIC<sup>4</sup>, Verena SCHÜLER<sup>5</sup>

<sup>1</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>2</sup> *Socavet, 75 bis boulevard Penthievre, 22 600 Loudéac, France*

<sup>3</sup> *Triskalia, 7 rue de la Roberdière, CS 56547, 35 065 Rennes Cedex, France*

<sup>4</sup> *Labofarm, 4 Rue Théodore Botrel, BP 351, 22 603 Loudéac, France*

<sup>5</sup> *IDT-Biologika GmbH*

### **CONTENT**

#### Background and Objectives

Edema disease (ED) is caused by Shigatoxin Stx2e, produced by STEC (Shiga Toxin producing Escherichia coli). It is described mainly as an acute pathology and a vaccine (Ecoporc SHIGA®) is available since 2013 in France. The mortality due to ED is controlled by this vaccine, but it seems that other performance parameters may improve as well. These observations raised the question of a subacute form of ED. A study was conducted in order to define the prevalence of STEC in farms without clinical ED.

#### Material & Methods

Forty-one farrow to finish farms, with no clinical ED and not using anti-ED specific vaccine were selected. In each farm two batches with at least 30 piglets in post-weaning were sampled, allowing the detection of a minimum of 10% prevalence. Two sampling methods were compared in the same pen: a pool of five rectal swabs (from one light, one heavy and three medium weight pigs, respectively) versus boot swabs. A qPCR for the detection of Stx2 was directly applied on the native samples.

#### Results

qPCR results at pen level are as follows: 17.5% positive for both sampling methods; 7.5% positive for boot swabs only, 2.5% positive for rectal swabs only. More positive pens were detected by boot swabs (24.7% vs 19.2%) with in average four positive pens (out of six) per positive batch. There is no age effect regarding STEC prevalence. At farm level, 19 out of 41 are positive with boot swabs (46.4%). In the positive farms, both batches tended to be positive.

#### Discussion & Conclusion

This study demonstrates a high prevalence of STEC in farms without clinical signs of ED. This supports the hypothesis of a subacute ED form in pig farms.



## **HHM-PP-30**

### **TITLE**

INVESTIGATION OF SUBACUTE EDEMA DISEASE IN FRANCE. IMPACT ON SWINE PERFORMANCE

Philippe LENEVEU<sup>1</sup>, Julien COLLET<sup>2</sup>, Jean-Luc SEVIN<sup>2</sup>, Anne DURAND<sup>3</sup>, Thierry SOLIGNAC<sup>2</sup>, Agnès JARDIN<sup>1</sup>, Paul CREAC'H<sup>1</sup>, Pierre-Yves MOALIC<sup>4</sup>, Verena SCHÜLER<sup>5</sup>

<sup>1</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>2</sup> *Socavet, 75 bis boulevard Penthievre, 22 600 Loudéac, France*

<sup>3</sup> *Triskalia, 7 rue de la Roberdière, CS 56547, 35 065 Rennes Cedex, France*

<sup>4</sup> *Labofarm, 4 Rue Théodore Botrel, BP 351, 22 603 Loudéac, France*

<sup>5</sup> *IDT-Biologika GmbH*

### **CONTENT**

#### Background and Objectives

Edema disease (ED) is caused by Shigatoxin Stx2e, produced by STEC (Shiga Toxin producing Escherichia coli). It is described mainly as an acute pathology and a vaccine (Ecoporc SHIGA®) is available since 2013 in France. The mortality due to ED is controlled with this vaccine, but it seems that other performance parameters may improve as well. These observations raised the question of a subacute form of ED. The objective of this study was to evaluate the link between presence of STEC, farm management, and pig growth performance.

#### Material & Methods

Management practices were recorded in 41 farms without clinical ED and analyzed regarding the isolation of STEC.

For 33 farms, complete data set on performance with a reference period of one year was available for comparison. The hypothesis was that one third of the farms with the best performance would have a lower STEC prevalence. Best farms (11/33) were defined as the ones having an average daily gain (ADG) 8-30 kg over 470g and post weaning losses below 2%.

#### Results

Farm management practices were not significantly different between STEC negative and STEC positive farms. STEC prevalence is significantly lower in best farms (18.2%; 2/11) compared to other farms (59.1%, 13/22; Chi2 test, p=0.026).

#### Discussion & Conclusion

The fact that STEC prevalence is significantly linked with performance strengthens the hypothesis of a subacute ED form underestimated until now. Vaccination field trials will be organised in order to test that hypothesis further.

## HHM-PP-31

### TITLE

ENVIRONMENTAL-, PERFORMANCE-, HEALTH- AND WELFARE-RELATED PARAMETERS IN PIG BARNES WITH NATURAL AND MECHANICAL VENTILATION

Ilias Chantziaras<sup>1</sup>, Tommy Van Limbergen<sup>1,2</sup>, Dimitri De Meyer<sup>3</sup>, Carlos Pineiro<sup>4</sup>, Marlijn Klinkenberg<sup>1</sup>, Ilias Kyriazakis<sup>5</sup>, Dominiek Maes<sup>1</sup>

<sup>1</sup> Ghent University, Faculty of Veterinary medicine, Porcine Health Management Unit

<sup>2</sup> Pehestat bvba

<sup>3</sup> Vedanko bvba

<sup>4</sup> Pig Champ Pro Europa S.L.

<sup>5</sup> Agriculture, school of natural and environmental sciences, Newcastle University

### CONTENT

#### Objectives

A multifactorial approach using environmental, performance, health and welfare parameters was used to investigate the numerous effects of ventilation throughout three consecutive fattening batches (08/2015 to 12/2016) in a farrow-to-finish commercial pig farm in Belgium. Apart from this, this study investigated how season and age associated with the respiratory disease daily prevalence.

#### Material and methods

Two fattening pig units were used, unit A (1256 pigs) with mechanical ventilation and unit B (1264 pigs) with natural ventilation. Animal genetics, nutrition, stocking density and health management were the same for both units. Key environmental indicators were monitored in real-time (temperature, humidity, CO<sub>2</sub> and NH<sub>3</sub>) and the daily prevalence of respiratory disease cases was recorded. The welfare status of the animals was assessed twice per production round (revised Welfare quality® protocol). Finally, performance parameters were calculated (average daily growth and feed conversion ratio) and upon slaughter lungs from pigs from unit A (n: 782) and unit B (n: 544) were assessed for the presence of lung lesions, pleurisy and fissures. Depending on the parameters tested, parametric (paired t-tests) and non-parametric (Wilcoxon-signed rank-sum, Mann-Whitney) tests were used.

#### Results

Overall, the use of mechanic ventilation resulted in a more optimal environment with regards to temperature ( $p < 0.001$ ), CO<sub>2</sub> ( $p < 0.001$ ) and NH<sub>3</sub> ( $p < 0.001$ ). Moreover, the number of respiratory disease cases was negatively associated with the use of mechanic ventilation ( $p < 0.001$ ), positively associated with spring season ( $p < 0.001$ ) and with animals aged between 117-162 days old ( $p < 0.001$ ). The visual assessment of the lungs revealed that the odds were 53.2% higher to have fissures in the naturally-ventilated unit. Finally, a better welfare score was seen in the mechanically-ventilated unit in all three production batches.

#### Conclusion

The mechanical ventilation led to better environmental conditions for the fattening pigs and improved most health, performance and welfare parameters.

## HHM-PP-32

### TITLE

DETECTION WITH THERMOGRAPHIC DEGREE APP OF VAGINAL TEMPERATURE VARIATIONS DURING WEANING TO SERVICE INTERVAL (WTSI)

Paula Sánchez<sup>1</sup>, Guillermo Ramis<sup>2,3</sup>

<sup>1</sup> *Agropor. Torres de Cotillas. Murcia. Spain*

<sup>2</sup> *Departamento Producción Animal. Facultad de Veterinaria. Universidad de Murcia. Spain*

<sup>3</sup> *Instituto Murciano de Investigación Bisoanitaria IMIB). Murcia.*

### CONTENT

#### BACKGROUND AND OBJECTIVES

The accurate detection of oestrus is critical to improve reproductive performance in pig production. Nowadays is based on human and boar combined evaluation. However, the boars used to detect heat have a very high economical cost. The aim of this work was to investigate the ability of Degree app (degree2act) designed for fever detection to find temperature variations during weaning to service interval (WSTI).

#### MATERIAL AND METHODS

Rectal and vaginal temperature of sows after weaning was assessed over 7 days by clinical thermometer 3 folds a day (morning, afternoon and evening) and simultaneously a thermal image of the vulvar areas was obtained with Degree app. This application calculates the maximum temperature in the image. Moreover, all the sows had a datalogger attached to neck skin to record continuously the skin temperature of the sows, reading temperature every 5 minutes (2048 records per animal). The onset and end of heat was visually assessed on the base of classical signs. All data were analysed with SPSS.

#### RESULTS

There was a significant difference between thermometric vaginal temperature and Degree temperature recorded during heat period compared to records during all the rest of the WSTI. In fact, there was a measurable decrease of vaginal temperature during heat period, also detected by Degree App. Rectal and skin temperature did not suffer variations along the whole period depending on the heat appearance. There was a high correlation between the vaginal temperature and Degree temperature ( $r < 0.650$ ,  $p < 0.001$ ).

#### DISCUSSION AND CONCLUSION

Degree could allow detecting accurately the decrease of vaginal temperature related to heat; reading the vulvar infrared emission with high correlation to intravaginal temperature. We can hypothesize that could be a tool improving the election of insemination moment and improving then the reproductive performances. This last term needs for more research.

## HHM-PP-33

### TITLE

THE INFLUENCE OF A RESPIRATORY DISEASE IN PIGS OF THE SAME AGE BUT DIFFERENT WEIGHTS ON THE DEVELOPMENT OF BACKFAT THICKNESS AND M. LONGISSIMUS DORSI DIAMETER

Bernd Reckels<sup>1</sup>, Ute Jörling<sup>1</sup>, Sandra Schnier<sup>1</sup>, Christian Visscher<sup>1</sup>

<sup>1</sup> *University of Veterinary Medicine Hannover, Foundation*

### CONTENT

**Background:** The influence of a respiratory disease in pigs of the same age but different weights on the development of backfat thickness and M. longissimus dorsi diameter may be of interest to see if specific types of pigs react different. The hypothesis was that differences in backfat thickness and diameter of M. longissimus dorsi occur depending on the body mass at the time when infections affect the pigs.

**Material & Methods:** The study was performed in a conventional pen with a sorting gate and automatic body weight recording. In a period of 10 weeks every second week ultrasound images of backfat and longissimus-muscle were taken from 169 animals of the same age. The 10 weeks were divided into 5 periods, and the differences of the periods were compared to each other. For the scientific evaluation the data were allocated to three groups by means of the body mass: "heavy", "middle", "light". The period of time four weeks before, four weeks during the disease (serological confirmed) and two weeks after were examined.

**Results:** In the first period of illness the backfat growth of the "heavy" group was significantly lower (? backfat-thickness (cm) Heavy/Middle/Light:  $0.01 \pm 0.12 / 0.04 \pm 0.13 / 0.06 \pm 0.12$ ), but in the second period the backfat growth was higher (? backfat-thickness (cm) Heavy/Middle/Light:  $0.09 \pm 0.10 / 0.03 \pm 0.10 / 0.03 \pm 0.10$ ).

Independent of the body weight all animals reacted promptly with a reduced muscle growth (? muscle-diameter (cm) Heavy/Middle/Light:  $-0.03 \pm 0.47 / 0.05 \pm 0.48 / 0.05 \pm 0.40$ ). However, muscle growth was significantly higher in the second period of the disease in the "heavy" group (? muscle-diameter (cm) Heavy/Middle/Light:  $0.31 \pm 0.44 / 0.17 \pm 0.38 / 0.15 \pm 0.34$ ).

**Conclusion:** Under the influence of respiratory disease during the last fattening period, changes in body mass, backfat thickness, and muscle diameter vary with body weight at the beginning of the infection. The temporal changes in growth and growth composition appear to occur earlier and more clearly in affected "heavy" animals.

## **HHM-PP-34**

### **TITLE**

PORCPROTECT BY IFIP: AN ASSESSMENT OF THE FARM BIOSECURITY LEVEL ON-LINE

Isabelle Correge<sup>1</sup>

<sup>1</sup> *IFIP, Le Rheu, France*

### **CONTENT**

#### Introduction

Biosecurity, whether external or internal, impacts animal health by acting as a preventive factor in the introduction or spread of diseases. Biosecurity is an essential step for any sustainable approach to reducing the use of antibiotics in pig farms. Moreover the improvement of the biosecurity level is absolutely necessary to face African Swine Fever. In the framework of the French Ecoantibio plan, IFIP has created a tool which objective is to evaluate biosecurity level of a farm and help pig farmers to change their practices.

#### Biosecurity assessment

PorcProtect enables farmers or vets or technical advisors to make either a fast assessment of the farm biosecurity with a first audit based on 15 questions, or a more detailed evaluation of the external or internal biosecurity level which focuses on the application of several biosecurity measures presented into 16 themes. PorcProtect is an on-line tool available on computer and tablet for free and can be accessed by the following web-address: <https://porcprotect.ifip.asso.fr/>. For each answer there is a scoring system matching to 3 different situations of application of the biosecurity measure (Good, Medium and Has to be improved) with a color system to see easily the good situation. In order to help users to understand the positive impact of a practice, the biosecurity measures to be followed are presented on technical sheets.

#### Results available

On the results page, users obtain a 0-to-10 score of the farm biosecurity level and they can identify in which biosecurity theme where they need to make improvements thanks to a graphic representation of percentages of good answers and percentages of answers to be improved. There is also a data basis which represents the average biosecurity level of other pig farms so as users to compare the level of application of biosecurity measures to other farms.

## HHM-PP-35

### TITLE

#### IMPACT OF VITALITY ON PIGLET SURVIVAL CHANCES

Jan Jourquin<sup>1</sup>, Joaquín Morales<sup>2</sup>, Kodore Camara<sup>3</sup>

<sup>1</sup> ELANCO, Antwerpen, BELGIUM

<sup>2</sup> PigCHAMP Pro Europa, Segovia, SPAIN

<sup>3</sup> ELANCO, Greenfield IND, USA

### CONTENT

#### Background and Objectives

Placental insufficiency is a major cause of intra-uterine growth restriction that influences birth weight (BW) and the thermo-regulatory capabilities of newborn piglets. For current breeds, a change point for BW of 1.13 kg was determined under which piglet survival chances decrease dramatically. Apart from BW, piglet vitality also plays an important role for survival.

The objective of this study was to investigate the relation between thermo-regulation the first day of life, as a measure of vitality, and survival chances.

#### Materials & Methods

Between 1 and 24 hours after birth, 1498 live born piglets from 111 litters were identified, weighed and their rectal temperature (RT) measured. Mortality information was recorded daily until weaning. To facilitate the analysis of the relationship between RT and mortality, a piecewise logistic regression model was conducted to determine the breakpoint where the slope changes. The change point was 37.74°C. Mortality incidences, timing and reasons were compared between low RT piglets (< 37.74°C) and the others.

#### Results

Of all live born piglets, 20.8% had low RT. The survival rate (29.8%) and BW (0.85 kg) of these low RT piglets were considerably lower than the ones of the other piglets (86.4% and 1.22 kg, respectively). Further, the incidences of dead piglets with signs of emaciation (80%), low viable piglets (39%) and piglets which died within 48 hours after birth with empty stomachs (61%) were considerably higher in low RT piglets than in the other piglets (56%, 17% and 19%, respectively).

#### Discussion & Conclusion

Both BW and RT are important markers for survival chances of a piglet. Low BW predisposes for low RT.

While BW cannot be remedied in the farrowing room, a correct temperature management can help piglets with impaired thermo-regulation to get access to colostrum, which is a precondition for survival.

## HHM-PP-36

### TITLE

HEALTHY CLIMATE: AMMONIA, CO<sub>2</sub>, RELATIVE HUMIDITY AND ENDOTOXINS IN DUTCH PIGFARMS

Josine Gelauf<sup>1</sup>, Jan van Schip<sup>2</sup>, Bas Kolpa<sup>1</sup>, Wikke Kuller<sup>1</sup>

<sup>1</sup> *University Farm Animal Practice, Harmelen, The Netherlands*

<sup>2</sup> *Utrecht University, Faculty of Veterinary Medicine, The Netherlands*

### CONTENT

#### Background and objectives

Pig vets are twice as likely to develop chronic cough as other vets. Lung diseases in pigs account for substantial antibiotic use. Our aim is to measure the indoor climate in pig barns.

#### Materials and methods

The temperature, relative humidity (RH), ammonia- and CO<sub>2</sub> concentrations were measured on 21 pig barns, on days with an outdoor temperature below 15 °C. We've collected 43 results. It was measured for at least 5 minutes per unit, on chest height, not at feeding time. On 18 of these farms, we have also collected dust, with air pumps. The farms have not been selected in any way.

#### Results

CO<sub>2</sub> concentrations were too high (>1200 ppm) for normal working conditions in 95% of our results. Ammonia concentrations are unhealthy from > 7 ppm, which was the case for 80% of our results. Relative humidity was too high in 54% of the results (norm humans 40-60%). For pigs, the norm for ammonia is 25 ppm which was exceeded in 20% of our results.

The endotoxin units per mg dust compared with CO<sub>2</sub> concentrations show extreme differences when CO<sub>2</sub> is >2400 ppm: the maximal endotoxin units are then up to three times as high.

Notable findings are that high ammonia (>25 ppm) and endotoxin concentrations seem to be linked to high CO<sub>2</sub> (>1800 ppm) and bad RH (>60% or <40%).

#### Conclusions

Recommended concentrations for CO<sub>2</sub> (2000-3000 ppm) and relative humidity (RH 50-80%) in pig barns are not healthy. CO<sub>2</sub> concentrations >1200 ppm cause ill working conditions. Moreover, there seems to be a link between high ammonia, endotoxins, CO<sub>2</sub> and RH.

We recommend CO<sub>2</sub> concentration <1800 ppm. To realise a healthier climate for ourselves and our pigs, we need at least CO<sub>2</sub> sensors next to temperature sensors connected to ventilation systems in each pig barn-unit.

## HHM-PP-37

### TITLE

#### LUNG LESIONS EVALUATION OF SWINES IN BRAZIL USING THE CEVA LUNG PROGRAM

William Costa<sup>1</sup>, Mauro Souza<sup>1</sup>, Cristian Postal<sup>1</sup>, Cintia Sartori<sup>1</sup>, Juliana Calveyra<sup>2</sup>, Roman Krejci<sup>3</sup>

<sup>1</sup> *Ceva Animal Health Brazil*

<sup>2</sup> *Ceva Animal Health Latin America*

<sup>3</sup> *Ceva Animal Health France*

### CONTENT

#### Introduction

The evaluation of lung lesions in animals at slaughterhouse is a very useful tool to estimate the importance of respiratory diseases in the farms. This study aims to demonstrate the prevalence of bronchopneumonia (Enzootic Pneumonia) and dorsocaudal pleurisy lesions (Pleuropneumonia) in Brazil.

#### Materials and Methods

Between November 2017 and October 2018 (12 months), 505 slaughter follow-ups were carried out (50 to 200 pigs per batch), in a total 48,986 lungs evaluated from 95 farms distributed in the main swine producing states of the country. Each farm was evaluated at least quarterly and additional strategic evaluations were performed when evaluating the effectiveness of disease prevention strategies.

The lungs were analyzed using Ceva Lung Program.

#### Results

The mean prevalence of bronchopneumonia in pigs was 56.1% (with variation from 0 to 95% between units) of slaughtered animals. The mean area of the lung lesions was 5.86% (range 0-18%). The percentage scarring was 7.9% (variation from 0 to 47%). The mean APP index (APPI) was 0.25% (range 0 to 2.11) and the prevalence of dorso-caudal pleurisy was 7.29% (range 0-63%).

#### Conclusions and Discussion

The results obtained from bronchopneumonia lesions suggestive of infection by *Mycoplasma hyopneumoniae* and dorsocaudal pleurisy, suggestive of *Actinobaccillus pleuropneumoniae* infection are similar to those reported in other countries. The picture shows a great opportunity for improvement in the control of respiratory diseases in Brazil, taking into account that in the absence of the PRRS virus and in the milder climatic conditions present in the country. The CLP proved to be an effective tool in the evaluation and later categorization of respiratory injuries in pigs at slaughter.



## HHM-PP-38

### TITLE

#### APPROACHING IAV-S CONTROL WITH A NEW UNIQUE TOOL

Jana Morgan<sup>1</sup>, Enrique Mondaca<sup>1</sup>, Erin Lowe<sup>1</sup>, Kellie Cicconi-Hogan<sup>1</sup>, Christa Goodell<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim Vetmedica, Inc.*

### CONTENT

#### Introduction

Influenza A virus in swine (IAV-S) is significant to the swine industry. Ingelvac Provenza™ (Boehringer Ingelheim Vetmedica, Inc., St. Joseph, MO) is an intranasally administered live attenuated influenza vaccine (LAIV) that can be given to pigs as early as one day of age. The results of two case studies are reported, within two integrated operations in the Midwestern USA, before and after the introduction of Ingelvac Provenza™.

#### Materials and Methods

For both cases, all piglets received Ingelvac Provenza™ at processing. Case 1: From July 2017- January 2018, pigs were vaccinated with Ingelvac Provenza™, and closeouts (5000 sows) were obtained from January 2017- July 2018. Case 2: This case study involves a two sow farm flow (5000 total sows). All piglets in both farms were vaccinated starting July 2017, and maintained existing protocols of PRRSV, Mhp and PCV2 vaccination at weaning; data from January 2014-May 2018 determined performance mean and variance for each KPI. Mortality, ADG, days to market, and closeout market weights, were entered into SPC software. Either means or medians were calculated before/after the intervention of Ingelvac Provenza™.

#### Results and discussion

Case 1: A significant increase in ADG of 0.12lbs/day was observed in the nursery after intervention ( $p<0.05$ ). There was a significant decrease in average nursery mortality rate observed from 3.23% prior to the intervention to 2.27% after ( $p<0.05$ ). In the finisher, there was a significant ADG increase, from 1.88 lb/day before vaccination to 1.93 after ( $p<0.05$ ). Case 2: There was an increase in nursery ADG of 0.08lb/day and a decrease in F:G of 0.03. There was an increase in finisher ADG of 0.09 lbs/day and an F:G decrease of 0.02. A decrease of 6.7 days to market was also observed, with a 3.13 lb. increase in average out weight. This suggests KPIs support field evaluation of Ingelvac Provenza™.

## HHM-PP-39

### TITLE

FIELD EXPERIENCES ON WEANING WITHOUT HIGH DOSES OF ZINC OXIDE AND ANTIBIOTICS

Nicolai Weber<sup>1</sup>, Poul Baekbo<sup>1</sup>, Tina Soerensen<sup>1</sup>

<sup>1</sup> *SEGES Danish Pig Research Centre*

### CONTENT

#### Background and Objectives

In the Danish pig industry, a high level of zinc oxide in weaner diets (2500 ppm) is commonly used to control post weaning diarrhea (PWD) and thereby reducing the antimicrobial use for treating PWD. The European Commission has banned the use of a high level of in-feed zinc oxide by June 2022. The objective of this study was to describe management approaches and feeding regimes in Danish pig farms that have already phased out the use of high level of zinc oxide in weaner diets.

#### Material & Methods

A project group was established, including seven pig veterinary practitioners and project leaders from SEGES. This group identified 10 pig farms with weaned pigs without using a high level of in-feed zinc oxide for a minimal period of six months. Farmers were interviewed on feeding regimes, hygiene measures, productivity, and antimicrobial use.

#### Results

The feeding strategies in the 10 study farms were characterized by a low level of standardized ileal digestible (SID) protein (avg. 164 grams /kg feed) and a high level of SID lysine (avg. 12,9 grams /kg feed) in the starter diet for weaners. Increasing feed uptake after weaning was prioritized in nine out of 10 farms. Management strategies focused on a stable production with an optimized pig flow and experienced farm personnel. Productivity was comparable with national average apart from mortality in weaners which was low in the 10 study farms (mean: 1,8%). Antimicrobial use for weaners was below national average.

#### Conclusion

This study showed that it is possible to wean pigs without using zinc oxide, maintaining a comparable productivity, welfare, and antimicrobial use. The field experiences acquired in this study will be used in the future to ensure a cost-efficient pig production without using zinc oxide and with a minimal use of antimicrobials.

## HHM-PP-40

### TITLE

ADAPTATION AND VALIDATION OF A SALMONELLA ELISA FOR THE DETECTION OF ANTIBODIES IN ORAL FLUID SAMPLES FROM PIGS

Christopher Erdmann<sup>1</sup>, Astrid Tschentscher<sup>1</sup>, Sabine Schütze<sup>2</sup>, Jürgen Harlizius<sup>2</sup>, Katrin Strutzberg-Minder<sup>1</sup>

<sup>1</sup> *IVD Innovative Veterinary Diagnostics (IVD GmbH)*

<sup>2</sup> *Landwirtschaftskammer Nordrhein-Westfalen*

### CONTENT

Within the framework of the German-Dutch INTERREG V A-project Food Protects, oral fluids (OF) were tested under field conditions for their suitability in antibody detection against Salmonella spp. as a means of herd classification.

In all, 120 OF, 600 blood sera (BS), and 60 pooled faeces samples were collected from 20 pig farms with different histories of Salmonella prevalence in Germany at the beginning, in the middle, and at the end of a fattening period. Serum samples were analyzed by Swine Salmonella ELISA A (cut-off 40 OD%) and compared to the OF samples using Swine Salmonella ELISA B with some modifications. Faecal samples used as reference were analyzed by culture and PCR for Salmonella spp. The cut-off value for Salmonella OF ELISA (B) was determined by ROC analysis.

For the OF Swine Salmonella-ELISA Kit B, the cut-off values of 29 OD% (positive) and 10 OD% (negative) were determined at the specificity and sensitivity level of greater than 95%. Results achieved by the OF Swine Salmonella ELISA represent the approximate mean of the results of all individual BS samples of the same animal group. The 120 statistical mean values from BS results were compared to OF results of the same animal group; 98 of these means tested negative for ELISA A, while 72 OF samples of the corresponding animal group were negative and 20 doubtful for ELISA B. *S. typhimurium* was identified by culture and PCR from six of the faecal samples, these were also positive by BS and OF. Five of the faecal samples were negative by culture, but positive by BS and OF.

The present study demonstrates that OF samples are promising for use in Salmonella herd monitoring but also that further studies are needed for to evaluate Salmonella OF ELISA for monitoring the Salmonella load of swine herds.

## HHM-PP-41

### TITLE

DEVELOPMENT OF A PRACTICAL PROTOCOL FOR COLOSTRUM INTAKE EVALUATION IN COMMERCIAL FARMS

Philippe LENEVEU<sup>1</sup>, Benoît LAUNAY<sup>2</sup>, Agnès JARDIN<sup>1</sup>, Paul CREAC'H<sup>1</sup>, Verena SCHÜLER<sup>3</sup>, Anne LEHEBEL<sup>2</sup>, Mily LEBLANC-MARIDOR<sup>2</sup>, Catherine BELLOC<sup>2</sup>

<sup>1</sup> *IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France*

<sup>2</sup> *BIOEPAR, INRA, Oniris, Université Bretagne Loire, 44 307 Nantes, France*

<sup>3</sup> *IDT-Biologika GmbH*

### CONTENT

#### Background and Objectives

Colostrum intake evaluation is described in literature but the methods use is not applicable in production farms (time-consuming and costly). This study aims to define a more feasible protocol focusing on growth (i.e. quantity ingested) and maternal immune transfer.

#### Material & Methods

To determine references values, 864 identified piglets of 10 production farms were weighed at birth and 24h after to calculate the 24h weight gain (WG24). They were also weighed at the end of farrowing and 24h later to calculate an approximate 24h weigh gain (WG24A). Blood samples of 496 piglets at 24h were analyzed for total IgG dosage.

#### Results

WG24A is correlated to WG24 ( $r=0.66$ ). But data of piglets weighed within 2-3 hours after birth show that the weight gain in the first 2.5h represents 46% of WG24. Using WG24A led to misestimate this crucial period. Consequently, suggested protocol is to spend two half days on farms during farrowing period. On day One, a minimum of 30 newborn piglets are identified and weighed at birth with a precise scale. On day Two, 24h later, the same piglets are weighed. Then, WG24 are compared to threshold values obtained in the 10 studied farms for 90% piglet-survival: piglets' birth weight < 1kg: WG24 ? 75g / [1- 1.2kg]: WG24 ? 50g / ? 1.2kg: WG24 positive.

Additionally, on day Two, six piglets from six litters are selected (one light, one medium, one heavy per half of farrowing) and blood sampled to investigate the immune status. Reference is a maximum of 10% piglets below 20mg/ml of total IgG.

#### Discussion & Conclusion

This protocol that can be easily implemented in commercial farms has been validated using a thorough study of weight gain and immune transfer during the first two days of piglet life in farms with hyperprolific sows.

## HHM-PP-42

### TITLE

EVALUATION OF THE EXTERNAL BIOSECURITY IN A FARM USING BIOPORTAL: CASE REPORT

Victor Rodriguez-Vega<sup>1</sup>, Iván Hernández-Caravaca<sup>1</sup>, Sebastián Figueras<sup>1</sup>, Gloria Abella<sup>1</sup>, Eugenio Sánchez<sup>1</sup>, Antonio Callén<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health Spain*

### CONTENT

Background and objectives

Molecular epidemiology of PRRSV, has been used for description of pathogen phylogenies and to make conclusions about the most likely virus source.

The objective of this study was to analyze the dynamics of the PRRSV in one farm and to understand if the new sequences obtained during a period of time were resident or lateral entrances of virus.

Materials and Methods

One farrow-to-finish-multiplier farm implemented a PRRS eradication program in June 2016, including two sow mass vaccinations, piglet vaccination and RT-PCR in sera of 30 due-to-wean piglets, 10 nursery piglets, and 10 fatteners in a monthly basis. Positive results were sequenced. Eighteen ORF5 sequences were obtained between June 2016 and August 2017. Bioportal software was used to analyze the phylogenetic relationships between sequences.

Results and Discussion

In June 2016 two different sequences were present in the farm, one modified live vaccine virus sequence and one field virus sequence. After sow mass vaccination and piglet vaccination at weaning those sequences were not found in the farm again. In November 2018 a new modified live vaccine strain never used in the farm was and in February 2017 a new field virus was found in fattening piglets. After this new entrance the nursery and the fattening were depopulated in July 2017. By the end of August 2017, a new failure of external biosecurity occurred and a new different virus was found. After 14 months from the start of the eradication program, the farm was still PRRS positive. Using Bioportal we were able to determine three entrances of new viruses due to external biosecurity failures.

Conclusions

Bioportal is a good tool to understand biosecurity issues. It helps us to understand the origin and dynamics of PRRSV in a farm, to evaluate the external biosecurity and to modify the PRRS control programs.

## HHM-PP-43

### TITLE

EPIDEMIOLOGICAL ANALYSIS OF THE PRRS VIRUS IN TWO FARMS IN SPAIN USING BIOPORTAL: CASE REPORT

Victor Rodriguez-Vega<sup>1</sup>, Iván Hernández-Caravaca<sup>1</sup>, Sebastián Figueras<sup>1</sup>, Eugenio Sánchez<sup>1</sup>, Gloria Abella<sup>1</sup>, Antonio Callén<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health Spain*

### CONTENT

Background and objectives

Access to molecular techniques allows us to compare the phylogenetic similarities for a better understanding of the PRRSV dynamics.

The objective of this study was to analyze the PRRSV dynamics in two farms.

Materials and Methods

Two 1,800 sow farms were included in this study. Farm A was a historically PRRS positive farm. Farm B, which belongs to the same production system, is 1.35 Km away from Farm A and was PRRS negative. There was a PRRSV outbreak in Farm B in August 2014. In July 2015 the company started a PRRS Control program in both farms including sows and piglets vaccination and the virus monitoring by RT-PCR in sera of 30 due-to-wean piglets and 10 nursery piglets in a monthly basis. ORF-5 was sequenced and Bioportal software was used to compare the sequences.

Results and Discussion

Eighty-one ORF5 sequences were obtained between July 2015 and September 2018. The degree of heterology between field virus sequences obtained in farm A varied from 0.2% to 3.0%. Whilst in farm B, went from 0.2% to 2%. Meanwhile, the heterology between sequences obtained in Farm A and Farm B varied from 18.9% to 19.8%. Therefore, we assumed that:

- The source of the virus responsible of the first outbreak in Farm B was not Farm A.
- Both farms haven't shared any virus in three years
- No new lateral entrances of viruses have been detected after the starting of the program.
- There was a problem of internal biosecurity with circulation of both resident viruses.
- Some management procedures must be implemented in both farms.

Conclusions

Bioportal is a good tool to understand the PRRSV dynamics and to help us to understand what is going on in the farms in order to modify the PRRS control programs if it is necessary.

## **HHM-PP-44**

### **TITLE**

LUNG LESION SURVEY IN SLAUGHTER PIGS USING CEVA LUNG PROGRAM (CLP) IN THE NETHERLANDS

Susan Kars-Hendriksen<sup>1</sup>, Steven Van Colen<sup>1</sup>

<sup>1</sup> *Ceva Santé Animale B.V., Naaldwijk, The Netherlands*

### **CONTENT**

Background and Objectives

Lung scoring at the slaughterhouse is an effective way to evaluate respiratory health status, economic impact and efficacy of vaccination on swine farms. The aim of the study is to evaluate the prevalence and severity of lesions in slaughter pigs in the Netherlands.

Material & Methods

Between October 2016 and November 2018 a total number of 52 batches which included 5.982 lungs from different Dutch farms were scored at different slaughterhouses according to the CLP method (Cvjetkovi? 2018). In the CLP, bronchopneumonia which is suggestive for enzootic pneumonia (EP) caused by *M. hyopneumoniae* (*M. hyo*), including scarring and cranial pleurisy was quantified. Dorso-caudal pleurisy which is suggestive for previous *Actinobacillus pleuropneumoniae* (*A.p.*) infections was scored and the APP index was calculated.

Results

The median % of bronchopneumonic lungs was 21,13%, with the Q1= 8,87% and Q3=32,51%. The median % of affected surface of the bronchopneumonic lungs was 4,73%, with the Q1=3,14% and Q3=6,46%. The median % of scarring was 7,32% with the Q1=3,51% and Q3=15,57%. The median % of cranial pleurisy was 4,21%, with the Q1=1,11% and Q3=11,60%. The median % of lungs with dorso-caudal pleurisy was 19,46%, with the Q1= 7,26% and Q3=37,08%. The median APP index was 0,49, with the Q1=0,19 and Q3=1,03.

Discussion & Conclusion

The results of the lung scoring from 2016-2018 indicate a high rate of EP-like and A.p.-like lesions. Although, compared to the overall European results described before, the EP-like lesions were less prevalent. On the other hand the A.p.-like lesions were more prevalent compared to the overall European results. One should keep in mind that the antibiotic use in the Netherlands is well below the EU average. So the control of *M. hyo* and A.p. infections remains a major challenge and farm-specific control programs should be evaluated regularly.

**HHM-PP-45**

**TITLE**

**SALIVARY ANALYTIC PROFILE FOR HEALTH STATUS CHARACTERIZATION**

Jorge Sánchez<sup>1</sup>, Ana María Montes<sup>2</sup>, Ana María Gutiérrez<sup>2</sup>

<sup>1</sup> *CefuSA*

<sup>2</sup> *University of Murcia*

**CONTENT**

- Background and Objectives:Saliva has been widely used for monitoring, surveillance and detection of disease in porcine populations in the last 10 years. High sensitive but low specific biomarkers have been explored in saliva for disease detection; however, its implementation in the field is still far for being achieved. The present work provides a novel approach to bear the use of salivary biomarkers for health status characterization in field conditions.- Material & Methods:45 pigs from a farm with documented disease outbreaks before the study were selected. 20 clinically healthy animals were sampled several months after the documented outbreak. Five groups of animals were performed according to the veterinary clinical examination: clinically healthy pigs, pigs with lameness, rectal prolapse, signs of respiratory distress and growth rate retardation. Saliva samples were collected and used for the quantification of C-reactive protein (CRP), haptoglobin (Hp), adenosine deaminase (ADA), total antioxidant capacity (TAC), zinc (Zn), cooper (Cu) and selenium (Se) using previously validated assays.- Results:The most sensitive biomarkers for detect disease were Cu followed by ADA and Pb due to altered levels in all diseased animals were observed, excepting those pigs suffering from growth-rate retardation, which showed exclusively altered Cu levels. The group of pigs with lameness and rectal prolapse showed increases in the levels of CRP and Hp but altered TAC levels were only detected in pigs with growth-rate retardation that shown also altered Se concentrations.- Discussion & Conclusion:Each parameter studied offers complementary information for disease characterization, thus a salivary analytic profile including several biomarkers should be performed in order to accurately differentiate between pathological conditions in the field. However, further studies are necessary to understand the mechanism underlying each condition.



## **HHM-PP-46**

### **TITLE**

**GOOD VACCINATION PRACTICE: HOW TO INJECT GILTS IN THE PROPER WAY?**

Stéphanie Dalle<sup>1</sup>, Martine Laitat<sup>1</sup>, Sjouke Van Poucke<sup>2</sup>, Annelies Michiels<sup>2</sup>

<sup>1</sup> *Uliège*

<sup>2</sup> *Hipra Benelux*

### **CONTENT**

Background and objectives:

Good vaccination procedures apply from moment of receiving until injecting the vaccine. Often, farmers use a 25 mm size needle to inject gilts. The aim of the study was to test different needle lengths for a perfect intramuscular injection on slaughterhouse material.

Material and methods:

Four gilts necks (carcass weight 125, 132, 114 and 126 kg) were collected at the slaughterhouse. Four different needle lengths (25, 38, 40 and 50 mm) mounted on a syringe were placed perpendicular on the pig skin on the transversal cut surface to localize the region where the needle tip finished. Two milliliters of a gelatin-colored paint mixture were injected with each needle perpendicular on the skin and in the vaccination triangle.

Results:

The subcutaneous fat layer thickness in the injection region of the three gilts was 15 to 27 mm. At any angle, the tip of the 25 mm needle always resulted in this fat layer. The same was observed with the 38 mm needle, however on the verge of the muscle region. Only the 40 and 50 mm sized needle reached the deep muscles in the neck region. The same observation as above was made with the colored liquid for the 25, 40 and 50 mm needle. The 38 mm needle barely reached the muscles, when injecting through a thin subcutaneous fat layer.

Conclusion and discussion:

This study concluded that injecting perpendicular in the correct vaccination place with a 40 or 50 mm needle resulted in a correct IM injection. The live weight of the gilts varied from 139 to 161 kg. A follow up study will test needle length sizes in heavier multiparous sows. In conclusion, it is important as part of good vaccination procedures to inform farmers regarding the adequate material to realize a correct intramuscular vaccination.

**HHM-PP-47**

**TITLE**

ANTIBIOTIC TREATMENTS IN SWEDISH PIG HERDS AS NUMBER OF TREATED DISEASE CASES IN RELATION TO HERD PRODUCTION DATA

Ida Clemensson Lindell<sup>1</sup>, Erik Lindahl<sup>2</sup>, Nils Lundeheim<sup>3</sup>, Lena Eliasson-Selling<sup>1</sup>

<sup>1</sup> *Farm&Animal Health*

<sup>2</sup> *Lunden's Animal Health*

<sup>3</sup> *Swedish University of Agricultural Sciences*

**CONTENT**

In Sweden, the usage of antimicrobials in pig herds is strictly regulated and a veterinary prescription is required for any antibiotic treatment. The aim of this study was to analyze antibiotic treatments at herd level, as number of treated disease cases in relation to herd production data, to achieve a comprehensive picture of health status in Swedish pig herds.

Veterinary records on antibiotic treatments for 2017 was collected from 147 herds with fattening pigs and 73 piglet producing herds. Antibiotic usage was studied for four age categories: suckling piglets, weaners, finishers and sows. Treatment data for the different age categories was merged with herd production data and related to yearly number of live born, weaned, slaughtered and farrowings.

A large variation was observed between herds in number of treated disease cases. For suckling piglets, the median number of antibiotic treated cases per 1000 live born was 245 [interquartile range, (IQR): 120-358]. For weaners the median was 78 cases per 1000 weaned pigs (IQR: 34-166). The median for treated cases on sows was 307 per 1000 farrowings (IQR:176-538). For finishers, the median was 46 antibiotic treated cases per 1000 slaughtered pigs (IQR:24-98). For suckling piglets and weaners, the diagnoses causing the highest proportion of antibiotic treatments were arthritis and diarrhea. Among sows, the most common diagnoses were PDS and mastitis and for finishers arthritis, lameness and tail biting.

By analyzing antibiotic usage as number of treated disease cases in relation to number of live born, weaned, slaughtered and farrowings we provide new insight to the health status in, as well as the variation between, Swedish pig herds. The results of this study confirm a prudent use of antibiotics in Swedish pig herds where only diagnosed sick animals are treated.

## HHM-PP-48

### TITLE

AVERAGE DAILY GAIN IN FINISHING HERDS INCREASED 34 G FOLLOWING PORCILIS® PCV M HYO VACCINATION

Gitte Blach Nielsen<sup>1</sup>, John Haugegaard<sup>1</sup>

<sup>1</sup> MSD Animal Health Nordic

### CONTENT

#### Background and Objectives

In practice, evaluation of vaccine efficacy is often based on development in production parameters following implementation of a vaccination program. The study objective was to evaluate mortality, average daily gain and feed conversion rate in commercial Danish finishing herds following Porcilis® PCV M Hyo vaccination.

#### Material and Methods

In 23 Danish finishing herds initiating Porcilis® PCV M Hyo vaccination in 2015 or 2016, production data from one year before and one year after fully implemented vaccination (whole herd vaccinated) were compared. Out of the 23 herds, 18 also previously vaccinated against PCV2 and *M. hyopneumoniae*. The development in production data was calculated by subtracting the 'before' from the 'after' data and Student's one-sample t-tests were used to determine if the developments significantly differed from zero. To account for previous vaccination strategies, year of initiated vaccination, difference in start weights between the periods and shared ownership for some herds, a linear mixed model was built for each production parameter.

#### Results

On average, mortality was reduced by 0.5% point ( $p=0.002$ ), average daily gain increased 36 g ( $p=0.001$ ) and feed conversion rate decreased 0.03 FU/kg ( $p=0.095$ ). When shared ownership (all parameters) and difference in start weights (average daily gain) were controlled for, the improvements following Porcilis® PCV M Hyo vaccination were -0.5% point mortality ( $p=0.01$ ), +34 g average daily gain ( $p<0.001$ ) and -0.04 FU/kg ( $p=0.13$ ). Previous vaccination strategy and year of vaccination were not significant in any of the models.

#### Discussion and Conclusion

In these 23 finishing herds, mortality and average daily gain significantly improved following Porcilis® PCV M Hyo vaccination. Totally, the enhanced productivity corresponded to ~€1.5 per finisher produced, regardless of whether a previous vaccination strategy against PCV2 and/or *M. hyopneumoniae* existed.

## HHM-PP-49

### TITLE

HEMATOLOGICAL DATA OF NEONATAL PIGLETS SUBMITTED TO DIFFERENT TYPES OF DRYING AT BIRTH

Mariela Aparecida Claro Martines<sup>1</sup>, Marina Lopes Mechler-Dreibi<sup>1</sup>, Beatriz Belloni<sup>1</sup>, Gabriel Yuri Storino<sup>1</sup>, Marcela Manduca Ferreira<sup>1</sup>, Luís Guilherme de Oliveira<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

### CONTENT

Background and objectives: Different types of drying are used on neonatal piglets, such as drying powder, wood shaving and paper towels. Particles smaller than 10 $\mu$ m can reach the lower respiratory tract of pigs and lead to an inflammatory response. The objective of this study was to evaluate the capability of these particles to cause lesions in the respiratory system of piglets, overloading the phagocytic action of alveolar macrophages. Material and methods: Six litters were divided into three equal groups. The first one was dried with commercial drying powder, the second with wood shaving, and the third was the control, dried with paper towel. On the first, fourth and seventh days of life, two piglets from each litter were euthanized, lung and tracheal fragments were collected for histopathological analysis and whole blood samples were collected for hematological evaluation. Also, we conducted a granulometric evaluation of the dry powder and the shaving by laser diffraction. Non-parametric Kruskal-Wallis statistical test was used to verify differences between the medians between the groups ( $p < 0.05$ ). Results: All variables of the hemogram were analyzed, and preliminary data showed no statistical difference between groups. The group dried with wood shaving presented a significant difference in the number of lymphocytes on the seventh day ( $4413.50a \pm 526.27$ ) when compared to the first ( $882.00b \pm 643.47$ ) and fourth ( $2395.00b \pm 557.97$ ) days. Regarding the particle diameter, the commercial dry powder showed 10% of particles smaller than 10 $\mu$ m, while the shaving showed 90%, disregarding the larger fragments. Discussion and Conclusion: These microscopic particles may have been phagocytosed by alveolar macrophages, which, by presenting antigens, sensitized lymphocytes to initiate immune response. However, only haematological evaluation is not sufficient to determine if the product can lead to injuries in the respiratory system. Grant # 2018/14964-5 São Paulo Research Foundation (FAPESP).

## **HHM-PP-50**

### **TITLE**

**EVOLUTION OF ANTIMICROBIAL USE ON FRENCH PIG FARMS FROM 2010 TO 2016 THROUGH THE INAPORC PANELS**

Anne HEMONIC<sup>1</sup>, Alexandre POISSONNET<sup>1</sup>, Claire CHAUVIN<sup>2</sup>

<sup>1</sup> *IFIP, Le Rheu, France*

<sup>2</sup> *Anses*

### **CONTENT**

#### **Background and Objectives**

The French Ecoantibio plan was a success: the exposure of pigs to antibiotics decreased by 41% from 2012 to 2016, while the initial target was -25%. The purpose of this study was to understand the major areas of reduction in antibiotic use through the INAPORC panels, which were surveys of representative samples of farms performed in 2010, 2013 and 2016.

#### **Material & Methods**

In 2016, the INAPORC panel was based on 143 farms, randomly selected from the National Swine Database of Identification (BDPORC). These volunteer farms were representative of the French pig herd population, characterized through activity, localization and size.

#### **Results**

From 2010 to 2016, the decrease in ALEA (Animal Level of Exposure to Antimicrobials) estimated by Anses-ANMV (-47%) and the INAPORC panels (-52%) was similar. However, the ALEA estimated by the INAPORC panels in 2010, 2013 and 2016 were always lower than those of Anses-ANMV, suggesting overestimation of the volume allocated to pigs during the stratification of sales by species. Over the six years, the mean number of treatment days for sows remained stable (-7%). In contrast, it significantly decreased for suckling piglets (28%), weaned piglets (-70%) and fatteners (71%). Other major results included a considerable decrease in the use of critically important antibiotics (kept in priority for human medicine), premixes and colistin. This did not result in increased use of other digestive antibiotics or in a massive use of zinc oxide (16% of farms using zinc oxide in 2016).

#### **Discussion & Conclusion**

The INAPORC panel contributes to providing detailed references on antibiotic use in the French pig production and demonstrates the continued commitment to improving current practices.

## HHM-PP-51

### TITLE

ASSESSMENT OF LUNG LESIONS IN SLAUGHTER PIGS IN BELGIUM IN 2017-2018, SCORED WITH THE CEVA LUNG PROGRAM

Eva De Jonghe<sup>1</sup>, Peggy De Backer<sup>1</sup>, Steven Van Colen<sup>1</sup>

<sup>1</sup> *Ceva Santé Animale, Metrologielaan 6, 1130 Brussels, Belgium*

### CONTENT

#### Background and Objectives

Lung scoring at the slaughterhouse is a valuable tool for the assessment of the respiratory health status of pigs. The aim of this study was to investigate the prevalence and the extension of lung lesions suggestive for *Mycoplasma hyopneumoniae* (M.hyo) and *Actinobacillus pleuropneumoniae* (A.p.) infections observed in slaughter pigs in Belgium.

#### Material & methods

Between January 2017 and November 2018 a total of 142 batches included 21.981 lungs from different Belgian farms were scored at the slaughterhouse, using the Ceva Lung Program (CLP) scoring methodology. In the Ceva Lung Program, bronchopneumonia which is suggestive for enzootic pneumonia (EP) caused by M.hyo, including scarring and cranial pleurisy is quantified. Dorso-caudal pleurisy which is suggestive for previous A.p. infections is scored and APP index is calculated.

#### Results

The median % of bronchopneumonic lungs was 20,78%, with the Q1= 10% and Q3=32,98%. The median % of affected surface of the bronchopneumonic lungs was 5,47%, with the Q1=3,7% and Q3=7,41%. The median % of scarring was 6,98% with the Q1=2,57% and Q3=13,82%. The median % of cranial pleurisy is 2,32%, with the Q1=0,84% and Q3=4,91%. The median % of lungs with dorso-caudal pleurisy is 16,2%, with the Q1= 4,12% and Q3=33,46%. The median APP index is 0,46, with the Q1=0,11 and Q3= 0,92.

#### Discussion & Conclusion

These results show a high rate of EP-like and A.p.-like lesions which is in accordance with earlier published data. Therefore, it remains important to optimize M.hyo and A.p. control measures. The CLP methodology is a valuable tool to evaluate the success of current and future management changes.

## HHM-PP-52

### TITLE

PREVALENCE AND SEVERITY OF ENZOOTIC PNEUMONIA AND PLEUROPNEUMONIA ON CZECH PIG FARMS BASED ON LUNG LESION SCORING IN 2018

ROMAN KREJCI<sup>1</sup>, Jonas Vanhara<sup>2</sup>, Daniel Sperling<sup>3</sup>

<sup>1</sup> CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE

<sup>2</sup> Ceva, Czech Rep

<sup>3</sup> Ceva, France

### CONTENT

#### Introduction

Monitoring of respiratory disease by lung scoring is beneficial to assess the farm health status. Clear correlation between lung lesions, the economic impact of the disease and the efficiency of vaccination has been reported. Ceva Lung Program (CLP) was confirmed as a valuable tool to establish the prevalence and severity of Enzootic Pneumonia (EP) and pleuropneumonia. The aim of this study is to evaluate the level of EP and A.p-like lesions on Czech pig farms in 2018 compared to the previous period.

#### Material and Method

The survey was conducted on conventional pig farms excluding those with the M.hyo and A.p. SPF status. A total of 5939 lungs in 59 batches of slaughtered pigs were scored using the CLP method. Bronchopneumonia lesions (BP), cranio-ventral pleurisy (CP) and scarring associated with older EP-like lesions were recorded and scored. Dorsocaudal pleurisy (DP) suggestive for previous pleuropneumonia was scored to describe A.p-like lesions. Data were compared to the period of 2015-2017.

#### Results

The prevalence of 33,85% of BP was found, compared to 37,7% previously. The area of affected surface of lung parenchyma in pneumonic lungs reached 4,19% vs 5,4%. Cranio-ventral pleurisy was recorded in 6,31% (vs 12,9% previously) of total number of lungs. As for pleuropneumonia – 10% (vs 11,1% previously) of lungs were affected by A.p-like lesions with the APPI index 0,27. All values are expressed as median.

#### Discussion

EP-like lesions have relatively high prevalence in lungs from Czech farms, but have a decreasing tendency compared to previous years. That indicates efficient preventive measures are being implemented in the farms. In comparison with EP-like lesions, changes characteristic for A.p infections were less prevalent showing that pleuropneumonia is not as much spread across the farms keeping very similar prevalence as before. Both types of respiratory diseases nevertheless deserve high attention to be controlled.

## **HHM-PP-53**

### **TITLE**

RESULTS OF LUNG LESION SCORING IN EUROPEAN COUNTRIES IN 2018

ROMAN KREJCI<sup>1</sup>, Philippe Mazerolles<sup>2</sup>

<sup>1</sup> *CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

<sup>2</sup> *Ceva, France*

### **CONTENT**

#### Introduction

Scoring of lung lesions in the slaughter pigs provides very important information about the respiratory health in the pig population. Lesions suggestive for previous M.hyo or A.p. infections and their scoring were described before. Scoring of those lesions allows quantifying the problems with enzootic pneumonia and pleuropneumonia. The aim of this survey was to collect the results of lung scoring performed in most of swine producing European countries in 2017.

#### Materials and methods

Ceva Lung Program scoring methodology was implemented to score the lesions at the slaughterhouse. The results were collected from 19 European countries in the 12 months period from December 2017 till end of November 2018. The mean values and quartiles were calculated for % of lungs with bronchopneumonia (%BP), % of affected lung parenchyma out of sick lungs (% parenchyma), % of dorso-caudal pleurisy (%DP) and APP index (APPI). For the two latter indicators the results from France were not included, because there they were not scored routinely.

#### Results

The total number of scored lungs was 409816 from 3538 reports with the average of 116 lungs per batch. The median value of %BP was 40,06% with the Q1=21,43% and Q3 61,61%. The median of affected parenchyma was 5,26% with the Q1=2,74% and Q3=8,43%. For % DP the median, Q1 and Q3 were 10,47%, 3,7% and 2,71% respectively and for APPI the corresponding values were 0,28; 0,1 and 0,64 respectively.

#### Conclusions

The data set from 19 European countries in 2018 shows very similar distribution of the values as the previous year 2017. With the 25% more lungs scored in 2018, those results confirm the value of CLP as a repeatable scoring methodology. The incidence of especially EP-like lesions remains high, which indicate the need for improvements of the preventive measures.



## **HHM-PP-54**

### **TITLE**

**INFLUENZA STABILIZATION OF A COMMERCIAL SOW FARM USING HERD CLOSURE AND LAIV VACCINATION OF GILTS AND GROWING PIGS**

Chris Sievers<sup>1</sup>, Jana Morgan<sup>2</sup>, Kellie Cicconi-Hogan<sup>2</sup>, Christa Goodell<sup>2</sup>

<sup>1</sup> *Swine Vet Center*

<sup>2</sup> *Boehringer Ingelheim Vetmedica, Inc.*

### **CONTENT**

Influenza continues to be a major cause of respiratory disease in commercial growing pigs and is considered an economically impactful endemic disease in the United States swine herd. The goal of this study was to reduce circulating IAV-S in mature replacement gilts as well as weaned pigs using herd closure combined with LAIV vaccination of gilts.

A 4400-head breed-to-wean herd with an onsite GDU experiencing influenza was selected for the trial. Because the herd experienced a PRRSV break within the prior 6 months, a load, close, homogenize PRRSV control program was in process. Since downstream pigs and the GDU experienced clinical IAV-S, IAV control was added. After loading and closing the GDU, all gilts were vaccinated with a commercial LAIV. A second vaccination was given to gilts prior to sow farm entry. Modified McRebel practices were implemented in the farrowing house. During the study (6 month duration), monthly OF was submitted for IAV-S detection by PCR from every age group available in the GDU, and each nursery housing 5-6week old pigs.

Thirty-seven OF samples were collected throughout this study on a biweekly regimen, 3 ropes per airspace sampling. Sampling lasted from March through July. 100% GDU and nursery OF samples were positive for IAV-S at the start of the study. Within 6 weeks of GDU vaccination and closure, no IAV-S was detected through the end of the study. Downstream piglet flow did not detect IAV after June.

Previously, herd closure and McRebel practices for PRRSV did not reduce influenza challenge in the nursery and GDU of this herd. Today, after re-opening the herd, an absence of clinical signs of IAV in the GDU and improved piglet overall health would suggest this additional focus on IAV control strongly and positively impacted IAV-S circulation in the sow herd and downstream flow.

## HHM-PP-55

### TITLE

EFFECT OF INTERNAL PERSONNEL MOVEMENTS IN SWINE PRODUCTION PARAMETERS

Andreia Arruda<sup>1</sup>, Nicholas Black<sup>1</sup>, Carlos Pineiro<sup>2</sup>

<sup>1</sup> *The Ohio State University*

<sup>2</sup> *PigCHAMP Pro Europa SL*

### CONTENT

#### Background and Objectives

Transmission of pathogens via fomite plays an important role in production, but quantitative information on movement patterns inside a swine farm is lacking. The objectives of this study are to utilize beacon-sensing technology to estimate between-room movement within a swine farm; investigate whether there is a difference in the amount of “risky” movements before and after an information session with farm employees; and investigate whether an increase in “risky” movements is associated with production.

#### Material & Methods

A 4,400-sow farrow-to-wean farm located in a swine dense area in the U.S. was enrolled and an internal biosecurity system (B-eSecure®) was installed. A “risky” movement was defined when an employee moved from a shipping point or nursery to other parts of the farm. The Wilcoxon rank test was used to test the difference in movements pre- and post- information session, and univariable linear regression models were built using number of piglets weaned per litter and pre-weaning mortality as outcomes. Statistical analyses were conducted in STATA-IC14, with statistical significance declared as  $P < 0.05$ .

#### Results

Across the 14-week study period, there was an average of approximately 1,841 (SD=352.4) and 263 (SD=50.3) weekly and daily movements, respectively. “Risky” movements accounted for 9.3% (SD=2.5%) of weekly movements. The number of “risky” movements did not differ before and after the information session ( $P=0.64$ ), but a 15.2% reduction was seen. There was a tendency for an increase in “risky” movements in a previous week to increase pre-weaning mortality by 3% ( $P=0.052$ ). An increase in “risky movements” tended to decrease the number of piglets per litter by 0.37 ( $P=0.09$ ).

#### Discussion & Conclusion

This study provides baseline information for internal movements in a large-scale farm in the U.S. Furthermore, it demonstrates how technology can be used to monitor and target specific within-farm movements and help towards improving biosecurity.

## **HHM-PP-56**

### **TITLE**

ONLINE MONITOR OF PIG HEALTH IN THE NETHERLANDS: BENEFITS AND CONCERNS

Theo Geudeke<sup>1</sup>, Manon Houben<sup>1</sup>, Maaïke Gonggrijp<sup>1</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

### **CONTENT**

#### **Background**

The Dutch pig health monitoring system is extended with an obligatory clinical signs surveillance by practitioners, the Online Monitoring. This system provides useful health information for the industry but also encounters challenges like sustainable data entry via motivated participants.

The Dutch pig health monitoring system is carried out by GD Animal Health in Deventer. Since 2002 GD collects and analyses disease data from approximately 2500 submissions for post mortem investigation, 1400 veterinary questions to a telephone helpdesk and 30 farm visits by GD specialists. As from 2016 this monitoring is complemented with the Online Monitor, recording also health data.

#### **Method**

Using an online application, veterinary practitioners register during monthly farm visits whether clinical signs are present. If so, they record the age group involved (piglets, finishers, sows), 'syndrome' (e.g. respiratory problems), main clinical signs (e.g. coughing) and most likely diagnosis (e.g. Influenza). Registering health data using the Online Monitor is made compulsory by the pig industry. Practitioners receive monthly overviews of the reported health issues compared to national and regional results.

#### **Results**

By 2018 approximately 80% of all Dutch pig farms have monthly records in the Online Monitor. The system enables estimation of the prevalence of health problems, even if the prevalence is low, due to the fact that from many herds disease data but also the absence of clinical signs are recorded. Furthermore, seasonal fluctuations and differences between consecutive years can be assessed.

#### **Conclusion**

The Dutch Online Monitor provides very useful data for practitioners and the pig industry, but the quality of the data is a concern. On the longer term, it is necessary to keep participants motivated to continue recording data, for instance by making interactive digital dashboards to provide practitioner and farmers opportunities to analyse their own data in near real-time.

## HHM-PP-57

### TITLE

BUSERELIN-TREATMENT OF GILTS/SOWS COMBINED WITH FTI REDUCED WEANING-TO-FARROWING INTERVAL

Michael Agerley<sup>1</sup>, Gitte Blach Nielsen<sup>2</sup>

<sup>1</sup> *Svinevet*

<sup>2</sup> *MSD Animal Health Nordic*

### CONTENT

#### Background and Objectives

Synchronization of ovulation with buserelin combined with fixed-time artificial insemination (FTI) allows for potential savings on labor and semen doses. The study objective was to assess if buserelin-treatment (Porceptal® (0.004 mg/ml), MSD Animal Health) of sows/gilts combined with FTI significantly differed from non-treated sows/gilts inseminated throughout estrus for the parameters: pregnancy rate, weaning-to-farrowing interval and total born.

#### Material & Methods

In a Danish 2100-sow herd, weaned sows of three consecutive batches (and heat-synchronized gilts of two) were equally allocated to two groups (P and C). Sows in heat prior to 86 h post-weaning were excluded in both groups. P sows received 2.5 ml Porceptal® 86 h post-weaning (gilts 118 h post last progestin heat-synchronization) and were inseminated once 30-33 h later, if in heat. P sows/gilts not in heat at this time were excluded. C sows/gilts were inseminated every 24 h throughout estrus. C sows/gilts not inseminated day 4-7 were also excluded. Time of farrowing was registered by 4 daily checks, 6 h apart.

#### Results

Average weaning-to-farrowing interval was one day shorter for the P group compared to the C group (121.4 vs. 122.2,  $p < 0.001$ ). Pregnancy rate (99% vs. 95%), total born (20.8 vs. 20.5) and percentage of sows inseminated day 5 (P) or 4-7 (C) (75% P vs. 77% C) did not differ between the groups. However, only 47% of P gilts were inseminated day 5 versus 94% of C gilts inseminated day 4-7. By day 7, also 94% of P gilts had, however, shown estrus.

#### Discussion & Conclusion

In this herd, pregnancy rate and total born did not differ between buserelin-treated sows/gilts including FTI and control sows/gilts inseminated according to estrus (2-3 times). For buserelin-treated sows/gilts, farrowing occurred one day earlier than control sows/gilts, ultimately resulting in a one-day longer lactation period.

## HHM-PP-58

### TITLE

CASE REPORT: ECONOMIC IMPROVEMENT AFTER CHANGING FEEDING STRATEGY AND TIMING OF VACCINATION IN IMPROVAC® MANAGED BOARS.

Tom Meyns<sup>1</sup>, Dirk Van Damme<sup>1</sup>, Niels Wuyts<sup>1</sup>

<sup>1</sup> ZOETIS Benelux, Mercuriusstraat 20, 1930 Zaventem, Belgium

### CONTENT

#### Background and Objectives

Vaccination against GnRF with Improvac® allows producers to benefit from superior growth performance and carcass characteristics of non-castrated boars without risk of boar taint. Vaccinated pigs spend most of their lives as boars, but transition to castrate physiology after the second Improvac dose, the timing of which relative to slaughter can be changed to optimize results relative to production objectives. This report assesses the impact of extending the time after second dose, and of changing the feeding strategy, on technical and economic performance in finishing pigs.

#### Material and methods

Belgian farm with 4000 fattening pigs already using Improvac. The first dose of Improvac (no physiological effect) was administered at around 10 weeks of age; the second dose was originally administered 4 weeks pre-harvest, but was moved forward in the new program to 6 weeks pre-harvest, extending the castrate phase. Additionally, pigs were left longer on the richer starter feed to optimize an early growth spurt in the boar phase, and switched to a lower protein formulation in the last castrate phase, when they eat significantly more but can be fed a more diluted and cheaper diet. Weekly results (MBI-Meat Building Index, ADWG, slaughter live weight and feed cost) were compared between 57 batches before and 39 batches after the changes.

#### Results

Vaccinated boars in the new program reached the desired carcass weight (average 92 kg) approximately one week earlier than before the changes. The MBI improved from 3.62 to 3.48, ( $P < 0.01$ ) feed cost was reduced by 0.63€ per pig, and ADWG increased by 25g/day resulting in an estimated additional net profit, additional to the initial profit obtained from Improvac versus physically castrated estimated 2.12€/pig.

#### Conclusions

Optimization of feeding strategy and timing of the second dose of Improvac can positively influence the technical and economic performance of fatteners.

## HHM-PP-59

### TITLE

THE USE OF DANBRED RESPIG-SPOTFIRE SYSTEM FOR MONITOR HEALTH STATUS AND HEALTH DECISIONS

Victor Geurts<sup>1</sup>, Luuk Kaalberg<sup>2</sup>

<sup>1</sup> MSD-AH Nederland, Boxmeer, The Netherlands

<sup>2</sup> Danbred BV, St. Oedenrode, The Netherlands

### CONTENT

Background and Objectives

Danish genetics is the fastest growing breed in The Netherlands. The breeding farms and/or mature gilts are free from 1 or more pathogens (PRRS, Mhyo, App).

ResPig monitoring program involvings regular cross-sectional serological/PCR investigations. An investigation including PRRS, Mhyo, App, Circo, Salmonella and Lawsonia is installed 4 times per year and in between a monthly monitor of mature gilts. When farm-or gilt status changes actions for improving the status are implemented. A monitor of the effects is needed. For that the MSD-AH analyze tool (ResPig-Spotfire) is used and evaluated.

Material and Method

The effect of 3 interventions is monitored and analyzed via ResPig-Spotfire.

1. Effect of hygiene/biosecurity vs salmonella vaccination on the Salmonella status of gilts.
2. Achieving a M hyo stable status of gilts on an infected SPF herd via vaccination and biosecurity.
3. Achieving ApxIV negative gilts on an infected SPF herd.

Spotfire combines farm-and group specific data captured in the digital logistic program Ressero and the test outcomes in the lab's management system. Via selection of variables different graphs are generated. Per disease: cross sectional graphs of recent submissions and graphs per group (including recent+historical submissions) are used for monitoring the intervention's effect.

Results

1. Strict hygiene and internal biosecurity procedures resulted in a Salmonella status improvement of gilts from status 3 to 1. No status changes via sow and piglet vaccination.
2. Via sow and initial 2-shot M hyo piglets/gilt vaccination, mature gilts have uniform low titers with a low SD.
3. Via internal biosecurity improvement and vaccination mature gilts became App ApxIV negative.

Discussion and Conclusions

The ResPig-Spotfire analyze/report tool is suitable for detecting health status changes of farms/groups and monitoring the intervention effects. This is important since in very pig dense areas the risk of changes of health status of farms is higher.

Well-founded veterinary advices resulted status improvement on infected farms.

## HHM-PP-60

### TITLE

PIG HEALTH LEARNING NETWORK – A CONTINUOUS PROCESS AIMING TO IMPROVE THE HYGIENE LEVEL ON FARMS

Hendrik Nienhoff<sup>1</sup>, Ines Spiekermeier<sup>1</sup>, Heiko Plate<sup>2</sup>, Stephan Welp<sup>2</sup>, Lothar Kreienbrock<sup>3</sup>, Imke Traulsen<sup>4</sup>, Assem Oubary<sup>5</sup>, Hubert Gerhardy<sup>6</sup>

<sup>1</sup> Swine Health Service, Chamber of Agriculture Lower Saxony

<sup>2</sup> VzF GmbH, Uelzen

<sup>3</sup> Department of Biometry, Epidemiology and Information Processing WHO Collaborating Centre for Research and Training for Health at the Human-Animal-Environment Interface University of Veterinary Medicine Hannover

<sup>4</sup> Livestock Systems, Department of Animal Science, Georg-August-Universität Göttingen

<sup>5</sup> Institute of Production Systems and Logistics, Leibniz Universität Hannover

<sup>6</sup> MSG, Garbsen

### CONTENT

#### Background and Objectives

In mechanical engineering, learning factories are implemented, besides other aspects, mainly for the continuous improvement of work processes (such as customer-oriented order processing). The aim of the project was to prove transferability of the tool “Kaizen” (i.e. continuous improvement) on pig farms to enhance pig health and reduce the use of antibiotics.

#### Material and Methods

A learning network was formed with 9 pig farmers, specialist advisors, veterinarians (swine health service, local veterinarians) and scientists (TiHo, UNGOE, IFA, MSG) to adapt the Kaizen processes for continuous improvement in a realistic and innovative way on farms.

In addition, obstacles and fears were investigated to guide the learning network through motivation.

Furthermore, at the beginning and at the end of the project, attitudes and behaviour of farmers and veterinarians were investigated in order to analyse the stabilization of awareness during the project. Regular meetings of workgroups (farmer, advisor, vet) guided by the swine health service were conducted on farm. In addition workshops with all project participants were organized to support the exchange of experiences and methods improving farm hygiene and management. To improve hygiene and pig health, measures were defined (at the workshops), executed (on the farms) and tracked. Finally, the effect of measures was analysed.

#### Results

The design of the innovative project helped to improve the salmonella status of two farms, the piglet losses in one farm, hygiene status of 3 farms. Due to already low use of antibiotic there was no great improvement. The awareness of networking to achieve enhancements improved.

#### Discussion and conclusion

By building a learning network, knowledge from different disciplines was combined. New solutions to improve awareness of importance of hygiene and animal health in order to reduce the use of antibiotics and achieve enhancements in production were established.

## HHM-PP-61

### TITLE

B-ESECURE: ESTIMATION OF EFFECT BIOSECURITY IMPROVEMENT ON PRODUCTION- AND ECONOMIC RESULTS

Victor Geurts<sup>1</sup>, Otto Schreurs<sup>2</sup>, Paul Bens<sup>3</sup>

<sup>1</sup> *MSD-AH Nederland, Boxmeer, The Netherlands*

<sup>2</sup> *Veterinary Clinic Advée, Ysselsteyn, The Netherlands*

<sup>3</sup> *DLV advies, Uden, The Netherlands*

### CONTENT

#### Introduction:

Biosecurity procedures impact diseases such as PRRS, but applying and following biosecurity rules is often difficult. B-eSecure (PigChamp EU program piloted by MSD-AH) is an electronic system that tracks and reports correct and wrong movements of people on farms. On single site multiplying farms PRRSv circulation in the nurseries increases the risk of reproductive problems of sows and thus the economic results. The system is installed on a Dutch 900 sows multiplying farm with repeated abortion waves and weak born piglets due to PRRSv. The effect of internal biosecurity improvement on reproduction- and economic results is evaluated.

#### Materials and method:

Via installed tracking-devices, movements of people who wear personalized beacons are reported. The PRRSv status of sows, gilts, farrowing-, nursery- and finishing unit was determined and groups with circulating PRRSv defined as red vs groups without as grey. Movements from grey to red were defined as safe and from red to grey and between red as unsafe unless a hygiene-lock was used between them (checked by locker devices). The % of correct and risky movements on farm and per person are reported. Reproduction- and economic effects are estimated via comparing the technical results over a 12 month period with the system with the 12 months before. PRRS shedding status is monthly monitored via PRRSv PCR testing on piglets at weaning. There were no changes in vaccination of feeding strategies.

#### Results:

Risky movements decreased: 23%(9-2017)? 8%(9-2018).

Weaners got PRRS PCR negative in 1-2018.

Farrowing rate:91,8%?90,5%

Weaned P/S/Y:30,13?30,58

Economic effect\* (?Weaned P/S/Y): €16,13/sow/year

\*guideline DLV-advies Uden

#### Conclusion:

B-eSecure is very helpful for visualization, implementation and improvement of biosecurity procedures and resulted in a structural decrease of risky movements.

Linking the program with PRRSv prevalence-and production results showed a positive relation between biosecurity improvement and technical and economical results on this farm.



## HHM-PP-62

### TITLE

UMBILICAL INFECTIONS IN PIGLETS AS A PORTAL OF ENTRY FOR SYSTEMIC INFECTION

Inge Larsen<sup>1</sup>, Kristiane Barington<sup>1</sup>, Peter Panduro Damborg<sup>1</sup>, Charlotte Sonne Kristensen<sup>2</sup>, Henrik Elvang Jensen<sup>1</sup>, Jens Peter Nielsen<sup>1</sup>

<sup>1</sup> *Department of Veterinary and Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark*

<sup>2</sup> *SEGES Pig Research Centre*

### CONTENT

The aim of the study was to isolate and identify bacteria in pure culture from the umbilicus of piglets, and to elucidate if similar bacteria were present in other tissues/organs as a sign of septicemia.

From each of two Danish sow herds (no. 1 and 2), 15 non-antimicrobial treated piglets, either dead within the first days of life or euthanized within the second to third week of life were selected. Pigs with gross abnormalities in the umbilical region or other signs of infectious disease were selected.

All piglets (n=30) were subjected to a complete necropsy followed by bacterial cultivation of swabs from the umbilicus (skin flamed, incision placed lateral to the umbilicus), left elbow joint cavity, meninges, abdominal cavity, liver and spleen.

In herd no. 1, the examined pigs were from one to eight days of age. By cultivation of the umbilicus, *Escherichia coli* (E.coli), a mixed culture and *Aerococcus viridans* (A.viridans) was isolated in five, four and three pigs, respectively. Remaining samples either were sterile or contained unspecific enterococci. In two pigs with umbilical E.coli, this bacterium was also isolated from other areas such as joint, abdomen and meninges. In one pig, A. viridans, was isolated from the umbilicus and the abdominal cavity.

In herd no. 2, pigs were one to 21 days of age. By cultivation of the umbilicus, E.coli was isolated in two pigs. Remaining samples either were sterile, with  $\beta$ -haemolytic streptococci or were contaminated. In the pigs with umbilical E.coli, this bacterium was also isolated from the joint cavity, meninges, abdominal cavity, liver and spleen.

This study demonstrates that umbilical infection in piglets may be an entry for septicemia.

This result is useful for septicemia intervention programs in young pigs. We can only speculate whether the infection plays a role in development of umbilical hernia.

## HHM-PP-63

### TITLE

DYNAMICS OF DISEASE IN A DANISH HERD BELONGING TO THE 'RAISED WITHOUT ANTIBIOTICS' PROGRAM.

Inge Larsen<sup>1</sup>, Nikolaj Kjer Jensen<sup>1</sup>, Julie Lynegaard<sup>1</sup>, Nicole Bakkegård Goecke<sup>2</sup>, Lars Erik Larsen<sup>2</sup>, Jens Peter Nielsen<sup>1</sup>

<sup>1</sup> *Department of Veterinary and Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark*

<sup>2</sup> *National Veterinary Institute, Technical University of Denmark*

### CONTENT

The increased pressure to reduce antibiotic (AB) consumption inspired the farmer-owned meat producer Danish Crown to initiate a program called Raised Without Antibiotics (RWA). Today 38 Danish farms are included. In short, all pigs are RWA-ear tagged at birth and if a pig receives any AB treatment, this ear tag is removed. The aim of this cohort study was to identify how many, when and why pigs receive AB treatment in the farrowing and nursery unit of one RWA-herd.

In one farrowing batch all piglets (n=518) born within two days were ear tagged at birth with a unique id in one ear and an RWA ear tag in the other ear. We monitored the pigs weekly for 12 weeks. Every fifth piglet (n=103) (ear tag 5, 10, 15 a.s.o.) was clinically examined and every tenth piglet (ear tag 10, 20, 30 a.s.o.) was subjected to nasal and rectal swabbing, which were analyzed in a high-throughput diagnostic system (Fluidigm) specific for 19 respiratory and enteric viral and bacterial pathogens.

Of 103 pigs, 75 and 64 pigs remained RWA at 4 and 12 weeks of age. The main reasons for a pig to lose RWA status were deaths (n=7), treatments (n=7) within the first week of life, treatments in the first week post weaning (n=5), and treatments in the last week of suckling (n=4).

The main clinical signs among the AM treated pigs were diarrhoea and mild respiratory signs.

Preliminary analyses of pathogen dynamics in this herd revealed a shift in prevalence over time for Influenza A Virus, E. coli F4 and F18 and Rotavirus A with the highest occurrence detected at weaning.

Other pathogens such as Porcine Cytomegalovirus, Str. Suis type 2 and Mycoplasma hyorhinis did not reveal any age related dynamics and were highly prevalent at several consecutive observations.

## HHM-PP-64

### TITLE

EFFICACY OF AN INJECTABLE TOLTRAZURIL - GLEPTOFERRON (FORCERIS®) TO CONTROL COCCIDIOSIS (CYSTOISOSPORA SUI) IN COMPARISON WITH IRON SUPPLEMENTED PIGLETS WITHOUT ANTICOCCIDIAL TREATMENT

Lysanne Hiob<sup>1,2</sup>, Ivette Holzhausen<sup>1,2</sup>, Gaëlle Pagny<sup>3</sup>, Laurianne Meppiel<sup>3</sup>, Naomi Isaka<sup>3</sup>, Daniel Sperling<sup>3</sup>, Arwid Dausgschies<sup>1,2</sup>

<sup>1</sup> *Albrecht-Daniel-Thaer-Institut e.V.*

<sup>2</sup> *Institute of Parasitology, Faculty of Veterinary Medicine, University of Leipzig*

<sup>3</sup> *Ceva, France*

### CONTENT

#### Background and Objectives

Neonatal coccidiosis caused by *Cystoisospora suis* occurs in association with pig husbandry worldwide and is clinically characterised by diarrhoea and reduced body weight gains. Efficacy and safety of an injectable toltrazuril/gleptoferron combination (Forceris®) in control of coccidiosis were investigated in naturally infected piglets.

#### Material & Methods

In a multicentric, blinded study 1508 piglets in five European commercial pig farms in France, Germany and Spain, were selected and randomised to treatment group (single intramuscular treatment with Forceris®, 45 mg toltrazuril and 200 mg iron per piglet at day 1, 2 or 3 of age) or control group (200 mg iron per piglet at day 1). Body weights, faecal scores and oocysts counts (given as oocysts per gram of faeces- OPG) were observed for 21 days. 1138 piglets were naturally exposed to coccidiosis and data sets of these animals were used for statistical analysis.

#### Results

Efficacy of Forceris® in control of coccidiosis was confirmed in higher body weight gains ( $5936.9 \pm 1821.1$  g vs.  $5625.6 \pm 1660.3$  g), lower percentage of animals with diarrhoea ( $p < 0.0001$ ), fewer samples with positive oocysts counts as well as lower excretion peak and reduced OPG values from study day (SD) 4 - SD 21 ( $p < 0.0001$ ). Pre-weaning mortality was significantly lower in Forceris® treated piglets (7.6 %) compared to control group (10.6 %;  $p = 0.046$ ).

#### Discussion & Conclusion

The results of our study in naturally infected piglets demonstrate the efficacy of Forceris® at a fixed dose of 1.5 ml/piglet when administered once at day 1, 2, or 3 of age. Coccidiosis due to *C. suis* was successfully controlled as Forceris® treated piglets displayed reduced oocyst excretion, less diarrhoea and improved body weight gain. Forceris® is a safe and efficient option to control coccidiosis and to prevent iron deficiency anaemia at the same time.

## HHM-PP-65

### TITLE

CYSTOISOSPORA SUI INFECTIONS IN EUROPE AND RISK FACTORS – AN UPDATE FROM A FIELD SURVEY IN AUSTRIA, GERMANY, CZECH REPUBLIC AND SPAIN

Barbara Hinney<sup>1</sup>, Vojislav Cvjetkovic<sup>2</sup>, David Espigares<sup>3</sup>, Jonas Vanhara<sup>4</sup>, Christoph Waehner<sup>5</sup>, Daniel Sperling<sup>6</sup>, Anja Joachim<sup>1</sup>

<sup>1</sup> *Vetmeduni, Vienna*

<sup>2</sup> *Ceva Austria*

<sup>3</sup> *Ceva Salud Animal*

<sup>4</sup> *Ceva, Czech Rep*

<sup>5</sup> *Ceva Tiergesundheit GmbH, Düsseldorf*

<sup>6</sup> *Ceva, France*

### CONTENT

A field study was conducted to determine the presence of *Cystoisospora suis* on pig farms and possible risk factors for piglet cystoisosporosis. 49 farms (65-10,000 sows) were included, 7 each from Austria and Germany, 17 from the Czech Republic, and 18 from Spain. Overall, 603 litters (6-63 litters/farm, mean: 12.3) were examined in the 2nd and 3rd week of life (n=1206 samples) by autofluorescence and considered positive when at least one oocyst could be detected. Faecal consistency was scored for diarrhoea. For each farm a questionnaire was provided for information on herd size, management, disinfection, use of toltrazuril and other medication. Overall, 79.5% of the farms and 31.2% of the litters were positive at least once. The prevalence on the farms was up to 100%. 21/26 farms (80.8%) with diarrhoea and 14/23 non-diarrhoeic farms (60.8%) were positive for *C. suis* ( $p=0.124$ ). 31/58 diarrhoeic samples (53.4%) and 271/545 of the non-diarrhoeic samples (49.7%) were autofluorescence positive. No significant differences ( $p>0.05$ ) were noted for the presence of diarrhoea or *C. suis* for 30 farms /381 litters under toltrazuril treatment. Only three questionnaires specified that a disinfectant with anti-coccidial activity against was used. On two of these no *C. suis* was detected. An important factor for the efficacy of treatment is the consistent application, correct dosing of all piglets before infection or within the prepatent period. Additionally, accompanying measures such as the use of suitable disinfectants are strongly recommended. If toltrazuril is prescribed, the pig farmer should be informed about the correct use of the drug, and the application and efficacy of the drug should be monitored by the attending veterinarian.

**HHM-PP-66**

**TITLE**

**EARLY APPLICATION OF PARENTERAL TOLTRAZURIL-IRON COMBINATION (FORCERIS®) IS COMPARABLE TO LATER TREATMENT IN THE CONTROL OF EXPERIMENTAL CYSTOISOSPOROSIS IN SUCKLING PIGLETS**

Anja Joachim<sup>1</sup>, Barbara Hinney<sup>1</sup>, Adnan Adnan Hodži?<sup>1</sup>, Hamadi Karembe<sup>2</sup>, Aruna Shrestha<sup>1</sup>, Daniel Sperling<sup>2</sup>

<sup>1</sup> *Vetmeduni, Vienna*

<sup>2</sup> *Ceva, France*

**CONTENT**

Cystoisosporosis (coccidiosis) is a leading cause of diarrhea in suckling piglets and is controlled by metaphylactic toltrazuril application. Recently, a single-dose combination product (Forceris®) has been developed for the prevention of piglet cystoisosporosis and iron deficiency anaemia. It is applied intramuscularly between the 2nd and 4th day of life (dol) (24 – 96 h after birth). In previous experimental studies, it was shown that treatment with Forceris® on the 2nd dol followed by experimental infection with *Cystoisospora suis* on the 3rd dol significantly reduced oocyst shedding and diarrhoea and to consequently improves body weight gain and health of the treated piglet compared to an infected untreated control. A subsequent study with experimental infection on the 1st dol and treatment on the 2nd dol was conducted to determine the efficacy of Forceris® when applied after the onset of neonatal infections. Piglets were randomly assigned to the Forceris® group (n=13; 45 mg toltrazuril + 200 mg iron/piglet), and to the Control group (n=12; 200 mg iron/piglet). General animal health was recorded daily and body weight was determined weekly during the study (1st – 29th dol). Individual faecal samples were collected from the 5th - 18th dol and examined for faecal consistency and the presence of oocysts. In the Control group all piglets shed countable oocysts, while the Forceris® group remained negative (p<0.0001). Diarrhoea was seen in all animals in the Control group and in one animal in the Forceris® group (p<0.001). Body weight gain was significantly depressed in the Control group compared to the Forceris® group during the first two weeks after infection (p=<0.0001). Forceris® was safe to use and effective in a single application against experimental infections with *C. suis* on the 1st dol and can be recommended for treatment of porcine coccidiosis in neonatal piglets.

## HHM-PP-67

### TITLE

EVALUATION OF THE EFFECT OF A COMBINED M. HYOPNEUMONIAE AND PCV2 VACCINE ON TECHNICAL PERFORMANCE AND ENZOOTIC PNEUMONIA LESIONS IN SLAUGHTERHOUSE.

Anne Staaedegaard-Huijbers<sup>1</sup>, Anke Verhaegen<sup>2</sup>, Tom Meyns<sup>3</sup>

<sup>1</sup> DAC Zuidoost, Deurne, The Netherlands

<sup>2</sup> Zoetis B.V., Capelle ad IJssel, The Netherlands.

<sup>3</sup> ZOETIS Benelux, Mercuriusstraat 20, 1930 Zaventem, Belgium

### CONTENT

#### Introduction

Subclinical M.hypopneumoniae infection is known to cause lower performance in finishers sometimes without obvious respiratory symptoms.

In a routine slaughterhouse check (July 2017) around 30% of the lungs of 2 batches showed catarrhal pneumonia. To evaluate the effect of Mhyo vaccination, 2 consecutive batches (non-vaccinated and vaccinated) were compared at slaughter.

#### Material and methods

A Dutch farrow-to-finisher farm (200 sows, 2000 finishers) changed routine vaccination from a monovalent PCV2 vaccine to Suvaxyn@Circo+MH RTU against PCV2 and Mhyo, primarily to reduce the lesions and losses associated with Mhyo. One of the last batches of non-Mhyo-vaccinated finishers (NV, n=151, Dec2017) and one of the first vaccinated groups (V, n=162, March2018) were compared at slaughter. Performance and mortality for all batches in the 4 months before and after start of vaccination were also recorded.

#### Results

Slaughterhouse checks showed gross lesions of pneumonia in both groups:

NV showed 46 animals positive for any gross lung lesions (30.5%), Vs 43 (26.5%) in V(not significant,  $\chi^2 = 0.59$ ;  $p=0.44$ ). For specific Mhyo associated lesions, NV showed 20 animals with fissures (13.2%) vs 7 (4.6%) in V(significant,  $\chi^2 = 7.90$  ;  $p<0.05$ ). NV also showed 15 animals with catarrhal pneumonia (9.9%) vs 9 (5.6%) in V (not significant,  $\chi^2 = 2.12$  ;  $p = 0.15$ ). In a period of 4 months prior to additional Mhyo vaccination, mortality was 1.0% in non-vaccinated batches versus 1.4% in the period of 4 months after additional Mhyo vaccination in vaccinated batches. ADWG (g/d) and FCR were 802 and 2.45 vs 847 and 2.40 for non-vaccinated and vaccinated batches respectively. Economic calculation showed a financial improvement of €2.16 per pig.

#### Conclusions

Although historical comparison might involve other factors, the report suggests that additional Mhyo vaccination was associated with reduction in lung lesions associated with enzootic pneumonia, increase in ADWG and reduction in FCR.

## HHM-PP-68

### TITLE

ORAL VACCINATION AGAINST LAWSONIA INTRACELLULARIS, A COST-EFFECTIVE ALTERNATIVE TO IMPROVE TECHNICAL AND ECONOMIC PARAMETERS IN A SPANISH FARM

Rafael Hervás Simón<sup>1</sup>

<sup>1</sup> *Nutrofar,S.L. ,Spain*

### CONTENT

#### Introduction

Porcine proliferative enteropathy caused by *Lawsonia intracellularis* (L.i) is highly prevalent in Spanish farms. Subclinical disease represents an estimated economic impact between € 1.3 and € 18.5 per affected pig. On the other hand, the swine industry requests a reduction in the use of antibiotics in production animals. This study aims to evaluate the efficacy of Enterisol Ileitis (Boehringer Ingelheim Vetmedica GmbH) in terms of performance improvement in a Spanish pig farm.

#### Materials and Methods

In a 300 sows farrow to finish, subclinical Ileitis was diagnosed in fattening pigs and L.i. infection was confirmed by ELISA. A total of 6,768 fattening, 3,393 non-vaccinated in 8 batches and 3,375 in 13 batches vaccinated with the nonvirulent live vaccine Enterisol? Ileitis. The pigs were orally vaccinated 2 weeks after weaning via drinking water in the nursery unit.

The parameters recorded for each fattening batch were: Weight in (Kg), Weight out (Kg), Mortality rate (%), Average days of occupation (ADO, days), Average daily feed intake (ADFI, Kg/d), Average daily gain (ADG, kg/d) and Feed conversion rate (FCR, Kg).

Data was analyzed using Mann Withney U test with R Software and SPC with Minitab.17.1.0.

#### Results

Vaccination led to a statistically significant reduction of 9.9 days of occupation, 0.258 kg. in FCR and a 15.7% improvement of the ADG (+0.106 kg/day).

Although there was a reduction of mortality and an improvement of daily feed intake (ADFI) during the vaccination period, the differences were not statistically significant.

#### Discussion and Conclusions

In this field experience, we found evidence supporting that performance parameters in chronically infected farms can be improved with Enterisol? Ileitis resulting in a clear economic benefit.

Oral vaccination as preventive alternative may contribute to reduce the use of antibiotics in the fattening of pigs and improves the pigs' health, the technical and economic results.

## HHM-PP-69

### TITLE

LACK OF DOCUMENTATION IN NATURAL MATING SYSTEMS CAN BE THE CAUSE OF THE OCCURRENCE OF THROMBOCYTOPENIC PURPURA

Sara Joller<sup>1</sup>, Anna Letko<sup>2</sup>, Cord Drögemüller<sup>2</sup>, Olivia Richard<sup>3</sup>, Heiko Nathues<sup>1</sup>, Alexander Grahofer<sup>1</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Institute of Genetics, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>3</sup> *Institute of Animal Pathology, Vetsuisse Faculty, University of Bern, Switzerland*

### CONTENT

#### Background

Thrombocytopenic purpura is a rare disease in piglets caused by maternally derived antibodies that destroy their thrombocytes, which leads to severe bleedings in the affected animals.

#### Material & Methods

An organic breeding farm with 80 sows and three boars produced piglets by natural mating. In the last year, three litters with severe bleeding amongst several piglets were recognized. Four affected piglets (one weak and three dead piglets) were submitted for further examination to the swine clinic and pathology, respectively. Blood and/or tissue samples from the affected piglets, the sow and all three boars on the farm were collected. Laboratory analyses were performed and all animals were genotyped. Testing for kinship was performed through identity by descent computation and calculation of Mendelian errors with plink software.

#### Results

A haematocrit of 0.16 L/L, a thrombocytopenia and an increased prothrombin time were detected. The necropsy of all four piglets revealed multifocal and acute bleeding in the skin over the whole body and on inner organs, as well as activated bone marrow. Epidemic diseases such as Classical Swine Fever and Porcine Reproductive and Respiratory Syndrome were ruled out by serology. Based on the case history and the results of the investigation a thrombocytopenic purpura was diagnosed. One boar was identified as the father of all affected litter.

#### Discussion & Conclusion

Repeated pairings of the same boar with the same sow are of high likelihood in natural mating system. This leads to an increased risk of thrombocytopenic purpura in piglets compared to farms using artificial insemination with various boars. To reduce the incidence of thrombocytopenic purpura at herd level, an implementation of breeding documentation is necessary to avoid the repeated matings. In addition, it is necessary to replace one boar every year to renew the blood line thereby avoiding repeated breeding.



## HHM-PP-70

### TITLE

EFFECT OF POSITIVE HANDLING OF SOWS ON LITTER PERFORMANCE AND PRE-WEANING MORTALITY

Dimitri De Meyer<sup>1</sup>, Arthi Amalraj<sup>2</sup>, Tommy Van Limbergen<sup>2</sup>, Ilias Chantziaras<sup>3</sup>, Martin Fockedeey<sup>1</sup>, Ilias Kyriazakis<sup>4</sup>, Dominiek Maes<sup>3</sup>

<sup>1</sup> *Vedanko BVBA Keukelstraat 66a, 8750 Wingene, Belgium*

<sup>2</sup> *Unit of Porcine Health Management, Faculty of Veterinary medicine, Ghent University, Belgium*

<sup>3</sup> *Ghent University, Faculty of Veterinary medicine, Porcine Health Management Unit*

<sup>4</sup> *Agriculture, school of natural and environmental sciences, Newcastle University*

### CONTENT

Background and Objectives:

Stress around parturition, such as fear of humans, may affect maternal behavior in pigs, increase farrowing duration and increase piglet mortality. This study investigated the effect of positive handling of sows (scratching, music) in the farrowing room on litter performance and pre-weaning piglet mortality.

Materials and Methods:

The study was conducted in a sow herd (n=560 PIC sows) that practiced a 2-week batch farrowing system. The sows were moved to the farrowing unit one week before farrowing. Lactating sows received commercial feed and were housed in conventional farrowing crates. Ten successive farrowing batches were included: three (n=140 sows; av. parity 3.13) were treated (T), seven (n=314; av. parity 3.27) served as controls (C). In the T batches, backscratching of the sows was done daily for 15 seconds per sow from entry into the farrowing unit until farrowing, and music (commercial radio station) was played from 6.00 am until 6.00 pm from entry into the farrowing unit until weaning (21 days). Litter performance and piglet mortality were recorded, and data were analyzed statistically using ANOVA or logistic regression.

Results:

The performance in the T and C groups, respectively, were: total piglets born (13.87 vs. 14.37), born alive (13.30 vs. 13.74), stillborn (4.27 vs. 4.67), mummified (0.23 vs. 0.39) and pigs weaned per sow (12.00 vs. 12.17) (P>0.05). Pre-weaning mortality was 9.83 vs. 11.91% in the T and C group, respectively (P<0.05).

Conclusions:

Under the present conditions, there were no significant effects on litter performance, but the preweaning mortality was significantly lower in the treated batches. Further research is warranted to confirm the present results and to assess the separate effects of different handling methods.

## **HHM-PP-71**

### **TITLE**

MICROCLIMATIC MEASUREMENTS AS A TOOL FOR PRDC MANAGEMENT - A FIELD STUDY

Péter Máté<sup>1</sup>, István Makkai<sup>1</sup>, László Búza<sup>1,2,3,4</sup>, László Ózsvári<sup>4</sup>

<sup>1</sup> *MSD AH CERG Swine Business Unit - HUNGARY*

<sup>2</sup> *Szent István University Doctorial School*

<sup>3</sup> *Hungarian Pig Health Management Association*

<sup>4</sup> *University of Veterinary Medicine, Budapest*

### **CONTENT**

#### Introduction

The environment of the pig is a very important factor in the pathophysiology of the Porcine Respiratory Disease Complex (PRDC). Lots of publication report that in order to run a feasible strategy to improve the PRDC status on a farm, we have to measure and follow up the microclimatic parameters of the farm regularly and systematically.

#### Materials and Methods

A Hungarian swine farm with 2.000 sows had continuous problem with *Actinobacillus pleuropneumoniae* cases. We analyzed the layout of the farm containing every unit, and surveyed the most important environmental parameters of the stables: CO<sub>2</sub>, dust, humidity, temperature and lighting. This "environmental map" of the farm is used as background for the slaughterhouse lung scoring, and can help making the internal biosecurity more effective.

#### Results

Having this environmental map of the stables, we could check many important factors influencing the PRDC status of the farm. In summer the main environmental problem was the dust, and in winter the CO<sub>2</sub> levels were dramatically high. In those units where seasonally there were big differences between the daily and night temperature, more pleuropneumonia cases occurred. Slaughter pigs from those buildings where continuously high CO<sub>2</sub> and humidity levels were measured, had lungs with higher MADEC and SPES scores than the average. The nursery units with high humidity and CO<sub>2</sub> levels owing to insufficient ventilation had more ear necrosis cases diarrhea and upper respiratory health problems (e.g. rhinitis, laryngitis and tracheitis).

#### Discussion and Conclusions

The environmental audits and the subsequent farm mapping helped planning the prophylaxis against PRDC. Surveying the parameters of the environmental conditions in the stables helped the communication with the farm managers, and it was easier to show the multifactorial nature of the PRDC to them.

## **HHM-PP-72**

### **TITLE**

INSTALLATION OF A DIGITAL BIOSECURITY SYSTEM ON HUNGARIAN SWINE FARMS

Csaba Tóth<sup>1</sup>, László Búza<sup>2,3,4,1</sup>, László Ózsvári<sup>1</sup>

<sup>1</sup> *University of Veterinary Medicine, Budapest*

<sup>2</sup> *MSD AH CERG Swine Business Unit - HUNGARY*

<sup>3</sup> *Szent István University Doctorial School*

<sup>4</sup> *Hungarian Pig Health Management Association*

### **CONTENT**

#### Introduction

In intensive pig production, a reliable biosecurity protocol is essential. The aim of the research was to evaluate if the B-eSecure™ (PigCHAMP Pro Europe) digital system, which can detect the movements of the workers inside the farms, could improve the biosecurity.

#### Material and Methods

This biosecurity system was installed on three farrow-to-finish pig farms in Hungary. Before the installation there was a detailed farm biosecurity check in August 2017. After the installation there was a three months long learning process, and the system could learn the workers' movement patterns and the role of the buildings in the shifts. The regular operation of the system started on 1 January 2018 and we collected data until 30 June 2018. The movements were categorized in three groups regarding their risk level to the farm biosecurity: safe, risky and unsafe.

#### Results

The maximum and minimum number of total and unsafe movements were detected in different months on the three farms. On farm “A” and “B” most of the unsafe movements were related to the transportation of cadavers. We regularly presented the results of the biosecurity analyses to the farm managers and afterwards the biosecurity protocols were modified. The reports also revealed that which workers made the most unsafe movements, and on farm “B” and “C” the same employees did this regularly.

#### Discussion and Conclusions

This digital biosecurity system could detect the risky and unsafe biosecurity movements on the farms, although it is up to the farm managers that how they can control their workers' movements from time to time. The investigation period needs to be longer to see improvements on behavior.

## **HHM-PP-73**

### **TITLE**

#### **ENVIRONMENTAL CONDITIONS ON HUNGARIAN PIG FARMS**

Levente Hudák<sup>1</sup>, László Búza<sup>2,3,4,1</sup>, László Ózsvári<sup>1</sup>

<sup>1</sup> *University of Veterinary Medicine, Budapest*

<sup>2</sup> *MSD AH CERG Swine Business Unit - HUNGARY*

<sup>3</sup> *Szent István University Doctorial School*

<sup>4</sup> *Hungarian Pig Health Management Association*

### **CONTENT**

#### **Introduction**

Environmental hygiene becomes more significant in intensive pig production, since manifestation of several diseases is influenced by housing conditions. These diseases can cause deterioration of production indicators, resulting in reduced profitability. Therefore, the goal of our research was to survey the current environmental conditions on Hungarian farrow-to finish swine farms.

#### **Material and Methods**

In our study we surveyed 14 large-scale pig farms between October 2016 and August 2018. 3 farms were rechecked, thus, altogether 18 farrowing and nursery units, 15 fattening units and 8 breeding sow units were involved. We measured the environmental conditions by using equipment to evaluate the environmental hygiene and ventilation in the farm units. During farm visits we used digital devices to measure the following environmental parameters: temperature, humidity, CO<sub>2</sub> concentration, lighting, airflow and airspeed.

#### **Results**

The results show that on most of the surveyed farms the environmental conditions were not ideal. The CO<sub>2</sub> concentration was the least ideal for fatteners, just in 6% of the surveyed fattening units was optimal. Temperature was the least favorable in the breeding sow units, it was optimal on 12% of the farms. The humidity level was sufficient in 22% of the surveyed nurseries. The lighting was mostly optimal, however, just on half of the surveyed breeding sow areas was ideal.

#### **Discussion and Conclusions**

In many cases settings and maintenance of ventilation systems on the Hungarian pig farms cannot fulfil the environmental requirements. The continuous monitoring of environmental conditions and the regular checks of ventilation would be essential for farm managers to receive proper and actual information which would largely contribute to make well-established decisions regarding future technology changes and investments.

## **HHM-PP-74**

### **TITLE**

**ELIMINATION OF M. HYOPNEUMONIAE IN A 1700 AN SOW NUCLEUS/MULTIPLIER FEEDER PIG FARM AND GILT FINISHING UNIT**

J. Mark Hammer<sup>1</sup>, Richard Conger<sup>2</sup>, Frederic Vangroenweghe<sup>3</sup>

<sup>1</sup> *Elanco, Greenfield (IN), USA*

<sup>2</sup> *River Bend Swine Consulting, Goldsboro (NC) USA*

<sup>3</sup> *Elanco, Antwerpen, Belgium*

### **CONTENT**

**Background and Objectives** - Older M. hyopneumoniae (Mhyo) elimination programs close the breeding herd until the breeding population is 10 months of age or older. Newer programs use gilt exposure with a 240 day herd closure period. The objective of this report was to assess if a 140 day herd closure period would allow the production of Mhyo-negative gilts.

**Materials & Methods** - A 1700 sow nucleus/multiplier herd with an on-site nursery, on-site gilt replacement barns, and an off-site gilt farm was selected. Gilt replacements were stopped on week 0. All breeding stock was at least 10 months of age on week 16. Tilmicosin-medication feed with concentrations of 363 g/ton and 181 g/ton in breeding and gestation or farrowing, respectively, was provided from week 18 to week 21. Phased weekly piglet lincomycin injections at 100 mg/piglet were given from week 16 to week 21. The on-site and off-site gilt replacement barns were depopulated by week 16 and week 25, respectively. Clinical examinations, serological tests (Idexx and Dako ELISA), and necropsies to collect broncho-alveolar lavage fluids (BALF) for Mhyo PCR were performed.

**Results** - No Mhyo clinical signs (i.e. a dry non-productive cough) were observed in the off-site gilt farm through week 88. At week 41, the detection of serologically positives pigs for both ELISA tests (double positives) necessitated further investigations. Because of Mhyo vaccination at weaning, collection of BALF for Mhyo PCR on all double positive pigs was initiated until non-vaccinated sentinels were available. Six collections of BALF consisting of sixteen pigs in total were PCR negative over six months. Six monthly non-vaccinated sentinel pig tests of various aged pigs detected no double positives.

**Discussion & Conclusion** - The Mhyo elimination was successful to date. These Mhyo negative gilts are currently supplying Mhyo negative breeding herds without clinical signs.

## HHM-PP-75

### TITLE

SURVEY ON MAJOR PRODUCTION PARAMETERS, PRDC STATUS AND VACCINATION PROTOCOLS ON PIG FATTENING FARMS

Roland Sipos<sup>1</sup>, László Búza<sup>2,3,4,1</sup>, László Ózsvári<sup>1</sup>

<sup>1</sup> *University of Veterinary Medicine, Budapest*

<sup>2</sup> *MSD AH CERG Swine Business Unit - HUNGARY*

<sup>3</sup> *Szent István University Doctorial School*

<sup>4</sup> *Hungarian Pig Health Management Association*

### CONTENT

#### Introduction

Porcine respiratory disease complex (PRDC) causes very large economic losses in swine industry. PRDC results in reduced performance, increased mortality and increased medication costs. Vaccination plays an important role in control of PRDC.

#### Material and Methods

We surveyed 72 large-scale pig farms between 2011 and 2016 in Hungary in terms of major production parameters, respiratory health status including PRDC pathogens and vaccinations against them. We personally interviewed farm managers and veterinarians by using the Respig Farm Audit Tool™ (MSD AH). Some farms were surveyed more than once, so altogether the study contains 111 surveys. The average number of sows per farm was 1299.

#### Results

The mean of weaning weight was 7.33 kg, that of slaughter weight 110.6 kg. The FCR was 1.81 kg/kg in the nurseries and 3.1 kg/kg in the fattening units. The ADG in the nurseries was 387.5 g, while in the fattening units, 752.5 g. The mortality rate was 4.0% in the nurseries and 4.1% in the fattening period. The animal health cost amounted to €7.11/finisher. The laboratory tests showed that Mhyo was the most prevalent herd-level PRDC pathogen (86.4%), followed by PCV-2 (81.2%) and APP (60.2%). Most of the swine herds vaccinated against Mhyo. (77.5%) and PCV-2 (72.5%), but only 23.5% of them against APP, probably because of the higher vaccination cost.

#### Discussion and Conclusions

The Hungarian average production indices do not reach the international standards. Regular checks of PRDC status including vaccinations can result in a significant improvement in productivity. The increase in vaccination costs can be offset by better productivity and decreased medication costs.

## HHM-PP-76

### TITLE

SWINE DISEASE REPORTING SYSTEM – AN ONLINE DASHBOARD TO COMMUNICATE AGGREGATED DIAGNOSTIC LABORATORY RESULTS FROM US SWINE

Giovani Trevisan<sup>1</sup>, Leticia C M Linhares<sup>1</sup>, Bret Crim<sup>1</sup>, Poonam Dubey<sup>1</sup>, Kent J Schwartz<sup>1</sup>, Eric Burrough<sup>1</sup>, Rodger Main<sup>1</sup>, Paul Sundberg<sup>2</sup>, Mary Thurn<sup>3</sup>, Paulo T F Lages<sup>3</sup>, Cesar Corzo<sup>3</sup>, Jerry Torrison<sup>3</sup>, Jamie Henningson<sup>4</sup>, Eric Herrman<sup>4</sup>, Gregg Hanzlicek<sup>4</sup>, Ram Raghavan<sup>4</sup>, Douglas Marthaler<sup>4</sup>, Jon Greseth<sup>5</sup>, Travis Clement<sup>5</sup>, Jane Christopher-Hennings<sup>5</sup>, Daniel C L Linhares<sup>1</sup>

<sup>1</sup> *Iowa State University*

<sup>2</sup> *Swine Health Information Center*

<sup>3</sup> *University of Minnesota*

<sup>4</sup> *Kansas State University*

<sup>5</sup> *South Dakota State University*

### CONTENT

Background and objectives

Historically, data from veterinary diagnostic laboratories (VDLs) regarding pathogen detection frequency and diseases are intermittently provided to the public through publications or proceedings. In the USA, there is no single data source to access aggregated diagnostic test results from VDLs. The purpose of this project was to develop a user-friendly informatics tool to summarize and report routine pathogen detection from samples submitted to participating VDLs over time.

Material & methods

Information from submission forms, tests performed, and test results from swine cases submitted to four VDLs (Iowa State University, University of Minnesota, South Dakota State University, and Kansas State University) were retrieved and aggregated using PROC DATA and PROC SQL scripts on SAS 9.4. Data were standardized and reported by age category, specimen, season, year, and state. Data included test PCR-based results for Porcine Reproductive and Respiratory Syndrome Virus (PRRSV), Porcine Epidemic Diarrhea Virus (PEDV), Porcine Deltacoronavirus (PDCoV), Transmissible Gastroenteritis Virus (TGEV), and Mycoplasma hyopneumoniae (MHP). The aggregated, and anonymized dataset was uploaded to Microsoft Power BI for dynamic charts/visualization.

Results

Altogether, results from the past 5 years were reported. There was a seasonal trend on the detection of the PRRSV, PEDV, PDCoV, and TGEV with a higher percentage of positive cases during winter or spring months, and MHP during fall. The frequency of detection of TGEV has decreased precipitously and has virtually a disappearance of TGEV since the emergence of PEDV and PDCoV.

Discussion & Conclusion

This informatics tool is known as the Swine Disease Reporting System, available at [www.powerbi.com](http://www.powerbi.com), username [sdrs@iastate.edu](mailto:sdrs@iastate.edu), password Bacon 100. Monthly reports are distributed by email. SDRS is a user-friendly tool that provides interactive information regarding swine pathogen detection aggregated from 4 VDLs, with the ability to be updated on a near real-time basis and allowing rapid visualization, thus keeping the swine industry informed regarding pathogen detection.

**HHM-PP-77**

**TITLE**

ERADICATION OF PED VIRUS AND BRACHYSPIRA HYODYSENTERIA IN A SOW-FARM

Inger Morthorst Møller<sup>1</sup>, Jakob Korsgaard<sup>1</sup>, Ken Steen Pedersen<sup>1</sup>

<sup>1</sup> Ø-vet a/s

**CONTENT**

**Background**

A herd with 3500 sows and 18000 nursery pigs in Ukraine was infected by PED virus and *B. hyodysenteria* causing outbreaks of diarrhea in sows, piglets and weaned pigs. The aim of this case is to describe a partial eradication for the two infections.

**Materials and methods**

The infections were verified by laboratory examination and the eradication was performed immediately hereafter. Pigs younger than 10 months were removed to another site and renovation, cleaning and disinfection of the stables were performed. All newborn piglets were euthanized and the intestines were used for immunization of all sows. Sows also received five weeks and newborn piglet two weeks of oral tiamulin medication. During the five weeks, all floors on the farm were washed and disinfected twice per day in order to reduce the sows contact to infected feces.

Following immunization and treatment sows were washed, disinfected and moved to clean farrowing sections before farrowing. McRebel-procedures were implemented in relation to management of piglets. Pigs were weaned to cleaned and disinfected sections.

**Results**

In eight months, clinical signs have been absent following the eradication. Six month apart fifty piglets were tested for PEDv on fecal samples by PCR and fifty replacement gilts were tested for dysentery by PCR. All samples were negative.

**Discussion and conclusion**

The current case demonstrate that it seems possible to eradicate both PED virus and *B. hyodysenteriae* from a large sow farm. Additional testing is necessary to investigate whether the infections are eliminated from the farm. However, the absents of clinical signs for 6 months demonstrate that by using this partial eradication protocol, it is possible to reduce the economical consequent of the infections.



## HHM-PP-78

### TITLE

EMPTINESS BETWEEN FARROWING BATCHES AND SHEDDING OF ROTAVIRUS AND ISOSPORA SUIIS IN PIGLETS

Emelie Pettersson<sup>1,2</sup>, Per Wallgren<sup>1,2</sup>

<sup>1</sup> National Veterinary Institute

<sup>2</sup> Swedish University of Agricultural Sciences

### CONTENT

#### Background and Objective

Rotavirus and Isospora suis are associated with diarrhoea during the suckling and post weaning periods. We aimed to document the incidence of these pathogens in piglets, in relation to empty time between farrowing batches.

#### Material and Methods

Management routines were documented, and faecal samples collected in 81 sow herds. A total of 791 faecal samples were collected as the piglets were two, four and six weeks of age. Rotavirus was detected using a sandwich-ELISA demonstrating virus antigen and Isospora suis was diagnosed using sedimentation and detection of coccidian oocysts by microscopy.

#### Results

All selected herds but one effectuated age segregated production from birth, thus emptying and cleaning each unit before entrance of new animals.

The overall prevalence of rotavirus was 11.4±17.7% at 2 weeks, 56.8±30.7% at 4 weeks and 71.1±29.1% at 6 weeks of age. At two weeks of age, the incidence was lowest in herds with an empty period between farrowing batches of 8 to 14 days (1.4±3.5%), which differed from herds with an empty period of 5 to 7 days (7.4±13.4%; p<0.05), 3 to 4 days (17.4±21.1%; p<0.01), and less than 3 days (17.1±19.9%;p<0.01). However, at the age of four and six weeks, no difference in incidence of litters shedding rotavirus was observed.

The overall prevalence of Isospora suis was 11.9±15.1% at 2 weeks of age, 10.7±16.7% at 4 weeks and 8.7±15.3% at 6 weeks of age. No difference in incidence of positive litters was correlated to the number of days between consecutive farrowing batches.

#### Discussion and Conclusion

An empty period of more than eight days between farrowing batches reduced the incidence of rotavirus in piglets under four weeks of age. Neonatal piglets ought to benefit from this reduced pathogen load since they will be older when exposed to rotavirus.

## HHM-PP-79

### TITLE

SEROPREVALENCE OF PRRS IN SOUTHERN BELGIUM (WALLONIA)

Frédéric Smeets<sup>1</sup>, Jean-Yves Houtain<sup>1</sup>, Christian Quinet<sup>1</sup>, Martine Laitat<sup>2</sup>

<sup>1</sup> ARSIA, Regional Association for Animal Identification and Health, Ciney, Belgium

<sup>2</sup> University of Liège, Liège, Belgium

### CONTENT

Background and objectives. A national PRRS control program, on a voluntary basis, started in Belgium in 2018. In this context, it was useful to review the specific situation of Wallonia, where only 6% Belgian pigs are kept.

Material and methods. A total of 1786 serums (585 breeders and 1201 growing/ fattening pigs), collected in 2016 as part of the official "Aujeszky" monitoring from 309 pig farms (106 farrowing and 203 weaning or wean-to-finish farms) have been kept at -20°C. A survey was addressed to these 309 farmers. For each farm, a maximum of 10 sera of sow and/or 5 growing/fattening pigs were tested. The ELISA PRRS assay used was the HerdCheck PRRS X3® Idexx Kit. An individual result was considered negative if the S:P ratio was <0.4; a herd was considered positive if at least one of the tested pigs had an S:P ratio ≥0.4.

Results. In 2016, for all farm types, the apparent herd and individual prevalences were respectively 51% (95% c.i.: 46-57%) and 45% (95% c.i.: 43-47%). Within these herds, individual prevalences observed in sows and fattening pigs were respectively 39% and 48% (p<0.001). Among farrowing farms, the apparent herd, individual and intra-herd prevalences were respectively 35% (95% c.i.: 26-43%), 36% (95% c.i.: 33-39%) and 38% (95% c.i.: 35-41%). In weaning or wean-to-finish herds, the apparent herd, individual and intra-herd prevalences were respectively 60% (95% c.i.: 53-67%), 54% (95% c.i.: 51-58%) and 85% (95% c.i.: 82-88%). The survey gave 121 answers from 75 sow and 46 pig(let) owners showing that PRRS monitoring and biosecurity measures (i.e. for sperm and gilts/boars purchases, hygiene and batch system) may be improved.

Conclusion and discussion. This study showed that in 2/3 of Walloon farrowing farms PRRS virus was not detected. In the context of a national control program, these indicative results will be useful when developing guidelines for PRRS control.

## HHM-PP-80

### TITLE

ECONOMIC IMPACT OF AN INFLUENZA OUTBREAK IN REPLACEMENT GILTS OF A 700 SOW HERD AND RESPIPORC® FLU3 RETURN ON INVESTMENT

VALERIE NORMAND<sup>1</sup>, CELINE CHEVANCE<sup>1</sup>, ARNAUD LEBRET<sup>1</sup>, Philippe LENEVEU<sup>2</sup>, SILKE WACHECK<sup>3</sup>, Agnès JARDIN<sup>2</sup>

<sup>1</sup> Porc Spective, ZA de Gohélève, Rue J et E Montgolfier, 56920 Noyal Pontivy, France

<sup>2</sup> IDT Biologika, 17 Rue du Sabot, 22 440 Ploufragan, France

<sup>3</sup> IDT Biologika, Am Pharmapark, 06861 Dessau-Roßlau, Germany

### CONTENT

**Background and Objectives** Swine influenza (swIAV) is a highly contagious respiratory infection with substantial economic consequences due to medication costs, pigs' growth retardation and decrease of reproductive performance in affected sow herds. The objective of this study is to evaluate the economic impact of a swine influenza outbreak in replacement herd and to assess the clinical satisfaction after implementation of an inactivated trivalent swIAV vaccine. **Material & Methods** An influenza-like syndrome occurred twice in 2016 (April and October) in gilts in a 700 sow breeding herd in a low pig density area in France. Gilts in quarantine and in mating room presented typical clinical signs (fever, anorexia, lethargy and coughing). They received individual and collective antipyretic treatments. H1avN1 swIAV was isolated from the nose of several sick gilts on weeks N°14 and 43. After the second outbreak, a swIAV vaccine was implemented in gilts during quarantine (basic immunization). **Results** The fertility rate of gilts exposed to H1avN1 infection around mating (108 gilts from 6 batches mating weeks N°12, 15, 18, 42, 45, 48) decreased in comparison with previous batches (117 gilts from 6 batches mating weeks N°3, 6, 9, 33, 36, 39): 83.2% versus 95.1%. This led to a significant reduction of farm productivity (Chi2 test, p=0.05) and represented a shortfall of 1,285€. As antipyretic treatments have cost 475€, total economic impact of these influenza outbreaks was 16€ per affected gilt. Since the implementation of the swIAV vaccine until submission, no more influenza-like illness occurred on the replacement herd. No collective antipyretic treatment has been used. Available fertility rate (first 99 vaccinated gilts) is excellent (92.9%) with a low standard deviation between batches (3.8% - 6 batches). **Discussion & Conclusion** This study demonstrates the economic impact of an Influenza outbreak on replacement herd and the interest of Respiporc® FLU3.

## HHM-PP-81

### TITLE

HEMOGLOBIN CONCENTRATIONS IN SOWS: CORRELATION WITH THE NUMBER OF STILLBORN PIGS

Glen Almond<sup>1</sup>, Elizabeth Noblett<sup>1</sup>, Juliana Ferreira<sup>1</sup>, Chris Olsen<sup>2</sup>, Jens Peter Nielsen<sup>3</sup>

<sup>1</sup> *North Carolina State University*

<sup>2</sup> *Pharmacosmos*

<sup>3</sup> *University of Copenhagen*

### CONTENT

#### Background and Objectives

Hemoglobin (Hb) concentrations are low in late gestation and early lactation, Sows with Hb levels < 9g/dL are at risk for an increased occurrence of stillbirths. The objective of this study was to determine the correlation between sow Hb concentrations and the numbers of stillborn piglets.

#### Materials and Methods

Sows (n=50-150/farm) from varying parities were selected on five farms (1700-4000 sows/farm). Blood samples were collected in late gestation (>110 days) and after farrowing for Hb determinations. Blood was obtained from ear veins and processed in a HemoCue™ Hb 201. Litter demographics were recorded for each sow. Lung flotation tests were performed to distinguish post-partum deceased piglets and intra-partum or pre-partum deaths. Pearson correlations were used to assess relationships among the various parameters.

#### Results

Post-farrowing Hb concentrations were less ( $P<0.05$ ) than the late gestation concentrations. Parity >4 sows had lower ( $P<0.05$ ) post-farrowing Hb concentrations than sows in other parities. Total number of stillborn pigs was  $1.08\pm 0.07$ /litter and pigs born alive was  $13.3\pm 0.16$ /litter. Late gestation Hb concentrations were negatively correlated ( $P<0.01$ ) to the number of stillborn pigs, and the number of pre-partum stillborn pigs.

#### Discussion and Conclusion

Based on the results, Hb concentrations are associated with the occurrence of stillborn piglets, particularly, pre-partum stillbirths. The precise mechanism to explain the relationship between sow anemia and stillbirths is speculative; however, iron deficiency may contribute to impaired uterine contractions at farrowing. The low Hb concentrations in late gestation are likely due, at least in part, to reduced transfer of iron from the dam to the fetuses through the maternal uteroferrin - transferrin - ferritin pathway. Additional studies are required to devise methods to reverse the anemia in older parity sows.

## HHM-PP-82

### TITLE

B-ESECURE INTERNAL BIOSECURITY PROGRAM IMPROVES FARM STAFF BEHAVIOR, VIREMIA, HEALTH AND PRODUCTIVE PERFORMANCE IN PRRSV POSITIVE FARMS

Inmaculada Díaz<sup>1</sup>, Cristina Escudero<sup>2</sup>, Antonio Pelaez<sup>2</sup>, Julian Gonzalez<sup>2</sup>, Carlos Pineiro<sup>1</sup>, Maria Aparicio<sup>2</sup>, Ricardo Perez<sup>2</sup>

<sup>1</sup> *Pig Champ Pro Europa S.L.*

<sup>2</sup> *Pig Champ Pro Europa SL*

### CONTENT

#### Background and Objectives

Biosecurity is a top concern in the swine industry since it affects performance, health and therefore, economic results. Regarding internal biosecurity, movements between barns are the highest risk in swine farms (Chantziaras, 2018). The objective of this study is to control the PRRSV spreading in farms by controlling farm staff movements using the B-eSecure System (MSD, Madison, NJ, USA) and evaluating the subsequent performance in 3 commercial EU farms for 12 months.

#### Material & Methods

The system uses small transmitters worn by farm staff read by devices placed at every barn. Movements within the different farm's areas were classified as safe, unsafe or risky, according to the PCR status for PRRSV. The program started in July 2017 and after 2 months measuring the baseline staff movements, a training session about PRRSV and its spreading capacity related to staff behavior was performed.

PRRSV prevalence was evaluated bimonthly by PCR in different age groups: from suckling piglets to ending nursery phase, breeding sows and gilts. Farm vets had real-time access to farm staff movements' data. Finally, performance KIPs were evaluated monthly: Non-Productive Days (NPD), Repeat Rate (RR) and Nursery Mortality (NM). Mann-Kendall test for trends detection was used to detect differences after the implementation of the B-eSecure system.

#### Results

Risk movements decreased between 35-90% and PCR + results decreased between 10-60%. Finally, performance results improved as well for the main KIPs; RR decreased between 50-75%, NPD decreased between 10-28 d per sow per year and NM decreased around 45-48% (P<0.05 for all of them).

#### Discussion & Conclusion

These results confirm the influence of farm staff movements and its impact on controlling PRRS disease and the consequences on farm health and performance.

## HHM-PP-83

### TITLE

PRESENTATION OF A 4-YEAR MONITORING OBSERVATORY FOR 2424 BATCHES OF PIGS IN FATTENING FARMS AS A TOOL TO DEMONSTRATE THE TECHNICAL AND HEALTH BENEFITS OF ANTIBIOTIC DEMEDICATION FOR VETERINARIANS

Thierry SOLIGNAC<sup>1</sup>, Sylvie Chouët<sup>2</sup>, jean-luc sevin<sup>1</sup>, julien Collet<sup>1</sup>, anne Durand<sup>3</sup>, Laurent Daluzeau<sup>2</sup>

<sup>1</sup> Socavet, 75 bis boulevard Penthievre, 22 600 Loudéac, France

<sup>2</sup> MSD Santé Animale, 7 rue olivier de Serres, CS 17144, 49071 Beaucouzé cédex

<sup>3</sup> Triskalia, ZI de lanrinou, CS 20100, 29206 Landerneau cédex

### CONTENT

In a regulatory context of reducing the use of antibiotics with the first “Eco-antibio” plan in France, the veterinarians of Socavet wanted to set up and validate the interest of an antibiotic demedication observatory in particular farms: fattening units under integration contracts.

#### Materials and methods

Over 4 years, the data and results of 2424 batches of pigs were recorded; 843,000 pigs followed by the entry for fattening up to the slaughterhouse.

For each batch, zootechnic, health and economic criteria shall be indicated. For health criteria, all pigs were vaccinated against Mycoplasma. However, depending on the farms, a plus-vaccination program (Circovirus, and/or PRRS virus, and/or ileitis), and/or antibiotic supplementation may have been introduced. The classical technical and economic criteria to evaluate the performance of each batch was recorded. All data were analyzed by Atlanstat.

#### Results

The first aim of reducing antibiotic supplementation has been largely achieved: 50% of reduction in the number of supplemented batches. The value of certain zootechnic practices, as heating at arrival, has been widely demonstrated. This observatory shows that the results on ADG and FCR are comparable between batches that received a plus-vaccination program and antibiotic supplementation and those that received a plus-vaccination program only. The batches that received PRRS vaccine associated with the Mycoplasma and Circovirus vaccines in comparison to the batches that received the Mycoplasma alone have a statistically improved FCR and ADG: 2.719 versus 2.783 and 828.92 gr versus 810.357 gr respectively ( p <0.001 value, Anova test)

#### Discussion

This observatory has allowed to identify relevant indicators for technical and health monitoring to convince farmers and technicians of the value of antibiotic demedication, even in difficult situation as fattening farms. It is shown that a vaccination program with tri-vaccination: Mycoplasma-Circovirus-PRRS (mainly Porcilis PRRS) stands out from other vaccine programs.

AD/FR/POL/1218/0004

## HHM-PP-84

### TITLE

IMPACT ON REPRODUCTION AND NURSERY PERFORMANCE OF THE IMPLEMENTATION OF THE B-ESECURE SYSTEM IN PRRSV POSITIVE FARMS

Inmaculada Diaz<sup>1</sup>, Cristina Escudero<sup>2</sup>, Antonio Pelaez<sup>2</sup>, Julian Gonzalez<sup>2</sup>, Ricardo Perez<sup>2</sup>, Carlos Pineiro<sup>3</sup>, Maria Aparicio<sup>2</sup>

<sup>1</sup> Pig CHAMP Pro Europa SL

<sup>2</sup> Pig Champ Pro Europa SL

<sup>3</sup> Pig Champ Pro Europa S.L.

### CONTENT

#### Background and Objectives

Biosecurity is a top concern in the swine industry since it affects performance, health and therefore, economic results. Regarding internal biosecurity, movements between barns are the highest risk in swine farms. The objective is to calculate the impact on health and performance of the B-eSecure System (MSD, Madison, NJ, USA) 1 year following implementation.

#### Material & Methods

The system uses small transmitters to control farm staff movements. During the last 2 years the system has been implemented in 26 farms in 14 countries for a total of 60.000 sows and 500 workers controlled, demonstrating its utility to control or eradicate PRRSV from farms. Moreover, reproductive, health and performance data were collected from 3 of the farms to assess the impact after the implementation of the system including non-productive days (NPD), pre-weaning mortality (PWM) and nursery mortality (NM)

#### Results

Calculations were based in significant health and performance effects. NPD decreased between 2.6 and 28.2 d /s/y ( $P<0.05$ ), mainly due to repeats and other gestation loses. At a cost of 2 € per NPD, the payback ranges 5.2-56.4 € /s/y. PWM decreased from 23 to 15 % v( $P<0.05$ ), which implied roughly 1 extra weaned piglet and 2.35 piglets more /s/y, which at 30 € per piglet means 70.5 € /s/y. Finally, NM drop from 7 to 4 % ( $P<0.05$ ), which under standard farm conditions with average EU prices means at least 3.0 € extra /s/y. All together, the payback ranged between 78.7-129.9 € /s/y under the conditions of this study.

#### Discussion & Conclusion

Improving farm staff movements by means of the B-eSecure system and therefore recurrent infections and viremia due to PRRSV shows a clear payback for the main key performance indicators.

## HHM-PP-85

### TITLE

USING A COUGH MONITOR FOR THE DIAGNOSTIC INVESTIGATION OF THE RESPIRATORY DISEASE COMPLEX (PRDC) IN A PIG FARM

ROBERT Nathalie<sup>1</sup>, PIEL Yohan<sup>2</sup>, FLEURY Roselyne<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim*

<sup>2</sup> *UNIVET SE*

### CONTENT

Introduction:

Respiratory diseases (PRDC) includes bacterial and viral pathogens and are responsible for important economic losses. In addition, lung lesion scoring at slaughter is a common tool for assessing the lung health.

The objective of this study is to evaluate the relationship between respiratory clinical signs, measured with an automatic longitudinal monitoring, with performance data and lung lesions and to compare the efficacy of 2 *Mycoplasma hyopneumoniae* (Mhp) vaccination programs.

Material and Methods:

Two batches (B1, B2 ; 250 piglets/batch) were included and divided into 2 groups (A, B) each. At 5 weeks of age, group A was vaccinated with a one dose Mhp vaccine and group B with MycoFLEX®.

Cough was monitored by a continuously cough monitoring device (Pig Cough monitor, FANCOM) during all the fattening period, and lung lesions were scored (out of 24) at slaughter.

Serological follow-up was performed.

Results:

In Batch 1 :

- Groups remained below 4000 coughs/day/room, equivalent to a 2,5 cough index, with the same patterns.
- Seroconversion profile, ADG and lung scoring were similar between the 2 groups.

In Batch 2 :

- Group B passed the 4000 coughs/day/room threshold shortly before slaughter, 3 weeks later than group A.
- Infection dynamics were different between A and B for Mhp and influenza with a delayed circulation of influenza in group B.
- The mean pneumonia score was higher for B. However, ADG was comparable between groups.

Discussion & Conclusion:

The cough monitor enabled an objective monitoring and quantification of cough over time. Results highlight that clinical symptoms, pig performance and lung lesion scores at slaughter are not perfectly linked, which questions the interpretation of lung scoring at slaughter.

In order to have a complete evaluation of PRDC or vaccine efficacy, we demonstrate the need to associate clinical observations, lab investigations and performances.



## **HHM-PP-86**

### **TITLE**

**THE ECONOMICS OF IRON DEFICIENCY ANEMIA ON US SWINE PRODUCTION: AN ANNUAL IMPACT OF UP TO 335 MILLION US DOLLARS**

Chris Olsen<sup>1</sup>

<sup>1</sup> *Pharmacosmos Inc.*

### **CONTENT**

Without treatment, piglets are prone to developing severe iron deficiency anemia (IDA) within the first weeks of life. And, despite nearly ubiquitous use of injectable iron, >75% of piglets in the USA are anemic at weaning. Studies show that a piglets hemoglobin status at weaning can significantly impact post-weaning growth. Therefore, the current project aimed to evaluate the economic impact of IDA on swine production in the USA.

Blood hemoglobin was measured at the time of weaning in 235 healthy piglets and classified as follows; >110g/L (optimal), 90-110g/L (sub-clinical) and < 90g/L (deficient). To determine wean-finish average daily gain (ADG), each baby pig was weighed individually at weaning and again at 131 days post-weaning. Ordinary Least Squares linear regression was used in RStudio to fit a regression model to predict the outcome of ADG using Hb Status, sex and weaning weight as covariates.

Using this model, herd ADG was predicted for herds giving a single 200mg dose of Uniferon® compared against the improvement in Hb status and hence ADG, resulting from a second 200mg dose of Uniferon® by day 12 of the baby pigs life. The model was built so that daily cost of production, labor and product cost can be replaced by farm-specific data to reflect the impact improvement in Hb Status would have for both a fixed-weight or fixed-time marketing strategy.

This study clearly demonstrates that despite long-standard recommendations to use a single 200mg dose of injectable iron for prevention of IDA, a tremendous economic potential remains untapped by a failure to maximize Hb status at weaning. Depending on farm-specific inputs and the marketing strategy used, the total economic impact of IDA in the US swine herd is up to 335.7 million US dollars despite long-standing iron injection practices.

## HHM-PP-87

### TITLE

EVALUATING A MYCOPLASMA HYOPNEUMONIAE (M.HYO) CONTROL INTERVENTION: A CLINICAL EXPERIENCE.

Antonio Vela<sup>1</sup>, Rut Menjón<sup>2</sup>, Marcial Marcos<sup>2</sup>, Marta Jimenez<sup>2</sup>, Juan Hernández<sup>1</sup>

<sup>1</sup> *Thinkinpig - Consulting*

<sup>2</sup> *MSD Animal Health*

### CONTENT

#### Background\_&\_Objectives

M.hyo aggravates Porcine Respiratory Disease Complex (PRDC) clinical signs, lesions and economic consequences. M.hyo vaccines are proved efficient to control Enzootic Pneumonia (EP) caused by M.hyo, though EP still occur despite vaccination. Finding (cost-)effective programmes is a big challenge for producers.

#### Materials\_&\_Methods

A breeding unit (300 sows) with satellite all-in-all-out growing farms are classified as clinical after detecting respiratory problems on fattening, M.hyo detection by PCR in tracheobronchial swabs and compatible lesions in slaughterhouse (23±5% of lungs with severe EP-like lesions affecting 16±3% of the surface).

The Average Daily Weight Gain of these batches ranged between 712 and 741 gr/day, and the impact of disease was estimated in reducing ADWG in 48-70 gr/day

An M.hyo vaccination protocol was implemented on weaners (Porcilis® PCV MHy vaccine + farm-staff costs: 0.48€/pig).

Results were monitored in following batches by cross-sectional tracheobronchial swab testing (cost: 180€) and slaughterhouse lung evaluations (cost for 8 consignments: 1110 €).

#### Results

M.hyo PCR test resulted negative on 6, 9 and 15 weeks-old pigs, and positive on 12-weeks-old pigs. EP clinical signs were not obvious but PRDC still occurred. Severe EP lung lesions were only present in 4.5±2% of the pigs, affecting 5.8±1.7% of the parenchyma (20-22 ADWG gr/day). ADGW after vaccination ranged between 733 and 792 gr/day, as well as other key performance indicators (mortality decreased 0.4%), with a net improvement of 0.22 €/pig (including vaccination costs).

#### Discussion\_&\_Conclusion

It is frequent to find EP lesions despite vaccination; optimize and monitor a good control programme is important to reduce the economic impact. Control strategies can yield a positive return even when effectivity is not total. We may not forget to address other concomitant diseases as they can be the cause of partial efficacy. Monitoring programmes spoil the turnover, nonetheless they are still necessary to evaluate interventions.

## HHM-PP-88

### TITLE

BREED-TO-WEAN FARM PERFORMANCE AND PRRSV RNA DETECTION IN PROCESSING FLUIDS OVER TIME ON A PRRS NAIVE HERD VACCINATED WITH MLV VACCINE

Clayton Johnson<sup>1</sup>, Giovani Trevisan<sup>2</sup>, Daniel Linhares<sup>3</sup>

<sup>1</sup> *Carthage Veterinary Service*

<sup>2</sup> *Iowa State University*

<sup>3</sup> *Iowa State University, Ames (IA), USA*

### CONTENT

#### Background and Objectives

PRRS affects the global swine herd. At risk breeding herds use PRRS MLV vaccine to build immunity. Our purpose was to evaluate production performance and PRRSV RNA detection over time in processing fluids (PF) on an ELISA-negative (naïve) breeding herd after intentional PRRS MLV exposure.

#### Material and Methods

A 6,000 breed-to-wean sow herd in the U.S. with a 10-month history of ELISA-negative results for PRRSV was exposed to PRRS Ingelvac MLV (Boehringer Ingelheim Vetmedica Inc., St Joseph, MO). Whole-herd exposure to MLV was defined as week 0. PF-sampling took place for all rooms and days of processing after MLV and were tested by pools of 5 at Iowa State Veterinary Diagnostic Laboratory. EWMA analysis using proc MACONTROL on SAS 9.4 (SAS Institute Inc., Cary, North Carolina) were performed to detect changes in key production parameters. The period between weeks -44 and -2 were used to define baseline. EWMA charts were created for percentage of mummies (MUM), stillborn, litter with <7 born alive, preweaning mortality rate (PWM), number of abortions, total and liveborn per farrow, pigs weaned per week, and per litter (PWL), total services, repeated services (RS), sow death, weaning to first service interval, and age at first service.

#### Results

PF were PCR-positive at week 1, with Ct values around 20 for weeks 2 to 4 increasing afterward keeping positive at end point of week 16. Outside baseline levels were detected for following parameters, week, and average change: MUM 4 to 20 +1.16%, PWM 2 to 5 3.35%, PWL 5 to 11 -0.95, RS 3 to 20 +6.69 per 100 sows mated.

#### Discussion & Conclusion

PRRS MLV vaccination on a naïve herd could alter performance of newborn piglets increasing PWM and MUM, leading to decreasing the PWL. Defining this impact helps producers determine PRRS MLV value.

## HHM-PP-89

### TITLE

NITRATE POISONING IN WEANED PIGLETS

Tineke van de Veerdonk<sup>1</sup>, Rutger Jansen<sup>2</sup>

<sup>1</sup> *De Varkenspraktijk*

<sup>2</sup> *Boehringer Ingelheim AH NL*

### CONTENT

This case report describes acute mortality of over 300 piglets in a 3200 sow farm.

Cases occurred at 5 to 10 weeks of age in a barn with 10.000 weaned piglets. The animals were found dead early in the morning, spread across the units. No visible health problems were seen in the other animals, which were active and had a good appetite.

A differential diagnosis was quickly established: acute poisoning by environmental gases, water or feed, or an infectious disease. Necropsies of 5 dead piglets was performed by the Dutch Animal Health Service to establish the cause of death. Air quality was measured (Impact pro M3: NH<sub>3</sub>, O<sub>2</sub>, CO<sub>2</sub> and H<sub>2</sub>S) and feed samples were taken and water was tested for nitrate (Merckoquant test strip)

First, poisoning by gases was excluded as a cause of death (NH<sub>3</sub> 10-12 ppm, O<sub>2</sub> 20%, CO<sub>2</sub> 0.1% and H<sub>2</sub>S 0.0%). Necropsy findings were in line with a nitrate intoxication: chocolate brown coloration of the blood and methemoglobin concentrations of 28%.

Nitrate poisoning was confirmed by the presence of nitrate in the drinking water (test strip; >1 mg/ml).

Laboratory analysis of the drinking water showed slight elevated levels of nitrate (0 mg/l - 0.37 mg/l). The feed has not been analysed.

Cause of mortality was proven due to nitrate intoxication. Further investigation revealed contamination of the drinking water with waste from the air washer. Due to occasionally negative pressure in the drinking water system at times of large water demands waste water could be sucked into the drinking water system. The occasional flow back of waste water can explain the variable nitrate contents of the different water samples and the relative low morbidity of nitrate intoxication. To prevent future nitrate poisoning, a separation was made between the drinking water system and the airwasher.

## HHM-PP-90

### TITLE

THE ADKAR® CHANGE MANAGEMENT MODEL AS TOOL FOR REDUCING ANTIMICROBIAL USE BY PIG FARMERS.

Manon Houben<sup>1</sup>, Nele Caekebeke<sup>2</sup>, Angelique van den Hoogen<sup>3</sup>, Tijs J. Tobias<sup>3</sup>, J. Arjan Stegeman<sup>3</sup>, Francisca C. Velkers<sup>3</sup>, Franca J. Jonquiere<sup>3</sup>, Nathalie Sleenckx<sup>4</sup>, Moniek Ringenier<sup>2</sup>, Jeroen Dewulf<sup>2</sup>, Merel Postma<sup>2</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

<sup>2</sup> *Ghent University, Faculty of Veterinary medicine, Veterinary Epidemiology Unit*

<sup>3</sup> *Faculty of Veterinary Medicine, Utrecht University, the Netherlands*

<sup>4</sup> *Experimental Poultry Centre, Belgium*

### CONTENT

#### Introduction

To reduce antimicrobial use (AMU) in pig farming, farmers have to change their way of working. It is observed that some farmers are more successful in doing so than others. It is hypothesized that successful and sustainable behavioural change can greatly be influenced by personal guidance. The objective of this study was to develop and explore the usefulness of a personal guidance tool for veterinary coaching of pig farmers based on the ADKAR® model.

#### Material and Methods

The livestock adjusted (LA-) ADKAR® Model is a goal-oriented change management model that guides individual and organizational change in livestock production. The model consists of five blocks: Awareness, Desire, Knowledge, Ability and Reinforcement which can be scored and addressed during the change process. Twenty seven Dutch and Belgian pig farmers with above average AMU were included in the study and scored for the ADKAR characteristics on a 5-point Likert scale by two veterinary researchers. Outcomes were used for a farmer specific approach with the goal to reduce AMU.

#### Results

Overall, Dutch farmers scored higher than Belgian farmers on all ADKAR characteristics, individual scores varied from one to five. Mean scores varied from  $2.71 \pm 1.07$  for Knowledge in Belgian farmers to  $4.08 \pm 1.32$  for Awareness in Dutch farmers. Mean scores in both countries were  $3.59 \pm 1.45$ ,  $3.26 \pm 1.35$ ,  $3.15 \pm 1.29$  and  $3.28 \pm 1.28$  for Awareness, Desire, Knowledge and Ability respectively. Reinforcement was not scored at the start of the study.

#### Discussion

The ADKAR scoring system provided insight in the main barriers for change by pig farmers related to AMU in pigs. It is important for veterinarians to be aware of these barriers in order to successfully guide farmers in AMU reduction. Veterinarians should embed excellent veterinary advice in the five building blocks for successful change management.

## HHM-PP-91

### TITLE

PROFITABILITY AND ECONOMIC IMPACT OF TOLTRAZURIL ADMINISTRATION PROTOCOL IN NATURALLY INFECTED PIGLETS IN BRAZIL

Giovani Marco Stingelin<sup>1</sup>, Marcela Cristina de Cezaro<sup>1</sup>, Raphaela Moreira Oliveira<sup>1</sup>, Reinaldo Fernandes Cooke<sup>2</sup>, Marina Lopes Mechler-Dreibi<sup>3</sup>, Elizabeth Moreira dos Santos Schmidt<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Veterinary Medicine and Zootechny, Botucatu, São Paulo, Brazil*

<sup>2</sup> *Eastern Oregon Agricultural Research Center, Oregon State University, 67826-A Hwy 205, Burns, OR 97720, USA*

<sup>3</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

### CONTENT

Background and objectives: Coccidiosis is one of the main diseases affecting suckling piglets and is endemic worldwide. This work aimed to evaluate the profitability and economic impact of different toltrazuril administration protocols in commercial piglets.

Material and methods: A total of 495 piglets was randomly divided into four groups. The control group (CG; n=125) did not receive toltrazuril. Piglets receiving toltrazuril on the third day of life (G2; n=127); Piglets receiving toltrazuril on the fifth day (G3; n=116), and piglets receiving two doses of toltrazuril at the third and seventh days (G4; n=127). They were individually weighted along 132 days to evaluate the growth performance in each treatment and the financial return at slaughter.

Results: All groups treated with toltrazuril presented higher live weight at slaughter compared to control group, with G2 group presenting the highest weight (98.05 kg), with a significant difference from CG (90.78 kg) (Tukey test, p<0.05). The individual dose of one mL of toltrazuril costs approximately USD 0.10. The price paid per kg of live swine at slaughter on September 2018, in São Paulo (Brazil), was USD 0.93.

Discussion and conclusion: G2 animals weighted 7.27 kg more compared to CG animals at slaughter, and one G2 animal valued USD 6.76 more compared a CG one. Discounting the individual cost of treatment, the income was USD 6.66 per animal at the slaughtered. For instance, a farm with 1.000 sows in a complete cycle that sells 27 pigs/female/year for slaughter, would increase profits in USD 179,820.00 in one year, which means a return on investment of 1:66. On the other hand, G2 pigs were slaughtered 3.68 kg heavier compared to G3 animals. Similarly, this farmer would profit USD 92,340.00. Toltrazuril administration proved to be profitable for swine producers, and administration on the third day showed the best profitability.

## HHM-PP-92

### TITLE

#### MYCOPLASMA SUIS ASSOCIATED WITH DYSGALACTIA AND ANEMIA IN A SOW HERD

Martine Laitat<sup>1</sup>, Jurgén Vandenbruaene<sup>2</sup>, Stéphanie Dalle<sup>1</sup>, Philip Vyt<sup>3</sup>

<sup>1</sup> *University of Liège, Liège, Belgium*

<sup>2</sup> *DAP Mervet, Merksplas, Belgium*

<sup>3</sup> *Dialab, Belsele, Belgium*

### CONTENT

A case of dysgalactia associated with *Mycoplasma suis* is described for a Belgian sow herd. In a 440-sow farm, clinical signs started in August when some sows showed signs of dysgalactia one week after farrowing. No signs of mastitis (hyperthermia or udder congestion/inflammation) were observed. Feed mycotoxin contamination was first suspected but not confirmed. The impact on piglets preweaning mortality could not be measured as no data were collected in this hyperprolific sow herd. In March, two pale animals (a sow and a gilt) were confirmed PCR-positive for *Mycoplasma suis*. Further tests allowed to confirm 6 PCR-positive sows/9 clinically suspected animals. At the same moment, pale suckling piglets were detected. Consequently, sows were treated during 3-4 weeks with oxytetracycline in feed. Possible predisposing factors of *M. suis* infections were identified in the herd: PCV2 was actively circulating among sows and a European wild strain of PRRS was identified in the nursery. Poor lactation may also be associated to acute PRRS-infection. In April, PCR tests showed that purchased gilts were carriers of *Mycoplasma suis* and probably the source of infection in this farm. The supplier was contacted and then delivered PCR-negative gilts after treatment with a single tulathromycin injection. One year later, dysgalactia was detected again in 20% of lactating sows. In September, one lactating sow presenting anemia, jaundice and hyperthermia (40.1°C) 14-days postpartum was confirmed PCR-positive for *M. suis*. Hematological parameters confirmed anemia and a recent PCV2 seroconversion was identified, without evidence of PRRS-infection.

Recommendations concern the introduction of *Mycoplasma suis* negative gilts, treating outbreaks in sows with 22 mg/kg/day tetracycline in feed for 2 weeks and the control of PRRS and PCV2 as they could play a predisposing role in the development of the disease. Special attention should be paid to the single use of needles for vaccination purposes.

## HHM-PP-93

### TITLE

A COMPARISON OF TRACHEO-BRONCHIAL SWABS (TBS) AND ORAL FLUIDS (OF) IN A LONGITUDINAL FIELDSTUDY ON A FARM WITH PRDC HISTORY SUPPORTED BY CONTINUOUS COUGH MONITORING WITH SOUND MONITOR (SOMO)

Tim van Sprang<sup>1</sup>, Frédéric Vangroenweghe<sup>2</sup>, Nico Wertenbroek<sup>3</sup>

<sup>1</sup> *Slingeland Dierenartsen*

<sup>2</sup> *BU Food Animals, Elanco Animal Health Benelux*

<sup>3</sup> *Boehringer Ingelheim Animal Health*

### CONTENT

#### Background and Objectives

Timely detection of respiratory problems in fattening pigs remains difficult, in most cases coughing is not detected until the clinical signs are already moderate to severe. In current management systems, observation of fattening pigs during an extended period is no option due to lack of time. Sound Monitor (SOMO; SoundTalks, Leuven, Belgium) can perform a continuous monitoring of fattening pigs with respect to coughing. The objective of the present study was to compare the use of OF and TBS sampling for different respiratory pathogens in combination with automated cough detection and serology in determining the cause of clinical disease.

#### Materials & Methods

Two compartments of a fattening unit in Germany were equipped with the SOMO. Two subsequent batches of fattening pigs were enrolled in the study and were sampled using serology, OF and TBS sampling every month from, irrespective of clinical signs observed. Blood was analyzed by Elisa for *M. hyopneumoniae*, SIV, PRRSV and APP for PRRS also PCR was performed on blood samples. OF and TBS samples were analyzed using a multiplex PCR for the same pathogens and PCV2. Clinical signs were registered using SOMO; and lungs were scored in the slaughterhouse.

#### Results

In the first batch with no clinical signs TBS performed better in detecting PRRS and *M. hyopneumoniae*, OF performed better in detecting APP. In the second batch with clinical signs TBS also had higher detection rates for PRRS and *Mycoplasma* whereas OF had higher detection rates for APP. Serology showed PRRS infection, SIV infection and very little APP infection.

#### Discussion & Conclusion

The introduction of SOMO into the fattening unit provided additional insights in respiratory diseases. The different respiratory pathogens require different diagnostic technics for best detection. Results in PRRS detection do not correlate with previous studies.



## **HHM-PP-94**

### **TITLE**

**PATHOLOGICAL-ANATOMICAL FINDINGS OF THE LOCOMOTOR SYSTEM IN SOWS FOUND DEAD OR EUTHANIZED**

Eve Ala-Kurikka<sup>1</sup>, Camilla Munsterhjelm<sup>2</sup>, Paula Bergman<sup>2</sup>, Taina Laine<sup>3</sup>, Henna Pekkarinen<sup>4</sup>, Olli Peltoniemi<sup>2</sup>, Anna Valros<sup>2</sup>, Mari Heinonen<sup>2,5</sup>

<sup>1</sup> *Helsinki University*

<sup>2</sup> *University of Helsinki*

<sup>3</sup> *Finnish Food Safety Authority Evira*

<sup>4</sup> *Finnish Food Safety Authority EVIRA*

<sup>5</sup> *Department of Production Animal Medicine*

### **CONTENT**

#### **Background and Objectives**

Lameness is one of the most common reasons to euthanize sows. However, lameness is a symptom, and the specific diagnosis of lame sows often remains unresolved. In many cases, post mortem examination is needed in order to get a proper diagnosis. The objective of this study was to investigate pathological-anatomical diagnoses (PAD) of locomotor system in spontaneously died and euthanized sows.

#### **Material & Methods**

The findings associated with locomotor system were studied as a part of standardized post-mortem examinations in 65 sows. The sows originated from 15 commercial Finnish farms; 38 of sows were euthanized and 27 found dead. The median parity of the sows was 3.

Abnormalities in shoulder-, elbow, hip- and knee joints were described in detail. Cloudy or purulent synovial fluid and changes of synovial membrane indicative of inflammation was regarded as infective arthritis. The presence of gross lesions (at least erosion or thinning of the joint cartilage) in one or more joints without changes indicating an acute inflammation was regarded as arthrosis.

#### **Results**

Majority of the sows (91%) got post-mortem findings in the locomotor system. One-third of sows had a primary PAD associated with locomotor system. Of these, the most prevalent were arthritis and fracture (9 and 8% of all animals, respectively). Arthrosis was diagnosed in 71% of the sows, mainly as minor finding. Two-third of the cases were bilateral.

#### **Discussion & Conclusion**

Pathological findings in the locomotor system were very common in this study. This indicates that sows have disorders associated with locomotion in modern production facilities. There is a need to continue researching locomotor problems and finding means to prevent them in sows.



# IMMUNOLOGY AND VACCINOLOGY

POSTER ABSTRACTS

## **IMM-PP-01**

### **TITLE**

**RESULTS FROM 14 FARROW-TO-FINISH FRENCH FARMS BEFORE AND AFTER IMPLEMENTATION OF COLIPROTEC F4/F18**

Bernard Fily<sup>1</sup>, Fabrice Boutin<sup>1</sup>, Vincent Burlot<sup>1</sup>, Nicolas Geffroy<sup>1</sup>, Thomas Gin<sup>1</sup>

<sup>1</sup> *Elanco*

### **CONTENT**

Post-weaning diarrhea (PWD) remains a major cause of economic losses for the pig industry. Coliprotec F4/F18 is a live non-pathogenic *E. coli* vaccine for active immunization of pigs against F4-Enterotoxigenic *E. coli* (ETEC) and F18-ETEC. This study describes the implementation of Coliprotec F4/F18 to control PWD caused by F4-ETEC and/or F18-ETEC infections in 14 French farms.

This study reports on 14 French farrow-to-finish farms with a history of PWD, representing 5500 sows. Antibiotics administered through feed, water and/or injection were used to control PWD. In order to optimize the control of PWD, it was decided to vaccinate piglets with Coliprotec F4/F18 at least one week before the onset of clinical symptoms and at a minimum of 18 days of age. Vaccination was implemented by drenching piglets or by using bowl in the farrowing unit. For each farm, mortality, average daily gain (ADG) and antibiotic treatments were recorded during the post-weaning period before and after implementation of Coliprotec F4/F18. Following vaccination with Coliprotec F4/F18 in all the 14 farms, PWD clinical signs decreased and PWD-specific antibiotic treatments were not required. The average mortality during the nursery in the 14 farms was shown to be significantly ( $p < 0.05$ ) lower after the implementation of the vaccination (2.5%) than before implementation of the vaccination (3.7%). The ADG during the nursery in the 14 farms was higher after implementation of the vaccination (483 g/day) than before the implementation of the vaccination (466 g/day), but this difference was not significant. The vaccination with Coliprotec F4/F18 was shown to increase the average net benefit with 0.91 € per pig.

In those 14 farms, the implementation of Coliprotec F4/F18 reduced clinical signs of PWD, reduced the mortality rate by 1.2% in the nursery, improved the ADG by 17 g/day, while PWD-specific antibiotic treatments were not required.

## **IMM-PP-02**

### **TITLE**

**IMPLEMENTATION OF COLIPROTEC F4/F18 AND A NEW FEED PROGRAM IN A FRENCH FARROW-TO-FINISH FARM TO CONTROL POST-WEANING DIARRHEA AND IMPROVE PERFORMANCES**

Christine Meymerit<sup>1</sup>, Daniel Ferreira<sup>1</sup>, Vincent Burlot<sup>2</sup>, Thomas Gin<sup>2</sup>

<sup>1</sup> *Interface*

<sup>2</sup> *Elanco*

### **CONTENT**

Coliprotec F4/F18 is a live non-pathogenic *E. coli* vaccine for active immunization of pigs against F4-Enterotoxigenic *E. coli* (ETEC) and F18-ETEC. This study describes the implementation of Coliprotec F4/F18 and a feed program having an increased protein contents to control post-weaning diarrhea (PWD) and improve performances in the nursery.

This study reports on a French 540-sow farrow-to-finish farm with a 10 batches management system weaning at 21 days of age. Piglets showed PWD and laboratory analysis identified an F4-ETEC. For two consecutive batches, piglets were divided in two groups. Control groups follow the standard protocol of the farm with PWD-specific antibiotic treatments based on colistin and trimethoprim + sulfadiazine while vaccinated groups were drenched in the farrowing unit with Coliprotec F4/F18 at 18 days of age. During the nursery, vaccinated groups were fed with a pre-starter and starter feed containing an extra protein content of +1.57% and +1.06%, respectively. For each group, mortality, average daily gain (ADG), feed conversion rate (FCR) and antibiotic treatments were recorded during the nursery. No statistical analysis was done.

Following vaccination with Coliprotec F4/F18, PWD-specific antibiotic treatments were not required for vaccinated groups. Nursery average mortality was 0.5% and 0.9% for non-vaccinated and vaccinated groups, respectively. Nursery ADG was 392 and 404 g/day for non-vaccinated and vaccinated groups, respectively. For light piglets at weaning (weight below 4.7 kg), ADG was 356 and 379 g/day for non-vaccinated and vaccinated groups, respectively. Nursery FCR was 1.51 for both the vaccinated and non-vaccinated groups.

The vaccinated pigs did not need PWD-specific antibiotic treatments. Vaccination improved nursery ADG by 12 g/day, reaching +23 g/day for light piglets at weaning. Coliprotec F4/F18 vaccination also allowed to move to a feed program having an increased protein contents in the nursery without occurrence of PWD.

## **IMM-PP-03**

### **TITLE**

**IN-USE STABILITY OF COLIPROTEC F4/F18, A LIVE E. COLI VACCINE FOR ORAL SUSPENSION, IN WATER ACIDIFIER AT DIFFERENT PH VALUES**

Cindy-Love Tremblay<sup>1</sup>, Louise Bélanger<sup>1</sup>, Danielle Tremblay<sup>1</sup>, Eric Nadeau<sup>1</sup>

<sup>1</sup> *Prevtex Microbia Inc, 3395 Casavant blvd. West, Saint-Hyacinthe, Québec, Canada*

### **CONTENT**

**Background and Objectives** Organic and inorganic acids are used to lower the pH of drinking water to increase the digestive enzymes activity, regulate the gut microbiota and reduce water contaminants. These products can interfere with the efficacy of oral live E. coli vaccines administered in drinking water. This study evaluated the in-use stability of an oral live E. coli vaccine when diluted with water adjusted at different pH using an acidifier. **Material and Methods** The in-use stability of an oral live E. coli vaccine that protects pigs against PWD caused by F4-enterotoxigenic E. coli (F4-ETEC) and/or F18-ETEC (Coliprotec F4/F18, Prevtex Microbia) was investigated at different pH using an acidifier made with phosphoric (main ingredient), citric, lactic and malic acids (JEFACID, JEFO Nutrition). The vaccine was reconstituted as per leaflet instructions with 10 ml of water (pH 8) and then diluted at 1 dose per 170 ml (drinking water administration) with water (pH 8) or with water adjusted to pH 6, 5, 4 and 3 using the acidifier. Viability of both vaccine strains (F4 and F18) was determined after 0 and 4 hours at 25 °C using viable plate counts. **Results** No impact on the viability of both vaccine strains was observed after 4 hours when the vaccine was diluted in water (pH 8) or when the pH was lowered to pH 6 and 5. However, at lower pH, the viability of both vaccine strains was affected, with a reduction of 19% at pH 4 and about 50% (59% for F4, 45% for F18) at pH 3. **Conclusion:** The oral live E. coli vaccine prepared for drinking water administration is stable for 4 hours at 25 °C at water pH between 5 and 8, but not at pH 4 and below. It is recommended to check the pH of water before vaccination.

## **IMM-PP-04**

### **TITLE**

**PRRS CONTROL: A FIELD CASE REPORT OF INTRADERMAL VACCINATION WITH TWO M.HYO AND PRRS VACCINES COMBINED**

Pascal HOURCQ<sup>1</sup>

<sup>1</sup> *SCOP de Vétérinaires BREIZHPIG*

### **CONTENT**

#### **Background and Objectives**

The pig respiratory disease complex is an important health concern for swine producers. Many pathogens are involved but *M.hyo* and PRRSv play a major role. For practical reasons Farmers requested a mix of two vaccines. This case report describes the implementation in piglets of a mixed Mhyo+PRRS vaccination by intradermal route.

#### **Material & Methods**

In February 2017 the studied farm presented a very serious respiratory syndrome in the fattening unit. Two affected production batches had a mortality rate of 17.1 and 15.8%, versus 3.7% usually. Laboratory tests showed a mixed infection with Mhyo and PRRSv. Sows were routinely vaccinated against PRRS, and piglets were already vaccinated against Mhyo and *A.pleuropneumoniae*. The farmer refused to handle the piglets twice in the farrowing or nursery unit, for practical and labor reasons. This is why an intradermal vaccination was implemented on four week-old-piglets, mixing the Porcilis MHYO IDonce and Porcilis PRRS vaccines. Clinical signs, fattening mortality and average daily gain rates (ADGs), and sow productivity were monitored for 3 periods: before PRRS outbreak (second half of 2016), during this outbreak (first half of 2017), and after implementation of the mixed vaccination (second half of 2017).

#### **Results**

Clinical signs and mortality returned quickly to normal on the first mixed vaccinated production batches. The average fattening mortality rates were 3.7; 9.7 and 2.8% respectively during the three periods. The ADGs were 836; 911 and 889 g/d. The average number of fatteners sold per sow and per year were 22.2; 20.7 and 23.2.

#### **Discussion & Conclusion**

The intradermal vaccination presented here is "off label", and must be considered by the veterinarian in accordance with Regulation. In this farm, it was convenient and efficient to control Mhyo and PRRSv and it offers the farmer a practical and sustainable solution over time.

## **IMM-PP-05**

### **TITLE**

**DIETARY ALGAL  $\beta$ -(1,3)-GLUCAN, MODULATING INFLAMMATION AND CELL-MEDIATED IMMUNE RESPONSES IN PIGLETS THROUGH THEIR MOTHER SOW**

Natasja Smeets<sup>1</sup>, Valentine Van Hamme<sup>1</sup>

<sup>1</sup> *kemin europa nv*

### **CONTENT**

Weaning is associated with stress, digestive disorders and growth performance depression, consequently antibiotics and minerals (ZnO) are used. Due to an increasing regulatory and consumer demand to reduce usage of those substances, because of concerns on antibiotic resistance and environmental accumulation, alternatives such as natural immune modulators are gaining interest.  $\beta$ -glucans have been demonstrated to modulate immune responses and as such increase resistance to diseases. A new source of  $\beta$ -(1,3)-glucan is the alga *Euglena gracilis*. The aim of the current research was to investigate whether supplementing sows and/or their piglets with algal derived  $\beta$ -(1,3)-glucan had a positive effect on inflammation and cell-mediated immune responses in piglets. This trial was performed at the research and educational institute for agriculture in Belgium. Six sows were supplemented with algal  $\beta$ -(1,3)-glucan (Aleta, Kemin) at 1g/sow/day 3 weeks before and 26 days into lactation. The negative control group was composed of 6 non-supplemented sows. The piglets of supplemented and non-supplemented mother sows were divided into a supplemented (200 g/T algal  $\beta$ -(1,3)-glucan) and a non-supplemented piglet group, resulting in 4 groups with 30 piglets/group, 10 animals per pen. Blood was taken from the piglets at 14 and 42 days after weaning and analyzed for T-lymphocyte counts (analyzing cell-mediated immunity), using flow cytometry, and haptoglobin (a biomarker for inflammation), using a colorimetric assay kit.  $\beta$ -(1,3)-glucan supplementation did significantly decrease haptoglobin level in piglets originating from supplemented mother sows, 42 days after weaning. Additionally, a significantly decreased population of CD4-CD8- T-lymphocytes (T-cell progenitors) and significantly increased populations of CD4+CD8lo (memory T-cells) and CD4-CD8+ (cytotoxic T cells) T-lymphocytes in piglets originating from supplemented mother sows were observed, indicating an increased lymphocyte proliferation and activity. These results show that supplementing sows and their piglets with  $\beta$ -(1,3)-glucan results in an alleviation of inflammation and an enhancement of cell-mediated immune responses.

## **IMM-PP-06**

### **TITLE**

**SAFETY OF SOWS' MASS VACCINATION WITH ATTENUATED PRRS VACCINE IN FARMS UNDER PRRS STABLE STATUS**

Daniel Torrents<sup>1</sup>, Joel Miranda<sup>1</sup>, Emili Barba<sup>1</sup>, Rafael Pedrazuela<sup>1</sup>, Alex Ramirez<sup>2</sup>, Daniel Linhares<sup>2</sup>

<sup>1</sup> *Laboratorios HIPRA S.A, Amer, Spain*

<sup>2</sup> *Iowa State University, Ames (IA), USA*

### **CONTENT**

Background and objectives

Sows' mass vaccination (SMV) with modified live virus vaccines (MLVv) is a very common strategy in order to control and prevent porcine reproductive and respiratory syndrome (PRRS) in breeding herds. Despite the safety of MLVv which have been widely reported in experimental and field conditions, there are still some concerns about possible effects of SMV with MLVv especially in PRRS stable farms. The aim of this study was to assess the impact of SMV with UNISTRAIN®PRRS (Hipra, Spain) on the productive performance of PRRS stable breeding herds.

Materials & Methods

Data related to PRRS sow's vaccination and PRRS stability status was collected from 35 PRRS positive Spanish breeding herds enrolled in a one-year systematic PRRS monitoring program. From this, a total of 51 SMV were applied under PRRS stable status and without new PRRS infection for at least eight weeks post-vaccination. Using abortions per one thousand sows (ABTHS), piglets born alive (BAR), pre-weaning mortality (PWMR), and wean piglets per one thousand sows (WPTHs) rates as key predictor factors (KPI) for PRRS, we compared the productive performance of the breeding herd eight weeks before and eight weeks after SMV using a T-Student test for paired data.

Results

Averages of KPI for PRRS for the eight weeks after SMV did not show any significant difference with the eight weeks prior to SMV: ABTHS (0.81 vs. 0.79; p=0.79), BAR (91.8% vs. 91.6%; p=0.40), PWMR (11.8% vs. 12.2%, p=0.47) and WPTHs (550.3 vs. 550.2, p=0.98).

Discussion & Conclusion

Results in this study showed no clinical impact on the productivity performance measured (KPIs) of the farm while using SMV with UNISTRAIN®PRRS in breeding herds under PRRS stable status. The use of MLVv UNISTRAIN®PRRS for SMV can be considered a safe strategy for PRRS prevention even in farms with PRRS stability.



## **IMM-PP-07**

### **TITLE**

**EFFECT OF MASS-VACCINATING SOWS WITH ATTENUATED PRRSV VACCINE ON THE PRRS STATUS OF BREEDING HERDS**

Daniel Torrents<sup>1</sup>, Joel Miranda<sup>1</sup>, Rafael Pedrazuela<sup>1</sup>, Alex Ramirez<sup>2</sup>, Daniel Linhares<sup>2</sup>

<sup>1</sup> *Laboratorios HIPRA S.A, Amer, Spain*

<sup>2</sup> *Iowa State University, Ames (IA), USA*

### **CONTENT**

Background and objectives

Vaccinating sows with modified live PRRS virus vaccines (MLV) may result in transient shedding of the vaccine's virus, which has the potential to be transmitted to their offspring. Therefore, sow mass vaccination (SMV) programs may affect PRRS status of breeding herds. The aim of this study was to assess the effect of SMV using UNISTRRAIN@PRRS (Hipra, Spain) on the likelihood of changing a PRRS stable status of breeding herds.

Materials & Methods

Data related to PRRSV vaccination, and PRRS status was collected from 35 PRRS-positive Spanish breeding herds, which were enrolled in a one-year systematic PRRS monitoring program based on 4-to-6 weeks periodic sampling of 30 serum from due-to-wean piglets. Breeding herds were classified as "PRRS stable" when achieved 4 consecutive samplings testing negative to PRRS RNA by RT-PCR. Then, PCR results of subsequent samplings immediately after SMV of PRRS stable breeding herds were evaluated. In case of PCR positive results, samples were submitted for PRRSV open reading frame (ORF)-5 nucleotide sequence.

Results

During the monitoring period, 58 SMV events were carried out on PRRS stable farms. PCR-positive samples right after SMV were obtained on 15 of 58 events, from which 6 were related to a wild-type PRRSV. For all other 9 cases (16%), PCR-positive results were transient, with duration of only 1 month. All farms had PCR-negative results in the next sampling.

Discussion & Conclusion

The low rate of PCR positive results immediately following SMV with UNISTRRAIN@PRRS in PRRS stable breeding herds indicated a very weak and occasional interference between this prevention strategy and the breeding herd classification in monitoring and control programs.

## **IMM-PP-08**

### **TITLE**

**IN-USE STABILITY OF COLIPROTEC F4/F18, A LIVE E. COLI VACCINE FOR ORAL SUSPENSION, WHEN USED WITH A DEXTROSE/ELECTROLYTE SOLUTION.**

Louise Bélanger<sup>1</sup>, Danielle Tremblay<sup>1</sup>, Eric Nadeau<sup>1</sup>

<sup>1</sup> *Prevtec Microbia Inc, 3395 Casavant blvd. West, Saint-Hyacinthe, Québec, Canada*

### **CONTENT**

**Authors** Louise Bélanger, Danielle Tremblay and Éric Nadeau *Prevtec Microbia Inc, 3395 Casavant blvd. West, Saint-Hyacinthe, Québec, Canada.*

**Background and Objectives** Oral live E. coli vaccines against PWD can be administered to pigs from 18 days of age. These vaccines are made up into suspension with water to be orally administered and should be consumed within 4 hours. Administration of the vaccine with bowls is often preferred to the drench application of suckling piglets to reduce manual labor and animal stress. Dextrose/electrolyte solutions are often used to facilitate water intake by suckling piglets. This study evaluated the in-use stability of an oral live E. coli vaccine when diluted with a dextrose/electrolyte solution, with or without a water stabilizer.

**Material & Methods** The viability of an oral live vaccine comprising two E. coli strains (Coliprotec F4/F18, *Prevtec Microbia*) was investigated when prepared with a dextrose/electrolyte solution made with dextrose, sodium chloride, betaine, monopotassium phosphate and a premix including sodium acetate and propionate (RéSORB2, *Provimi*). The vaccine was reconstituted with 10 ml water (pH 7.7) and then diluted at 1 dose per 83 ml with a 4% v/v dextrose/electrolyte solution (pH 4.6) or a solution of 4% dextrose/electrolyte and 0.5 g/L of a water stabilizer (AviBlue, *Elanco*) (pH 5). A dilution of the vaccine in water was also analyzed as a control. Viability of vaccine strains (F4 and F18) were determined after 0 and 4 hours at 25 °C using viable plate counts.

**Results** No impact on the viability of both vaccine strains was observed after 4 hours when the vaccine was diluted in water and in the dextrose/electrolyte solution, with or without the water stabilizer.

**Discussion & Conclusion** The oral live E. coli vaccine prepared for bowl administration to suckling piglets is stable for 4 hours at 25 °C when prepared with a dextrose/electrolyte solution to facilitate the vaccine intake. The addition of a water stabilizer to the dextrose/electrolyte solution did not affect the in-use stability of the vaccine.

## **IMM-PP-09**

### **TITLE**

A COMPARATIVE TRIAL EVALUATING IMMUNE RESPONSE, IL-10 AND PROTECTIVE EFFICACY AGAINST A SINGLE HP-PRRSV CHALLENGE OR IN CONJUNCTION WITH PRRSV TYPE 1 OF PIGS INTRADERMALLY AND INTRAMUSCULARLY VACCINATED WITH MODIFIED LIVE PRRSV TYPE 1

Adthakorn Adthakorn<sup>1</sup>, Kepalee Saeng-Chuto<sup>1</sup>, Joel Miranda<sup>2</sup>, Angka Tantituvanont<sup>3</sup>, Dachrit Nilubol<sup>1</sup>

<sup>1</sup> *1 Department of Veterinary Microbiology, Faculty of Veterinary Science, Chulalongkorn University, Bangkok, Thailand*

<sup>2</sup> *HIPRA*

<sup>3</sup> *3 Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand*

### **CONTENT**

The study was conducted to evaluate the protective efficacy of type 1 porcine reproductive and respiratory syndrome virus (PRRSV) modified live vaccine (MLV) when administered intramuscularly (IM) or intradermally (ID) in pigs against either a single challenge infection with highly pathogenic (HP)-PRRSV or in conjunction with PRRSV type 1. Antibody and IFN- $\gamma$  secreting (ISC) following vaccination in addition to IL-10, a parameter to evaluate safety of the vaccine, were characterized. Forty-two, 3 weeks-old, PRRSV-free pigs were randomly allocated into 7 groups of 6 pigs each. Groups 1 (IM/PRRS2) and 4 (IM/PRRS1+2), and groups 2 (ID/PRRS2) and 5 (ID/PRRS1+2) were intramuscularly and intradermally vaccinated with MLV type 1 (UNISTRAIN® PRRS), respectively. Dosage and route of vaccination were in accordance with manufacturer's directions. Groups 3 (NV/PRRS2) and 6 (NV/PRRS1+2) were left as challenge controls. At 35 days post vaccination, groups 1-3 and 4-6 were intranasally challenged with single HP-PRRSV and in conjunction with type 1 PRRSV, respectively. Group 7 was non-vaccinated and non-challenge control. Following vaccination, ID vaccinated pigs had shorter viremic phase and lower RNA level compared to IM vaccinated pigs. ID vaccinated pigs had significantly lower IL-10 level than IM vaccinated pigs, but ISC were significantly higher. There was no difference in antibody response. Following challenge, viremic phase and lung lesion score at 7 days post challenge were significantly lower in ID vaccinated pig compared to IM vaccinated pigs. In conclusion, the results of the study suggested PRRSV MLV administered, either by ID or IM, can provided protection against challenge with HP-PRRSV, either alone or in conjunction with PRRSV type 1 as demonstrated by reduced lung lesion and viremia. ID route might represent an alternative to improve vaccine efficacy as it provided lower IL-10 and higher ISC.

## **IMM-PP-10**

### **TITLE**

**PRESENCE OF PRRS VACCINE VIRUS IN NURSERY PIGS IN 22 FARMS VACCINATING PIGLETS IN THE NETHERLANDS**

Anke Verhaegen<sup>1</sup>, Tom Meyns<sup>2</sup>, An Vanderzeypen<sup>2</sup>

<sup>1</sup> ZOETIS B.V., Rivium Westlaan 74, Capelle ad IJssel, The Netherlands

<sup>2</sup> ZOETIS Benelux, Mercuriusstraat 20, 1930 Zaventem, Belgium

### **CONTENT**

#### Introduction

PRRS (Porcine Reproductive and Respiratory Syndrome) is probably the most costly pig disease in The Netherlands and farmers are increasingly vaccinating piglets with MLV (modified-live-virus) PRRS vaccines. The objective was to assess the presence of PRRS vaccine viruses in previously vaccinated nursery pigs.

#### Materials and methods

Between April and October 2018, 22 farms vaccinating piglets with any of the four commercial MLV vaccines available were selected by participating herd veterinarians. In each farm, 45 piglets were sampled as follows: 20 at start, 15 at mid and 10 at the end of the nursery period. Samples were pooled per 5 and investigated by PRRS PCR. In case of positive outcomes, the virus in the pool with the lowest ct value was sequenced for ORF5, and for Suvaxyn PRRS MLV vaccinating farms, pools were additionally investigated with a Zoetis in house DIVA PCR PRRS test (specific for the vaccine virus).

#### Results

The presence of PRRS virus (vaccine or field) in the nursery period was confirmed by PCR in all 22 farms. Field virus was found in 8 farms and vaccine virus in 14 farms. In 10 farms, a vaccine virus was found at the end of the nursery period. Viruses from all 4 vaccines were found at the end of the nursery period. Vaccine virus was found during the nursery period on all 5 farms vaccinating piglets with Suvaxyn® PRRS MLV at 4 days of age. All these farms were also vaccinating sows.

#### Conclusions

PRRSv from all 4 commercially available vaccines was detected at the end of the nursery period in farms vaccinating piglets. Suvaxyn PRRS MLV virus was found in nursery pigs born to Suvaxyn PRRS MLV vaccinated sows and given the vaccine themselves at 4 days of age, showing no indication of maternal immunity interference.

## **IMM-PP-11**

### **TITLE**

**PRODUCTIVE EFFECTS OF VEPURED® IN A VT2E-POSITIVE FARM WITHOUT CLINICAL SIGNS NOR MORTALITY RELATED TO EDEMA DISEASE.**

ALMUDENA SÁNCHEZ MATAMOROS<sup>1</sup>

<sup>1</sup> *HIPRA*

### **CONTENT**

#### **Background and Objectives**

Edema disease (ED) is an enterotoxaemia caused by the Verotoxin 2e (Vt2e) of *E. coli*. The subclinical form of the disease is characterized by a delayed growth performance without clinical signs. Detection of the vt2e gene in piglets allows the identification of this disease, while vaccination against ED could improve the productive parameters. The aim of this study was to evaluate the effect of VEPURED® vaccination on growth performance in a vt2e-positive farm without clinical signs or mortality related to ED.

#### **Material & Methods**

A Belgian farrow-to-finish commercial farm, without clinical signs nor mortality related to ED and vt2e positive PCR, was selected. One batch of 621 piglets of 2-4 days of age was randomized in a vaccinated and a control group administrating VEPURED® or 1 ml of PBS, respectively. ED clinical signs, vt2e presence, mortality and individual productive parameters were assessed from farrowing to slaughter.

#### **Results**

This farm diagnosed with subclinical ED disease based on vt2e detection, absence of ED clinical signs and mortality, together with a suspicious of reduced productive results. This set-up allowed the assessment of the vaccine efficacy against subclinical ED based on productive results. Individual growth performance was significantly higher ( $p$ -value $<0.01$ ) in vaccinated animals both at the end of the fattening period (167 dpv) and in the slaughterhouse (2.67 and 2.04 Kg higher in vaccinated group compared to control group, respectively).

#### **Discussion & Conclusion**

Piglet vaccination against ED showed a positive effect in this particular farm with a significant improvement of the productive parameters at culling time. These results confirm that piglet vaccination from 2 days of age with VEPURED® could be a useful tool against the delayed growth performance and its economic effects in farms with a subclinical form of ED.

## **IMM-PP-12**

### **TITLE**

COMPARATIVE STUDY OF THE HUMORAL RESPONSE AND SAFETY EFFECTS OF TWO COMMERCIAL REPRODUCTIVE VACCINES UNDER FIELD CONDITIONS IN BREEDING SOWS

Ramon Jordà<sup>1</sup>, Oriol Boix<sup>1</sup>, Antonio Ubierno<sup>2</sup>

<sup>1</sup> *HIPRA, Amer (Girona), Spain*

<sup>2</sup> *AVP Planasdemunt & Associats*

### **CONTENT**

#### **BACKGROUND AND OBJECTIVES**

The aim of this study was to assess and compare the humoral immune response and safety effects after vaccination against Swine Erysipelas (SE) and Porcine Parvovirus (PPV), using two commercial bivalent vaccines under field conditions.

#### **MATERIAL & METHODS**

Two different trials were performed in two commercial farms to assess humoral response and safety effects. Studied animals were randomly assigned in two groups. Group 1 (G1) received ERYSENG® PARVO (HIPRAMUNE® G adjuvant) while Group 2 (G2) received Vaccine B (aluminium hydroxide adjuvant).

Humoral response: forty seronegative gilts against SE and PPV were vaccinated and revaccinated following the manufacturer's instructions. Serological response was assessed at 0, 21, 42 and 63 days post vaccination (dpv) using a commercial ELISA kit and haemagglutination inhibition assay (HI) for quantification of SE and PPV antibodies respectively.

Safety effects: thirty-eight multiparous sows and ten gilts were vaccinated once ten days after farrowing. Safety effects were assessed by monitoring the rectal temperature and the average feed intake per sow.

#### **RESULTS**

Regarding the humoral response, SE and PPV antibodies in G1 showed significant differences (p-value<0.05) compared to G2 from day 21 until the end of the study. Moreover, antibody titres against SE and PPV were 21% and 26% higher in G1 compared to G2 at 42 dpv respectively.

Concerning safety effects after vaccination, no differences between G1 and G2 were observed (p-value>0.05).

#### **DISCUSSION & CONCLUSION**

The results of this study demonstrate that seroconversion against SE and PPV after vaccination with ERYSENG® PARVO was higher and tend to last longer than Vaccine B, this could be related to a different recognition of the antigen by the immune system and/or different effects of the adjuvants. On the other hand, both vaccines have shown similar degree of safety when injected under similar conditions.

## **IMM-PP-13**

### **TITLE**

**DIFFERENCE IN IGA PRODUCING CELLS IN INTESTINE: COMPARISON OF PIGLETS FEEDED WITH AND WITHOUT FUNGAL DIETARY TREATMENTS DURING NURSERY**

Guillermo Ramis<sup>1,2</sup>, Fernando Fariñas<sup>3</sup>, Nienke de Groot<sup>4</sup>, Javier Roques<sup>5</sup>, Francisco José Pallares<sup>6,2</sup>

<sup>1</sup> *Departamento Producción Animal. Facultad de Veterinaria. Universidad de Murcia. Spain*

<sup>2</sup> *Instituto Murciano de Investigación Bisoanitaria IMIB). Murcia.*

<sup>3</sup> *Instituto de Inmunología Clínica y Enfermedades Infecciosas. Málaga. Spain*

<sup>4</sup> *Trouw Nutrition Innovation, Amersfoort, The Netherlands*

<sup>5</sup> *Trouw Nutrition Spain, Madrid. Spain*

<sup>6</sup> *Dpto. Anatomía y Anatomía Patológica Comparadas. Facultad de Veterinaria. Universidad de Murcia. Spain*

### **CONTENT**

#### **BACKGROUND AND OBJECTIVES**

The future ban on using antimicrobials and heavy metals as prophylactic measures pushes to find new approaches to maintain the gut health of piglets. By understanding how alternatives work, new feeding strategies could be developed. The main objective of this study was to compare the quantity of IgA producing cells - as local immunity indicator - in gut tissue of piglets supplemented with a fungal dietary ingredient, compared to control piglets.

#### **MATERIAL AND METHODS**

A novel fungal dietary treatment (mannanase hydrolyzed copra meal and rye overgrown with mycelium of *Agaricus subrufescens*) (Trouw Nutrition, the Netherlands) was added at 2 kg/mt to prestarter and starter diet of treatment group (FSG), keeping a control group (CG). Animals were humanely killed at 0 (basal group; BG), 15, 30 and 45 days of life. Finally, 10 basal (BG), 26 CG and 33 FSG animals were euthanized, and samples from jejunum, ileum and colon were fixed in formalin. Immunohistochemistry was done on tissues to detect IgA producing cells. The cells in 10 field of 10.000  $\mu$ m<sup>2</sup> were counted.

#### **RESULTS**

IgA producing cells increased 30 and 45 days after weaning in CG and FSG animals in all parts of the intestinal tract. At 15 days of life IgA cell number were significantly lower in FSG piglets compared to CG piglets and basal levels. IgA cells count was significantly lower in FSG piglets compared to CG piglets in all parts of the intestinal tract at 30 days of life and in the colon at 45 days of life.

#### **DISCUSSION AND CONCLUSION**

The addition of the fungal dietary ingredient in feed resulted in a significant lower number of IgA producing cells in jejunum, ileum and colon. These findings suggest a lower stimulation of intestinal local immune system or an anti-inflammatory response in treated groups.

## **IMM-PP-14**

### **TITLE**

**IMPACT OF MATERNALLY DERIVED ANTIBODIES ON AVERAGE DAILY WEIGHT GAIN IN PIGLETS VACCINATED AGAINST PORCINE CIRCOVIRUS 2 (PCV-2)**

Sebastián Figueras<sup>1</sup>, Lorenzo Fraile<sup>2</sup>, Joaquim Segalés<sup>3,4</sup>, Bernd Grosse Liesner<sup>5</sup>, Ivan Hernández<sup>1</sup>, Francisco García<sup>1</sup>

<sup>1</sup> *Departamento de Fisiología, Facultad Veterinaria, Universidad de Murcia, Murcia, España*

<sup>2</sup> *Departamento de ciencia animal, Universidad de Lleida, Lleida, España*

<sup>3</sup> *Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.*

<sup>4</sup> *UAB, Centre de Recerca en Sanitat Animal (CRESA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.*

<sup>5</sup> *Boehringer Ingelheim Vetmedica GmbH AH Swine, Ingelheim, Germany*

### **CONTENT**

#### **Background and Objectives**

High levels of maternally derived antibodies (MDA) partly interfere with the induction of humoral immunity elicited by vaccination against Porcine circovirus 2 (PCV-2). Within this scenario, there is controversy about its interference on vaccine efficacy measured by production parameters.

The purpose of this study was to evaluate the impact of MDA on the average daily weight gain (ADG) from weaning to slaughter in piglets vaccinated at 3 weeks of age with Ingelvac CircoFLEX®.

#### **Materials and Methods**

This study summarizes the results of 4 trials carried out in four farms from three different European countries. Overall, the study comprises data from 2,835 piglets. Each piglet (experimental unit) was bled at weaning (around 21 days of age). All piglets were vaccinated by an intramuscular injection of 1 ml of Ingelvac CircoFLEX® at weaning.

PCV-2 serum antibody titers were assessed by means of the indirect immunofluorescence antibody test (IFAT) at weaning prior to vaccination. Titers were expressed as log<sub>10</sub>. Piglets were weighted both at weaning and before slaughter at 25 weeks of age; then, ADG was calculated and expressed in kg/d.

#### **Results**

IFAT titers ranged from 1 log<sub>10</sub> and 4.3 log<sub>10</sub>, and ADG values varied from 0.279 to 0.932 kg/d. No significant association ( $p>0.05$ ) was found between IFA titer at vaccination and ADG during the rearing period.

#### **Discussion and Conclusions**

PCV-2 MDA in piglets at the age of vaccination with Ingelvac CircoFLEX® did not apparently have a negative impact on their subsequent ADG, independently of the IFAT titer at weaning. Therefore, present data support the lack of MDA interference on the growth of piglets vaccinated with this product within the studied range of antibody titers.



## IMM-PP-15

### TITLE

#### COMPARATIVE GROWING PERFORMANCE HOMOGENEITY OF TWO PCV-2 AND MYCOPLASMA HYOPNEUMONIAE VACCINATION PROTOCOLS

Adam Martínez<sup>1</sup>, Sebastián Figueras<sup>2</sup>, Gloria Abella<sup>2</sup>, Antonio Callén<sup>2</sup>, Ivan Hernández<sup>2</sup>, Victor Rodríguez<sup>2</sup>, Eugenio Sánchez<sup>2</sup>

<sup>1</sup> *General Pecuaria S.A., Vic, Spain*

<sup>2</sup> *Boehringer Ingelheim Animal Health España, Spain.*

### CONTENT

#### Introduction

Spanish piglets are usually vaccinated against PCV-2 and *Mycoplasma hyopneumoniae* (M.hyo). The market offers different possibilities. This field study compares two different protocols; one using separate vaccinations with monovalent PCV-2 and M.hyo vaccines, the other a freshly mixed combination.

#### Materials and Methods

The study involved 84000 piglets originating from two 1000 sows farrow-to-wean farms, which are PRRSv positive-stable, and M.hyo and APP positive as well. Group A (27 batches) received 2ml of Porcilis PCV® (Intervet) and 2ml of Suvaxyn MHone® (Zoetis). Group B (27 batches) received FLEXCombo® (Circoflex® 1mL+Mycoflex® 1mL, Boehringer Ingelheim). Both groups were vaccinated intramuscularly at weaning (3 weeks of age) and shared the same nurseries but moved 6 weeks later to different finishers. Vaccination protocols were switched between nursery batches to obtain comparable treatment groups. Main production parameters were compared between treatment groups and statistically analyzed.

#### Results

Initial weight of both treatment groups had comparable means ( $p=0.75$ ) with similar variances ( $p<0.6$ ). No statistical differences ( $p=0.8$ ) were found between the means of the ADWG. Group B had a numerical advantage of 33 g/kgs ( $p=0.2$ ) in FCR.

Average final weight was statistically comparable ( $p=0.33$ ) but variances were statistically different between groups either by Bonett or by Leneve test ( $p<0.001$ ). The variability of the average of the final weight in group B was statistically reduced compared to group A.

#### Conclusions

Starting from two comparable populations these results show that the homogeneity in the final weight of pigs vaccinated with FLEXcombo® was statistically higher than the population vaccinated with the other protocol. These results demonstrate that analyzing the variances of a relevant production index can be a good tool to determine profitability. This statement is based on the fact that as higher the uniformity in slaughtered pigs is, as more the producer is paid by the slaughter plant.

## **IMM-PP-16**

### **TITLE**

A FIELD TRIAL COMPARING THE EFFICACY OF TWO VACCINES AGAINST PCV2 AND MYCOPLASMA HYOPNEUMONIAE IN TERMS OF VIREMIA, LUNG LESIONS AND GROWTH PERFORMANCE

William Costa<sup>1</sup>, Juliana Calveyra<sup>2</sup>, Luciano Lunardi<sup>2</sup>, Mauro Souza<sup>1</sup>, Thaiza Barbosa<sup>1</sup>, Divino Santana<sup>3</sup>, Roman Krejci<sup>4</sup>

<sup>1</sup> *Ceva Animal Health Brazil*

<sup>2</sup> *Ceva Animal Health Latin America*

<sup>3</sup> *Rio Branco Alimentos, Brazil, Patrocínio-MG*

<sup>4</sup> *Ceva Animal Health France*

### **CONTENT**

#### **Introduction**

PCV2 and Mycoplasma hyopneumoniae are two of the most frequent pathogens of swine causing major economic losses. The efficient prevention requires a long lasting protection, which can be evaluated by scoring lungs at slaughter and by recording pigs' growth rate.

The aim of this trial was to evaluate the efficacy of a single shot vaccines, Circovac® & Hyogen® in comparison with a two shot vaccines on protection against PCV2 and Enzootic Pneumonia.

#### **Materials and Methods**

Three commercial pig farms with 2000 sows each were selected for the trial. In total 3200 piglets were vaccinated with Circovac® and Hyogen® at 3 WOA (group G1) and 3200 piglets were vaccinated with Mhyo and PCV2 vaccine A at 3 and 6 WOA (group G2). Pigs' growth performance was recorded and the relevant economic impact was calculated using Respinomics™. Lung scoring was performed at slaughterhouse according to the Ceva Lung Program.

#### **Results**

Animals vaccinated with Circovac® and Hyogen® showed 34.28% of Bronchopneumonic lungs (BP) while animals vaccinated with vaccines A presented 41.22% of BP ( $p < 0.05$ ). The EP-Index (calculated from the frequency and severity of EP-like lesions) was on average by 0.41 lower ( $p < 0.05$ ) in G1 compared to G2. The scar scoring also had statistical difference between the vaccinated groups ( $G1 = 8.44$ ,  $G2 = 17.66$   $p < 0.05$ ). From the zootechnical point of view, G1 had on average 16g higher ADG ( $p > 0.05$ ) compared to G2; 0.03 better feed conversion than G2 ( $p > 0.05$ ) and 0.16% lower mortality ( $p > 0.05$ ). The profit in G1 was calculated using Respinomics™ application as 4.19€ per pig.

#### **Conclusions and Discussion**

The single dose vaccination with Circovac® e Hyogen® improved pigs' lung health and farm's profitability due to better growth performance. Despite zootechnical differences were not significant, the economic impact was extremely relevant, since a high amount of animals was evaluated. Moreover, it was less stressful for the pigs compared to the double shot vaccination.

## **IMM-PP-17**

### **TITLE**

**IN-VITRO TESTING OF THE ANTIGENICITY AND SAFETY OF TWO NEWLY DEVELOPED IRRADIATED VACCINE CANDIDATES AGAINST HIGHLY PATHOGENIC PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS 2**

Tatjana Sattler<sup>1,2</sup>, Jasmin Fertey<sup>3</sup>, Boris Hartmann<sup>2</sup>, Adi Steinrigl<sup>2</sup>, Viskam Wijewardana<sup>4</sup>, Richard Kangethe<sup>4</sup>, Susanne Richter<sup>2</sup>, Giovanni Cattoli<sup>4</sup>, Sebastian Ulbert<sup>3</sup>, Friedrich Schmoll<sup>2</sup>

<sup>1</sup> *University Leipzig, Clinic for Ruminants and Swine, Germany*

<sup>2</sup> *AGES, Institute for Veterinary Disease Control Mödling, Austria*

<sup>3</sup> *Fraunhofer IZI Leipzig, Germany*

<sup>4</sup> *IAEA Laboratories Seibersdorf, Austria*

### **CONTENT**

#### **Background and Objectives**

Vaccination against PRRSV still remains unsatisfactory regarding efficacy and safety. In this study, we tested the in-vitro antigenicity and safety of highly pathogenic (HP) Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) 2 irradiated in two different ways as potential vaccine candidates.

#### **Material and Methods**

An HP PRRSV 2 field strain, cultured in MARC 145 cells and concentrated by ultracentrifugation, was treated with low energy electron irradiation (LEEI) or gamma irradiation (with and without trehalose as stabilizer) at a dosage of 30 kGy. The inactivation has been tested by estimation of the viral load and TCID<sub>50</sub> of live and irradiated viruses in cell culture for three passages. Electron microscopy has been performed to assess virus structure. The in-vitro antigenicity was measured by an in-house ELISA by coating wells of a microtiter plate with live and the irradiated viruses, respectively and testing them with known antibody positive and negative serum.

#### **Results**

After ultracentrifugation, the TCID<sub>50</sub> of the live HP PRRSV 2 was 1E-6.75. A viral load of 6.6E+10 was measured. After irradiation, the viral load was 1.4E+10 and 1.1E+10 in gamma-irradiated virus (+trehalose) and 8.8E+9 in LEEI virus. No cytotoxic effect has been detected after irradiation. In electron microscopy, 63% of the non-irradiated virus particles were intact, whereas in irradiated viruses about 30% intact particles were found. In the ELISA, OD values in positive pig samples were above 1.5 and did not differ substantially between live and irradiated virus wells. In negative serum samples, OD values stayed beneath 0.3.

#### **Discussion and Conclusion**

Both gamma irradiation as well as LEEI, were able to safely inactivate the tested HP PRRSV 2 strain. The in-vitro antigenicity as well as the viral load of the irradiated viruses were comparable to the live virus. Testing the immunogenicity in pigs will be the next step.

## **IMM-PP-18**

### **TITLE**

EXPERIENCES WITH SEROLOGICAL RESPONSE AND SECURITY, AFTER SIMULTANEOUS AND CONCURRENT USE OF PORCILIS® COLICLOS AND PORCILIS® GLÄSSER

Ivan Mayor<sup>1</sup>, David Escalada<sup>1</sup>, Miguel Angel Jimenez<sup>1</sup>

<sup>1</sup> UVE S.A.

### **CONTENT**

#### Background and Objectives

A single herd can suffer a variety of diseases caused by different pathogens. To reduce the number of injections, and therefore the stress on the sows, it is preferable to use combined vaccinations against more than one agent. The aim of the present report was to evaluate the safety and serological response of both simultaneous and separate use of Porcilis® Glässer and Porcilis® Coliclos.

#### Material & Methods

The trial was conducted in a 3,500-sow farm. Forty (40) primiparous were selected and divided in two groups. They had not been previously vaccinated against Glasser and neonatal diarrhea. Group 1: 20 sows simultaneously vaccinated with Porcilis® Glässer + Porcilis® Coliclos, with both vaccines mixed in one syringe immediately prior to use. Group 2: 20 sows vaccinated in two different sites. Both groups received two doses (day 0, day 28 day). Animals were monitored for local and systemic side effects. Blood samples were taken at day 0 (T0), day 28 (T1) and day 43 (T2) and assayed to assess seroconversion for type F4ab, F4ac, F5, F6, LT-toxin, by Elisa-ECO and for Haemophilus parasuis by ELISA HPS Biocheck.

#### Results

No local or systemic reactions were seen. Post-vaccination serological titers for all E. coli antigens were statistically higher at T2 than T0 regardless of method of vaccination.

Serological response in F4ab, F4ac, F5, F6, LT-toxin are equal in both groups. Regarding HPS (Glässer) the S/P-ratios are statistically equal in both groups (67% of the sows had seroconversion, half in each group).

#### Discussion & Conclusion

The results of this study demonstrate that simultaneous application of Porcilis® Glässer and Porcilis® Coliclos, in which both vaccines are mixed, is safety and increased antibodies for different adhesion factors of E. coli and seroconversion against HPS.

## **IMM-PP-19**

### **TITLE**

**EFFICACY OF PIGLET'S VACCINATION WITH PORCILIS® GLÄSSER TO REDUCE CLINICAL SIGNS OF GLÄSSER'S DISEASE IN FINISHING PIGS**

Manolo Morejón<sup>1</sup>, Rut Menjón<sup>2</sup>, Marcial Marcos<sup>2</sup>, Jiménez Marta<sup>2</sup>

<sup>1</sup> *Porvilsat*

<sup>2</sup> *MSD Animal Health*

### **CONTENT**

#### **Background and Objectives**

The objective of this trial was to evaluate the efficacy of piglet's vaccination to reduce the clinical signs and mortality related to *H. parasuis* in finishing pigs.

#### **Material & Methods**

The trial was conducted in a 280 sows farm, PRRS and App negative. Piglets were weaned at 28d and moved to a site2. At 9-10 weeks of age, 60% of production was moved to a finishing farm. From 10 to 12 weeks of age 10-12% of the piglets showed clinical signs compatible with Glässer's Disease, resulting in 2-3% of extra mortality and high use of antibiotics. *H. parasuis* was confirmed (isolation and PCR). Two finishing batches (400 piglets) were vaccinated with Porcilis®Glässer, at 5 and 7w of age. Morbidity, mortality and antibiotic usage were recorded and compared to the ones of pre and post-vaccination batches.

#### **Results**

Total mortality in the finishing phase was reduced (Pre-vac 3,76% vs Vac 2,55% vs Post-vac 4,82%;  $p < 0,05$ ), In the vaccinated batches, none of the dead animals showed lesions compatible with Glässer's disease, with statistical differences vs the pre and post-vaccination batches. (Pre-vac 2,38% vs Vac 0% vs Post-vac 2,5%;  $p < 0,05$ ). Clear differences were detected in morbidity, with an average of 11% of animals affected in the pre and post-vaccination batches, whilst any animal was affected in the vaccination groups. In pre and post-vaccination batches all animals needed to be treated with Doxycycline orally for 5 days, and the affected animals injected with ceftiofur (3days) and ketoprofen (2days). No antibiotic treatment was needed at the vaccinated batches. Vaccinated animals had an extra benefit of 1,96€/pig, including the cost of the vaccine.

#### **Discussion & Conclusion**

In this study, vaccination with Porcilis® Glässer was shown to be an efficacious and profitable alternative to control Glässer's disease in finishing pigs, allowing a clear reduction in antibiotic consumption.

## **IMM-PP-20**

### **TITLE**

**SAFETY OF A NEW OCTAVALENT VACCINE AGAINST ERISIPELAS, PARVOVIRUS AND LEPTOSPIRA (PORCILIS® ERY+PARVO+LEPTO) IN GILTS AND SOWS**

Jiménez Marta<sup>1</sup>, Rut Menjón<sup>1</sup>, César Llorente<sup>1</sup>, Marcial Marcos<sup>1</sup>

<sup>1</sup> *MSD Animal Health*

### **CONTENT**

#### **Objectives**

A new octavalent vaccine, Porcilis® Ery+Parvo+Lepto (MSD AH) was recently launched in Europe. The aim of this trial was to evaluate the safety of the vaccine in a commercial sow's farm.

#### **Material &Methods**

The trial was conducted in a 1200 sow's farm. 70 animals were divided in 3 groups: 30 gilts (G), 30 lactating sows (LS) and 10 sows of 100d of gestation (GS).

Gilts and Lactating groups were divided in 3 subgroups: vaccinated and revaccinated with Porcilis® Ery+Parvo+Lepto (EPL), vaccinated and revaccinated with Porcilis Ery+Parvo (EP) and control not-vaccinated (C). Sows of Gestation group were vaccinated and revaccinated with Porcilis® Ery+Parvo+Lepto. Rectal temperatures of groups G and LS were recorded at first vaccination (T0), 6h later (T6) and 24 hours later (T24). In GS group, temperature was measured at T0 and 20h later (T20). Local and systemic reactions were recorded, as well as reduction in feed intake. Data were statistically analyzed (two-factor ANOVA analysis).

#### **Results**

No local nor systemic reactions were observed. One animal of the C group and one of the EP group showed a reduction in feed intake at T24.

Temperatures: no statistical differences detected between the Gilts and Lactating sows groups. Temperature data in °C were:

- GT0: C38,4 vs EP38,3 vs EPL38,6. GT6: C38,3 vs EP38,3 vs EPL38,5; GT24: C38,3 vs EP38,2 vs EPL38,3  
- LST0: C38,4 vs EP38,7 vs EPL38,6. LST6: C38,6 vs EP38,9 vs EPL38,7; LST24: C38,6 vs EP38,7 vs EPL38,7

GS group: statistical differences were found between T0 and T20 (T0 38,4 vs T20 38,0; p=0.047).

#### **Discussion & Conclusion**

Porcilis® Ery+Parvo+Lepto does not induce local nor systemic reactions and does not have any negative effect on rectal temperature, being therefore a very safe vaccine that can be used in any production phase.

## **IMM-PP-21**

### **TITLE**

COMPARISON OF TWO DIFFERENT VACCINATION SCHEMES AGAINST PCV2 AND M. HYOPNEUMONIAE

Glòria Abella<sup>1</sup>, Ivan Hernández<sup>1</sup>, Sebastián Figueras<sup>1</sup>, Antonio Callén<sup>1</sup>, Victor Rodríguez<sup>1</sup>, Eugenio Sánchez<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health España, Spain.*

### **CONTENT**

#### Background and Objectives

Spanish piglets are usually vaccinated against PCV2 and Mycoplasma hyopneumoniae (M.hyo). In the market there are different possibilities, the aim of this field study was to compare two different vaccination protocols.

#### Materials and Methods

The study was developed in a site-3 farm. Two groups were compared; Group CS received two monovalent vaccines - Circovac 0.5mL (Ceva Salud Animal, S.A.) + Stellamune 2mL (Elanco Animal Health) and Group FC received FLEXCombo - CircoFLEX 1mL+MycofLEX 1mL (Boehringer Ingelheim Vetmedica GmbH). Both groups were vaccinated at weaning. A total of 71 site 3 batches were compared, 35 using Circovac+Stellamune (40,320 animals) vs. 36 using FLEXCombo (41,472 animals). The impact in the production parameters during the fattening period: %mortality, initial weight, final weight, standard feed conversion, ADG, medication cost and days on feed, were evaluated. Statistical analysis was done using Anova and Kruskal-Wallis test. Raw ADG and FCR indexes were recalculated to standardize to 18-105 production cycle.

#### Results and Discussion

Statistical differences were observed in mortality rate, standard feed conversion and also in initial weight. Group FC had a significantly lower percentage of mortality (4.9%) compared to Group CS (6.6%). Standard feed conversion was significantly lower ( $p < 0.05$ ) in the FC group (2,48) compared to CS group (2,62). FLEXCombo group had lower body weight at the beginning of the fattening period, compared with the CS group. In addition, no differences were observed in medication cost, final weight and days on feed. While the days on feed were no statistical different, it must be taken into account that initial body weight differed among groups.

#### Conclusions

Better productive parameters had been observed in the animals vaccinated with FLEXCombo. The positive effect was observed, and statistically significant, for mortality rate and standard feed conversion.

## **IMM-PP-22**

### **TITLE**

**EFFECTS ON ACUTE PHASE PROTEINS IN IBERIAN BREED PIGLETS OF TWO DIFFERENT CIRCOVIRUS TYPE 2 AND MYCOPLASMA HYOPNEUMONIAE VACCINE PROTOCOLS**

Tomás Fernandez-Aguilar<sup>1</sup>, Damian Escribano<sup>2</sup>, Victor Rodriguez-Vega<sup>3</sup>, Sebastián Figueras-Gourgues<sup>3</sup>, Iván Hernández-Caravaca<sup>3</sup>, Gloria Abella<sup>3</sup>, Antonio Callén<sup>3</sup>, Eugenio Sánchez Tarifa<sup>3</sup>

<sup>1</sup> *Casa de San Pedro Swine Farm, Spain*

<sup>2</sup> *Department of Animal and Food Science, UAB, Spain*

<sup>3</sup> *Boehringer Ingelheim España, S.A., Spain*

### **CONTENT**

#### **Introduction**

Acute Phase Proteins (“Hp” Haptoglobin; “CRP” C-Reactive Protein) have been proposed as suitable biomarkers for monitoring inflammatory response, welfare and may be an indicator of average daily weight gain (ADWG) in swine farms. The objective of this study was to analyze these parameters with two different vaccination protocols.

#### **Materials and Methods**

60 Iberian breed piglets were vaccinated at 28 days of age. Group N, (n=31) with 2 mL of FLEXcombo® (1 mL CircoFLEX® and 1 mL MycoFLEX®). Group Z, (n=29) with 0.5 mL of Circovac® and 2 mL of Hyogen. Blood samples, rectal temperature (T<sup>re</sup>) and the weight of each animal were taken before vaccination, 24h and 48 after vaccination.

Dunn's multiple comparisons test was used for APPs and T<sup>re</sup>. For ADWG, the ANOVA test was performed.

#### **Results**

The administration of both protocols increased concentrations of Hp and CRP in comparison to the basal level.

At 24 hours post vaccination, Hp concentration was significantly higher (p<0.01) in group Z. In addition, there was a numerical but not significant difference for the CRP levels in group Z (approximately twice as high).

At 24 hours post immunization, the rectal temperature was significantly higher in group Z compared to N (p<0.01).

Moreover, at 24 hours post immunization, the ADWG was significantly higher in animals in the group N (p<0.05). Indeed, data show a negative weight gain during that period in group Z.

#### **Conclusion**

According to our results, the release of APPs has been significantly higher in piglets vaccinated with the Z protocol. Furthermore, a significant increase of rectal temperature and a lower ADWG was observed in group Z pigs. As described in other studies, vaccination with FLEXcombo® has a minor effect on well-being parameters and induces less stress compared to other vaccines, which is important for growth performance during the nursery period.



## **IMM-PP-23**

### **TITLE**

**RETURN TO BASELINE PRODUCTION AFTER A CHANGE OF VACCINATION SUBSEQUENT TO A HIGH VIRULENT PRRS VIRUS STRAIN OUTBREAK**

Javier Diaz<sup>1</sup>, Antonio Callen<sup>2</sup>, Eugenio Sanchez<sup>2</sup>, Gloria Abella<sup>2</sup>, Ivan Hernandez-Caravaca<sup>2</sup>, Sebastian Figueras<sup>2</sup>, Victor Rodriguez-Vega<sup>2</sup>

<sup>1</sup> *Inga Food, Almendralejo, Spain*

<sup>2</sup> *Boehringer Ingelheim Animal Health Spain*

### **CONTENT**

Background and objectives

PRRS is one of the most damaging diseases in the swine industry. The implementation of the sows and piglets vaccination as well as the 5 Step Programs, have had a significant positive impact on the productive parameters. This study analyzes the evolution of the productive parameters after a change in the control program through the application of 5 Step Program after a high virulent PRRSV outbreak in a vaccinated commercial farm.

Materials and Methods

The study is being conducted in a 2,000 sows farrow-to-wean PRRS positive farm. Sows were being vaccinated with a commercial vaccine on a quarterly basis. In January 2017 there was a PRRS outbreak in the farm affecting both the reproductive parameters and the productive parameters.

In April, the farm started with the Boehringer Ingelheim 5 Step Process Platform which includes two sow mass vaccinations, and vaccination of piglets before weaning. The farm was closed to incoming gilts for 6 months and the McRebel protocol was set up in the farrowing room.

For the statistical analysis the Minitab.17.1.0 software (2013 Minitab Inc.) was used.

Results and discussion

Results of the main reproductive parameters before the outbreak, during the outbreak and after the PRRS control program were:

- Average of abortions/week: 2.46, 16.56 and 2.83.
- Average of piglets born alive/Farrow: 12.25, 10.86 and 12.56.
- Percentage of preweaning mortality: 10.26%, 16.58% and 12.67%.
- Average of piglets weaned/farrow: 10.56, 8.95 and 10.20.
- Percentage of nursery mortality: 8.2%, 18.7% and 6.5%.

The farm recovered the baseline production levels 10 weeks after the implementation of the new PRRS control program.

Conclusions

The setup of the measures included in the 5 Step Process, sows and piglets vaccination was able to reestablish the baseline production in a farm experiencing a severe PRRS outbreak in spite of a systematic vaccination.

## **IMM-PP-24**

### **TITLE**

**PORCINE PLEUROPNEUMONIA CONTROL WITH COGLAPIX® VACCINATION UNDER FIELD CONDITIONS.**

Sonia Cárceles<sup>1</sup>, Pablo Del Carmen<sup>1</sup>, Mayte Lasierra<sup>1</sup>, Marta Carmona<sup>1</sup>, Salvador Oliver-Ferrando<sup>1</sup>, Florentina del Carmen Cuestas<sup>2</sup>, Sergi Celma<sup>2</sup>, David Espigares<sup>1</sup>

<sup>1</sup> *Ceva Salud Animal, Barcelona, Spain*

<sup>2</sup> *Ingafood, Spain*

### **CONTENT**

#### **INTRODUCTION**

*Actinobacillus pleuropneumoniae* (Ap) causes porcine pleuropneumonia, a disease of high dissemination, highly contagious and often lethal in pigs. Ap infections results in production losses, high mortality and decrease in the growth rate, in grower and finishing pigs. Vaccination has proven to provide efficient protection.

The aim of this study was to assess the efficacy of vaccination with CoglapiX® (Ceva) against Ap in comparison with non-Ap-vaccinated controls.

#### **MATERIAL AND METHODS.**

The study was performed in pigs from a 1700 sow herd located in the South East of Spain. Ap problems were observed at the end of the finishing period. To estimate the moment of optimal vaccination a cross-sectional serological investigation was performed, including PRRS (ELISA) and Ap (ELISA Apx IV) in pigs from 7 till 16 weeks of age (woa).

A total of 16632 pigs were vaccinated against Ap with CoglapiX at 8 and 11 woa, and productivity parameters were compared to a total of 16431 non-vaccinated controls over a period of two consecutive years. The following parameters were recorded by groups: mortality, feed conversion ratio (FCR), average daily weight gain (ADWG) and production cost/kg.

Results were analyzed by a parametric test Anova.

#### **RESULTS**

CoglapiX® group:

Mortality 6,5% (p=0.011), FCR 2,49 (p=0.023), ADWG 680g (p<0.001) and production costs/kg 1.15€ (p=0.003).

Non-Ap-vaccinated group:

Mortality 9,01%, FCR 2,61, ADWG 640g and production costs/kg 1.19€.

#### **DISCUSSION AND CONCLUSIONS**

The productivity parameters of pigs vaccinated with CoglapiX® were all clearly better than those of the non-Ap-vaccinated pigs. These results confirm data obtained in others field trials.

## **IMM-PP-25**

### **TITLE**

**SOWS AND PIGLETS VACCINATION AGAINST PCV2 WITH CIRCOVAC® IN A CASE OF EARLY PRRSV INFECTION.**

Sonia Cárceles<sup>1</sup>, Florentina del Carmen Cuestas<sup>2</sup>, Sergi Celma<sup>2</sup>, Salvador Oliver-Ferrando<sup>1</sup>, Pablo Del Carmen<sup>1</sup>, Marta Carmona<sup>1</sup>, Mayte Lasierra<sup>1</sup>, David Espigares<sup>1</sup>

<sup>1</sup> *Ceva Salud Animal, Barcelona, Spain*

<sup>2</sup> *Ingafood, Spain*

### **CONTENT**

#### **INTRODUCTION**

The efficacy of vaccines may be compromised when piglets are vaccinated at the same time that a PRRS infection occurs. CIRCOVAC® is a PCV2 vaccine registered in sows and piglets. Vaccination in sows and piglets has been shown to be an effective strategy to control clinical and subclinical PCVD in pigs.

#### **MATERIAL AND METHODS.**

The study was carried out on a commercial farrow to wean pig farm of 1200 sows. Piglets were vaccinated against PCV2 at 4-6 weeks of age (woa) but at the same age they were infected with the PRRSv.

The objective of this study was to improve the production results in the fattening stage by an optimization of the vaccine program against PCV2. An alternative vaccination protocol was used against PCV2 to avoid piglets vaccination at the same time as PRRSv infection occurred. Two groups were compared in the same period during two consecutive years:

Group 1: piglets vaccinated against PCV2 with Circovac at 4 woa

Group 2: sows and piglets vaccinated against PCV2 with Circovac® at day 90 of gestation (D90) and at 10 woa, respectively.

Results were analyzed by a parametric test Anova.

#### **RESULTS**

In total, 30795 pigs were included in the study (group 1: 14335 pigs, group 2: 16460 pigs). In group 1 mortality was 7,09% FCR was 2,51 and ADG 630 gr. and in group 2 mortality was 4.71% ( $p < 0.001$ ), Feed Conversion Ratio (FCR) was 2,44 kg ( $p = 0.013$ ) and Average Daily Gain (ADG) was 660 gr ( $p = 0.047$ ).

#### **DISCUSSION AND CONCLUSIONS**

Sows and late piglets vaccination with Circovac® in early PRRSv infection cases in post-weaning stage improves the productive parameters compared to piglets vaccinated against PCV2 at 4 woa (at the same time PRRSv infection) and could contribute to reduce economic impact of PCV2 due to a better control of it.

## **IMM-PP-26**

### **TITLE**

**MYCOPLASMA HYOPNEUMONIAE (MHYO) SEROCONVERSION STUDY IN A LOW-LEVEL MDA FARM DUE TO A BIVALENT VACCINE COMBINING PCV2 AND MHYO**

Marcial Marcos<sup>1</sup>, Marta Jiménez<sup>1</sup>, Rut Menjón<sup>1</sup>, Rosa García Gallo<sup>2</sup>, Jesús Bollo<sup>1</sup>

<sup>1</sup> *MSD Animal Health*

<sup>2</sup> *CANPIPORK S.A.*

### **CONTENT**

#### **Introduction**

Mhyo is an important pathogen worldwide distributed and responsible for retarded growing, mainly in the finishing period. Use of bivalent vaccines to control of Porcine Circovirus type 2 (PCV2) and Mhyo is very extensive due to management convenience and good productive results obtained. But few data exist regarding seroconversion to the Mhyo fraction of this kind of vaccines.

#### **Material &Methods**

In a Spanish farm, Iberian genetics, where low-level maternal derived antibodies (MDA) against Mhyo were detected, 39 piglets were selected pre-weaning. VACCINATED GROUP(VG): 20 piglets vaccinated against PCV2 and Mhyo using a commercial vaccine (Porcilis® PCV M Hyo, MSD Animal Health) the day before weaning. CONTROL GROUP(CG): 19 piglets not vaccinated. All of them individually identified and blood sampled just prior vaccination (T1) (4 weeks of age), and at 7 (T2) and 10 (T3) weeks of age to determine serological response to Mhyo. No positive results detected in previous studies regarding real time PCR of nasal swabs at weaning (0/30 positive). Serum analyzed by IDEXX® M. hyo ab test (Positive>844, Negative<617).

#### **Results**

Group effect: T1; statistical differences were found ( $p < 0.001$ ) in favor of CG (VG=6 vs. CG=316), but still negative. T2 and T3; statistical differences were found ( $p < 0.001$ ) in favor of VG (T2: VG=2113 vs. CG=369) (T3: VG=1535 vs. CG=491). In VG, statistical differences were found between T1 and T2-T3 ( $p < 0.001$ ), showing a clear seroconversion (titer value in CG decreases with time). In VG there is also a statistical correlation between T1 and T3, indicating low titers value in T1 are correlated with high ones in T3 ( $p = 0.005$ ).

#### **Discussion & Conclusion**

Despite erratic data regarding seroconversion to Mhyo vaccines, this trial with low-level MDA demonstrated a clear seroconversion to Mhyo in vaccinated piglets. So, in this situations seroconversion could be used as a tool to determine a correct vaccination technique.

## **IMM-PP-27**

### **TITLE**

SAFETY OF PORCILIS® ERY+PARVO+LEPTO VACCINE AT FARM LEVEL

Marcial Marcos<sup>1</sup>, Marta Jimenez<sup>1</sup>, Rut Menjón<sup>1</sup>, Alfredo Romero<sup>1</sup>, Jose María Ordoñez<sup>2</sup>, Javier Llamazares<sup>2</sup>

<sup>1</sup> *MSD Animal Health*

<sup>2</sup> *PROGATECSA S.A.*

### **CONTENT**

#### **Background&Objectives**

Use of vaccines with various agents is widely accepted for effectiveness and management convenience. Until now, vaccines containing *Erysipelothrix rhusiopathiae* and Parvovirus in combination are extremely used. Some studies have showed growing seroprevalence against different *Leptospira* serovars, so the introduction of a new multivalent vaccine containing *Leptospira* would be very interesting in porcine market. The aim of this study was to evaluate the safety of a new RTU multivalent vaccine containing these pathogens.

#### **Material &Methods**

Three groups of animals tested: Replacement (R): 22 nulliparous sows 6 months age; Gestation (G): 18 sows between 97-106 pregnancy days; and Lactation (L): 18 sows between 10-19 lactation days. There were 3 treatments each group: EPL, Porcilis® Ery+Parvo+Lepto vaccinated; and EP, Porcilis® Ery+Parvo vaccinated (both MSD Animal Health); and 1 control C (not vaccinated). Parameters individually evaluated: systemic reactions; local reactions 24 hours post-vaccination; feed intake (L and G groups); rectal temperature (°C) pre-vaccination (T0) and 24 hours post-vaccination (T24).

#### **Results**

Systemic reactions: not found in any animal of the study. Local reactions: not found in control group (as expected), but slight local reaction (less than 1cm) in all vaccinated animals (except 1 EP with less than 2cm) without statistical differences between EPL-EP. Feed intake: all sows ate properly except 4 sows in EP and 1 in EPL, that left a few amount 2 hours post-offering (no statistical differences between groups). Temperature: regarding sampling moment: no statistical differences were found at T0 and T24 between groups. Regarding groups of treatment: in R group, at T24 EPL(40.1°C) and EP(40.1°C) showed an increased temperature respecting T0 (39.4°C and 39.3°C respectively), not showed neither in control group (39.4°C and 39.8°C) ( $p=0.005$ ) nor L and G.

#### **Discussion & Conclusion**

This study suggests Porcilis® Ery+Parvo+Lepto is a very safe product that can be used during gestation and lactation.

## **IMM-PP-28**

### **TITLE**

**EFFICACY OF PORCILIS® GLASSER IN THE CONTROL OF HAEMOPHILUS PARASUIS INFECTION AT FARM LEVEL**

Marcial Marcos<sup>1</sup>, Marta Jimenez<sup>1</sup>, Rut Menjón<sup>1</sup>, Andrés de las Heras<sup>2</sup>

<sup>1</sup> *MSD Animal Health*

<sup>2</sup> *ATP (Asesoría Técnica Porcina)*

### **CONTENT**

#### **Background&Objectives**

Haemophilus parasuis (HPS), present worldwide, is an important agent in porcine pathology, causing Glässer's Disease (GD), responsible of direct losses due to mortality of growing piglets and indirect ones due to reduction of growth and increase of antimicrobials consumption. Sometimes it shows up as asymptomatic but depending on strain virulence it can appear as an aggressive agent. The aim of this study was to compare effect of sow vaccination against HPS in the health status of their offspring.

#### **Material &Methods**

The trial was conducted in a 600 sows farm (Spain) reporting clinical problems: dead piglets post-weaning and retarded growing during lactation and nursery periods in some animals. HPS serotypes 4, 9 and 13 were diagnosed (real time PCR) from dead piglets with polyserositis. Two randomized groups of sows were created: Group V (8 sows vaccinated with Porcilis® Glasser, two doses separated 4 weeks prior farrow) and Group C, control group (8 sows not vaccinated). The following data were recorded in each group: total born, born alive, litter weight at 24 hours, weaned per litter, lactation mortality, age at weaning, weight at weaning and 2 weeks later. All the data were statistical analyzed.

#### **Results**

No statistical differences were found in following data between groups: total born, born alive, litter weight at 24 hours, weaned piglets, lactation mortality and age of weaning. Statistical differences were found regarding weight at weaning in favor of the vaccinated group (GV: 7.42 vs. GC: 7.25) ( $p < 0.05$ ), and 2 weeks post-weaning (GV: 10.21 vs. GC: 9.49) (numerical differences).

#### **Discussion & Conclusion**

According to the results of this study, the use of vaccines to control GD is a good tool to avoid lack of growing due to a subclinical form of this disease, since piglets from vaccinated sows showed better growth than those from the control group.

## **IMM-PP-29**

### **TITLE**

SEROCONVERSION STUDY OF PORCILIS® GLASSER AT FARM LEVEL

Marcial Marcos<sup>1</sup>, Marta Jimenez<sup>1</sup>, Rut Menjón<sup>1</sup>, Andrés de las Heras<sup>2</sup>, Alfredo Romero<sup>1</sup>

<sup>1</sup> MSD Animal Health

<sup>2</sup> ATP (Asesoría Técnica Porcina)

### **CONTENT**

#### Background&Objectives

Haemophilus parasuis (HPS): important agent worldwide distributed, responsible of Glässer's Disease (GD). Sometimes it shows up as asymptomatic but depending on the strain virulence it can appear as an aggressive agent. The aim of this study was to evaluate seroconversion with commercial vaccine administered prior farrowing and ulterior serological behaviour of the piglets.

#### Material &Methods

It was selected a commercial sow farm (600 sows), with diagnosed problems of HPS in growing piglets. 16 sows selected for the trial and randomly distributed: Vaccinated Group(VG), 8 sows vaccinated with commercial GD vaccine (Porcilis® Glasser, MSD Animal Health) receiving two doses (6 and 2 weeks prior farrowing); 8 sows not vaccinated as Control Group(CG). Blood samples were collected from all sows just before first vaccination(T1S), at second vaccination(T2S), and at farrow(T3S). Two piglets from each sow were individually identified and blood sampled at 7(T1P) and 21(T2P) days of life. Samples analyzed by commercial ELISA (INgezim®Haemophilus, Ingenasa; Positive>0.6, Doubtful 0.6-0.4, Negative<0.4).

#### Results

Sow results: T1S; no statistical differences in SP value between groups (VG:0.860 vs. CG:0.848; p=0.965). T2S; all positive but statistical differences in favor of VG (VG:1.089 vs. CG:0.770; p=0.007). T3S; majority of CG were doubtful and there were statistical differences favorably to VG (0.956 vs. CG:0.524; p=0.001). Piglets results: T1P (VG:1.137 vs. CG:0.696) and T2P (VG:0.779 vs. CG:0.368) showing statistical differences in the medium SP ratio value (p<0.001) favorably to both vaccinated. Medium SP ratio is decreasing with time in all piglets. In vaccinated groups, there is a high correspondence between SP medium value in T3S with T1P (p<0.001) and T2P (p=0.028).

#### Discussion & Conclusion

This study demonstrated seroconversion showed by commercial vaccine against GD in the field, as well as ulterior transference of this maternal immunity to their offspring, key point to achieve protection against HPS in pre and post-weaning period.

## IMM-PP-30

### TITLE

NEUTRALIZING ANTIBODIES AGAINST PRRS VIRUS IN BREEDING PIGS VACCINATED WITH THE COMBINED ADMINISTRATION OF UNISTRAIN® PRRS AND ERYSENG® PARVO

Joel Miranda<sup>1</sup>, ALMUDENA SÁNCHEZ MATAMOROS<sup>1</sup>, Enric Mateu<sup>2</sup>, Ivan Diaz Luque<sup>2</sup>

<sup>1</sup> HIPRA

<sup>2</sup> Centre de Recerca en Sanitat Animal, Universitat Autònoma de Barcelona

### CONTENT

The combined administration of UNISTRAIN® PRRS (UP), PRRS MLV vaccine, and ERYSENG® PARVO (EP), inactivated Porcine Parvovirus and Swine Erysipelas, is licensed. PRRSV generates an immune response characterized by weak and delayed production of neutralising antibodies (NA) and cell-mediated immunity (CMI). However, both NAs and CMI have been related to protection against PRRSV. CMI response after UP vaccination it induces a significant specific CMI response against heterologous PRRSV strains after a common vaccination scheme with primary vaccination and revaccination 4 months later. The objective of the present study was to assess homologous viral NA against the PRRS MLV vaccine strain.

Ten PRRS-naïve healthy gilts, 6-month-old, were randomly allocated to three groups: group A (n=6, UP + EP, 2 ml/dose IM) and group C (n=4, control group, 2 ml PBS/dose IM). Animals were vaccinated at days 0, 21 and 147 of the study. Blood samples were collected at days 0, 21, 28, 42, 147 and 154. NAs against the PRRS MLV vaccine were measured.

Homologous NAs were detected as early as day 21 in all vaccinated animals (individual log<sub>2</sub> titres from 2 to 3) and remained positive throughout the study. From day 21 onwards, NA titres increased and peaked at day 42 (mean titre = 4.6 ± 1.2). Remarkably, the titres remained unchanged during the four-month interval (mean titres = 3.8 ± 0.4 at day 28 vs 3.9 ± 1.3 at day 147). Comparison of the titres showed a significant boost from day 21 to 28 post-vaccination (p < 0.05).

The combined administration of UP and EP based on primary vaccination (two shot 3 weeks apart) and revaccination 4 months later showed to boost CMI after each administration against genetically and immunologically diverse PRRSV strains (previously published) and to induce a homologous NA response by day 21, which remained constant thereafter.



## **IMM-PP-31**

### **TITLE**

COMPARATIVE STUDY TO EVALUATE IMMUNITY INDUCED BY ACTINOBACILLUS PLEURONEUMONIAE VACCINES

Jose Lopez<sup>1</sup>, Marta Jimenez<sup>2</sup>, Marcial Marcos<sup>2</sup>, Rut Menjón<sup>2</sup>

<sup>1</sup> *Agropecuaria Casas Nuevas*

<sup>2</sup> *MSD Animal Health*

### **CONTENT**

#### Background and Objectives

Pleuropneumonia is a world-wide disease causing substantial economic loss to the swine industry. The disease is characterized by hemorrhagic, fibrinous and necrotic lung lesions. The most accepted control measure for this disease is the generation of immunity in animals through vaccination. Nowadays, different types of vaccines are available in the market. The purpose of this study was to compare immunity response based on antibodies to the toxins and outer membrane protein (OMP) of different commercial APP vaccines.

#### Material & Methods

The trial was conducted in a Spanish farm (1,500 sows), where an APP serotype 4 was diagnosed (no ApxI expression) At 9 weeks of age, piglets (3000 per group) were vaccinated in 3 sequential batches (different vaccine every batch), Group A (Autovaccine serotype 4), (Porcilis® APP) Group B or Group C (bacterin based in serotype 1,2), and revaccinated 3 weeks later, according to maternal antibodies levels. Blood samples were collected from the piglets 4 weeks after 2nd dose (10 piglets per group). Antibody titers against specific antigens (toxins ApxI, ApxII, ApxIII and OMP) were measured with ELISA tests, internal MSD AH test and to ApxIV (Idexx APP)

#### Results

Piglets in group A had negative or very low seroconversion (log<sub>2</sub> titer) to every antigen (ApxI 6,32, ApxII 7,44, ApxIII 7,71, OMP 8,14), group B had similar antibodies results to every antigen (ApxI 11,34, ApxII 11,95, ApxIII 11,2, OMP 10,78), and group C had variable results (ApxI 7,39, ApxII 11,14, ApxIII 10,26, OMP 8,99). In ApxIV response, group A had 0%, group B 50% and group C 90% of seropositive results (maybe had contact with the field agent)

#### Discussion & Conclusion

The Porcilis® APP vaccinated pigs showed a significant and homogeneous response in the toxins and OMP antigens and antibody titers were larger in Porcilis® APP group.

## **IMM-PP-32**

### **TITLE**

**WEANING DID NOT AFFECT THE SEROLOGICAL RESPONSE TO INTRADERMAL PCV2 VACCINATION IN PIGLETS**

Lea Rentsch<sup>1,2</sup>, Sanna Nikunen<sup>3</sup>, Gitte Blach Nielsen<sup>3</sup>, Mari Heinonen<sup>1,4</sup>

<sup>1</sup> *University of Helsinki*

<sup>2</sup> *Department of Veterinary Biosciences*

<sup>3</sup> *MSD Animal Health Nordic*

<sup>4</sup> *Department of Production Animal Medicine*

### **CONTENT**

#### Background and objectives

The objective of this study was to investigate how timing of intradermal PCV2 vaccination affected the serologic response of piglets. We aimed to evaluate if the serologic response differed for Study A: vaccination before compared to at weaning and Study B: one week after weaning compared to at weaning.

#### Materials and methods

For each study four medium-sized piglets from 21 litters were selected in a farrow-to-finish farm. In study A, all piglets were vaccinated at 3.5 weeks. Half of these were weaned (A1), whereas the other half stayed with the sow for one further week (A2). In study B, half of the piglets were weaned at 3.5 weeks (B2), whereas the other half was weaned a week later (B1). At this point all were vaccinated in study B. In both studies, each piglet was blood sampled at vaccination and 4 weeks later. The serologic response was determined by an AlphaLISA (R&D Service Lab, MSD AH) reporting the log(2) PCV2 antibody level. Difference in antibody levels was evaluated using Student's t-tests with a significance level of 0.05.

#### Results

The mean antibody levels at vaccination did not differ between groups in neither Study A (A1: 5.59 + 1.06 log(2) ml, A2: 5.61 + 1.09 log(2), p=0.926) nor Study B (B1: 5.44 + 1.09 log(2), B2: 5.39 + 1.12) log(2), p=0.949. Similarly, the mean antibody levels four weeks after vaccination did not differ significantly between the groups in neither Study A (A1: 7.89 + 1.25 log(2), A2: 8.06 + 1.09 log(2), p=0.512) nor Study B (B1: 8.13 + 1.15 log(2), B2: 7.42 + 1.32 log(2), p=0.173). No PCV2 was detected in any of the studies.

#### Discussion and conclusions

The serologic response to intradermal PCV2 vaccine was not altered when vaccinating at weaning compared to vaccination before or after weaning.

## **IMM-PP-33**

### **TITLE**

**HOW TO COACH THE SWINE FARMERS TO OMIT ANTIBIOTIC TREATMENT IN PIGLETS VACCINATED AGAINST POST-WEANING DIARRHEA: THE EXAMPLE OF THE FECAL SCORECARD**

Frédéric Vangroenweghe<sup>1</sup>

<sup>1</sup> *BU Food Animals, Elanco Animal Health Benelux*

### **CONTENT**

**Background & Objectives** – Post-weaning *Escherichia coli* diarrhea (PWD) caused by enterotoxigenic *E. coli* (ETEC) remains a major cause of economic losses for the pig industry and provokes mild to severe watery diarrhea. Coliprotec® F4/F18, an oral live bivalent vaccine is now available, which reduces the impact of PWD caused by F4-ETEC and F18-ETEC. However, following vaccination, a transient mild diarrhea might be observed, but it does not evolve into clinical diarrhea. The objective was to evaluate behavior of swine farmers after coaching using a fecal scorecard as a decision tool on early treatment of piglets vaccinated pre-weaning with Coliprotec® F4/F18.

**Material & Methods** – A fecal scorecard was developed, with fecal scores of 0 (normal), 1 (pasty), 2 (mild diarrhea), 3 (moderate diarrhea) and 4 (severe diarrhea). Following application of Coliprotec® F4/F18 vaccine, no fecal scores belonging to score 3 and 4 have been observed. Therefore, it is of critical importance that swine farmers who observe a fecal score of 2 do not immediately take action and treat the piglets, since experience has learnt that this score is transient, evolving within 24-36 hours towards a fecal score of 1 or 0. Using the fecal scorecard treatment behavior of swine farmers (n = 20 farms) was monitored during the critical 10 days post-weaning.

**Results** – Analysis of the behavior showed that managing expectations and clear communication on vaccine experiences and antibiotic treatment resulted in 85% of the farmers postponing and eventually omit premature treatment of vaccinated piglets.

**Discussion & Conclusion** – Managing expectations and clear communication with swine farmers on the indications of Coliprotec® F4/F18 vaccine are essential to obtain a significant reduction in antibiotic use. Through coaching discussions with his advisors and practical use of the fecal scorecard swine farmers get successful guidance to prevent early, unnecessary antibiotic treatment.

## **IMM-PP-34**

### **TITLE**

**EFFICACY OF COLIPROTEC® F4/F18 IN PIGLETS WITH POST-WEANING DIARRHEA DUE TO F18-ETEC IN A COMMERCIAL ITALIAN FARM.**

Mariavittoria Gibellini<sup>1</sup>, Paolo Ferro<sup>1</sup>

<sup>1</sup> *Elanco Italia Spa*

### **CONTENT**

#### **Background and Objectives:**

Post-weaning diarrhea (PWD), mainly caused by enterotoxigenic *Escherichia coli* (ETEC), remains a major cause of economic losses for the pig industry. Coliprotec®F4/F18 is a live oral vaccine for active immunization of pigs against PWD caused by F4-ETEC and/or F18-ETEC.

This study investigated the efficacy of Coliprotec®F4/F18 administered to piglets before weaning in a pig farm in Italy.

#### **Materials & Methods:**

A 550-sow farm with a history of PWD due to F18-ETEC confirmed by laboratory PCR diagnosis was selected for this study. The farm has a separated nursery unit. Full litters of pigs from one weaning batch were randomly distributed into 2 groups at 24 days of age (0 dpv, days post-vaccination). Group-A (200 piglets) was vaccinated with Coliprotec®F4/F18 at 0 dpv and Group-B (200 piglets) remained unvaccinated. Pigs were weaned the day after vaccination. Average daily weight gain (ADWG), mortality, diarrhea and PWD-specific treatments were investigated by group during the 72-day nursery period.

#### **Results:**

Following vaccination with Coliprotec®F4/F18, clinical signs of PWD decreased and PWD-specific antibiotic treatment was not required in Group-A. Gentamicin treatment was used in the non-vaccinated Group-B due to a PWD outbreak. Mortality was reduced in the vaccinated group (Group-A: 4.5%; Group-B: 7%). An improvement of 77 g/d in ADWG was shown during the second half of post-weaning period for the vaccinated group, with an overall improvement of 52 g/d for the entire nursery period (Group-A: 390 g/d; Group-B: 338 g/d). Coliprotec®F4/F18 vaccinated pigs were 3.53kg heavier at the end of the nursery period. Results showed a positive Return On Investment (ROI 3,35:1).

#### **Discussion & Conclusion:**

This study shows that Coliprotec®F4/F18 was efficacious in reducing clinical signs and mortality due to PWD caused by F18-ETEC. In addition, pigs vaccinated with Coliprotec®F4/F18 showed better performance parameters as substantiated by an increased ADWG during the nursery.

**TITLE**

**CHARACTERIZATION OF MACROPHAGE POPULATION OF THE THYMUS IN PIGS AFTER INFECTION WITH PRRSV STRAINS OF DIFFERENT IN VIVO VIRULENCE**

Giulia Ognò<sup>1</sup>, Irene Magdalena Rodríguez Gómez<sup>2</sup>, Elena Canelli<sup>1</sup>, Inés Ruedas Torres<sup>2</sup>, Belén Álvarez<sup>3</sup>, Javier Domínguez<sup>3</sup>, Paolo Borghetti<sup>1</sup>, Paolo Martelli<sup>1</sup>, Jaime Gómez Laguna<sup>2</sup>

<sup>1</sup> *Department of Veterinary Science, University of Parma, Strada del Taglio, 10 – 43126, Parma, Italy*

<sup>2</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Spain*

<sup>3</sup> *Department of Biotechnology, National Institute for Agricultural and Food Research and Technology (INIA), Madrid, Spain*

**CONTENT**

**Background and objectives**

The emergence of the so-called highly pathogenic isolates of porcine reproductive and respiratory syndrome (HP-PRRSV) has raised new concerns about the control of the disease. Cells from the porcine monocyte-macrophage lineage represent the target for this virus, which replicates mainly in the lung, and especially in virulent strains, also in lymphoid organs, such as the thymus. However, current commercial modified live virus vaccines confer partial cross-protection against virulent strains. The aim of the present study was to analyse the impact of PRRSV infection with isolates of different in vivo virulence on the macrophage population of the thymus as well as the effect of a heterologous vaccine in the thymus of animals infected with a virulent strain.

**Material & Methods**

After experimental infection with Italian PR11 (low virulent) and PR40 (high virulent) PRRSV-1 subtype 1 isolates samples from thymus were analysed by histopathology and immunohistochemistry for PRRSV antigen, TUNEL, CD172a, CD163, CD107a and BA4D5 expression.

**Results**

Mortality was similar in both infected groups, but lung lesions and thymus atrophy were more intense in PR40 group. Animals infected with either PR11 or PR40 that died at 10-14 dpi, showed the most severe histopathological lesions, with a strong inflammatory response of the stroma and extensive cell death phenomena in the cortex. These animals presented an increase in the number of PRRSV, CD172a, CD163 and BA4D5 positive cells together with a decrease in the number of CD107a positive cells.

**Discussion & Conclusion**

Our results highlight the recruitment of macrophages in the thymus, an increased expression of the major receptor of PRRSV and the regulation of the host cytotoxic activity by macrophages. No marked differences were observed between PR11- and PR40-infected animals. Heterologous vaccination was able to restrain virus spread as well as the extent of the lesions in PR40-infected animals.

## **IMM-PP-36**

### **TITLE**

**EFFECT OF MYCOPLASMA HYOPNEUMONIAE VACCINATION TIME AFTER BIRTH AND VACCINE DELIVERY METHOD (INTRAMUSCULAR VS. INTRADERMAL) ON THE EXTENT OF ANTIBODY AND CELLULAR IMMUNE RESPONSES IN CONVENTIONALLY REARED PIGS UPON NATURAL CHALLENGE**

Luca Ferrari<sup>1</sup>, Elena De Angelis<sup>1</sup>, Valeria Cavalli<sup>1</sup>, Gianluca Bazzoli<sup>1</sup>, Elena Canelli<sup>1</sup>, Alessia Catella<sup>1</sup>, Giulia Ogno<sup>1</sup>, Paolo Borghetti<sup>1</sup>, Paolo Martelli<sup>1</sup>

<sup>1</sup> *Department of Veterinary Science, University of Parma, Strada del Taglio, 10 – 43126, Parma, Italy*

### **CONTENT**

The rationale and improvement of vaccination schedules and vaccine administration has been studied to find the most efficient conditions to let piglet immunity properly develop despite the interference of maternal immunity. These conditions primarily concern vaccination time, distance between vaccination and weaning, and administration methods. Besides the IM route, the ID route proved to be an efficient way, able to stimulate dermal dendritic cells to present antigens to T lymphocytes and trigger the downstream reactions. The aim of this work was to determine the best time for *Mycoplasma hyopneumoniae* (M.hyo.) vaccination after birth and comparing the intramuscular (IM) vs. the intradermal (ID) route in eliciting the antibody and cellular responses. In total, 9 groups of 100 piglets each from non-vaccinated sows were considered: one IM and one ID vaccinated group were enrolled at 1, 2, 3 and 4 weeks of age and one group was kept non-vaccinated. Blood samples were collected at vaccination and one week apart until 24 weeks of age. ELISA antibodies and M.hyo-specific ELISPOT IFN-gamma-secreting cells were investigated.

All vaccinated groups did not show significant responses after vaccination and only groups vaccinated from 2 weeks of age onwards had an antibody response after infection. Almost all groups showed a significant IFN-gamma-SC response at 4 weeks post-vaccination and a variable response after infection. The groups vaccinated at 3 and 4 weeks of age had the most intense responses, with the ID delivery route always better than the IM. Three- and four-week-old vaccinated piglets had more efficaciously elicited antibody and cellular responses, reasonably because immune activation occurred further from the maternally-derived antibody (MDA) vanishing. The ID vaccination route showed a better response, and this further confirms that ID vaccination is able to efficiently prime local antigen recognition and trigger an efficient immune response both at tissue level and systemically.

## IMM-PP-37

### TITLE

AN ANTIBODY-DERIVED KILLER PEPTIDE (KP) RAPIDLY TRIGGERS PORCINE INFLAMMATORY MONOCYTES, INNATE AND ADAPTIVE T LYMPHOCYTES, TOGETHER WITH TH1 CYTOKINE SECRETION AND CROSS-REACTIVE PRRSV-SPECIFIC AND PCV2-SPECIFIC IFN-GAMMA SECRETING CELLS IN PBMC OF CONVENTIONAL PIGS

Luca Ferrari<sup>1</sup>, Giulia Ferrarini<sup>2</sup>, Elena De Angelis<sup>1</sup>, Benedetta Passeri<sup>1</sup>, Giulia Ognò<sup>1</sup>, Walter Magliani<sup>3</sup>, Paolo Borghetti<sup>1</sup>, Paolo Martelli<sup>1</sup>

<sup>1</sup> *Department of Veterinary Science, University of Parma, Strada del Taglio, 10 – 43126, Parma, Italy*

<sup>2</sup> *IZSLER, Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna "B. Ubertini", Unit of Mantova, Strada Circonvallazione Sud, 21/a - 46100, Mantova, Italy*

<sup>3</sup> *Department of Biomedical, Biotechnological and Translational Sciences (S.Bi.Bi.T), University of Parma, Via Gramsci, 14 – 43126, Parma, Italy*

### CONTENT

An engineered killer peptide (KP), based on an anti-idiotypic antibody mimicking a yeast killer toxin, showed a wide-spectrum antimicrobial activity against fungi, viruses and parasites in humans and parasites in the dog and mouse. KP was demonstrated to interact with mouse dendritic cells and macrophages, stimulating Th1 responses. In porcine PBMC, KP is able to functionally activate pro-inflammatory CD14+high monocytes and natural killer T (NKT) cells in parallel with CD4+CD8alpha+ T helper (Th) memory cells and CD8beta+ conventional cytotoxic T lymphocytes (CTL) upon prolonged in vitro incubation.

The present study aims at investigating the ability of KP in early modulate the phenotype of porcine immune cells and induce Th1 cytokines to determine the efficacy in triggering cellular reactivity able to potentially influence the early response to two major porcine viruses, namely PRRSV and PCV2.

PBMC from adult pigs were stimulated with KP, or a scramble irrelevant peptide (SP), or kept unstimulated for a time period included between 20 min. and 20 hours, and analyzed by flow cytometry and ELISA. KP pre-incubation or co-incubation conditions were investigated to evaluate the effect on virus-specific IFN-gamma secreting cell responses by ELISPOT.

KP stimulated and maintained an early dose-dependent shift from quiescent to activated pro-inflammatory CD172alpha+CD14+high monocytes and NKT CD3+CD16+ cells. Noteworthy, KP remarkably triggered early and maintained up-regulation of CD8alpha and CD8beta on classical CD3+CD4-CD8alpha+/beta+ CTL and double positive (DP) CD3+CD4+CD8alpha+ Th memory cells, especially expressing high levels of CD8alpha (DP CD4+CD8alpha+high CD8beta+ CTL), associated with IFN-gamma and TNF-alpha release.

KP markedly and synergistically induced high reactivity and cross-reactivity of IFN-gamma secreting cells to PCV2b and particularly to PRRSV-type 1 isolates in vaccinated animals. The results support the efficacy of KP in stimulating Th1-biased immunomodulation and the potential use in vivo as immunomodulator and/or vaccine adjuvant against infections by PCV2 and PRRSV.

## **IMM-PP-38**

### **TITLE**

IMMUNE RESPONSES TO VACCINATION OF 1-DAY-OLD NAÏVE PIGS WITH A PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME-1 BASED MODIFIED LIVE VIRUS VACCINE

Monica Balasch<sup>1</sup>, Lucas Taylor<sup>1</sup>, Ivan Díaz<sup>2</sup>, Enric Mateu<sup>2</sup>, Jay Calvert<sup>1</sup>

<sup>1</sup> *Zoetis*

<sup>2</sup> *CReSA, IRTA-UAB*

### **CONTENT**

#### Introduction

The study assessed innate and adaptive immune responses to vaccination of 1 day-old pigs with a PRRSV-1 based MLV vaccine by IM and IN routes, challenged 18 weeks later with a heterologous PRRSV-1 isolate.

#### Materials and methods

Twenty-five, 1 day old, PRRSV-naïve piglets were given Suvaxyn PRRS MLV by IM (n=10) or IN route (n=10), or saline (n=5). Post-vaccination all pigs were bled at days 3, 7, 28, 56, 83, 113 and 125. Assays were performed for cytokines IL-10, IL-8, interferon- $\gamma$  (IFN- $\gamma$ ) (all ELISA on serum); tumor necrosis factor alpha (TNF- $\alpha$ ) and IFN- $\gamma$  (from stimulated peripheral blood mononuclear cells, ELISA and ELISPOT respectively) and vaccine strain serum neutralizing antibodies (NA).

#### Results

Induction of IL-10 was rare, indicating that IL-10 mediated immunomodulation/immune dysfunction was not a feature of vaccine or challenge virus. IL-8 was detected in only two pigs post-vaccination but most pigs after challenge, indicating a non-impaired ability to produce an innate immune response. TNF- $\alpha$  was not detected in any vaccinated pigs until day 83. After challenge, only a minority of pigs produced TNF- $\alpha$ . IFN- $\gamma$  was detected in all vaccinated pigs post-vaccination, indicating potential for an effective Th1 adaptive immune response. IFN- $\gamma$ -secreting cells were detected in all vaccinated pigs after vaccination. NA were first detected at day 56 in pigs vaccinated by both routes and remained until challenge. Post-challenge, a boost in NA was observed. Vaccine efficacy was demonstrated by reduction of viremia and nasal shedding post-challenge.

#### Conclusions

Following administration of a PRRSV-1 based MLV vaccine at 1 day of age, by either IM or IN routes, piglets were competent to mount an effective immune response characterized by: (1) undetectable/low levels of IL-10, IL-8 and TNF- $\alpha$ , (2) increased IFN- $\gamma$  expression within the first seven days, (3) a gradual increase in antigen-specific IFN- $\gamma$ -secreting cells, and (4) induction of detectable NA.



## **IMM-PP-39**

### **TITLE**

VACCINATION OF SOWS WITH A PRRS MODIFIED LIVE ATTENUATED VACCINE DEMONSTRATES PROTECTION FOLLOWING A PRRSV CHALLENGE 26 WEEKS LATER

Monica Balasch<sup>1</sup>, Alicia Reixach<sup>1</sup>, Lucas Taylor<sup>1</sup>, Jay Calvert<sup>1</sup>

<sup>1</sup> *Zoetis*

### **CONTENT**

#### **Introduction**

Depending on circumstances and objectives, PRRS vaccination in sows may be on a regular, whole herd basis or timed to the reproductive cycle of individual animals. Knowing the duration of immunity that can be expected from a vaccine can help veterinarians to design the most appropriate farm protocol. Suvaxyn PRRS MLV has previously demonstrated a duration of immunity of 4 months in gilts. This study evaluated efficacy 26 weeks following vaccination, using a heterologous PRRSV-1 challenge.

#### **Materials and methods**

Eighteen PRRSV-naïve, non-pregnant sows were included in the study: nine kept as negative controls and nine vaccinated with Suvaxyn PRRS MLV. All sows were mated eleven to eighteen weeks post-vaccination and then challenged with a virulent PRRSV-1 isolate at 81-89 days of gestation. Viremia and shedding were monitored. Litters were evaluated at farrowing and piglets monitored until euthanasia at weaning; data gathered included: clinical observations, piglet viremia and body weight at birth and weaning, lung scoring at necropsy and PRRSV viral load in lungs.

#### **Results**

Piglets from vaccinated sows showed significant increases in the percentages born alive (87 v 61,  $p=0.0343$ ), born healthy (77 v 42,  $p=0.0449$ ) and weaned (79 v 37,  $p=0.0098$ ); weights at birth ( $p=0.0183$ ) and weaning ( $p=0.0001$ ) and calculated ADWG ( $p=0.0001$ ); along with significant reductions in % stillborn (11 v 31,  $p=0.0313$ ), level of piglet viremia at birth and at weaning ( $p<0.0001$ ), viral load in lungs ( $p=0.0001$ ) and clinical signs such as abnormal general condition ( $p=0.0205$ ), depression ( $p=0.0164$ ) and respiratory distress ( $p=0.0159$ ). In vaccinated sows post-challenge viral loads in serum, nasal swabs and oral swabs were significantly reduced at different sampling points.

#### **Conclusions**

A duration of immunity of 26 months was demonstrated for Suvaxyn PRRS MLV in breeding sows, allowing veterinarians greater flexibility when developing vaccination protocols to suit specific farm circumstances.

## **IMM-PP-40**

### **TITLE**

**PRRSFLEX® EU VACCINATED PIGLETS WERE PROTECTED FROM THE DETRIMENTAL EFFECTS OF AN EXPERIMENTAL INFECTION WITH HIGHLY PATHOGENIC PRRS-1 STRAIN AUT15-33 IN TERMS OF AVERAGE DAILY WEIGHT GAIN AND COUGH**

Sophie Dürlinger<sup>1</sup>, Gyula Balka<sup>2</sup>, Poul Henning Rathkjen<sup>3</sup>, Christian Kraft<sup>4</sup>, Rebecca Morgenstern<sup>5</sup>, Andrea Ladinig<sup>1</sup>

<sup>1</sup> *University Clinic for Swine, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Austria*

<sup>2</sup> *University of Veterinary Medicine Budapest*

<sup>3</sup> *Boehringer Ingelheim Vetmedica GmbH*

<sup>4</sup> *Boehringer Ingelheim Veterinary Research Center GmbH & Co. KG*

<sup>5</sup> *Boehringer Ingelheim RCV GmbH & Co KG*

### **CONTENT**

Porcine reproductive and respiratory syndrome (PRRS) remains one of the most wide-spread and economically devastating disease in swine industry, characterized by reproductive losses in breeding herds, as well as respiratory disorders and a prolonged fattening period.

The aim of the study was to investigate the effect of a PRRS AUT15-33 challenge on the daily weight gain and amount of coughing on vaccinated and non-vaccinated piglets.

Study design: In this experiment five groups of piglets at four weeks of age were either vaccinated (1, 2, 5) or not (3, 4) and subsequent challenged with the highly pathogenic PRRS-1 strain AUT15-33 ('ACRO' strain) with a low dose (10e3, groups 2+4) or a high dose (10e5, groups 1+3), while group 5 remained un-challenged (negative control). Weight was recorded on day of vaccination (D0), challenge (D28), one and two weeks post challenge (D35/41). Cough was monitored continuously with a sound recording device (Sound Talks NV, Belgium) throughout the study.

Results: Sound recording revealed a slightly higher cough index was recorded in the room with vaccinated piglets until day of challenge compared to the non-vaccinated groups, however, the cough index stayed the same after challenge while the non-vaccinated groups started to cough with a more than doubled cough index one week after challenge. The weight gain was comparable in all groups until the day of challenge. After challenge the weight gain was reduced in the non-vaccinated groups one week post challenge and was significantly lower compared to the control and vaccinated group.

Conclusion: An experimental challenge with the highly pathogenic strain AUT15-33 caused a substantial decrease in weight gain and coughing in unprotected animals both with a high and low challenge dose. However, vaccination can ease both effects with a better health status through reduced coughing and significant higher average daily weight gains after challenge.

## **IMM-PP-41**

### **TITLE**

**RECORDING OF COUGH IN AN EXPERIMENTAL PRRS INFECTION WITH AN 24/7 SURVEILLANCE TOOL REVEALS STRIKING DIFFERENCES COMPARED TO A DAILY BUT SINGLE TIME POINT INVESTIGATION**

Christian Kraft<sup>1</sup>, Sophie Dürlinger<sup>2</sup>, Gyula Balka<sup>3</sup>, Poul Henning Rathkjen<sup>4</sup>, Rebecca Morgenstern<sup>5</sup>, Andrea Ladinig<sup>2</sup>

<sup>1</sup> *Boehringer Ingelheim Veterinary Research Center GmbH & Co. KG*

<sup>2</sup> *University Clinic for Swine, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Austria*

<sup>3</sup> *University of Veterinary Medicine Budapest*

<sup>4</sup> *Boehringer Ingelheim Vetmedica GmbH*

<sup>5</sup> *Boehringer Ingelheim RCV GmbH & Co KG*

### **CONTENT**

Porcine reproductive and respiratory syndrome (PRRS) remains one of the most widespread, and economically devastating disease in swine industry. It is characterized by reproductive losses in breeding herds, increased mortality in newborns and respiratory disorders in growing pigs.

The aim of the study was to investigate the induction of cough after a challenge with a highly pathogenic PRRS strain (AUT15-33) on vaccinated and non-vaccinated piglets.

**Method:** In this experiment a total of 25 piglets at three weeks of age were included and assigned into three groups. One group of 10 animals were vaccinated with PRRSFLEX EU, while a second group of 10 animals was not vaccinated (challenge control), the third group of five animals served as negative control. Three weeks after vaccination groups 1 and 2 were experimentally challenged with the highly pathogenic strain AUT15-33 ('ACRO' strain) and cough was monitored by daily investigation by the study director. In addition, a sound monitoring system (Sound Talks NV, Belgium) was installed in each room that recorded cough continuously. Data were collected from day of vaccination until 14 days post challenge.

**Results:** The investigator recorded no respiratory clinical sign in the vaccinated group and one animal was recorded with dyspnoe in the challenge control group 10 to 14 days post challenge. The cough monitor recorded a low amount of cough until time of challenge (cough index: 0-6). After challenge the cough index remained the same for the vaccinated group. In the challenge control group the cough index started to rise above the previous background and was markedly higher (up to cough index 19) for the following seven days.

**Conclusion:** The continuous recording of cough revealed a distinct difference between vaccinated and non-vaccinated animals after challenge that was not observed with the punctual recording by human staff.

## **IMM-PP-42**

### **TITLE**

**INTERACTION OF SWINE INFLUENZA A VIRUS INFECTION WITH PRRS MLV VACCINATION IN PIGLETS**

Patricia RENSON<sup>1,2</sup>, Céline DEBLANC<sup>1</sup>, Mireille LE DIMNA<sup>1</sup>, Stéphane GORIN<sup>1</sup>, Sophie MAHE<sup>1</sup>, Frédéric PABOEUF<sup>1</sup>, Gaëlle SIMON<sup>1</sup>, Olivier BOURRY<sup>1</sup>

<sup>1</sup> Anses, Laboratoire de Ploufragan, France

<sup>2</sup> IFIP, France

### **CONTENT**

#### **Background**

Swine influenza A virus (swIAV) is a major respiratory pathogen frequently circulating after weaning, a period commonly used to implement PRRS MLV vaccination in piglets. SwIAV infection was previously shown to induce a strong IFN $\gamma$  response. A recent study also showed that IFN $\gamma$  could abrogate the replication of a PRRSV-2 MLV and the inherent immune response.

#### **Objectives**

The objectives of this study were to evaluate in piglets the impact of swIAV infection on (i) the replication of a PRRSV-1 MLV (MLV-1), (ii) the post-vaccinal immune response and (iii) the post-challenge vaccine efficacy, both at systemic and pulmonary levels.

#### **Material & Methods**

Groups of 6 SPF piglets were either infected with a swIAV and vaccinated with a MLV-1 6h later (SIVAC group), or vaccinated with a MLV-1 (VAC group), or not vaccinated (UNVAC group). Four weeks after vaccination, all groups were challenged with a PRRSV-1 field strain. An unvaccinated/unchallenged control group was also included. During both post-vaccinal and post-challenge periods, PRRSV genomic load (RT-qPCR), specific anti-PRRSV humoral (ELISA) and cellular immune responses (ELISPOT) were followed in blood and bronchoalveolar lavage (BAL).

#### **Results**

In blood, vaccine viremia and seroconversion were delayed in SIVAC group compared to VAC group. In contrast, MLV-1 genomic load and antibodies were earlier detected in BAL from SIVAC. In SIVAC, the cellular response was also enhanced at both systemic and lung levels. The vaccine efficacy towards the PRRSV challenge was similar in both VAC and SIVAC groups.

#### **Conclusion**

In this study, swIAV infection was shown to interact with MLV-1 vaccination, delaying and decreasing MLV-1 replication in blood but stimulating PRRSV specific cellular immunity, without any impact on protective efficacy. Further studies are needed to better understand these interactions and the potential impact of swIAV infection on PRRSV MLV vaccination in the field.

## IMM-PP-43

### TITLE

PRELIMINARY STUDY ON “PAN-SURFOME” OF TRUEPERELLA PYOGENES ISOLATED FROM PIGS IN SPAIN

Angela Galán-Relaño<sup>1</sup>, Lidia Gómez-Gascón<sup>1</sup>, Manuel José Rodríguez-Ortega<sup>2</sup>, Fernando Cardoso-Toset<sup>3</sup>, Belén Huerta<sup>1</sup>, Inmaculada Luque<sup>1</sup>, Carmen Tarradas<sup>1</sup>

<sup>1</sup> *Animal Health Department, University of Córdoba, International Excellence Agrifood Campus ‘Ceia3’, 14071, Córdoba, Spain*

<sup>2</sup> *Department of Biochemistry and Molecular Biology, University of Cordoba. Campus of Rabanales, 14071, Cordoba, Spain ‘International Excellence Agrifood Campus, Ceia3’*

<sup>3</sup> *CICAP – Food Research Centre, 14400, Pozoblanco, Córdoba, Spain*

### CONTENT

#### Background and Objectives

*Trueperella pyogenes* is an opportunistic pathogen responsible for different clinical manifestations in livestock animals, being especially important in swine, in which it causes suppurative infections (abscesses, pneumonia, arthritis, endocarditis or lymphadenitis) rising number of condemnations at slaughterhouse. Programs based on vaccination would be an ideal tool to control these diseases. The surface proteins, exposed to antibodies, could be good vaccine candidates. The objective of this work was to study the “pan-surfome” of *T. pyogenes* to identify some new antigen(s) to be used in further studies as a vaccine candidate.

#### Material & Methods

In this study, 16 *Trueperella pyogenes* obtained from slaughtered pigs were analysed by proteomics. They were “shaved” (alive cells digestion using trypsin) and analysed by LC/MS/MS to identify the “pan-surfome”.

#### Results

A total of 170 surface proteins were identified, corresponding 29 of them to lipoproteins (4.74%), 44 (25.9%) to cell wall and 82 (48.23%) to membrane proteins, also 15 (8.82%) proteins secreted were identified. We classified the proteins into three categories according to the frequency of appearance in the isolates. Group I gathered all the proteins identified in more than 70% of isolates, group II in 50-70%, and group III in 30-50%. Group I included 18 proteins, group II 3 and group III 28. These proteins would be good vaccine candidates.

#### Discussion & Conclusion

The “pan-surfome” of *Trueperella pyogenes* is described for the first time, applying the “shaving” method. Despite the contamination with cytosolic proteins, due to lysis, the majority of identified proteins were surface ones; a set of 18 proteins included in Group I (8 Cell Wall proteins, 6 Lipoproteins and 4 secreted proteins) are attractive to develop recombinant vaccines or subunit ones, although further studies are necessary. This demonstrates the excellent application of this method on this microorganism to determine the “pan-surfome”.

## **IMM-PP-44**

### **TITLE**

VACCINATION AGAINST SWINE ENZOOTIC PNEUMONIA WITH HYOGEN: PREVALENCE AND SEVERITY OF LUNG LESIONS IN A COMMERCIAL FARM.

Tiago Nunes<sup>1</sup>, Francisco Costa<sup>1</sup>, Joana Ceia<sup>2</sup>

<sup>1</sup> *Ceva Portugal, Lda*

<sup>2</sup> *DVM - Valpor, SA (Alcanede - Portugal)*

### **CONTENT**

Controlling enzootic pneumonia (caused by *Mycoplasma hyopneumoniae* and other co-infections) remains a challenge in current commercial farms worldwide, although vaccines have demonstrated their effectiveness in reducing clinical signs and lung lesions.

The purpose of this retrospective study was to compare the efficacy of Hyogen ® against a competitor vaccine (Combined Mh and PCV2 RTU vaccine) in reducing the prevalence and severity of Enzootic pneumonia-like lesions in finishing pigs.

A total of 852 pigs from a Portuguese commercial farm infected with *Mycoplasma hyopneumoniae* (Mh) were monitored at slaughter for lung lesions (Hyogen® – 427 pigs, Vaccine A – 425 pigs). All the pigs were vaccinated with a single shot at 3 weeks of age and reared under similar conditions. The lung lesions were evaluated according to the CEVA Lung Program criteria (Modified Madec System + Modified SPES).

The prevalence of bronchopneumonic lesions was significantly lower in the Hyogen® group (26% vs. 55%;  $p < 0,01$ ), as well as the average Madec scoring ( $1,07 \pm 2,52$  in Hyogen vs.  $2,31 \pm 3,38$  in Vaccine A;  $p < 0,01$ ). The severity of the lesions in the bronchopneumonic lungs was lower in the Hyogen group ( $4,08 \pm 3,47$  vs.  $4,22 \pm 3,58$ ;  $p > 0,05$ ).

The vaccination of 3-week-old piglets with Hyogen significantly reduced the prevalence and the severity of lung lesions at slaughter in pigs reared under commercial conditions in comparison with a competitor vaccine.

## **IMM-PP-45**

### **TITLE**

**INFLUENCE OF A COMBINED COLI/CLOSTRIDIUM VACCINATION OF SOWS ON THE ANTIBIOTIC USE IN PIGLETS DURING THE FARROWING - AND NURSERY PHASE**

Elise Vandekerckhove<sup>1</sup>, Ilse Declerck<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim*

### **CONTENT**

#### ?Background & Objectives

*Clostridium perfringens* type C and *E. coli* play an important role in the prevalence of diarrhea during the farrowing and nursery phase respectively, resulting in growth retardation, mortality and an increase of antimicrobial treatments in piglets. European recommendations concerning the reduction of therapeutic use of ZnO and colistin highlight the need for alternative control acts. Several vaccines are available administered to vaccinate pregnant sows, resulting in an elevated colostral protection of their offspring. In this field study a combined *E. coli/C. perfringens* vaccine was administered to vaccinate all pregnant sows and gilts present on a farm in order to evaluate the influence on birth weight, weight at weaning, % mortality and the use of antibiotics during 12 months, in comparison with the data obtained during 12 months before vaccination was implemented.

#### ?Material & Methods

Data were obtained from a closed farm with a history of neonatal diarrhea. Pregnant sows and gilts were intramuscularly vaccinated with 2 ml of Entericolix, a registered inactivation bacterial vaccine. All piglets were individually weighted at birth and at weaning. If diarrhea was present, a swab was taken before any antimicrobial treatment took place and analyzed. Data on average numbers of live born piglets, number of mummies and number of weaned piglets per sow were obtained. Statistical analyses were performed to define if there was a significant improvement after the implementation of sow vaccination.

#### ?Results

Preliminary data show that vaccination results in a significant improvement of weight at weaning ( $P < 0.0001$ ), a decrease of mortality ( $P < 0.05$ ) and less antibiotic use.

#### ?Discussion & Conclusion

Administration of Entericolix to pregnant sows protects their offspring during the first weeks after birth, results in higher survival rates and weight at weaning and thus providing an alternative for antibiotic use for the control of diarrhea in piglets.

## **IMM-PP-46**

### **TITLE**

**ERADICATION OF PRRSV WITH THE PRIME BOOST VACCINATION CONCEPT ON A HUNGARIAN SWINE FARM**

Gabor Schindler<sup>1</sup>, Tamas Revesz<sup>1</sup>, Preben Mortensen<sup>2</sup>, Han Smits<sup>3</sup>

<sup>1</sup> *Ceva Hungary & EU zone, Budapest, Hungary*

<sup>2</sup> *Ceva Sante Animale, Libourne, France*

<sup>3</sup> *Ceva Phylaxia, SID, Budapest, Hungary*

### **CONTENT**

#### Background and Objectives

PRRS is globally one of the most economically devastating diseases in modern swine industry. It creates mainly reproductive and respiratory problems and is hard to control with modified live virus (MLV) vaccines alone. Hungary started in March 2014 with a PRRS national eradication program. The status of all farms in the country was checked and a tailor made eradication protocol was started. A lot knowledge on the control and eradication of the disease and the virus was collected this way.

#### Material & Methods

In the east of Hungary a 1.000 sow farrow-to-finish farm, had PRRS problems (mainly reproductive) for many years despite PRRS MLV vaccination: farm vaccination 3 times/year since 2012. The farm has been proven PRRS positive by PCR (genotype 1, Spanish cluster); end nursery and beginning finishing piglets were tested positive. From December 2017 the vaccination program was changed to the Progressis® Prime-Boost Concept (PBC) 7+3: vaccination of all pregnant gilts and sows PRRS type 1 MLV in 7th week of gestation and KV (Progressis®) 3 weeks prior to farrowing. The gilts received Progressis® PBC vaccination in isolation with 4 weeks interval, finalized 3 weeks before first mating.

#### Results

Since the recent start-up of the PBC 7+3 program the clinical problems related to PRRSv were reduced. In the national monitoring program (20 x 1st and 2nd parity sows, 60xpiglets 4WOA, 60xpiglets 11WOA) from 14-02-2018, 29-05-2018 and 01-10-2018, all the samples tested negative in the PCR.

#### Discussion & Conclusion

Despite many years of MLV vaccination on this Hungarian farrow-to-finish farm the PRRS problems were not controlled. When starting with the Progressis® PBC 7+3 program the clinical problems disappeared. The piglets in nursery were proven PCR negative for PRRSv. The added value of the Progressis® PBC has been confirmed in the national PRRS program.



## **IMM-PP-47**

### **TITLE**

**EFFICACY OF INNOVATIVE BACTERIN VACCINES AGAINST EXPERIMENTAL INFECTION WITH MYCOPLASMA HYOPNEUMONIAE IN PIGS**

Anneleen Matthijs<sup>1</sup>, Gaël Auray<sup>2</sup>, Filip Boyen<sup>1</sup>, Alexandra Schoos<sup>1</sup>, Annelies Michiels<sup>3</sup>, Obdulio Garcia-Nicolas<sup>2</sup>, Tuba Barut<sup>2</sup>, Virginie Jakob<sup>4</sup>, Nicolas Collin<sup>4</sup>, Christophe Barnier-Quer<sup>4</sup>, Artur Summerfield<sup>2</sup>, Bert Devriendt<sup>1</sup>, Freddy Haesebrouck<sup>1</sup>, Dominiek Maes<sup>1</sup>

<sup>1</sup> Faculty of Veterinary Medicine, Ghent University, Belgium

<sup>2</sup> Institute of Virology and Immunology, Switzerland

<sup>3</sup> Hipra Benelux

<sup>4</sup> Department of Biochemistry, University of Lausanne, Switzerland

### **CONTENT**

#### **Background & Objectives:**

In a recent study, we assessed the immune responses of different innovative *Mycoplasma hyopneumoniae* bacterins. The aim of this experimental study was to assess the efficacy of three of these experimental bacterin formulations, which differed in their ability to induce either Th1 and strong antibody responses (DDA:TDB liposomes (Lipo\_DDA:TDB)), Th1 responses and moderate antibody responses (squalene-in-water emulsion + Toll-like receptor (TLR) ligands (CpG ODN, resiquimod and Pam3Cys-SK4; SWE\_TLR) or Th17 responses (PLGA:CTAB microparticles + TLR ligands; PLGA\_TLR).

#### **Material & Methods:**

Four groups, each consisting of 12 *M. hyopneumoniae*-free piglets, were primo- (D0; 39 days of age) and booster (D14) vaccinated intramuscularly with either one of the three experimental bacterin formulations or PBS. Five pigs served as a negative control group. The pigs of the groups Lipo\_DDA:TDB, SWE\_TLR, PLGA\_TLR and PBS (infection control group, ICG) were intra-tracheally inoculated with 7 mL 10<sup>7</sup> CCU/ml of the highly virulent strain F7.12C (D28) and the low virulent strain F1.12A (D29). The efficacy parameters were macroscopic lung lesion score (MLL; D56) and log copies *M. hyopneumoniae* DNA determined with qPCR on bronchoalveolar lavage (BAL) fluid (D42-D56).

#### **Results:**

The results for each group are given in the order: Lipo\_DDA:TDB, SWE\_TLR, PLGA\_TLR and ICG. Groups that have no superscript in common are significantly different from each other ( $p < 0.05$ ). The results of the MLL were 2.28a, 0.88a, 1.43a and 7.57b. Results of the *M. hyopneumoniae* qPCR were 2.50ab, 1.25a, 2.20a and 3.82b at D42, and 1.24a, 0.63a, 1.76a and 1.74a at D56.

#### **Discussion & Conclusion:**

All three formulations were able to reduce MLL, and formulations SWE\_TLR and PLGA\_TLR significantly reduced the *M. hyopneumoniae* load in BAL fluid 2 weeks after challenge. Reduction of both parameters was the highest in group SWE\_TLR. Additional parameters, e.g. histopathological lesions and clinical symptoms, will be presented.

## **IMM-PP-48**

### **TITLE**

THE IMPACT OF VACCINATION WITH ENTERISOL ILEITIS® (BOEHRINGER INGELHEIM) ON GROWTH PARAMETERS AND ANTIBIOTIC CONSUMPTION.

Piotr Cybulski<sup>1</sup>, Katarzyna Podgorska<sup>2</sup>, Artur Jablonski<sup>2</sup>, Edyta Michalik<sup>1</sup>, Tomasz Chareza<sup>1</sup>, Tomasz Stadejek<sup>3</sup>

<sup>1</sup> Goodvalley Agro S.A., Przechlewo, Poland

<sup>2</sup> Swine Disease Department, National Veterinary Research Institute, Pulawy, Poland

<sup>3</sup> Department of Pathology and Veterinary Diagnostics, Faculty of Veterinary Medicine, Warsaw University of Life Sciences, Warsaw, Poland

### **CONTENT**

#### Background and Objectives

Porcine proliferative enteropathy (PPE; ileitis) is a common intestinal disease affecting susceptible pigs raised under various management systems around the world. The causative agent of PPE is *Lawsonia intracellularis* and is considered endemic. PPE can be controlled through antibiotic (macrolides, pleuromutilin derivative) medication or vaccination. The objective of this study was to assess the impact of vaccination with Enterisol Ileitis® (Boehringer Ingelheim) on production performance and consumption of antibiotics in large fattening units.

#### Material & Methods

The study was conducted in two twin fattening farms: 'V' and 'C'. Both farms had the same layout of buildings and used the same source of weaners and feed. Both the management practices as well as health status were comparable. In the farm V Enterisol Ileitis® (Boehringer Ingelheim) was applied orally at 12 weeks of age (one week after transport) using automatic watering systems equipped with a proportioner. Farm 'C' remained unvaccinated. The mortality rate (%), ADWG (g), FCR (MJ) and average consumption of antibiotics (g/kg) were observed for the period of 14 months.

#### Results

More than 50 000 fatteners were evaluated in each farm. Average mortality, ADWG and FCR during the fattening period reached 3.2%, 928.2g and 2.81 in non-vaccinated and 3.1%; 959.7g and 2.71 in vaccinated pigs, respectively. Average consumption of antibiotics was significantly higher ( $p < 0.05$ ) in non-vaccinated pigs (0.064g/kg) compared to recorded in vaccinated fatteners (0.039g/kg).

#### Discussion & Conclusion

In the present study, only slight differences in mortality, ADWG and FCR in favour of the vaccinated group of fatteners were observed. However, immunisation significantly reduced the total use of antibiotics. This was mainly due to the reduction in the consumption of antibiotics used to control PPE. Obtained results indicate that vaccination against PPE is an effective tool contributing to the reduction of antibiotics consumption in pig production.

## **IMM-PP-49**

### **TITLE**

HEALTH BENEFITS OF SETTING UP AN INTRADERMAL VACCINATION PROGRAM FOR PIGLETS

FLORIAN VOISIN<sup>1</sup>, SYLVIE CHOUET<sup>2</sup>, DIDIER DUIVON<sup>2</sup>, MARTIAL RIGAUT<sup>2</sup>

<sup>1</sup> *HYOVET, 5 P.A. Carrefour du Penthièvre - 22640 PLESTAN France fvoisin@hyovet.com*

<sup>2</sup> *MSD Santé Animale, Rue Olivier de Serres Angers Technopole - BP 17144, 49 071 Beaucozézé Cedex France*

### **CONTENT**

#### Background and Objectives

The intradermal route for administration of swine vaccines is increasingly used. It offers the advantages of a direct approach to stimulate immunity resulting in the possibility to implement a humoral, cellular and mucosal immune response.

Pressure injectors used for intradermal vaccination avoid pathogen's transmission risk due to needles, as they are needle free.

In this field case, the objective, with an intradermal vaccination program for piglets, was to improve the ergonomics of the vaccination and to reduce the number of "needle" injections.

#### Material and Methods

In a 640 sows farrow to finish farm with 10 batches management and weaning at 21 days, an intradermal vaccination scheme for piglets at weaning, based on intradermal licensed vaccines, was set up to replace an equivalent intramuscular one (*Mycoplasma hyopneumoniae* and Porcine Circovirus type 2).

#### Results

The operators observed an improvement in work comfort and safety (no needles to handle). Piglets showed less stunting at the end of the vaccination.

After one year without pathogen's transmission risk due to needle, a comparison in post-weaning period showed a decrease of arthritis incidence and a reduction in antibiotic use of more than 70% (from 20% of animals treated individually for arthritis to 5.5%). At the same time, post-weaning mortality fell by more than 50% (from 5.3 to 2.5%). The rate of "Pigs Without antibiotics" labelling recorded over 9 consecutive months increased by nearly 40% (from 66 to 92%).

#### Discussion & Conclusion

In addition to improving people's working comfort, setting up an intradermal vaccination program for piglets, led to an improvement in animal welfare. In this study, it coincided with a lasting decrease in the incidence of arthritis and individual treatments, allowing a much higher proportion of animals to meet the requirements for "Pigs Without antibiotics" labelling, which means that they are better valued.



# MISCELLANEOUS

POSTER ABSTRACTS

## **MIS-PP-01**

### **TITLE**

ANTHELMINTIC EFFICACY OF A NEW FENBENDAZOLE NANOSUSPENSION FOR PIGS

Lieven Claerhout<sup>1</sup>, Wouter Depondt<sup>1</sup>

<sup>1</sup> *Huvepharma NV*

### **CONTENT**

Background and objectives

Worm infections in pigs have an enormous impact on the average daily weight gain, feed conversion and mortality rate, if not well controlled. *Ascaris suum* is the most important endoparasite worldwide. The larval migration enhances respiratory and enteric infections and provokes white spots on the liver. Furthermore, worm infections negatively influence the immune response after an infection or vaccination. The eggs are massively excreted and the environmental infection pressure can only be significantly lowered by consecutive anthelmintic treatments, based on the prepatent period of 6 weeks. The efficacy of a new easy to use fenbendazole nanosuspension (Pigfen® 200 mg/ ml oral suspension) against adult and larval stages of *Ascaris suum* was investigated.

### Material & methods

Weaned pigs (n=100), shown to be negative for worms before challenge, were artificially infected for 3 consecutive days with approximately 150 *Ascaris suum* eggs per day at the start of the study. Counts of L4 larvae, L5 larvae and adult worms were performed on an equal amount of treated and control pigs. Pigfen® 200 mg/ ml oral suspension was administered at 2.5 mg fenbendazole/ kg bodyweight/ day for 2 consecutive days in the drinking water on day 7-8, 14-15 or 44-45. Six days after the end of the treatment, necropsies were performed to count respectively the L4 larvae, L5 larvae and adult worms in the small intestines or lungs. The percentage reduction, based upon geometric means, was determined.

### Results

Counts of adult worms, L4 and L5 larval stages showed a reduction of 100 %, 99.3 % and 100 % respectively in the treated groups.

### Discussion & conclusion

This study confirmed the excellent efficacy of Pigfen® 200 mg/ ml nanosuspension at a target daily dose of 2.5 mg fenbendazole/ kg bodyweight for 2 consecutive days against adult and development stages of *Ascaris suum*.

## **MIS-PP-02**

### **TITLE**

**MICROGRANULATED PREMIXES IMPROVE SAFETY OF MEDICATED FEED BY LESS DUST CONTENT**

Lieven Claerhout<sup>1</sup>, Wouter Depondt<sup>1</sup>

<sup>1</sup> *Huvepharma NV*

### **CONTENT**

Background and objectives

The extent of carry-over and the following risk of cross-contamination of medicated premixes depend on the feed mill installation and the product features, such as the formulation and the active. The dust content of a premix is closely correlated with this extent of carry-over. The dust index (mg dust per 100 g product) of three premixes of the benzimidazole group of anthelmintics for pigs was determined.

Material & methods

Two tested formulations were powders based upon simple mixtures; a 40 mg/ g fenbendazole premix and a 50 mg/ g flubendazole premix. The third formulation was Pigfen® 40 mg/ g fenbendazole premix (Huvepharma®), developed by a unique microgranulation technology. This ensures that fenbendazole is captured in microgranules which are fully embedded in a matrix of starch. The dust index was determined according to the Stauber-Heubach method. A premix sample was fed into a rotating drum and moved at constant conditions. A vacuum pump drew air through the drum and a separator was placed downstream to separate the coarse particles. Dispersible particles passing through this separator were collected on a filter in an air filtration unit and weighed. Each test covered 4 separate measurements. Results are shown in form of the mean value of the individual measurements.

Results

The dust index of the flubendazole and fenbendazole powder premixes were respectively 39.4 and 12.2 mg dust per 100 g premix. On the other hand, for the microgranulated Pigfen® premix a dust index of 3.2 mg dust per 100 g premix was determined.

Discussion & conclusion

The formulation of a premix plays a crucial role in the dust content. Compared to simple mixtures, microgranulated premixes demonstrate a lower dust index and reduce significantly the risk of carry-over and cross-contamination. This results in better feed safety.

## **MIS-PP-03**

### **TITLE**

**MICROBES ARE MORE THAN JUST PATHOGENS**

Lisanne Verschuren<sup>1</sup>, Dirkjan Schokker<sup>2</sup>, Egbert Knol<sup>1</sup>, Marc Martens<sup>1</sup>, Rob Bergsma<sup>1</sup>, Mario Calus<sup>3</sup>

<sup>1</sup> *Topigs Norsvin Research BV*

<sup>2</sup> *Wageningen Livestock Research*

<sup>3</sup> *Wageningen University & Research*

### **CONTENT**

Background and Objectives

Microbiota not only play a role in diseased animals but also influence production results in healthy animals. Our study investigated the association between fecal microbiota, fecal nutrient digestibility and performance traits in healthy commercial grower-finisher pigs.

Material & Methods

A total of 142 three-way crossbred grower-finisher pigs were fed either a diet based on corn/soybean meal or wheat/barley. Fecal samples were collected on the day before slaughter. The samples were used to determine fecal digestibility of several nutrients by using wet chemistry, and their microbiomes were profiled by sequencing the 16S hypervariable ribosomal DNA regions. We estimated microbiability, which is the percentage of the variation in fecal nutrient digestibilities and performance traits that was associated with fecal microbiota.

Results

Microbiability was higher than 50% for most of the fecal nutrient digestibilities and was as high as 93% for crude protein digestibility. The performance indicators had lower microbiabilities, with a value of 43% for feed intake and 28% for average daily gain, and had large standard errors. Surprisingly, feed conversion ratio had a microbiability of 0.

Discussion & Conclusion

Microbiability of nutrient digestibilities, feed intake and average daily gain were higher than our own estimates of the heritability of these traits. Therefore, fecal microbiota composition is possibly more predictive than genetics of the pig for fecal nutrient digestibility, average daily gain and feed intake. In conclusion, specific individual microorganisms can be pathogens but the collective populations of microbiota are important contributors to a good performance in healthy pigs.

## **MIS-PP-04**

### **TITLE**

#### **NO EVIDENCE OF MASTITIS IN SOWS WITH POSTPARTUM DYS GALACTIA SYNDROME**

Marianne Kaiser<sup>1</sup>, Magdalena Jacobson<sup>2</sup>, Poul Bækbo<sup>3</sup>, Jan Dahl<sup>4</sup>, Stine Jacobsen<sup>1</sup>, Yongzhi Guo<sup>2</sup>, Torben Larsen<sup>5</sup>, Pia Haubro Andersen<sup>2</sup>

<sup>1</sup> *Copenhagen University*

<sup>2</sup> *Swedish University of Agricultural Sciences*

<sup>3</sup> *SEGES, Danish Pig Research Centre*

<sup>4</sup> *Danish Agriculture and Food Council*

<sup>5</sup> *Aarhus University*

### **CONTENT**

#### **Background and Objectives**

Mastitis is expected to be prevalent in sows with postpartum dysgalactia syndrome (PDS) - mainly due to *Escherichia coli* (*E. coli*), whose cell membrane contains lipopolysaccharides (LPS) that can induce inflammation. This study investigated LPS in the udder vein blood of PDS-affected sows (PDS+) and changes in milk constituents.

#### **Material & Methods**

PDS+ sows (n =38) and matched healthy sows (PDS-; n =38) underwent daily clinical examination and blood sampling from the udder vein for LPS detection from 60 hour before to 36 hours after farrowing. Milk samples were obtained for microbiological examination and detection of mastitis [N-acetyl-beta-d-glucosaminidase (NAGase), lactate dehydrogenase (LDH),  $\beta$ -glucuronidase ( $\beta$ -glu)], the mammary energy status [isocitrate (isoC), free glucose, uric acid (UA)], ketosis [ $\beta$ -hydroxybutyrate acid (BHBA)], and the protein status [urea].

#### **Results**

PDS+ sows had decreased concentrations of milk UA ( $P < 0.0001$ ), increased heart rates ( $P < 0.01$ ) and mammary edema ( $P < 0.05$ ), and prolonged capillary refill time ( $P < 0.01$ ) compared to PDS- sows. BHBA increased over time for a few individuals. No differences were found between the groups for bacteriological findings, LPS, LDH, NAGase, free glucose, isoC or urea. Milk  $\beta$ -glu were highest in PDS- sows, but values were below the pathological levels. Concentrations of LPS were not associated with signs of mastitis in the mammary glands. However, the glands became redder ( $P < 0.0001$ ), warmer ( $P < 0.0001$ ), and firmer ( $P < 0.05$ ) over time in all sows.

#### **Discussion & Conclusion**

Signs of mastitis were not consistently linked to sows with PDS, and mastitis did thus not seem to be a part of the pathogenesis of PDS. However, the cardiovascular system seemed to be compromised in PDS+ sows already before farrowing.



## **MIS-PP-05**

### **TITLE**

**HORMONAL AND METABOLIC CHANGES IN SOWS WITH POSTPARTUM DYS GALACTIA SYNDROME**

Marianne Kaiser<sup>1</sup>, Stine Jacobsen<sup>1</sup>, Pia Haubro Andersen<sup>2</sup>, Poul Baekbo<sup>3</sup>, José Joaquin Cerón<sup>4</sup>, Jan Dahl<sup>5</sup>, Damián Escribano<sup>4</sup>, Peter Kappel Theil<sup>6</sup>, Magdalena Jacobson<sup>2</sup>

<sup>1</sup> *Copenhagen University, Denmark*

<sup>2</sup> *Swedish University of Agricultural Sciences, Sweden*

<sup>3</sup> *SEGES Danish Pig Research Centre, Denmark*

<sup>4</sup> *University of Murcia, Spain*

<sup>5</sup> *Danish Agriculture and Food Council, Denmark*

<sup>6</sup> *Aarhus University, Denmark*

### **CONTENT**

#### **Background and Objectives**

Postpartum dysgalactia syndrome (PDS) in sows may be due to disturbances in hormonal and metabolic processes or oxidative stress during the periparturient period. Further, PDS is difficult to diagnose. This study describes the changes of cortisol, chromogranin A (CgA), glucose, C-peptide, prolactin, and 8-epi prostaglandin F2 alpha (8-epi-PGF2?) in sows with PDS (PDS+) in order to elucidate the pathogenesis of PDS and the potential of these biomarkers for early identification of PDS.

#### **Material & Methods**

Saliva and blood were sampled daily in 38 PDS+ sows and 38 PDS healthy sows (PDS-) from 60 hours ante partum to 36 hours post partum. The study period was separated into seven time periods (A to G) and the concentrations of CgA, cortisol, glucose, C-peptide, prolactin, and 8-epi-PGF2? were compared over time (time period A served as baseline to B-G) and between the PDS+ and PDS- sows.

#### **Results**

Salivary CgA was significantly higher in PDS+ sows than in PDS- sows during the entire study period. Significant differences between PDS+ and PDS- sows were also found for cortisol, fasting blood glucose, C-peptide, and 8-epi-PGF2?, with levels of saliva cortisol and 8-epi-PGF2? being different already before parturition.

#### **Discussion & Conclusion**

The increased CgA concentration in PDS+ sows may indicate a homeostatic disturbance that is present before parturition. The increased cortisol concentration in PDS+ sows compared to PDS- sows could reflect occurrence of inflammation or stress. Lower C-peptide in PDS+ sows may be due to a lower food intake causing a low energy turnover. CgA, cortisol and serum 8-epi-PGF2? may potentially serve as early diagnostic indicators for PDS.

## MIS-PP-06

### TITLE

EVALUATION OF DRINKING BEHAVIOR OF NURSERY PIGLETS TO ASSESS FEASIBILITY OF USING FEEDING BOWLS FOR ORAL ADMINISTRATION OF ILEITIS VACCINE

Rutger Jansen<sup>1</sup>, Herjan Klein Leetink<sup>2</sup>, Rita Schuttert<sup>3</sup>

<sup>1</sup> *Boehringer Ingelheim AH NL*

<sup>2</sup> *ForFarmers*

<sup>3</sup> *De Oosthof*

### CONTENT

#### Background and Objectives

The oral live vaccine Enterisol Ileitis, is commonly applied via the drinking water system. In some occasions the drinking water system is not suitable for administering the vaccine. In these cases, the use of a feeding bowl can be an alternative. The objective of this study was to evaluate the drinking behavior of nursery piglets when using a feeding bowl.

#### Material & methods

In total 93 piglets spread over 4 pens were evaluated. Pigs were individually marked with numbers on their back two weeks after weaning. Based on literature 4h-water consumption was estimated to be approximately 6.5 l, this amount was applied (including Thiosulphate Blue) in a feeding bowl (7l capacity). For each minute the drinking behavior of pigs was noted. A piglet was recorded as having a drinking bout when the snout was deep in the water and it had an active drinking position. The drinking behavior was video recorded for a period of 5 hours starting about 11.30 am, during that time the usual nipple drinker water system was shut-off.

#### Results

Due to intensive neo-explorative behavior, it was not possible to identify and record individual piglets having a drinking bout in the first 30-45 minutes of observation. The bowls were emptied between within 3h4', 3h28', 3h35' and 4h10'. Except for one, all piglets had at least one recognizable drinking bout before the bowl was emptied. The non-drinking piglet was considered sick.

#### Discussion & Conclusion

Application of drinker bowls can be a suitable method for the application of Enterisol Ileitis. To ensure that the vaccine is consumed in the recommended 4h-time period it is advisable to measure water intake the previous day at the time of planned vaccination.

**MIS-PP-07**

**TITLE**

**HIGH PREVALENCE OF ANEMIA IN DANISH PIGLETS AT WEANING**

Inger Morthorst Møller<sup>1</sup>, Ken Steen Pedersen<sup>1</sup>

<sup>1</sup> Ø-vet a/s

**CONTENT**

**Background and Objectives**

It is common practice to provide piglets 200 mg of iron-supplementation at birth in Danish sow herds. Increasing litter size at birth and weaning in modern sows may have increased the necessary dose for iron supplementation.

The aim of this study was to investigate the hemoglobin level in Danish piglets at weaning.

**Material and methods**

A total of 61 Danish sow herds were selected for the study. In each herd blood samples were obtained from 20 randomly selected piglets from different sows within the last week before weaning. Hemoglobin level was measured by a hemocue Hb 201+(HemoCue). Anemia was defined as hemoglobin below 90 g/L. Causes of low levels were investigated and corrections were performed. Hemoglobin levels were re-examined about two month later.

**Results**

Hemoglobin levels were approximately normal distributed (mean = 104.9 g/L; SD = 19.8 g/L; n=1131 piglets).

The mean with-in herd prevalence of piglets with anemia was 19 % (range 0-90 %).

Causes of anemia included, low dose of iron supplementation, Mycoplasma suis-infection and unknown.

Hemoglobin levels were re-examined in 26 herds. An increased and decreased level of hemoglobin was observed in 18 and 8 herds respectively.

**Discussion and conclusion**

The study demonstrates that anemia in piglets at weaning is a highly prevalent problem in some herds.

Interestingly causes of anemia could not be detected in several herds, indicating that increasing litter size may have increased the need for iron-supplementation. This needs to be further investigated.

Re-examining herds demonstrated that hemoglobin levels in piglets at weaning may vary between batches.

Indicating a possible biological variation between batches.

In conclusion, anemia is highly prevalent in piglets at weaning and routine examinations of hemoglobin levels and iron-supplementation procedures are indicated.

**MIS-PP-08**

**TITLE**

**UNUSUAL HISTOPATHOLOGICAL FEATURES OF THE TYMUS IN PORCINE PERIWEANING FAILURE-TO-THRIVE SYNDROME**

Francisco José Pallares<sup>1,2</sup>, Serafín Gómez<sup>1</sup>

<sup>1</sup> *Dpto. Anatomía y Anatomía Patológica Comparadas. Facultad de Veterinaria. Universidad de Murcia. Spain*

<sup>2</sup> *Instituto Murciano de Investigación Bisoanitaria IMIB). Murcia.*

**CONTENT**

**BACKGROUND AND OBJECTIVES**

Porcine periweaning failure-to-thrive syndrome (PFTS) is a clinical condition affecting nursery pigs that occurs within 2 to 3 weeks of weaning. Characteristic histological lesions include thymic atrophy, superficial lymphoplasmacytic fundic gastritis, villous atrophy of the small intestine, superficial colitis, lymphocytic and neutrophilic rhinitis, and mild nonsuppurative meningoencephalitis. This work describes the appearance of unusual histopathological features in thymic Hassall's corpuscles associated with the disease.

**MATERIAL & METHODS**

Six 5-6 weeks old pigs from 3 different farms of the same commercial company with significant loss of body condition were submitted for anatomopathological evaluation. Piglets were humanely sacrificed and necropsies were performed. Samples of thymus, lung, small and large intestine, stomach, liver, kidney, spleen, inguinal superficial lymph nodes, tonsil, nasal turbinates, cerebrum and cerebellum of all animals were fixed in 10% neutral buffered formalin and routinely processed for histopathology. An immunohistochemical study using the ABC method was performed in order to discard the presence PCV2 and PRRSV.

**RESULTS**

Microscopically, all the pigs presented thymic atrophy, lymphocytic superficial fundic gastritis, atrophic enteritis, superficial colitis and neutrophilic and lymphocytic rhinitis. In the pigs from 2 of the farms many of the Hassall's corpuscles had infiltrations of polymorphonuclear neutrophils and degenerate cells in different degrees, in some cases breaking the corpuscle and infiltrating the surrounding parenchyma. No positive immunostaining was seen in the thymus of any animal.

**DISCUSSION & CONCLUSION**

PCV2 and PRRSV were discarded as possible causes of the thymic atrophy. Although the presence of neutrophils in Hassall's corpuscles has been associated to an involution process, in this case was discarded due to the age of the animals. Neutrophil infiltration of the thymic Hassall's corpuscles associated to PFTS has not been previously described.

## MIS-PP-09

### TITLE

THE CAUSE OF CONGENITAL WATTLES IN PIGS

Alexander Grahofer<sup>1</sup>, Anna Letko<sup>2</sup>, Irene Häfliger<sup>2</sup>, Paolo Ciaramella<sup>3</sup>, Cord Drögemüller<sup>2</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Institute of Genetics, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>3</sup> *University of Naples Federico II, Department of Veterinary Medicine and Animal Production Veterinary, Napoli, Italy*

### CONTENT

#### Background

In some rare breeds of domestic pigs, such as Kunekune from New Zealand or Casertana from Italy, most of the animals show congenital wattles at the base of their throat. Wattles are supposed to be under genetic control with a Mendelian dominant mode of inheritance. This study aims to unravel the molecular genetics of wattles in pigs.

#### Material & Methods

Hair root samples of 40 KuneKune were collected and the animals were scored for the number of wattles. Most KuneKune (32/40) showed two wattles on their lower jaw, whereas a single animal showed only one wattle and seven pigs showed no wattles. Furthermore, blood samples of 11 Casertana pigs (5 with and 6 without wattles) were collected from Campania in Italy. A total of 35 samples were genotyped with GeneSeek Genomic Profiler Porcine 51k SNP chip for a subsequent genome-wide association study.

#### Results

A cohort of 23 pigs (18 Kunekune and 5 Casertana) with wattles and 12 pigs (7 Kunekune and 5 Casertana) without wattles was genotyped successfully at 45787 SNP markers. We obtained a single strong genome-wide significant association signal on pig chromosome 1 in a region containing a gene encoding a bone morphogenetic protein (BMP) family member. The associated haplotype is shared across breeds.

#### Discussion & Conclusion

This is the first report, mapping the most likely dominant inherited wattles locus in the porcine genome. Members of the BMP family have been implicated in setting up patterning of the vertebrate limb and in its outgrowth. Interestingly, the identified association is not located in the genomic region containing the gene associated with wattles in goats indicating genetic heterogeneity causing this phenotype in different domestic animal species. We are currently sequencing the whole genomes of individual pigs with and without wattles from both examined breeds to identify the causative variant.

## MIS-PP-10

### TITLE

#### MORPHOMETRIC DIFFERENCES IN THE UMBILICAL CORD OF IUGR AND NORMALLY DEVELOPED PIGLETS

Charlotte Amdi<sup>1</sup>, Olga F. Nielsen<sup>1</sup>, Christian F. Hansen<sup>1</sup>, Jens Peter Nielsen<sup>1</sup>

<sup>1</sup> *Department of Veterinary and Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark*

### CONTENT

Intrauterine growth restriction (IUGR) during foetal development is observed in a sub sample of small piglets in litters from highly prolific sows. The umbilical cord is assumed to play a significant role in the development of IUGR. The aim of the study was therefore to determine if there were differences in the morphology of the umbilical cords of IUGR compared to normal piglets at birth. Twelve normal and 12 IUGR piglets were taken immediately after birth and characterized as IUGR or normal based on their headshape. Five centimeters of the umbilical cord was cut (from 20 to 25 cm) and fixed in formalin for histology analysis. The umbilical cords were then fixed, cut and stained with an H&E staining and analysed in Zeiss Zen Blue software. Results of the birth weight showed that IUGR piglets were smaller than normal piglets (0.76 kg vs. 1.37 kg; SE 0.06;  $P < 0.001$ ), and had smaller total area of umbilical cord than normal piglets (33796982.3  $\mu\text{m}^2$  vs. 48457483.7  $\mu\text{m}^2$  SE 3079659.3;  $P < 0.003$ ). In addition, IUGR piglets had smaller Wharton jelly areas (27516627.9  $\mu\text{m}^2$  vs. 38423040.8  $\mu\text{m}^2$ , SE 336234.1;  $P = 0.03$ ) and also smaller umbilical vein (2869260.9  $\mu\text{m}^2$  vs. 3982334.8  $\mu\text{m}^2$  SE 407610.9;  $P < 0.05$ ) and umbilical artery (2495655.0  $\mu\text{m}^2$  vs. 4203237.6  $\mu\text{m}^2$  SE 342812.6;  $P < 0.001$ ) areas than normal piglets. In conclusion, the size of the umbilical cord and thereby the foetal blood supply could be the limiting factor for growth and development during gestation in IUGR piglets but more research is needed to understand the mechanisms behind.

## **MIS-PP-11**

### **TITLE**

**REVEALING THE UNSEEN: USE OF 24 H CAMERA SURVEILLANCE DIAGNOSED SEVERE MANAGEMENT PROBLEMS AND NOT SOW HEALTH OR PARTURITION PROBLEMS**

Wikke Kuller<sup>1</sup>, Tom Verbrugge<sup>1</sup>, Josine Gelauf<sup>1</sup>, Bas Kolpa<sup>1</sup>

<sup>1</sup> *University Farm Animal Practice, Harmelen, The Netherlands*

### **CONTENT**

**Introduction-** A farrowing unit of 1200 sows experienced problems with neonatal diarrhea and increased mortality. Different interventions were not successful. The local veterinarian consulted a behavioural specialist for 24 h video analysis of sow and piglet behaviour around parturition.

**Material and methods:** 6 high definition cameras were used for 24 h/ 7 d analysis of animal behaviour.

**Results-** 24h analysis showed quiet sows with a normal duration of parturition. The piglet nest was not attractive and piglets did not use it. However, also human behaviour was on camera. There was almost no supervision on day of parturition. Staff moved a sow in labour to another cage, replacing it by another sow in labour.

Parturition was extended and the litter was later treated for diarrhoea. Different staff members were cross fostering piglets on different days within and between farrowing units. Biosecurity was poor with staff stepping into all the pens. Staff was obsessed by administration and several times passed a sick sow without detecting.

**Discussion and conclusion-** Neonatal diarrhea can be a severe problem in farrowing units and can be a result of health problems of the sow or weak piglets. However, also management practices can be a risk factor, especially on larger farms with different co-workers. In this case, 24 h camera analysis showed poor quality of the piglet nest, but also a lack of knowledge on biosecurity of the staff. The manager assumed that farm protocols were followed. Farm visits of managers, vets and other advisors are usually short and during daytime. Video analysis provides valuable 24 h information in the field to reveal animal and in this case also human behaviour. Thereby, using video material is usually an easy way to convince caretakers, advisors and veterinarians that things need to be changed. All staff agreed on video analysis.

## **MIS-PP-12**

### **TITLE**

COMPARISON OF PROPOSED NATIONAL DEFINED COURSE DOSES TO PREVIOUSLY ESTABLISHED EUROPEAN COURSE DOSES FOR QUANTIFYING ANTIBIOTIC USE IN PIGS

Marie Sjölund<sup>1</sup>, Kerstin Annér<sup>2</sup>, Elin Karlsson<sup>2</sup>, Maria Lindberg<sup>2</sup>

<sup>1</sup> *National Veterinary Institute SVA*

<sup>2</sup> *Farm & Animal Health*

### **CONTENT**

#### **BACKGROUND & OBJECTIVES**

The European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) project has previously proposed a standardized method for quantifying antibiotic use using defined daily doses (DDDvet) and defined course doses (DCDvet). The aim of this study was to develop national DCD for Sweden (DCDse) and to assess potential effects of the two measures on comparability of antibiotic use between Swedish pig farms.

#### **MATERIAL & METHODS**

DCDse were defined for all products containing antibiotics approved for use in pigs in Sweden during 2016 and 2017, including those sold with special license. The highest authorized daily dose and the longest treatment period according to the national Summary of Products Characteristics for each active substance (AS) were used to assign DCDse. DCDse were then compared to DCDvet for each AS and formulation.

#### **RESULTS**

Sixty-nine products were included in this study of which 35 were products for parenteral use, 30 for oral use and four for topical use. Differences in dosing between DCDse and DCDvet ranged from -57% (valnemulin for oral use) to +178% (amoxicillin for parenteral use). DCDse for formulations for parenteral use were in general greater than DCDvet. DCDse for substances for oral use varied more, ranging from -57% to +117%.

#### **DISCUSSION & CONCLUSION**

The proposed national DCDse for antibiotic products used for pigs in Sweden differed in many instances considerably to the DCDvet established by ESVAC. This was expected, as DCDvet is based on averages, while DCDse was based on maximum doses. Given the wide variation in differences between the measures, antibiotic usage for pigs could be overestimated in herds with certain usage profiles if DCDvet is used for quantification and comparison between herds nationally. We therefore suggest the use of nationally defined units for monitoring antibiotic use at a national level whereas DCDvet should be used for international comparison.



## **MIS-PP-13**

### **TITLE**

#### **FATAL OUTCOME OF CHEMICAL IMMOBILIZATION IN TWO MANGALICA PIGS**

Nicole Studer<sup>1</sup>, Corinne Gurtner<sup>2</sup>, Heiko Nathues<sup>3</sup>, Alexander Grahofer<sup>3</sup>

<sup>1</sup> *Clinical Anesthesiology, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Institute of Animal Pathology, Department of Infectious Diseases and Pathobiology, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>3</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

### **CONTENT**

#### **Background**

Chemical immobilization of uncooperative animals increases the risk for complications. In order to further investigate the reproductive tract of two feral managlica pigs, both received a general anaesthesia .

#### **Material & Methods**

Both adult animals were fasted for 12 hours, before they received following medication intramuscularly to induce general anaesthesia: 0.1mg/kg detomidin, 10mg/kg ketamine and 0.2mg/kg butorphanol. The pigs reached an adequate level of general anaesthesia without problems. A continuous monitoring of the vital parameters was conducted, revealing a slight increase in body temperature of both animals. Therefore, the animals were cooled with running 6 °C water over the body for twenty minutes. After roughly one hour, atipamezol 0.2mg/kg was administered intramuscularly to accelerate the recovery from general anaesthesia. During the recovering period, the pig showed signs of excitement with tachypnoea and vocalization, but after 45 minutes, the animals were calm and able to walk. On the following day, both pigs showed a slightly reduced general condition. Both pigs died with respiratory depression within 24 hours of chemical immobilization for unknown reason.

#### **Results**

A pathological investigation of the boar revealed diffuse, acute and monophasic degeneration and necrosis of the muscle. This finding indicates a capture myopathy, nutritional myopathy, or the malignant hyperthermia of pigs. Blood samples taken under general anaesthesia were analysed. No abnormalities were found by haematology and serology. In addition, Vitamin E and selenium were tested, revealing a normal concentration. Genetic analysis is still on-going.

#### **Discussion & Conclusion**

In this case, it is possible that an adverse drug reaction secondary to genetic or also individual variability led to the fatal outcome of the chemical immobilization. It is known that butorphanol can cause severe side effects, such as dyspnea and excitation. Therefore, further research is needed to prove and understand the severe side effects of butorphanol in pigs.

## MIS-PP-14

### TITLE

PLASMA DISPOSITION KINETICS AND DISTRIBUTION OF TOLTRAZURIL AND ITS MAIN METABOLITE IN INTESTINAL TISSUES AND CONTENTS OF PIGLETS AFTER ORAL AND INTRAMUSCULAR ADMINISTRATIONS

Hamadi Karembe<sup>1</sup>, Reynald Magnier<sup>1</sup>, Mathieu Peyrrou Peyrrou<sup>1</sup>, Nicolas Guerra<sup>1</sup>, Jan Vasek<sup>2</sup>, Jiri Smola<sup>2</sup>, Anja Joachim<sup>3</sup>, Daniel Sperling<sup>1</sup>

<sup>1</sup> Ceva, France

<sup>2</sup> VFU Brno

<sup>3</sup> Vetmeduni, Vienna

### CONTENT

#### Background and objectives

Porcine coccidiosis caused by *Cystoisospora suis* is a major cause of diarrhea and poor growth in piglets worldwide. The most commonly used chemotherapeutic drug available for the control is toltrazuril, typically administered orally. Intramuscular injections of iron complexes are a common solution to prevent IDA. Recently, the first toltrazuril-iron based combination for injection has been developed for the concomitant prevention of coccidiosis and IDA in piglets (Forceris®, Ceva, France). This study aimed to evaluate, the disposition kinetics of toltrazuril and its main metabolite in the plasma and predilection tissues of *Cystoisospora suis* after oral (Baycox®) and intramuscular (Forceris®) application of toltrazuril in piglets.

#### Material and methods

56 piglets from 4 litters were included and randomly allocated to two treatment groups. Piglets in Group A were treated with Forceris® on the second day of life (24h+). Piglets in Group B were treated with intramuscular iron dextran on the second day of life (24h+) and oral toltrazuril on the third day of life (48h+). Samples were collected at 1, 5, 13 and 24 days post-treatment. Concentrations of toltrazuril and its active metabolite (toltrazuril sulfone) were determined by HPLC analysis.

#### Results

On overall, intramuscular application resulted in significantly higher and more sustained concentrations in plasma, intestinal tissue (ileum and jejunum) and intestinal content. Higher tissue concentrations after oral dosing were observed only immediately after dosing (Day 1). Remarkably, toltrazuril and toltrazuril sulfone accumulated more in proximal intestinal segment (jejunum), independently of the administration route.

#### Discussion & Conclusion

Drug concentrations at the predilection site of the parasite are important for its pharmacological effects. *C. suis* is an intracellular parasite affecting enterocytes in the jejunum and ileum. Higher and more sustained concentrations were observed following IM application, which may be responsible for its higher anticoccidial activity.

## **MIS-PP-15**

### **TITLE**

#### **DIAGNOSIS OF CYSTOISOSPORA SUI OOCYSTS IN STEATORRHOEIC PIGLET SAMPLES**

Anja Joachim<sup>1</sup>, Baerbel Ruttkowski<sup>2</sup>, Daniel Sperling<sup>3</sup>

<sup>1</sup> *Vetmeduni, Vienna*

<sup>2</sup> *Vetmeduni*

<sup>3</sup> *Ceva, France*

### **CONTENT**

Detection of oocysts is a hallmark of the diagnosis of coccidiosis, including suckling piglet cystoisosporosis. However, in practice rapid and simple detection is often severely hampered by the high fat content of suckling piglet samples. In steatorrhoeic samples the formation of lipid bubbles can lead to misdiagnosis of oocysts (false positive results) and centrifugation leads to formation of fat plugs that can entrap oocysts and completely prevent their recovery from the suspension (false negative results). Several options are available for circumventing these problems. In faecal smears, oocysts can be detected with increased specificity by staining or by autofluorescence. Staining of smears requires additional steps increasing examination time and many stains are toxic and inconvenient to handle. Autofluorescence examination can be conducted without staining or labelling of the sample but requires a suitable fluorescence equipment (light bulb, filters). Equipment for fluorescence microscopy can easily be adapted. In a direct comparison of paired samples, autofluorescence microscopy proved to be more sensitive than carbol-fuchsin staining. The calculated sensitivity of autofluorescence for 0.1 g of faeces is 10 oocysts per gram of faeces (OpG). Autofluorescence microscopy of faecal smears permits only semiquantitative evaluation of samples. For determination of oocyst concentrations in a faecal sample a modified McMaster technique can be used which was originally developed by Christensen and Henriksen (1992) and adapted to small amounts of faeces. It requires 0.5 g/sample and has a detection limit of 333.3 OpG when two McMaster chambers (=300 µl) are counted. The use of a combined sugar-salt solution and the removal of debris by inverted punch-sieving greatly reduces the formation of lipid droplets in the McMaster chamber. Both methods can be used on individual as well as litter-collected samples to detect initial infection and to determine treatment efficacy.

## MIS-PP-16

### TITLE

ANALYSES OF TONSILLAR MICROBIOME IN PRRSV VACCINATED VS. NON-VACCINATED GILTS AFTER EXPERIMENTAL INFECTION WITH TWO DIFFERENT PRRSV-1 FIELD ISOLATES

Ursula Ruczizka<sup>1</sup>, Barbara Ulrike Metzler-Zebeli<sup>2</sup>, Christian Knecht<sup>1</sup>, Lisa Reiter<sup>1</sup>, Till Rümenapf<sup>3</sup>, Andrea Ladinig<sup>1</sup>

<sup>1</sup> *University Clinic for Swine, Department for Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Vienna, Austria*

<sup>2</sup> *Institute of Animal Nutrition and Functional Plant Compounds, Department for Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Vienna, Austria*

<sup>3</sup> *Institute of Virology, Department for Pathobiology, University of Veterinary Medicine Vienna, Vienna, Austria*

### CONTENT

#### Background and Objectives:

Tonsils are a reservoir for host-specific pathogens and commensal organisms, mostly bacteria and viruses. The resident tonsillar microbiome is assumed to interact with incoming pathogens by preventing colonization via competitive exclusion. The present study aimed to investigate alterations of the tonsillar microbiome in PRRSV vaccinated vs. non-vaccinated gilts after experimental infection with two different PRRSV-1 field isolates and a potential association with tonsillar viral load.

#### Material and Methods:

Twentyfour gilts, divided into 6 groups, one non-vaccinated and one vaccinated control group, one non-vaccinated and one vaccinated group infected with one of two PRRSV field isolates. Vaccination was done twice prior to insemination and once in mid gestation with ReproCyc®PRRS EU. Experimental PRRSV infections with either the virulent PRRSV-1 AUT15-33 (syn. Acro, Austria 2015) or PRRSV-1 720789 (Germany 2012) were done on gestation day 84. Three weeks post infection gilts were euthanized and tonsillar tissues were collected. DNA was extracted and 16S rRNA gene sequencing using Illumina MiSeq was performed. Bioinformatics were done using QIIME pipeline and data were analysed using SAS and mixOmics in R.

#### Results:

The bacterial community in the tonsils across all sow groups was dominated by Proteobacteria, Bacteroidetes, Fusobacteria, Firmicutes and Actinobacteria. Non-infected gilts comprised more Flavobacteriaceae than infected gilts and the genera Haemophilus and Mycoplasma showed differences between PRRS-1 isolates and vaccinated groups. All but two infected gilts were PRRSV positive in tonsillar tissues. Relevance networks showed positive correlations between Sphingomonaceae, Sediminibacterium and Pasteurella and viral load in the tonsils. Moreover, Microbacterium and Clostridium were negatively associated with weight gain during gestation.

#### Discussion and Conclusion:

Results showed that an experimental PRRSV infection with two different PRRSV-1 isolates altered the abundance of pathogenic bacterial phylotypes in vaccinated and non-vaccinated gilts. Results further indicated that virus load may influence bacterial community in tonsils.

## **MIS-PP-17**

### **TITLE**

**FIELD EVALUATION OF HAEMOGLOBIN (HB) LEVEL AND INFLUENCING FACTORS AT WEANING ON FRENCH FARMS**

Sophie Brilland<sup>1</sup>, Nathalie Capdevielle<sup>2</sup>, Paloma Suarez<sup>2</sup>, Hamadi Karembe<sup>2</sup>, Nicolas Guerra<sup>3</sup>, Daniel Sperling<sup>3</sup>

<sup>1</sup> *CEVA 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

<sup>2</sup> *CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

<sup>3</sup> *Ceva, France*

### **CONTENT**

#### Background and Objectives

Iron deficiency anaemia (IDA) is a serious health problem in neonatal piglets and is controlled by routine application of iron in various formulations. The iron status at weaning of piglets with fast growing genetics is frequently discussed. The aim of the present study was to evaluate the haemoglobin level (Hb) of piglets at weaning in commercial farms in France and to assess the possible influence of the piglet size, the litter size, the Hb status of the sow and the type of iron form on Hb.

#### Materials and Methods

Twelve randomly selected farms using different forms of iron supplementation (oral, injectable) were included in the study. Within each farm, ten randomly selected litters from different parity sows have been assessed (30 piglets per litter, 360 piglets in total). Sow, small, medium and large piglet were sampled and Hb levels were measured immediately on farm test (HemoCue®). The influence of size of the piglet, product used and interaction (parity, litter size) was evaluated by ANOVA.

#### Results

The selected treatment (product used) has significant effect on Hb level at weaning. Oral forms of iron provided generally lower and more variable Hb levels when compared with dextran/gleptoferron based products with some exceptions. The percentage of not anaemic piglets (Hb>9 g/dL) was highly variable from one farm to another depending on product used. There was no statistically significant effect of other factors.

#### Discussion and Conclusions

In our study, the type of iron used has significant effect on the Hb level at weaning. There was no effect of size of the piglets on Hb level; with one of the possible explanations was rather smaller size of the litters (11.42 piglets on average) with rather equal size of the piglets born.

## **MIS-PP-18**

### **TITLE**

THE ROLL OF EVIDENCE BASED VETERINARIAN MEDICINE (EBVM) IN THE DUTCH SWINE INDUSTRY: POINTS OF FRICTION AND SOLUTIONS

Victor Geurts<sup>1</sup>, Theo Geudeke<sup>2</sup>, John Vonk<sup>3</sup>

<sup>1</sup> *MSD-AH Nederland, Boxmeer, The Netherlands*

<sup>2</sup> *Specialist Animal Health Service (GD), Deventer, The Netherlands*

<sup>3</sup> *Chairman VGV KNMvD, Veterinary Clinic de Varkenspraktijk, Oss, The Netherlands*

### **CONTENT**

#### Background and Objectives

EBVM is the use of best evidence from research for health decisions in the veterinary profession. These principles are in The Netherlands incorporated in guidelines for veterinary actions.

Despite the good performance of the industry still several points of friction for implementing EBVM remain.

#### Material and Methods

Geudeke (specialist-AnimalHealthService), Vonk (Chairman VakGroepVarken of KNMvD) and Geurts (veterinarian/Lawyer) are questioned in order to get an overview of main friction points regarding implementing EBVM and possible solutions are discussed.

#### Results

- 1.Lack of reviewed-, randomized-, controlled- and longitudinal cohort studies on specific topics. Case studies are often not properly randomized and use historical controls.
- 2.No registered effective antibiotics for specific indications and/or dosage.
- 3.Report guidelines are often not properly followed resulting in off label- or autogenous vaccinations without justification leading to liability of the vet.
- 4.Farmers get veterinary orientated off label advises from not qualified advisors. This can have serious consequences for animal welfare, trading partners and farmer's results.
- 5.Lack of ROI data of farm constructions based on pig health versus constructions based on the lowest construction cost.

#### Discussion and Conclusions

Although results of the Dutch pig industry are good it faces several challenges that can be overcome. Some of them need cooperation of several stakeholders.

Veterinarians can avoid liability connected with off label use by following the report guidelines (problem definition, clinical investigation, diagnostic and technical data, plan and follow up).

Mandatory report and accountability for non-veterinary farm advisors in private quality systems.

Case studies value with historical control can be improved by a more critical review of the setup, statistics and conclusion before publishing. Publishing all registration trials can provide more scientific information for health decisions. ROI calculation where farm constructions based on animal welfare (multi-side, hygiene lock, clean-dirty routes) are compared with the "traditional" constructions.

## **MIS-PP-19**

### **TITLE**

**FIELD EVALUATION OF HAEMOGLOBIN (HB) LEVEL AND FACTORS INFLUENCING HB STATUS IN PIGLETS AT WEANING ON NETHERLANDS FARMS**

Susan Kars-Hendriksen<sup>1</sup>, Paloma Suarez<sup>2</sup>, Nicolas Guerra<sup>2</sup>, Hamadi Karembe<sup>2</sup>, Daniel Sperling<sup>2</sup>

<sup>1</sup> *Ceva Santé Animale B.V., Naaldwijk, The Netherlands*

<sup>2</sup> *Ceva, France*

### **CONTENT**

#### **Background and Objectives**

Iron deficiency anaemia (IDA) is a serious health problem in neonatal piglets and it is controlled by routine application of iron in various formulations. The aim of the study was to evaluate the haemoglobin level (Hb) at weaning in the commercial farms in Netherlands and to assess influence of the size of the piglet, litter size (TBL), parity, weaning age and type of iron form.

#### **Materials and Methods**

Ten randomly selected farms using different forms of iron (dextran, gleptoferron) and route of administration (injection x needle-less) were included. Within each farm, ten randomly selected litters from different parity sows have been assessed (30 piglets per litter, 300 in total). Small, medium and large piglet were sampled per litter, Hb levels were measured immediately on farm test (HemoCue ®). The statistical evaluation of interaction was performed by ANOVA.

#### **Results**

The type of iron treatment (product comparison) has significant effect ( $P=0.0096$ ) on Hb level at weaning. The effect of parity, weaning age, TBL and the size of the piglet was not significant, but there was a tendency for lower Hb with big piglets, piglets from low parity sows (1-3), piglets from larger litters (>14 TBL vs. 8-13) and piglets weaned earlier (21 days vs. 26, 27 and 28 days).

#### **Discussion and Conclusions**

The effects of evaluated variables were not significant; however, the trend suggests that big piglets from large litters of low parity sows can be at risk of IDA. More studies needs to be done to confirm it. There was no visible evidence of influence of different route of administration of iron supply efficiency. The percentage of no anaemic piglets (Hb >9 g/dL) was variable from one farm to another depending on product used and seems to be a more sensitive criterion beside Hb levels.

## **MIS-PP-20**

### **TITLE**

**DIAGNOSES IN ADULT PIGS 2008 TO 2018 IN ENGLAND AND WALES FROM ANALYSIS OF LABORATORY CARCASE SUBMISSIONS**

Cornelia Bidewell<sup>1</sup>, Camilla Brena<sup>1</sup>, Livio Pittalis<sup>1</sup>, Edward Fullick<sup>1</sup>, Susanna Williamson<sup>1</sup>

<sup>1</sup> *Animal and Plant Health Agency*

### **CONTENT**

#### **Background and objectives**

Analysis of surveillance data and diagnoses in adult pigs over a ten-year period in England and Wales was undertaken. This provides insight into the presenting signs and disease syndromes that prompt postmortem examinations (PME) in the GB scanning surveillance network, and the range of diagnoses made.

#### **Material and Methods**

Data collected from adult pigs submitted for PME under Government-subsidised surveillance at sites in England and Wales were analysed for 2008-2018. This included main presenting sign and diagnoses, which were made according to strict criteria. Adult pigs were defined as seven-months-old and older. Submissions from any size of herd were included.

#### **Results**

Data for around 650 submissions were analysed. The two most common primary clinical signs were “found dead” and “musculoskeletal/lame”. Amongst the main types of disease were 1) abdominal catastrophes which includes small intestinal torsions, some of which occurred as small outbreaks in outdoor pigs, and 2) osteochondrosis dissecans and non-degenerative arthritis. The diagnoses of bacterial and parasitic diseases varied in presentation; erysipelas being seen in smaller unvaccinated herds or young breeding stock; hepatic necrosis due to *Clostridium novyi* in sows; and coccidiosis in replacement breeding stock occurring soon after entry to outdoor sites.

#### **Discussion and conclusion**

Examination of carcasses allows full diagnostic investigation and is an important component of scanning surveillance. The submission of adult pigs from commercial herds, unless of high value or boars, most often follows disease in more than one animal in a group. This analysis shows that pigs being found dead or having musculoskeletal disease are the main signs prompting submissions for diagnostic investigation. Non-infectious disease was prominent amongst diagnoses, some with managerial risk factors; however a range of infectious diseases were also diagnosed. Descriptions of these in surveillance reports provides vets attending pigs with information to help in prevention of disease.



## **MIS-PP-21**

### **TITLE**

#### **SEROLOGICAL SURVEY IN WILD BOAR IN THE NETHERLANDS**

Manon Houben<sup>1</sup>, Jobke van Hout<sup>1</sup>, Theo Geudeke<sup>1</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

### **CONTENT**

#### **Background and objective**

Despite a zero-tolerance policy, the wild boar population in the Netherlands is increasing in numbers and extending its habitat. Growing numbers of wild boar are living in the immediate vicinity of commercial pig farms. With African Swine Fever (ASF) advancing, the wild boar population is perceived a risk for the pig industry. This project aimed to evaluate the prevalence of antibodies against five (in the Netherlands endemic) infectious diseases in serum samples of wild boar, to obtain first insight into possible spread of infectious diseases in wild boar.

#### **Material and Methods**

In total 262 serum samples were tested with commercial available ELISA's for antibodies against ApxIV (*Actinobacillus pleuropneumoniae*), influenza A virus (SIV), *Mycoplasma hyopneumoniae* (Mhyo) and PRRS virus and with an in-house ELISA for Porcine Epidemic Diarrhoea virus (PEDV). Serum samples were collected from wild boar, shot from the first of June 2016 till June 30th 2017, in 30 different municipalities spread over the rural areas with commercial pig holdings. The age of the animals varied from 1 to 120 months (mean 14 months, standard deviation 11 months). The samples originated from 125 male and 137 female animals.

#### **Results**

Seroprevalance of antibodies against ApxIV, SIV and Mhyo was respectively 32.78%, 27.07% and 46.80%. All samples tested negative for PRRSV. One sample tested positive for PEDV. Differences in seroprevalence were seen between the different municipalities.

#### **Discussion**

The outcome of this serological survey of wild boar shows circulation of known infectious diseases in the wild boar population in the Netherlands. As the samples were mainly from animals shot in pig dense areas, these wild boar could function as a reservoir for commercial pig herds. The contribution of inter wild boar transmission and exchange of infectious diseases to and from commercially kept pigs could not be determined.



# REPRODUCTION

POSTER ABSTRACTS

## **REP-PP-01**

### **TITLE**

REPRODUCTIVE IMPACT OF PCV2 INFECTION: EFFECT OF SOW VACCINATION

Valérie Normand<sup>1</sup>, Gwenaël Boulbria<sup>1</sup>, Pauline Berton<sup>1</sup>, Mathieu Brissonnier<sup>1</sup>, Franck Bouchet<sup>1</sup>, Sophie Brilland<sup>2</sup>, Justine Jeusselin<sup>1</sup>, Dorothée Desson<sup>1</sup>, Arnaud Lebret<sup>1</sup>

<sup>1</sup> *PORC SPECTIVE, Chêne Vert Conseil Veterinary Group, ZA du Gohélève Rue E et J Montgolfier 56920 NOYAL PONTIVY FRANCE*

<sup>2</sup> *CEVA 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

### **CONTENT**

Background and objectives

The impact of Porcine Circovirus type 2 (PCV2) on reproductive disorders has been demonstrated in experimental and field conditions. The objective of this study was to evaluate the impact of sow vaccination on reproductive performances.

Material and methods

Two farrow-to-finish farms in which PCV2 infection in the breeding herd was diagnosed were selected. The diagnosis was based on serological and qPCR tests on blood samples from sows and, in one case, completed with PCR on mummies.

Herd 1 had a 5-batches management program and Herd 2 a 20-batches management program. After diagnosis: in herd 1, all the sow herd was vaccinated; in herd 2, only gilts and parity 2 sows were vaccinated against PCV2. For each herd, the number of total alive borns/litter (AB), dead borns/litter (DB), mummified piglets/litter (MM), weaned piglets/litter (WP) and fertility rate (FR) (respectively in 5 and 10 batches before and after implementation of CIRCOVAC® on sows) were compared.

Results

In herd 1, AB raised from 12 to 13.4 for the gilts and from 11.7 to 13.8 for the sows. The percentage of MM decreased from 7% to 0.8% and from 3% to 1.3% respectively. Consecutively, WP increased from 11.3 to 11.9 and from 10 to 11.8.

In herd 2, AB raised from 15.15 to 15.63 for the gilts and from 13.04 to 13.45 for the sows. FR raised from 92% to 100% for the gilts but remained stable for the sows. WP increased from 12.56 to 13.14 and from 11.73 to 12.2 respectively.

Discussion and Conclusion

The results of this study show that practitioners have to take into account PCV2 in the differential diagnosis of suboptimal reproductive results, even in not newly established herds. Vaccination of the sows seems to be a useful tool to control PCV2 and to improve reproductive results.

## **REP-PP-02**

### **TITLE**

PCV2 SEROPROFILES ON BREEDING HERDS: A USEFUL TOOL TO DETECT VIRUS CIRCULATION AND ITS POTENTIAL IMPACT ON REPRODUCTIVE PERFORMANCES

Valerie Normand<sup>1</sup>, Gwenaël Boulbria<sup>1</sup>, Pauline Berton<sup>1</sup>, Mathieu Brissonnier<sup>1</sup>, Franck Bouchet<sup>1</sup>, Sophie Brilland<sup>2</sup>, Arnaud Lebret<sup>1</sup>

<sup>1</sup> *PORC SPECTIVE, Chêne Vert Conseil Veterinary Group, ZA du Gohélève Rue E et J Montgolfier 56920 NOYAL PONTIVY FRANCE*

<sup>2</sup> *CEVA 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

### **CONTENT**

#### Background and Objectives

Porcine Circovirus type 2 (PCV2) is an ubiquitous virus responsible for various symptoms. Its impact on reproductive disorders has been demonstrated in experimental and field conditions. The objective of this study was to evaluate the interest of PCV2 serologic profile on sows in order to investigate involvement of this virus in reproductive problems.

#### Materials and methods

Four farrow-to-finish herds, without PCV2 vaccination on sows and encountering reproductive disorders were selected. Technical criteria considered were suboptimal results of fertility, prolificacy and mortality. In each herd, we sampled blood from 5 gilts before artificial insemination, 5 gestating gilts, 5 parity 2 sows and five to ten parity 3 (or more) sows.

Sera were analyzed with a commercial ELISA (SERELISA PCV2 Ab Mono Blocking, Synbiotics, Lyon, France). They were treated following manufacturer's instruction (short incubation time) and an adapted protocol with a longer incubation time at 4°C during 18h. A sample was considered positive following serological kit's cut-off using short incubation time and the cut-off published in the Fablet et al. publication using long incubation time.

#### Results

The serological results showed a variable proportion of seronegative gilts or sows from 50 to 87.5% using short incubation protocol and 0 to 31.25% using longer incubation time.

Although PCV2 is a very resistant and widespread virus within pig farms, some animals coming from high health status multipliers may be naïve at entry in the farm and sometimes still for a long time, even after several parities.

#### Conclusion

This study evidences the high variability of PCV2 serological status in sow herds and the interest of serological profile when a complete differential diagnosis of reproductive disorders is needed.

This type of investigations is still challenging and expensive but the impact of PCV2 on gilts and multiparous sows performances shouldn't be underestimated by practitioners.

## **REP-PP-03**

### **TITLE**

IMPACT OF PCV2 AND PORCINE PARVOVIRUS IN INFECTIOUS ABORTIONS: STATISTICS ON A DECADE OF DIAGNOSIS FROM THE NECROPSY ROOM.

LUC MIELI<sup>1</sup>, ELVIS LEBON<sup>1</sup>, NATHALIE CAPDEVIELLE<sup>2</sup>, SOPHIE BRILLAND<sup>2</sup>

<sup>1</sup> LABOCEA, 7 rue du Sabot, 22440 Ploufragan (France)

<sup>2</sup> CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE

### **CONTENT**

#### Background and Objectives

Porcine circovirus 2 (PCV2) has been shown to be involved in reproductive disorders in sows such as return-to-oestrus, increased number of mummified, stillborn or non-viable piglets at birth and also abortions. To date, there is no reliable statistic showing the relationship between Porcine Circovirus type 2 and reproductive problems observed in swine herds. The current approach is therefore completely new and the information acquired is high ranking for swine industry.

#### Material & Methods

The approach is based on a retrospective analysis and consisted in examining the positivity rates of swine aborted fetuses regarding porcine parvovirus and Pcv2 from samples submitted to the necropsy room at Laboceca Ploufragan over a very long period (around 10 years). For both viral diagnoses, 2 types of techniques were used. For Porcine parvovirus: a serological technique (IHA on individual aborted fetuses juices) and a PCR technique. For Pcv2: a serological technique (qualitative ELISA developed on individual aborted fetuses juices) and a PCR technique.

#### Results

The results obtained enabled to validate the quality of work in the necropsy room (parvovirus is expected to be unfrequent due to the systematic vaccination of sows) and to give full validity to the results of Pcv2 involvement on the examined samples.

#### Discussion & Conclusion

This study highlights the strong and regular involvement of Pcv2 in porcine reproductive problems submitted to LABOCEA Ploufragan, usually underestimated in the field. Moreover, the results show a much better sensitivity in first-line of the Laboceca serological ELISA tool compared to the PCR tool to point out the Pcv2 implication in abortion samples.

## **REP-PP-04**

### **TITLE**

**NITRIC OXIDE PRECURSOR: SPORT NUTRITION LEVERAGED TO INCREASE PIGLET LIVABILITY**

Caroline Vanderhaeghe<sup>1</sup>, Kaat Goris<sup>1</sup>, Moniek van den Bosch<sup>1</sup>

<sup>1</sup> *Cargill CPN EU, Rotterdam, The Netherlands*

### **CONTENT**

Over the recent decades, piglet losses have increased as the pork industry selects for larger litter size. A key factor driving piglet losses is the increased farrowing duration which can lead to in utero asphyxia and stillbirth. In practice, most sows are nutritionally not prepared for (prolonged) farrowing, but recent literature indicates that optimizing nutrition around farrowing may improve piglet livability. In the current study, a technology used in sports nutrition is leveraged to enhance endurance of sows during farrowing. Proxymum™, a Nitric Oxide (NO) precursor in the maternal diet, is hypothesized to lead to a higher blood flow and thus oxygen and nutrient flow to the fetuses due to the vasodilation. The risk for asphyxiation and therefore stillbirth and pre-weaning mortality may be reduced. A total of 350 sows were allocated to six treatments including a control lactation diet without Proxymum and diets containing either 0.03, 0.06, 0.09, 0.12 and 0.15% of Proxymum from d108 of gestation until 4 days after farrowing.

Proxymum added to the maternal diet linearly increased piglet birth weights ( $P=0.04$ ). A tendency for a quadratic effect ( $P=0.10$ ) of dosage of Proxymum supplementation was found on pre-weaning mortality of piglets with the lowest level of mortality at a moderate dosage. From 190 sows, additional information on piglet vitality, placental quality, umbilical cord blood gasses and farrowing were collected. The probability of a higher vitality score of piglets linearly increased with increasing dosage of Proxymum ( $P=0.03$ ). A tendency for a higher  $pO_2$  ( $P=0.10$ ) and an increased placenta width ( $P=0.02$ ) was found with increasing dosage of Proxymum, but no effect on placenta length was found. Farrowing duration was not affected by maternal Proxymum supplementation. In summary, NO boosting technology is promising to enhance piglet livability.

## **REP-PP-05**

### **TITLE**

THE VARIATION OF PLASMA LEVEL OF ALTRENOGEST AND THE HORMONE WITHDRAWAL TO ESTRUS INTERVAL OF GILT INFLUENCED FROM THE COMMERCIAL PRODUCTS IN THAILAND

Nutthee Am-in<sup>1,2</sup>, Akkapon Ratchatasriprasert<sup>3</sup>, Kritwat Thitchote<sup>3</sup>, Viriya Seemuang<sup>3</sup>, Voramet Sirinopwong<sup>3</sup>

<sup>1</sup> *Department of Obstetrics, Gynaecology and Reproduction, Faculty of Veterinary Science, Chulalongkorn University, Bangkok, Thailand*

<sup>2</sup> *Swine Reproduction Research Unit, Chulalongkorn University, Bangkok, 10330, Thailand*

<sup>3</sup> *Faculty of Veterinary Science, Chulalongkorn University, Bangkok, Thailand*

### **CONTENT**

In Thailand, altrenogest is commonly used for adjusting the number of gilts for batch and weekly farrowing system. Nevertheless, two-third of gilts showed the estrous sign within 7 days after altrenogest withdrawal in some weeks. The variation of altrenogest withdrawal to estrus interval (WHEI) was speculated to be influenced by the variation of commercial hormonal products. The elimination study was conducted to investigate the plasma level of altrenogest and WHEI in 15 Yorkshire×Landrace gilts. Age, weight and backfat depth (BF) were recorded. 20 ug altrenogest from product A, B, C were fed to 5 gilts per product for 18 days. Altrenogest concentration was measured at Day 0, 3, 18 and 20 from plasma collection by liquid chromatography-tandem mass spectrography. WHEI was recorded after altrenogest withdrawal. All gilts have no difference of age, weight and BF (P=0.4). WHEI of product B trend to be shorter than A and C (5.0±0.7 vs 7.2±1.9 vs 6.4±1.8 day, respectively; P=0.07). Altrenogest concentrations were maintain over 23 ng/mL from D3 to D18. At D20 the concentrations of product B was significantly lower than A and C (1.5±0.1 vs 2.4±0.4 vs 2.9±0.1 ng/mL, respectively; P=0.07). From the results, we found the difference of altrenogest concentrations and WHEI among the commercial products. This data may be used to design the starting day of feeding altrenogest in gilt of Thailand.

## REP-PP-06

### TITLE

FIXED TIME ARTIFICIAL INSEMINATION PROTOCOL IN GILTS, A USEFUL TOOL TO IMPROVE REPRODUCTIVE PERFORMANCE

Juan Cumplido<sup>1</sup>, Marta Jimenez<sup>2</sup>, Marcial Marcos<sup>2</sup>, Cesar Llorente<sup>2</sup>, Rut Menjon<sup>2</sup>

<sup>1</sup> *Technical advisor*

<sup>2</sup> *MSD AH*

### CONTENT

#### Background and Objectives

The aim of this study was to compare the efficacy of a FTAI program using buserelin 4µg/ml (Porceptal®, MSD Animal Health) and conventionally based estrous insemination on reproductive performance in commercial Iberian gilts.

#### Material and Methods

Seventy-one gilts (Iberian x Duroc breed, farm with 750 sows) were included in the study and were randomly assigned to control group (CG, n=27) or Porceptal® group (PG, n=44). Gilts were treated with 20 mg of altrenogest [5 ml of Regumate® oral solution (0.4%)] for 18 days. In CG, estrus was checked once a day from D4 until heat onset and two AI, s were done at 4 and 24h after estrous detection. In PG, gilts were treated with 2.5ml of Porceptal® 120h after last day of treatment with Regumate® and received FTAI 30-33h later.

Pregnancy rate, gestation length, farrowing data, total born and weight at birth were recorded

#### Results

Pregnancy and farrowing rates were different between groups (CG: 74% and 74% vs. PG: 88% and 84%, respectively). PG gestation length was 1 day shorter than in the CG (113.0 d vs 114 d, respectively). The mean number of piglets born alive per gilt was 7,86 (CG) vs 7,53 (PG) (p>0.05) and the mean birth weight was 1,49 (CG) vs 1,44 (PG) kg (p>0,0.5)

#### Conclusions

Porceptal® can be a very useful tool in FTAI programs in Iberian farms, especially in gilts synchronized using Regumate®. Pregnancy rates and farrowing rates in Porceptal® group were higher than in the control group and gestation length was shorter. There were no differences in production parameters (piglets born alive and birth weight). FTAI demonstrated other benefits such as: semen savings (expensive in Iberian breed), grouping of farrowings, reduction of non-productive days and efficiency in the farm organization and management



## **REP-PP-07**

### **TITLE**

CAN HYDATID CYSTS OF MORGAGNI CAUSE INFERTILITY IN SOWS?

Alexander Grahofner<sup>1</sup>, Gaby Hirsbrunner<sup>2</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Clinic for Ruminants, Vetsuisse Faculty, University of Bern, Switzerland*

### **CONTENT**

#### **Background**

Cysts of the paramesonephric duct origin are common in mammals and are located on the fimbria of the oviduct. The term used for this degeneration is hydatid cyst of Morgagni and is most often a benign, non-inflammatory condition of the fallopian tubes. This cystic degeneration is a possible cause of unexplained infertility in humans.

#### **Material & Methods**

Due to reproductive failure in a sow-pool system, three genital tracts of pluriparous crossbred Large White x Landrace sows were sent for post-mortem examination. During the examination, a Hydatid cyst of Morgagni on the left paramesonephric duct with a diameter of 5 cm was found in one sow without other pathological lesions of the genital tract.

#### **Results**

For further diagnostics, the fluid of the cyst was evaluated, revealing an extremely low cellularity with a clear background. Nucleated cells consisted predominantly of macrophages and/or cyst-lining cells displaying minimal vacillation. Furthermore, a low number of lymphocytes and neutrophils were detected. No evidence of malignancy was found. In addition, a histopathological examination was conducted. The wall of the cyst consisted of a single layer of columnar epithelial cells resting on a basal membrane with connective tissue and a low number of smooth muscle cells.

#### **Discussion & Conclusion**

The present report describes the first detection of a Hydatid cyst of Morgagni in a sow with fertility problems. Like in other mammals, a Hydatid cyst of Morgagni might be a possible cause of infertility in sows. Therefore, further investigation is necessary to evaluate the presence of Hydatid cysts of Morgagni in the genital tract of sows and to prove the relevance for reproductive failure in sows.

## **REP-PP-08**

### **TITLE**

THE EFFECT OF ALTRENOGEST TREATMENT ON INCIDENCE AND PREVENTION OF EARLY PARTURITION IN SOWS

Vazul Fulop<sup>1</sup>, Tamas Revesz<sup>2</sup>, Jana Blahova<sup>3</sup>, Daniel Sperling<sup>4</sup>

<sup>1</sup> *Agro-Feed ltd, Hungary*

<sup>2</sup> *Ceva, Hungary*

<sup>3</sup> *Department of Animal Protection, Welfare and Etology, VFU Brno, Czech Republic*

<sup>4</sup> *Ceva, France*

### **CONTENT**

#### Introduction

Altrenogest is proven the effective tool for synchronization of gilts. Physiological length of gestation is considered 115-116 days, with high variability reported (110-121d of pregnancy), farrowing before day 113 considered as early parturition.

The aim of the study was to to investigate the efficacy of altrenogest administration on 109–111d of gestation in sows (n=354) on preventing early parturition the farrowing distribution.

#### Material and Methods

The trial was done on commercial farm with reported variability of parturition by decision on farm on three subsequent batches of sows randomly allocated into groups according to the parity. The effect of altrenogest (20 mg, Altresyn®) treatment was evaluated on 75 sows compared to control (279). Treated animals received daily individual dose on day 109-111 of gestation based on the sow's insemination date. Optimum farrowing was defined as 115-116d, early farrowing as ? 114d and late farrowing as ? 117d of gestation. Statistical analysis was conducted using Unistat 6.5. Excel. Chi-square test and contingency tables were used for the evaluation of differences among frequency of early, optimum and late parturition.

#### Results

Significant effect of treatment was observed in 61.3% (n=46/75) of treated sows farrowed in optimum gestation length period (115-116 days) compared to control 42.7% (n=119/279) (p= 0.004). Numerical decrease of early farrowing was confirmed in treated group compare to control 12% (9/75) vs. 19.7% (55/279) (p= 0.1233). Late farrowing was as well lower numerically in treated group 26.7% (20/75) vs. 37.6% (105/279) (p= 0.0777).

#### Discussion and Conclusions

The most of farrowing events occurred between 115-116d in group treated by altrenogest, the frequency of late parturition (? 117d) was numerically lower. Optimum gestation length is associated with lower risk for stillborn piglets as well as with optimum farrowing management. Altrenogest could be one of the possible solutions for farms experiencing such problems.

## **REP-PP-09**

### **TITLE**

#### **EFFECT OF HYPOSPADIAS IN A CROSSBRED BOAR ON REPRODUCTION**

Alexander Grahofner<sup>1</sup>, Heiko Nathues<sup>1</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

### **CONTENT**

#### **Background**

Hypospadias, a congenital anomaly of the urogenital tract, is rarely described in boars.

#### **Material & Methods**

In this case, the effect of hypospadias in a crossbred intact Pietrain x Duroc boar on sexual function and reproductive parameters is reported. 57 matings with the boar were compared with the average reproductive performance of the other three boars in the farm (70 litters) and reproductive performance after artificial insemination (567 litters).

#### **Results**

General physical examination revealed no abnormalities. The andrological examination supplemented with ultrasound revealed no abnormalities of the genital tract apart from the distal hypospadias. Subsequently, the boar was exposed to a sow showing signs of oestrus, in order to assess the ability to mount and to ejaculate. The boar showed a normal mating behaviour and the semen quality parameters were within the normal ranges. The analysis of the reproductive data revealed that the boar with the hypospadias had a return to oestrus rate of 13.7 % compared to 9.3% after mating with other boars and 7.4% after artificial insemination. Furthermore, the number of total born and live born piglets from the affected boar was lower compared to the other groups.

#### **Discussion & Conclusion**

This is the first report that describes the effect of hypospadias in a boar on sexual function and reproductive parameters. Interestingly, the affected boar showed no abnormalities in the sexual behaviour and the semen quality. However, a reduced reproductive performance was manifest in comparison with other mating boars and artificial insemination. It is not clear, whether the observation differ due to the pathoanatomical finding or the individual variation of this single boar. However, in human medicine it was shown that hypospadias has a negative impact on sexual function and fertility. A case-control study is needed to statistically prove the effect of hypospadias in boars on reproduction.

## **REP-PP-10**

### **TITLE**

WHY DID THE FARROWING RATE DECREASE IN A HUNGARIAN SOW FARM? – A FIELD STUDY

László Búza<sup>1,2,3,4</sup>, Péter Máté<sup>1</sup>, István Makkai<sup>1</sup>, László Ózsvári<sup>4</sup>

<sup>1</sup> *MSD AH CERG Swine Business Unit - HUNGARY*

<sup>2</sup> *Szent István University Doctorial School*

<sup>3</sup> *Hungarian Pig Health Management Association*

<sup>4</sup> *University of Veterinary Medicine, Budapest*

### **CONTENT**

#### Introduction

To monitor production parameters farms started to use data collecting and analyzing management tools.

One of the most important economic parameters of sow farms is the farrowing rate.

#### Material and Methods

An 1800 sow farm experienced an increase in the “not-in-pig” sow number although the sows were pregnant on the 28 days pregnancy check. No abortions had been reported, that’s why they focused on the investigation of the 28-35 days of the pregnancy (before ossification). Data analysis by genetic lines of the farm, farm management and feeding audit, insemination on-site monitoring, genital tracts’ slaughterhouse examination, laboratory tests (PRRS, PCV2, PCV3, PPVs, PCMV, 6 serotypes of *Leptospira*) were completed. Employees were incentivized for any reported and sampled abortion. ReproPig based investigation model was used for analysis.

#### Results

With the employee incentive plan, immediately 26 abortions were reported and sent to the lab in 1 month.

Results did not reveal an infectious or nutritional etiology. Analysis discovered 65% of repeat breeders (RB) are non-cyclic and 40% of RB are over 48 days. 44% of RB’s weaning-to-serve interval (WTSI) was more than 6 days. Many environmental conditions - e.g. lighting, CO2 level and temperature - were inappropriate. The adaptation of the gilts was insufficient e.g. they did not contact older sow till the farrowing unit phase.

Inseminated sows and gilts were removed from individual cages in the period of “5-10 days after insemination”. The RB detection of pregnant sows was not performed. Cyclic ovaries were found on culled sows. The USG pregnancy check on farm was performed adequately, although numerous data collection and analyzing problems were identified.

#### Discussion and Conclusions

Our study shows that multiple factors are essential for good reproduction performance and productiveness.

Prudent continuous data collection and analysis are crucial to identify problems and to support effectiveness of reproduction.

## **REP-PP-11**

### **TITLE**

TRANSABDOMINAL ULTRASOUND EXAMINATION OF THE OVARIES OF CULLED SOWS TO DETECT THE REASON OF THE CULLING - A FIELD STUDY

Péter Máté<sup>1</sup>, István Makkai<sup>1</sup>, László Búza<sup>1,2,3,4</sup>, László Ózsvári<sup>4</sup>

<sup>1</sup> MSD AH CERG Swine Business Unit - HUNGARY

<sup>2</sup> Szent István University Doctorial School

<sup>3</sup> Hungarian Pig Health Management Association

<sup>4</sup> University of Veterinary Medicine, Budapest

### **CONTENT**

#### Introduction

Most of the sow farms in Hungary utilize hyper prolific breeds, and they usually have high culling rates. Sometimes the sows, which are culled due to reproductive failures, have functional ovaries, but the farm cannot detect this with data analysis, physical examinations or stimulation, albeit the animals just do not have strong enough estrus signs.

#### Materials and Methods

A Hungarian farm with 2.000 sows turned to the MSD AH Swine Team for help to reduce the number of culled sows and to avoid the disposal of sows with good genetic background. The examinations were done in the end of August 2018. After they chose 40 sows and sent them to the slaughterhouse, transabdominal ultrasound examinations (USG) and macroscopic pathological examinations of the ovaries were performed on of the culled animals. Before slaughter the ear tags numbers of the sows were recorded and their reproductive data analyzed. This data was compared with the results of the macroscopic and USG examinations.

#### Results

We found functional ovaries with USG despite of the reported anestrus of animals. We identified many different macroscopic changes on the ovaries by pathological examination: acyclic ovaries, corpus luteum cysts. We recommended the farm veterinarians use appropriate hormonal treatments, used protocols to avoid the “anestrus” problems, and synchronize ovulation especially, in the younger high genetic potential females because their ovaries are able to produce healthy follicles.

#### Discussion and Conclusions

USG of ovaries is a useful method to check sows selected for early culling due to reproduction failures so that culling of valuable sows can be avoided.

## **REP-PP-12**

### **TITLE**

INFLUENCE OF POLYPHENOLS (HYDROXYTYROSOL AND CARNOSIC ACID) SUPPLEMENTATION ON REPRODUCTIVE PERFORMANCE OF SOWS

JUAN CAÑETE GONZALEZ<sup>1</sup>, PEDRO GONZALEZ AÑOVER<sup>2</sup>, MARIA JOSE LOPEZ ANDREO<sup>3</sup>, GUILLERMO RAMIS VIDAL<sup>4</sup>

<sup>1</sup> *Miavit Nutrición Animal S.L. Tarragona, Spain*

<sup>2</sup> *Cuarte S.A. Zaragoza, Spain*

<sup>3</sup> *Molecular Biology Section. University of Murcia, Spain*

<sup>4</sup> *Department of Animal Production. Faculty of Veterinary Sciences. University of Murcia, Spain.*

### **CONTENT**

Key words: Hydroxytyrosol, carnosic acid, reproductive, sows, piglets.

#### **BACKGROUND AND OBJECTIVES**

Swine production has markedly increased its reproductive performance over the past 50 years. One of the most important limitations to continue increasing the size of the litter, or to fully express the genetic potential of the breeders, is the prenatal mortality of embryos. Among other causes the antioxidant/oxidative balance has a key role, alternative sources of antioxidants are polyphenols and, particularly, the current study aimed to analyze the usefulness of hydroxytyrosol and carnosic acid during gestation supplementation in the reproductive performance of sows in commercial herds.

#### **MATERIAL AND METHODS**

A total of 97 female breeding pigs from the 1st to the 7th litter were allocated into two treatment groups during the whole gestation period to compare the effects of supplementation with hydroxytyrosol and carnosic acid (MiaPhenol; 150 ppm; group MPH) and control group. Both treatments received the same basal diet. Data were collected individually for total number of born piglets, live-born piglets, stillborn piglets and mummified piglets at the farrowing moment (<12 h post farrowing).

#### **RESULTS**

Throughout the treatment, the group MPH showed higher number of total born piglets (18.28 vs. 16.39), as well as, number of live-born piglets (16.65 vs. 14.78) compared to control group. Number of stillborn and mummified piglets did not significant differs among groups (1.41 vs. 1.24; 0.22 vs. 0.37 respectively).

#### **DISCUSSION AND CONCLUSION**

The present trial indicates that the supplementation with hydroxytyrosol and carnosic acid during gestation period improve number of total born piglets. Moreover, the addition of polyphenols does not affect stillborn and mummified number of piglets. Further studies are needed to clarify mode of action and efficacy of MiaPhenol.

## **REP-PP-13**

### **TITLE**

**MACHINE LEARNING CAN PREDICT WEANING TO ESTRUS INTERVAL BASED IN LACTATION INTAKE OF SOWS**

Diocleciano Gayubo<sup>1</sup>, Carlos Pineiro<sup>1</sup>, Celia Santiago<sup>1</sup>, M Angel de Andres<sup>1</sup>, Inmaculada Diaz<sup>1</sup>, Maria Aparicio<sup>1</sup>

<sup>1</sup> *Pig Champ Pro Europa SL*

### **CONTENT**

#### Background and Objectives

New technologies and innovative farm's equipment allow massive data collection that properly used can help to optimise production. In particular, electronic sow feeding is helping to understand better sows' needs and performance. This study aimed to predict the weaning to first service interval (WFSI) based on lactation feed intake in sows

#### Material & Methods

A total of 62 sows of the Swine Research Farm in Aguilafuente, Segovia, Spain were included in the study. Data collection for lactation intake were performed using the farm equipment Gestal Solo (Jyga Technologies, Saint-Lambert-de-Lauzon, QC , Canada) Reproductive data were collected from PigCHAMP software to determine weaning to first service interval (WFSI). Several predictive models were used, including MM-type Estimators for Linear Regression model, Support Vector Machines and eXtreme Gradient Boosting (machine learning).

#### Results

MM-type resulted in a high error rate, due to the anestrus (estrus 10 d or late after weaning) showed by sows. Therefore, this model was accompanied by other which also allowed the prediction of the anestrus periods, using the Support Vector Machines which had a success rate of 100% on predicting just the anestrus. Finally, (eXtreme Gradient Boosting) was tested as well and improved the rest of the models with a success rate of 91.7% overall on predicting the day the sow is going to show the estrus.

Finally, (eXtreme Gradient Boosting) was tested as well with a success rate of 91.7% on predicting the anestrus.

#### Discussion & Conclusion

In conclusion, the models used in this preliminary study confirm that WFSI can be predicted by knowing feed intake of the sow during the lactation period.

## **REP-PP-14**

### **TITLE**

EVOLUTION OF REPRODUCTIVE PERFORMANCE IN SPANISH FARMS IN THE LAST 10 YEARS.  
IMPACT OF FARMS' SIZE

M Angel de Andres<sup>1</sup>, Armando Occon<sup>1</sup>, Celia Santiago<sup>1</sup>, Inmaculada Diaz<sup>1</sup>, Carlos Pineiro<sup>1</sup>, Maria Aparicio<sup>1</sup>

<sup>1</sup> *Pig Champ Pro Europa SL*

### **CONTENT**

#### Background and Objectives

The objective of this study was to describe the evolution during the last 10 years for the reproductive KPIs including: farrowing rate (FR), adjusted farrowing rate (AFR) and number of repeat services (RS), including big and small farms because of its possible impact on the competitiveness.

#### Materials & methods

Data from 260 farms and a total of 255,386 sows were used obtained from the PigCHAMP Pro Europa SL database in the interval 2009-2018. Time series analysis was performed by decomposing into components for three types of patterns, trends, seasonality and cycles in R software. Data were distributed in groups depending on the number of sows: G1 (all the farms), G2 (farms > 1500 sows) and G3 (farms < 500 sows).

#### Results

In G1, FR began having marks between 82.1% to end up in the last years with an increase of 84.9%, AFR began in 86.2% to end up with 89.0%, and RS began with 11.3% to end up with a dropping of 8.6%. A seasonal effect was showed since FR and AFR showed lower values in winter while RS was worse in autumn than in the rest of the seasons

In December 2013 there was a significant deviation in which FR (81.1%) and AFR (85.3%) dropped up to 4% instead of growing up like in previous years. Also, in October 2013 there was a significant deviation in RS (11.0%), something not showed in the following years. We hypothesize if this could be related with the adaptation works to group sows because of welfare regulation that was performed in around that period despite it is not possible to confirm it.

#### Discussion & Conclusions

Reproductive data improved overall in the last decade in Spanish farms being bigger in big farms.



## REP-PP-15

### TITLE

EVOLUTION OF REPRODUCTIVE PERFORMANCE IN SPANISH FARMS IN THE LAST 10 YEARS.  
IMPACT OF FARMS' PERFORMANCE (I)

M Angel de Andres<sup>1</sup>, Armando Occon<sup>1</sup>, Celia Santiago<sup>1</sup>, Inmaculada Diaz<sup>1</sup>, Carlos Pineiro<sup>1</sup>, Maria Aparicio<sup>1</sup>

<sup>1</sup> *Pig Champ Pro Europa SL*

### CONTENT

#### Background and Objectives

The objective of this study was to describe the evolution during the last 10 years for the reproductive KPIs including total born (TB), born alive (BA), still born (SB), mummifies (MM), weaning to first service interval (WFSI) and preweaning mortality (PWM).

#### Materials and methods

Data from 260 farms and a total of 255,386 sows were used obtained from the PigCHAMP Pro Europa SL database in the interval 2009-2018. Time series analysis was performed by decomposing into components for three types of patterns, trends, seasonality and cycles in R software. Data were distributed in groups depending on the number of weaned piglets/sow/year (WPSY): G1 (all the farms), G2 (farms>30 WPSY) and G3 (farms<25 WPSY).

#### Results

The results for G1 showed an increase of TB from 12.3 to 15.6, BA from 11.3 to 14.0, SB from 7.2 to 7.7%, MM from 0.9% to 2.4% and PWM from 10.8 to 13.0%. WFSI decreased from 6.8 to 5.6 days throughout the 10 years. The worst values were registered in winter for SB, summer for MM and autumn for WFSI. TB, BA and PWM were better in spring.

In 2018 G2 showed 3.73 TB and 3.20 BA per farrowing more than G3. MM showed a significant increase in G2 vs G3, 3.4 vs 1.7% in 2018 respectively. WFSI improved in G2 vs G3, 5.1 vs 6.4, (P<0.05 for all of them).

#### Discussion & Conclusion

High and low performing Spanish farms managed differently the performance improvement in the last decade as main KPIs showed

## REP-PP-16

### TITLE

EVOLUTION OF REPRODUCTIVE PERFORMANCE IN SPANISH FARMS IN THE LAST 10 YEARS.  
IMPACT OF FARMS' PERFORMANCE (II)

M Angel de Andres<sup>1</sup>, Armando Occon<sup>1</sup>, Celia Santiago<sup>1</sup>, Inmaculada Diaz<sup>1</sup>, Carlos Pineiro<sup>1</sup>, Maria Aparicio<sup>1</sup>

<sup>1</sup> *Pig Champ Pro Europa SL*

### CONTENT

#### Background and Objectives

The objective of this study was to describe the evolution during 2008-2018 (June to June) for the reproductive KPIs including farrowing rate (FR), adjusted farrowing rate (AFR) and number of repeat services (RS)

#### Materials & Methods

Data from 260 farms and a total of 255,386 sows were used obtained from the PigCHAMP Pro Europa SL database in the interval 2009-2018. Time series analysis was performed by decomposing into components for three types of patterns, trends, seasonality and cycles in R software. Data were distributed in groups depending on the number of weaned piglets/sow/year (WPSY): G1 (all the farms), G2 (farms>30 WPSY) and G3 (farms<25 WPSY).

#### Results

In G3 FR ranged from 82.1 to 85.9, AFR from 86.2 to 89.0 and RS from 11.3 to 8.6% in 2008 to 2018 respectively. A seasonal effect was shown since FR and AFR had worse values in winter while RS was worse in Autumn than in the rest of the seasons

In December 2013 there was a significant deviation in which FR (81.1%) and AFR (85.3%) dropped up to 4% instead of growing up like in previous years. We can hypothesize if this could be related with the adaptation works to group sows because of welfare regulation that was performed in around that period despite it is not possible to confirm it.

FR and AFR increased in G1 over the years and RS decreased (9.4% to 5.0%). FR and AFR kept stable in G2 although with higher variance than G1. RS decreased slower in G2 than in G1. RS improved much more in G2 vs G1 (4.9 vs 11.9%)

#### Discussion & Conclusion

FR, AFR and RS improved in the last 10 y in Spanish farms mostly due to the improvement in the high performing ones



# VETERINARY PUBLIC HEALTH

POSTER ABSTRACTS

## **VPH-PP-01**

### **TITLE**

**REDUCTION OF SALMONELLA SEROTITERS BY CLOSTRIDIUM BUTYRICUM IN A COMMERCIAL TRIAL**

Lars Kunstmann<sup>1</sup>, Leif Meedom<sup>1</sup>, Veerle Hautekiet<sup>2</sup>, Wouter Van der Veken<sup>2</sup>, Anni Arvad Andersen<sup>3</sup>

<sup>1</sup> *Huvepharma N.V., Denmark*

<sup>2</sup> *Huvepharma N.V., Belgium*

<sup>3</sup> *Vet-Team Denmark*

### **CONTENT**

A Danish fattening farm buying pigs at 30 kg experienced a sudden increase in Salmonella meat juice index (based on Salmonella antibodies present), resulting in higher economic deductions at the slaughterhouse. One of the piglet supply farms was positive for Salmonella tested in pen floor samples. The farm management was all in – all out at section level, with cleaning and disinfection between batches. The farm used liquid feed based on 30% barley, 25.25% wheat, 25.25% rye, 16.25% soybean and 3.25% mineral premix, stabilized with formic acid.

334 pigs were allocated to either a treatment or control group, each divided over 10 pens. Five to six pigs per pen were ear tagged with individual identification tags, as a reference for later blood sampling. Blood samples were taken and analysed three times during the trial: at entry, 5 weeks after entry and 10 weeks after entry, with 50 samples being taken each time per group. The treatment group received  $2.5 \times 10^6$  CFU Clostridium butyricum (Miya-Gold®)/pig/day through the feed, from the first feeding until slaughter.

The initial number of Salmonella positive pigs above the OD% cut-off value at arrival was 16 for the treatment group, which decreased to 11 after 10 weeks. For the control group 12 pigs exceeded the Salmonella OD% cut-off value at arrival, which increased to 16 after 10 weeks. The average OD% at 10 weeks was significantly lower (P-value = 0.051) for the treatment group compared to the control: a mean of 6.52 +/- 12.3 (standard deviation) versus 12.76 +/- 18.7 respectively.

Supplementation with Clostridium butyricum reduced Salmonella titers, confirming the potential of the probiotic to restrict and suppress Salmonella. As such the risk of economic deductions at the slaughterhouse due to a high Salmonella meat juice index was reduced.

## **VPH-PP-02**

### **TITLE**

NO EFFECT OF A BIOCIDES ON THE PREVALENCE AND AMOUNT OF LA-MRSA IN A PIG FARM

Poul Baekbo<sup>1</sup>, Helle Sommer<sup>1</sup>, Karl Pedersen<sup>2</sup>, Carmen Espinosa-Gongora<sup>2</sup>

<sup>1</sup> *SEGES Danish Pig Research Centre*

<sup>2</sup> *Technical University of Denmark*

### **CONTENT**

#### Background and Objectives

Livestock associated MRSA (LA-MRSA) is wide spread in pig herds in most European countries. Most people working in positive pig farms will carry LA-MRSA in their noses. These farm workers may transmit this organism to other people outside the farm premises and thus jeopardize human health, especially in healthcare settings. The objective of this trial was to test if a new biocide (BiovirR) with a good in vitro killing effect on MRSA and used extensively in a pig farm could reduce the level of LA-MRSA on the pigs and in the farm environment.

#### Material and Methods

The trial was performed in a 700-sow farrow-to-wean unit with an AI-AO flow by room in farrowing crates and nurseries. Nine tests and 9 control groups were run parallel over time. In the test groups, the farrowing crates and the nurseries were disinfected between flows with the biocide, and twice a week for the entire production cycle the pigs (sows, piglets and weaners) in the two compartments were exposed to a mist of the biocide. The amount of MRSA in weaners and environment at the end of the nursery period was based on culturing MRSA from nasal swabs from 26 pigs (two per pen) and in air-samples. The productivity in the nurseries was registered.

#### Results

No significant effect of the biocide was found on the prevalence of positive pigs, or the level of MRSA in pigs (CFU/swab) or the environment. The productivity (ADG, mortality) was similar in the control and test groups.

#### Discussion and Conclusion

Even though pigs were exposed twice a week to a mist of an 'in-vitro efficient MRSA-elimination biocide', the level of MRSA in the pigs and in the environment, was not reduced. Once introduced, MRSA seems difficult to eradicate from a pig farm.

## **VPH-PP-03**

### **TITLE**

#### **TOWARDS ANTIBIOTIC-FREE PRODUCTION IN BELGIAN PIG HERDS THROUGH COACHING AND BIOSECURITY MEASURES**

Elise Bernaerd<sup>1,2</sup>, Tommy Van Limbergen<sup>2</sup>, Merel Postma<sup>1</sup>, Dominiek Maes<sup>2</sup>, Jeroen Dewulf<sup>1</sup>

<sup>1</sup> *Ghent University, Faculty of Veterinary medicine, Veterinary Epidemiology Unit*

<sup>2</sup> *Ghent University, Faculty of Veterinary medicine, Porcine Health Management Unit*

### **CONTENT**

**Background & Objectives:** Antimicrobial usage is the main driver for selection of antimicrobial resistance. This causes a health risk for animals and humans. The aim of this study was to decrease the use of antimicrobials in Belgian pig herds. Farms that already used few antibiotics were coached towards antibiotic free production.

**Material & Methods:** Sixteen Belgian farrow-to-finish pig herds were selected for this trial. Each farm was visited 3 times: the first time to collect information on antimicrobial usage and to complete a biosecurity audit by means of the Biocheck.UGent survey. In the second visit farm specific advice was given based upon the herd situation. In the third visit an evaluation of the trend in antimicrobial usage was determined. The antimicrobial usage metric is the BD100 (amount of treatment days with antibiotics on 100 days).

**Results:** Preliminary results based on 12 farms are very promising. The average BD100 for the initial visit was 6.02, 18.14, 1.74 and 0.76 for respectively suckling piglets, weaned piglets, fatteners and sows. After a period of 6 months the BD100 was reduced to 1.05, 11.24, 0.85 and 0.57 respectively.

**Discussion & Conclusion:** At some farms there was a reduction in 3 out of 4 animal categories, combined with a slight increase of antimicrobial usage in 1 other animal group. At 1 farm, where antimicrobial usage was initially very low, a reduction of antimicrobial usage was not possible due to an outbreak of swine dysentery. Overall this study showed a reduction in antimicrobial usage of 83%, 38%, 51% and 25% for suckling piglets, weaned piglets, fatteners and sows respectively in 12 Belgian pig herds, without jeopardizing health or performance. Eight farms were able to produce a large percentage of antibiotic-free pigs (i.e. pigs that didn't receive a treatment with antibiotics from birth to age of slaughtering).

## **VPH-PP-04**

### **TITLE**

**REDUCING ANTIMICROBIAL USE IN PORK PRODUCTION: IS IMPROVED ANIMAL HEALTH THE ANSWER?**

Gertraud Schüpbach-Regula<sup>1</sup>, Myriam Harisberger<sup>2</sup>, Luis Gomes do Carmo<sup>1</sup>

<sup>1</sup> *Veterinary Public Health Institute, University of Bern, Switzerland*

<sup>2</sup> *SUISAG, Division Swine Health Service, Sempach, Switzerland*

### **CONTENT**

**Background:** Among different European countries, differences in usage patterns of antimicrobials (AM) are enormous. The objectives of the two studies summarized in this presentation were (1) to describe differences and similarities of AM usage patterns in different European countries, and (2) to evaluate the effect of herd health consulting to reduce AM use.

**Methods:** (1) An expert survey among swine specialists in Denmark, Switzerland and Portugal was performed to describe AM usage patterns. Information was collected on specific AM substances used, indications for treatment, and age classes treated. (2) In a field trial, 35 breeding and 35 fattening farms with quarterly visits by a specialized veterinarian were compared to a control group with respect to their AM use over a one-year period.

**Results:** (1) Experts' answers to patterns and indications for AM use varied widely within and between countries. Detailed results can be consulted in <https://lpgcarmo.shinyapps.io/eeii/>. For example, most treatments with parenteral cefquinome in Portugal targeted gastrointestinal disease, while in Switzerland musculoskeletal problems were the main indication. Parenteral marbofloxacin is not used for respiratory diseases according to Swiss experts, contrarily to what was suggested by Portuguese experts.

(2) Treatment incidence in breeding farms of the intervention group decreased from a median of 321 animal daily doses per 1000 animals and day to 94. The control group also decreased their usage (from 287 to 112). In fattening farms, the decrease was from 205 to 75 in the intervention, and from 220 to 182 in the control group, respectively.

**Conclusion:** Good animal health is a prerequisite for pork production with minimal AM use and high animal welfare. However, available data indicate that good health is not sufficient to ensure low use. Even more important drivers for AM usage are motivation towards prudent use, and availability and pricing of AM drugs.

## **VPH-PP-05**

### **TITLE**

**ANTIMICROBIAL RESISTANCE IN COMMENSAL E. COLI ISOLATES RECOVERED FROM DIFFERENT SWINE PRODUCTION SYSTEMS**

Oscar Mencía-Ares<sup>1</sup>, Rubén Miranda-Hevia<sup>1</sup>, Manuel Gómez-García<sup>1</sup>, Héctor Puente-Fernández<sup>1</sup>, Pedro José Gómez de Nova<sup>1</sup>, Ana Carvajal-Urueña<sup>1</sup>, Pedro Rubio-Nistal<sup>1</sup>

<sup>1</sup> *University of León*

### **CONTENT**

Antimicrobial resistance in food-producing animals is nowadays a major threat for food security and public health worldwide. Antibiotic consumption in pig production is higher in the intensive production system than in the extensive and organic ones, what could have an impact on the antimicrobial resistance of indicator bacteria in these farms. Therefore, the objective of this study is to evaluate antimicrobial resistance in commensal E. coli isolates recovered from Spanish swine farms, assessing the effect of its production system.

A total of 111 E. coli isolates obtained from 37 Spanish swine farms, classified as intensive (18), extensive (12) and organic (7), were evaluated by the microdilution broth method using commercial plates (Sensititre™ EUVSEC) and were classified as susceptible or resistant for 14 antibiotics of 10 different antimicrobial families according to established clinical breakpoints (EUCAST, 2018). Percentage of resistance among production system was compared using Chi-square test at  $\alpha=0.05$  (SPSS Statistica v.24).

In global, isolates were mainly resistant to tetracycline (58.6 %), ampicillin (58.6 %), sulfamethoxazole (54.1 %), trimethoprim (48.6 %) and chloramphenicol (34.2 %). These resistances are slightly higher than those obtained in commensal E. coli from other European countries, such as Denmark (Rosager et al. 2017) or Belgium (Callens et al. 2017). No resistant isolates were found for colistin, tigecycline, meropenem, cefotaxime and ceftazidime. Antimicrobial resistance for ampicillin ( $p<0.001$ ), tetracycline ( $p<0.001$ ), trimethoprim ( $p<0.001$ ), sulfamethoxazol ( $p=0.001$ ), chloramphenicol ( $p=0.001$ ) and gentamicin ( $p=0.019$ ) were significantly higher in intensive swine farms as compared to extensive or organic production systems. Differences were also near to statistical significance for ciprofloxacin and nalidixic acid ( $p=0.118$  and  $p=0.090$ , respectively).

In conclusion, intensive production system seems to have an impact on antimicrobial resistance phenotype of commensal E. coli from swine farms. According to this, interventions to reduce antibiotic use and therefore resistance should focus on intensive swine herds.



## **VPH-PP-06**

### **TITLE**

**CORRELATION OF NATIONAL AND INTERNATIONAL DEFINED DAILY AND COURSE DOSES FOR ANTIMICROBIAL DRUG USAGE IN PIGS**

Thomas Echtermann<sup>1</sup>, Cedric Muentener<sup>2</sup>, Xaver Sidler<sup>1</sup>, Dolf Kuemmerlen<sup>1</sup>

<sup>1</sup> *Division of Swine Medicine, Department for Farm Animals, Vetsuisse Faculty, University of Zurich*

<sup>2</sup> *Institute of Veterinary Pharmacology and Toxicology, Vetsuisse Faculty, University of Zurich*

### **CONTENT**

#### Background and Objectives

Defined Daily Doses (DDD) and Defined Course Doses (DCD) have been established in both human and veterinary medicine in order to standardize the measurement of treatments in a population. In 2016 the European Medicines Agency published average defined daily dose (DDDvet) and defined course dose (DCDvet) values for antimicrobial agents used in livestock production. Similarly, national defined doses (DDDch and DCDch) for the pig sector in Switzerland have recently been determined. The aim of this study was to compare the outcome of calculating antimicrobial consumption of Swiss pig farms based on either DDDvet/DCDvet or DDDch/DCDch.

#### Material & Methods

Data from 227 Swiss pig farms regarding the antimicrobial usage was collected in 2015. The numbers of treatment days and treatments per farm and per animal were calculated by using DDDvet/DCDvet and DDDch/DCDch respectively. Correlations between calculated numbers of DDDvet/DCDvet and DDDch/DCDch on farm level were investigated by a linear regression model. In addition, differences concerning antimicrobial usage were investigated between different production types of a farm (piglet producer, finishing farm or farrow to finishing farm).

#### Results

Using linear regressions, correlations between calculated treatment days as well as treatments based on either Swiss or European values were observed. The number of treatment days or treatments per farm and per animal was higher for piglet producers and farrow to finishing farms compared to finisher farms regardless of Swiss or European values for DDD or DCD were used for the calculation (each  $P < 0.00001$ ).

#### Discussion & Conclusion

As a consequence of the shown correlation, using either Swiss or European values gives similar results when determining antimicrobial usage on farm level. Both Swiss and European values show comparable results regarding to the antimicrobial usage between different production types.

## **VPH-PP-07**

### **TITLE**

**FUNGI DERIVED FEED ADDITIVES BIND SALMONELLA TYPHIMURIUM AND ESCHERICHIA COLI AND INDUCE MACROPHAGE ACTIVATION.**

Janneke Allaart<sup>1</sup>, Petra Roubos<sup>2</sup>, Ralph Litjens<sup>2</sup>, Célia Silva<sup>3</sup>

<sup>1</sup> *Faculty of veterinary medicine, Utrecht University, Utrecht, The Netherlands*

<sup>2</sup> *Trouw Nutrition R&D*

<sup>3</sup> *Trouw Nutrition*

### **CONTENT**

Fungi and their derivatives may play a role to reduce antimicrobial use in swine diets because of their antimicrobial and immunomodulatory properties and their ability to degrade substrate into bioactive compounds. In this research, copra meal, enzymatically hydrolyzed by fungi derived beta-mannanase (CM) and rye overgrown with mycelium of *Agaricus subrufescens* (ROM) were evaluated on macrophage activation and adhesion capacity to intestinal bacteria in vitro.

To measure adhesion capacity of CM and ROM to intestinal bacteria, a 96-well plate was coated with PBS (negative control) or a 1 % suspension of CM or ROM. The plate was incubated with a diluted *Salmonella typhimurium* or *Escherichia coli* culture. After a washing step to remove unattached bacteria, growth medium was added to the wells. Bacterial adherence was expressed in time (hours) to reach the initial bacterial culture concentration (less hours means better bacterial adherence). Macrophage activation was determined in another experiment. Plain medium (negative control), CM, ROM or LPS (positive control) were added to HD11 macrophage-like cells. After 48 hours, culture supernatant was collected and nitric oxide (NO) production was analyzed as a measurement of macrophage activation.

In vitro results showed a shorter growth time of *Salmonella typhimurium* for both CM (5,90±0 hours) and ROM (5,97±0,01 hours) compared to PBS (6,98±0,06 hours) and of *Escherichia coli* for ROM (5,67±0,15 hours) compared to PBS (7,11±0,52 hours). CM showed a slightly higher NO production (+9,4±0,3 ?M), while ROM showed a stronger activation (+31,8±2,6 ?M) and LPS showed the strongest activation (+60,8±2,4 ?M) of HD11 macrophages compared to plain medium.

In conclusion, in vitro studies showed both adhesion capacity of CM and ROM as shown by a reduction in growth time in the adhesion assay as well as macrophage activation. Therefore, CM and ROM may be useful to reduce antimicrobial use in pork production.

## **VPH-PP-08**

### **TITLE**

**ON FARM INTERVENTIONS TO REDUCE THE USE OF ANTIMICROBIALS IN PIG FARMS, A PRACTICAL APPROACH**

Manon Houben<sup>1,2</sup>, Claire CHAUVIN<sup>3</sup>, Pascal SANDERS<sup>3</sup>, Angelique van den Hoogen<sup>4</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

<sup>2</sup> *PorQ, the Netherlands*

<sup>3</sup> *Anses, France*

<sup>4</sup> *PorQ, The Netherlands*

### **CONTENT**

#### Background and Objectives

Prudent use of antimicrobials in livestock production is of relevance to prevent the selection for antimicrobial resistance (AMR). Antimicrobial use (AMU) in pig production, differs per country in Europe. To set up a practical on farm approach to reduce the use of antimicrobials in different countries an assessment decision support (ADS) tool was developed.

#### Material and methods

The basis of the ADS was the AMU assessment and farm audit on hygiene and overall management. An optimization cycle to reduce the use of antimicrobials was implemented, detailed and followed up in 41 farrow to finish farms in the Netherlands and France during 2 years on average.

#### Results:

The most important disease problems were in the piglets post weaning (39%) and suckling piglets (29%), followed by fatteners (18%). Implemented interventions were allocated to the following topics: disease management, farm management and improving stockman ship. In suckling piglets the most important health problem was related to intestinal problems and batch management and AMU stewardship were most implemented interventions. Another frequent implemented intervention was improvement of climate in farrowing. In post weaning piglets meningitis from *Streptococcus suis* infections was the major problem. Autogenous vaccination was started in 11 farms. The predominant problem in fatteners were lawsonia infections. Vaccination and improved feed quality were the implemented interventions.

#### Conclusion:

Although main disease problems in farrow to finish farms were related to respiratory problems, intestinal problem and to streptococcal infections, there is a broad scale of possible interventions. To find the optimal intervention for the farm, it is important to assess the disease problem, disease management, farm management and stockman ship in a structured way.

## **VPH-PP-09**

### **TITLE**

**ANTIBIOTIC RESISTANCE AND GENETIC PROFILE OF KLEBSIELLA PNEUMONIAE FROM CLINICALLY DISEASED PIGLETS**

Jobke van Hout<sup>1</sup>, Tom Duinhof<sup>1</sup>, Linda Peeters<sup>1</sup>, Rianne Buter<sup>1</sup>, Annet Heuvelink<sup>1</sup>, Manon Houben<sup>1</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

### **CONTENT**

#### Background and objectives

In 2015, the first cases of septicaemia and sudden death in 2-3 week old suckling piglets, resulting from *Klebsiella pneumoniae* subspecies pneumonia (KPP) infection, were found in the Netherlands. KPP is in human medicine notorious for carbapenemase production/multi-resistance and concomitant treatment difficulties. This project aimed to evaluate antibiotic resistance (ABR) and molecular profiles of KPP from diseased piglets.

#### Material & Methods

KPP isolates were cultured at GD Animal Health from diseased piglets submitted for post-mortem examination. Antibiotic susceptibility testing (broth microdilution) was carried out. Eight isolates (from 6 different farms) were screened for presence of ABR genes using a commercial micro-array for *E. coli*. Additionally, a modified MLST was applied using genes *phoE*, *infB* and *tonB*. After sequence analysis and alignment, concatenated sequences were used for constructing a maximum parsimony tree and sequence types (ST) were assigned.

#### Results

Phenotypically (n=22; 2015-2018), very low levels/absence of resistance was observed for colistin, enrofloxacin, cefotaxim, apramycin, neomycin, gentamicin, amoxicillin/clavulanic acid and TMP/S. High level resistance was observed for florfenicol, macrolides and tiamulin.

Only one out of 8 isolates harboured aminoglycoside, beta-lactam, sulfonamide, tetracycline and trimethoprim resistance genes in its profile.

KPP MLST showed that 7 KPP isolates (including 3 isolates from the same farm) were genetically identical, sharing a known ST (ST30). For the other isolate another ST (ST37) was found.

#### Discussion & Conclusion

The KPP isolates showed phenotypically (hardly) no resistance to antibiotics relevant for human cases of KPP. The one isolate harbouring different resistance genes (based on micro-array) was phenotypically susceptible for these antimicrobials and belonged to ST30. A similar ST was found in English and Australian KPP isolates from diseased piglets.

More KPP isolates from diseased piglets from different geographical areas need to be analysed to gain more insight into dissemination of clinically relevant KPP strains.



# VIRAL DISEASES

POSTER ABSTRACTS

## **VVD-PP-01**

### **TITLE**

**CASE REPORT OF TRANSMISSIBLE GASTROENTERITIS CORONAVIRUS INFECTION ASSOCIATED WITH SMALL INTESTINE AND BRAIN LESIONS**

Vasileios Papatsiros<sup>1</sup>, Ioanna Stylianaki<sup>2</sup>, Georgios Papakonstantinou<sup>3</sup>, Nikolaos Papaioannou<sup>2</sup>, Georgios Christodoulou<sup>3</sup>

<sup>1</sup> *Clinic of Medicine, Faculty of Veterinary Medicine, School of Health Sciences, University of Thessaly,*

<sup>2</sup> *Laboratory of Pathology, School of Veterinary Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki*

<sup>3</sup> *Clinic of Medicine, Faculty of Veterinary Medicine, School of Health Sciences, University of Thessaly*

### **CONTENT**

#### **Background and Objectives**

This case study reports a transmissible gastroenteritis coronavirus (TGEV) infection in newborn piglets of a commercial pig herd, including histopathological examinations in affected piglets.

#### **Material & Methods**

The clinical signs of infection appeared in newborn piglets, including medium morbidity and low rate mortality rate. Rectal swabs were collected from 5 different affected litters for laboratory examinations (Real-time polymerase chain reaction-RT PCR, cultural examinations and antibiotic sensitivity tests). In addition, three of the aforementioned piglets with symptoms were euthanized and they were sent to laboratory for necropsy and histopathological examinations. In addition, three of the aforementioned piglets with symptoms were euthanized and they were sent to laboratory for necropsy and histopathological examinations.

#### **Results**

All faecal samples were TGEV positive by Real time PCR. Necropsy revealed non-specific gross lesions. The histopathological examinations revealed villi fused with denuded tips and severe villus atrophy, leading to extensive epithelial flattening in middle and lower small intestine. The architecture pattern of villi presented columnar and cuboidal poorly differentiated enterocytes with mild subepithelial oedema. In some of these pycnotic nuclei were detected. The examined tissue sections from the brain revealed diffuse gliosis in the area of pia matter with mild congestion of the meningeal and parenchymal vessels and neuronal degeneration.

#### **Discussion & Conclusion**

This case study reported a TGEV infection in newborn piglets, characterized by typical histopathological lesions in small intestine, as well as the typical pattern of viral brain lesions, suggesting that TGEV has neurotropic effect.

## VVD-PP-02

### TITLE

PREVALENCE OF PCV2 GENOTYPES IN ORAL FLUID SAMPLES ORIGINATING FROM GERMAN AND AUSTRIAN PIG FATTENING FARMS

Vojislav Cvjetkovi<sup>1</sup>, Carina Antonczyk<sup>1</sup>, Christoph Waehner<sup>1</sup>, Maxi Harzer<sup>2</sup>, Kristin Heenemann<sup>2</sup>, Dr. Antje Rückner<sup>2</sup>, Michael Sieg<sup>2</sup>, Bernd-Andreas Schwarz<sup>3</sup>, Thomas Vahlenkamp<sup>2</sup>

<sup>1</sup> Ceva Tiergesundheit GmbH, Düsseldorf

<sup>2</sup> Center for Infectious Diseases, Institute of Virology, Faculty of Veterinary Medicine, University of Leipzig, An den Tierkliniken 29, 04103 Leipzig, Germany

<sup>3</sup> Vaxxinoa GmbH, Leipzig

### CONTENT

Quantitative measuring of PCV2 in serum samples is the golden method for monitoring PCV2 infections in growing and finishing pigs. However, over the last years, oral fluid (OF) sampling has gained more attention since it's less invasive and more animals can be sampled at once. The aim of this study was to measure the amount of PCV2 in OF and if possible, categorize the main genotypes.

In total 20, well described fattening farms were selected for the analysis. Two ropes were placed into two different pens for a period of approx. 30 minutes, without directly coming into contact with feed, water or excretions. Both ropes were subsequently centrifuged and the OF pooled into one sample. PCV2 quantitative analysis was performed by a real-time multiplex polymerase chain reaction (rt-PCR), positive samples ( $10^5$  copies/ml) were then sequenced using the Sanger chain-termination method. Alignment and phylogenetic analysis were performed using the software BioEdit and Mega 5.

Out of the 20 samples, 14 were positive for PCV2 with an average value of  $9,14 \times 10^6$  copies/ml. Seven had a value of  $10^5$ /ml (mean  $1,83 \times 10^7$ /ml), out of which five were sequenced: Four belonged to PCV2 genotype a (three PCV2-vaccinated herds, one PCV2-unvaccinated) and one to PCV2b (PCV2-vaccinated herd). One sample showed fragment lengths and nucleotide sequences similar to either PCV2d or PCV2e and therefore couldn't be differentiated.

Under the conditions of this study, monitoring of PCV2 through OF was shown to be efficacious at revealing PCV2 presence, quantity and if possible, the respective PCV2 genotype. High PCV2 copies in OF should always be considered together with clinical (subclinical) symptoms and if necessary, they can open the door for further diagnostic steps including serological, virological and pathological investigations.

## VVD-PP-03

### TITLE

CLINICAL AND VIRAL CHARACTERISTICS OF RECENT PRRS OUTBREAKS ON SOW FARMS IN THE NETHERLANDS

Tom Duinhof<sup>1</sup>, Jos Dortmans<sup>1</sup>, Manon Houben<sup>1</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

### CONTENT

#### Background and objectives

Since its introduction in the Netherlands in 1991 PRRSv still causes clinical outbreaks and subsequent economic damage on swine farms. In this study a description is given of farm characteristics, clinical picture and sequence results of the found PRRSv strains on 27 sow farms with a recent laboratory confirmed clinical PRRS outbreak in the period of 2015 to 2018.

#### Material & Methods

PRRS outbreaks on sow farms in the period of 2015 to 2018 were investigated. Farm size varied from 200 to 3000 sows, including farrow to finish farms. Five farms did not vaccinate the sows, 19 used modified live vaccines and one farm used a killed vaccine.

#### Results

The distribution of outbreaks over the seasons was: 13 outbreaks in the fourth quarter, 7 outbreaks in the first, 5 in the second, and 2 in the third quarter. First clinical signs were seen in sows (26 farms), or in weaners, finishers or breeding stock (5 farms). Typing of isolated PRRSv strains was done in 22 farms, this resulted in 21 field strains and one vaccine strain. Phylogenetical analysis based on ORF5 sequencing showed no indication for the circulation of Acro-, Lena- or Flanders-13-virus strains.

#### Discussion and conclusion

This study confirms that even accurately applied vaccination schemes, in sows and piglets together, are no guarantee for prevention of PRRS outbreaks. Based on the sequence results farm owners concluded that either a new virus introduction had occurred, or a known virus was still circulating on the farm. This has led to adjustments in internal or external biosecurity procedures. Typing of PRRSv strains is a useful tool for farm owners and veterinarians to assess and adjust existing biosecurity protocols.



## **VVD-PP-04**

### **TITLE**

A SYSTEMATIC APPROACH TO PRRS CONTROL IN 35 BREEDING HERDS IN THE NETHERLANDS

Karien Koenders<sup>1</sup>, Eveline Willems<sup>2</sup>, Marc Martens<sup>2</sup>

<sup>1</sup> *Topigs Norsvin Nederland B.V.*

<sup>2</sup> *Topigs Norsvin International B.V.*

### **CONTENT**

Background and Objectives

PRRS is a viral disease that has a big impact on cost of swine production, animal health and welfare. Although Topigs Norsvin Nucleus herds are free from PRRS, conventional breeding herds of Topigs Norsvin Netherlands are producing and distributing replacement females to production herds in the Netherlands. Topigs Norsvin has started a systematic approach to PRRS control for those conventional breeding farms.

Material & Methods

A health monitoring is performed 3 times a year. Since June 2018 this monitoring consists of serological tests and PCR tests for PRRS virus in strategic animal groups: 5 young sows, 5 old sows, 5 own replacements, 20 10 weeks old pigs, 30 due to be weaned pigs, 5 16 weeks old and 5 22 weeks old. Samples are pooled per 5 for PCR. Based on the outcomes farms are classified as stable or unstable positive. PRRS strains found by PCR are further typed by sequencing on ORF5 and phylogenetic trees are constructed.

Results

The starting measurement is completed and the monitoring will proceed further. The outcome and history of the phylogenetic analysis gives direction to working on either internal or external biosecurity on each farm. Following the outcomes of the monitoring, guidelines are given for control of disease. In general these are targeted towards biosecurity, vaccination and animal flow. Farm specific measures will be implemented, based on results of the monitoring and the guidelines. The first systematic monitoring shows a diversity in PRRS stability of the farms. The first phylogenetic tree shows a wide variety in present PRRS strains between the breeding herds.

Discussion & Conclusion

PRRS virus is still highly prevalent in the Netherlands. First steps are taken to a systematic approach starting from the breeding herds of Topigs Norsvin Netherlands.

## VVD-PP-05

### TITLE

A PHENOTYPING METHOD TO IDENTIFY PRRSV-RESILIENT SOWS IN PRRSV-INFECTED FARMS UNDER EPIDEMIC AND ENDEMIC SCENARIOS

Gloria Abella<sup>1</sup>, Elena Novell<sup>2</sup>, Vicens Tarancon<sup>2</sup>, Romi Pena<sup>1</sup>, Joan Estany<sup>1</sup>, Lorenzo Fraile<sup>1</sup>

<sup>1</sup> *University of Lleida, Lleida, Spain*

<sup>2</sup> *Grup de Sanejament Porci, Lleida, Spain*

### CONTENT

#### Introduction

Porcine reproductive and respiratory syndrome (PRRSV) is a viral disease with negative impact on sow reproduction. A strategy to control this virus is to select animals more resilient to the infection. A key issue to deal with disease resistance is to set up a cost-efficient phenotyping strategy. The aim of this study was to develop a phenotyping criterion to discriminate susceptible from resilient sows in PRRSV-infected farms under epidemic and endemic scenarios.

#### Material & Methods

A total of 382 Landrace x Large White gilts were classified as resilient (R) or susceptible (S) to PRRSV virus following vaccination with MLV-PRRSV at 6-7 weeks of age. Gilts were phenotyped as R if serum was negative to PRRSV at 0, 7 and 21 days post-vaccination (DPV) or as S if any of the samples at 7 and/or 21 DPV was positive. The total number of piglets born, born alive, dead and mummified was recorded in each parity. Gilts were allocated in the same farm and followed up throughout 30 months. An animal mixed model with repeatability was used to assess the difference between R and S sows for number of dead and mummified piglets.

#### Results

The number of lost piglets (dead plus mummified) was lower in R versus S sows in the epidemic situation ( $2.43 \pm 0.27$  vs  $3.36 \pm 0.21$  piglets, respectively,  $P < 0.05$ ). Remarkably, this was due to mummified piglets (associated to viral infection), which were two-fold higher in S as compared to R sows during the PRRSV outbreak ( $0.55 \pm 0.09$  vs  $1.15 \pm 0.07$  piglets for R and S, respectively,  $P < 0.05$ ).

#### Discussion & Conclusion

The criterion used to identify resilient sows can effectively reduce the number of lost piglets at farrowing in PRRSV epidemic and endemic scenarios. There is also evidence that this trait could display enough genetic variation to respond to selection.

## VVD-PP-06

### TITLE

EVALUATING THE OUTCOME OF ADVANCING PIGLET VACCINATION WITH SUVAXYN® PRRS TO 8 DAYS OF AGE ON A FRENCH FARM

Benoit Boivent<sup>1</sup>, Anne-Laure Ledoux<sup>2</sup>, Françoise Blond<sup>2</sup>, Elise Capron<sup>2</sup>, Floriane Pez<sup>3</sup>, Frédéric Colin<sup>2</sup>

<sup>1</sup> UNIVET SANTÉ ELEVAGE, rue Monge, 22600 Loudéac, France

<sup>2</sup> ZOETIS, Bâtiment VIVA, 10 Rue Raymond David, 92240 Malakoff, France

<sup>3</sup> BIOSELLAL, 27 chemin des peupliers, 69570 Dardilly, France

### CONTENT

Porcine reproductive and respiratory syndrome (PRRS) control strategies rely on a combination of acclimation, vaccination and internal biosecurity measures. On French family farms, both the herd veterinarian and the farmer would benefit from an accurate assessment of the impact of any change in the farm routines. Zoetis has developed tools to support such an approach, including IPC ABATTOIR (analyses slaughter results at batch level) and qPCR DIVA PRRS (discriminates the PRRS virus strain in Suvaxyn® PRRS MLV from wild European strains).

These tools were deployed on a 160-sow farrow-to-finish farm located in Brittany (France), with a weaning age of 28 days, where changes were implemented in the PRRS vaccination protocol in April 2018. The time of piglet vaccination against PRRS was advanced from weaning to 8 days of age. The vaccine was also changed to Suvaxyn® PRRS MLV both for piglets and quarterly mass-vaccination of sows. The herd veterinarian monitored the vaccinated piglets for clinical signs during regular visits, and blood samples of piglets were taken at 31, 49 and 70 days of age.

Preliminary results show that the respiratory health of pigs was markedly improved during post-weaning and finishing. Also, average losses ascribed to respiratory diseases decreased (from 2% before to 0.3% after the change in vaccination). Preliminary results of the IPC ABATTOIR analysis showed an average wean-to-slaughter daily weight gain of 707 g/d and an average 94.5 kg carcass weight. Analysis with qPCR DIVA PRRS detected presence of the vaccine strain genome in piglets at 31 and 49 days of age, and to a lesser degree at 70 days of age. No PRRSV field strain was detected. Further batches have been included in the follow-up to corroborate the preliminary zootechnical results.

## VVD-PP-07

### TITLE

PCV2D GENOGROUP MIGHT HAVE BECOME DOMINANT IN FRANCE

Anne Leroux<sup>1</sup>, Laetitia Poret<sup>2</sup>, Alexis Nalovic<sup>3</sup>, Guilhem Poudevigne<sup>4</sup>, Hervé Tosser<sup>1</sup>, Luc Miéli<sup>5</sup>, Frédéric Colin<sup>6</sup>

<sup>1</sup> HYOVET, Carrefour de Penthièvre, 22640 Plestan (France)

<sup>2</sup> SELAS DU BOCAGE, 36, route de Tercei, 61200 Argentan (France)

<sup>3</sup> EPIDALIS, 16, bd Denis Papin, 35500 Vitré (France)

<sup>4</sup> SOCSA ELEVAGE, 11, rue d'Ariane, 31240 L'Union (France)

<sup>5</sup> LABOCEA, 7 rue du Sabot, 22440 Ploufragan (France)

<sup>6</sup> ZOETIS, Bâtiment VIVA, 10, Rue Raymond David, 92240 Malakoff, (France)

### CONTENT

A shift in dominant PCV2 genogroups from PCV2a to PCV2b has already taken place worldwide. More recently, the PCV2d genogroup emerged in China and the USA, where it has since become dominant. In France, PCV2 genome typing was not routinely available until recently. It was implemented in 2018 and a retrospective study is underway, and is still including new herds. Farms are eligible when i. The practitioner obtained positive quantitative PCR results with a PCV2 DNA load of at least 107 copies/ml (serum) or g (organs) of samples taken before the implementation of PCV2 vaccination; ii. Vaccination has been performed at weaning for at least six months with either Suvaxyn® PCV or Suvaxyn® Circo + MH RTU and iii. The practitioner has validated that no signs of PCV2-associated disease have been observed in piglets after weaning since the implementation of PCV2 vaccination. In a preliminary stage, seven farms were included in the study, five of which are located in Brittany, and were sampled between 2015 (1 farm) and 2017 (5 farms). In one case, the genogroup could not be determined (probable co-circulation of two strains of different genogroups). In samples of the 2015 farm, PCV2b was found. In all other, more recent cases, PCV2d was identified.

PCV2 vaccines, including the whole inactivated recombinant PCV1 virus containing the PCV2 ORF2 protein (chimeric PCV1-2), have proven to be efficacious at preventing clinical signs and viraemia, both following experimental PCV2d challenge and under field conditions. These preliminary results suggest that the PCV2d genogroup might have become dominant in France, without any observable disruption in the vaccine strategies in place on farms.

## VVD-PP-08

### TITLE

RESULTS OF THE SEROLOGICAL INVESTIGATION OF AUJESZKY'S DISEASE AMONG SWINE IN UKRAINE.

Vitaliy Ukhovskiy<sup>1</sup>, Oleksandr Romanov<sup>2</sup>, Jevgeniya Shajhet<sup>3</sup>, Iryna Sobko<sup>3</sup>

<sup>1</sup> *Institute of Veterinary Medicine of National Academy of Agrarian Sciences, Kyiv, Ukraine*

<sup>2</sup> *Independent expert health and welfare of pigs, Ukraine,*

<sup>3</sup> *Center of Veterinary Diagnostics, Kyiv, Ukraine*

### CONTENT

**Background and Objectives:** This study was aimed to analyze the serological diagnostics of Aujeszky's disease among swine in Ukraine. Data are presented on serological studies of blood sera samples from swine for the presence of specific humoral antibodies against the Aujeszky's disease virus during six years (2011–2016).

**Material & Methods:** Blood sera samples were collected from all regions of Ukraine. The visual mapping and statistical analysis were conducted by using GIS technologies through software ESRI ArcGIS 10.1. The research for the presence of specific humoral antibodies against Aujeszky's disease virus in blood sera from domestic swine was performed by enzyme-linked immunosorbent assay (ELISA) using test system IDEXX Herd@PRV gI Antibody Test Kit.

**Results:** During the period 2011–2016, 9,026 blood sera samples from swine were studied and in 2,277 were received positive reactions against Aujeszky's disease (antibodies were detected in 25.2% animals from the total number of investigated swine). The monitoring investigations have covered all regions of Ukraine. For this period, 331 farms were examined and 103 of them turned disadvantage to Aujeszky's disease, which amounted to 31.1%.

During the analyzed period, the largest number of blood sera samples from swine were investigated in three regions: Dnipropetrovsk (1,789 samples), Kyiv (1,647 samples) and Donetsk (1,215 samples) oblasts. At the results of serological monitoring, it was established that the highest seroprevalence to Aujeszky's disease was registered in four oblasts: Kirovohrad – 57.1%, Kherson – 52.2%, Kharkiv – 49.3% and Sumy – 47.6%.

Antibodies to the virus were not detected in this species of animals from Ivano-Frankivsk, Luhansk, Rivne and Khmelnytsk oblasts.

**Discussion & Conclusion:** The obtained data of serological research allow us to approve that the causative agent of Aujeszky's disease circulates among the swine herds in Ukraine.

## **VVD-PP-09**

### **TITLE**

**INFECTION PRESSURE OF PCV2 IN 20 FRENCH FARMS AND IMPACT OF THE VACCINATION ON THE EXCRETION.**

**SOPHIE BRILLAND<sup>1</sup>, NATHALIE CAPDEVIELLE<sup>1</sup>, ROMAN KREJCI<sup>1</sup>, ANDREA LUPPI<sup>2</sup>, CORALIE DEFFONTAINE<sup>3</sup>, MILY LEBLANC-MARIDOR<sup>3</sup>**

<sup>1</sup> *CEVA SANTE ANIMALE 10 Avenue de la Ballastière 35101 LIBOURNE CEDEX FRANCE*

<sup>2</sup> *IZSLER, Reggio Emilia, Italy*

<sup>3</sup> *BIOEPAR, INRA, Oniris, Université Bretagne Loire, 44 307 Nantes, France*

### **CONTENT**

#### **Background and Objectives**

The control of porcine circovirus type 2 (PCV2) associated diseases (PCVD) is based on management strategies, control of the co-infections, and vaccination. Several vaccines are registered and many different protocols including gilts, sows or piglets are implemented worldwide to reduce horizontal and vertical transmission. This survey investigates the infection pressure of PCV2 in various age categories of pigs and the impact of different vaccination's protocol on PCV2 excretion.

#### **Material & Methods**

From December 2017 to March 2018, twenty farms located in the West of France were included in the study. In a single visit, laryngeal swabs were collected from 10 sows and from 2 piglets per sow just before weaning and five oral fluids were taken in pens during the post-weaning and the fattening period (pigs from 6 to 24 weeks-old). All samples were tested individually for PCV2 qPCR.

#### **Results**

Few piglets (5/400 ie 1.2%) from four farms were shedding PCV2 just before weaning. In seven breeding herds, positive PCR results were observed in sows (5.5% positivity in sows). The pair sow-piglet shedding was not systematic. Gilt vaccination seems to prevent the risk of having PCV2 positive sows in farrowing unit ( $p = 0.04$ ) and both gilts and sows vaccination tend to reduce piglets shedding at weaning ( $p=0.12$ ;  $p=0.275$ ). The vaccination of the breeding herd tends also to lower the risk of PCV2 shedding piglets in post-weaning period ( $p= 0,09$ ;  $p=0,27$ ).

#### **Discussion & Conclusion**

PCV2 infection in a herd can be maintained thanks to the presence and the circulation of the virus within the breeding herd and thus shedding by gilts and young sows in farrowing-units. In our survey the prevalence of PCV2 shedding piglets is low at weaning and the vaccination of the breeding herd appears as a key point to control PCV2 infection dynamic.

## VVD-PP-10

### TITLE

ANTIBODY RESPONSES TO INFLUENZA VIRUS TYPE A (IVA) FROM WEANING UP TO MARKETING IN PIGS IN ONTARIO, CANADA

Vahab Frazan<sup>1</sup>, Elana Raaphorst<sup>1</sup>, Robert M Friendship<sup>1</sup>, Brandon N Lillie<sup>1</sup>

<sup>1</sup> *University of Guelph*

### CONTENT

#### Background and objectives

Swine influenza caused by type A influenza virus (IVA) is one of the important swine respiratory problems resulting in decreased herd health, poorer quality meat products, and producer profits. Understanding the trends in seropositivity of the pathogen at different stages of production may help in developing control strategies to minimize the presence and impact of disease on commercial swine farms. The objective of this study was to investigate the antibody response against IVA in pigs from weaning up to end of finisher stage.

#### Material and methods

Fourteen groups of 54-60 pigs were selected from eight farrowing farms in Ontario, Canada. A summer and a winter cohort were tested on each farm. Blood samples were collected at weaning and at the end of nursery, grower, and finisher stages. Serum samples were analyzed by ELISA (SWINE INFLUENZA AB, IDEXX Laboratories) for the presence of antibodies against IVA.

#### Results

Overall, 38.5% of serum samples tested positive for IVA. In the winter cohort, 57.3% of pigs tested positive for SIV while 10.0% of pigs tested positive for IVA in the summer cohort. Seropositivity to IVA was detected in 58.3, 19.5, 30.9, and 47.2% pigs at weaning, at end of nursery, grower, and finisher stage, respectively.

#### Discussion and conclusion

These findings indicate a high level of IVA maternal antibodies present in pigs at weaning and a decline towards the end of the nursery stage. The increase of antibodies towards the end of the finisher stage indicates exposure to the virus during production. Monitoring the swine farms by IVA universal ELISA kit may be a practical and less expensive method for screening swine farms for presence of virus, and further testing for specific SIV subtypes can then be used in order to identify the IVA subtypes.

## VVD-PP-11

### TITLE

ECONOMIC BENEFIT OF AN INCREASE IN PIGLETS WEANED AFTER ACHIEVING PRRS STABILITY IN A LARGE INTEGRATED PIG PRODUCTION SYSTEM IN EUROPE

Daniel Torrents<sup>1</sup>, Joel Miranda<sup>1</sup>, Rafael Pedrazuela<sup>1</sup>, Daniel Linhares<sup>2</sup>, Alex Ramirez<sup>2</sup>

<sup>1</sup> *Laboratorios HIPRA S.A, Amer, Spain*

<sup>2</sup> *Iowa State University, Ames (IA), USA*

### CONTENT

Background and objectives

PRRS instability in breeding herds can affect productivity reducing the number of piglets weaned due to the reduction in piglets born alive and the increase in pre-weaning mortality. The aim of this study was to evaluate the economic benefits of achieving PRRS stability in PRRS positive unstable breeding herds due to the improvement of the number of piglets weaned.

Materials & Methods

In a one-year PRRS monitoring program established in a large integrated pig production system in Europe including 35 breeding herds (78,680 sows), weekly PRRS status and productive data were recorded. Difference between PRRS stable weeks and PRRS unstable in the number of weekly piglets weaned per 1000 sows (WPTHs) was calculated using a generalized linear mixed model. Based on this difference, and using a partial-budgeting model, we estimated the economic benefit of one-year PRRS stability in the large production system in Europe regarding the PRRS stability rate of each farm.

Results

An increase of 26.2 WPTHs per week was observed under PRRS stable conditions, compared to PRRS unstable. Taking into account the number of PRRS stable weeks in each sow farm during the study period, in this production system there was a total increase of 70,048 piglets weaned per year. According a 6% wean-to-finish average mortality rate observed in the group, and the current pig market profitability in Spain, during the study period, we estimated a total increase of 65,845 pigs to market and of 2.18 M€ economic benefit.

Discussion & Conclusion

Estimating the economic benefit of PRRS stability is a key point to consider in the design of control strategies and the evaluation of the return to investment of the actions implemented to stabilize breeding herds. Increase of piglets weaned through PRRS stabilization can play a significant role in the economic benefits improvement.



## VVD-PP-12

### TITLE

TIME TO STABILIZATION IN 9 SPANISH FARMS EXPERIENCING PRRS OUTBREAKS BY VACCINATING PIGLETS AT PROCESSING

Javier Abadías<sup>1</sup>, Jonás Hernández<sup>1</sup>, Clara Farre<sup>1</sup>, Ester Maiques<sup>1</sup>

<sup>1</sup> Zoetis Spain

### CONTENT

#### Introduction

Sow vaccination against PRRS (Porcine Reproductive and Respiratory Syndrome) is common practice to achieve farm stability and production of newborn piglets negative to wild-type PRRS virus (WT-PRRSv). Recently, piglet vaccination has proven to reduce/delay WT-PRRSv infection of growing pigs. The objective was to determine Time to Stability (TTS) for PRRS in commercial farms, defined as time needed to produce WT-PRRSv negative piglets at birth, 6 or 9 weeks of age, using a new vaccine and vaccination protocol..

#### Materials and Methods

Nine farrow to nursery (9 weeks of age) farms located across Spain, with clinical PRRS outbreaks diagnosed by clinical signs and confirmed by PCR, were included.. Mass vaccination of sows and routine vaccination of piglets at processing with Suvaxyn® PRRS MLV was started in each farm. To investigate sow to piglet WT-PRRSv transmission, 12–15 newborn piglets per farm were sampled at processing (1-5d of age, tails, testicles and/or sera) and tested by PCR. To determine circulation of WT-PRRSv in nurseries, 12–15 piglets per farm were bled at 3 and either 6 or 9 weeks of age, and tested using a newly developed DIVA PRRS PCR (differentiates-field-and-vaccine virus) in pools of 3 samples.

#### Results

TTS in breeding herds (WT-PRRSv negative newborn piglets) was achieved 4-7 weeks after starting vaccination; TTS in nursery (WT-PRRSv PCR negative) was achieved in 9-12 weeks in 3 farms based on 6 week of age testing, and 12-16 weeks in all farms based on 9 week of age testing.

#### Conclusion

The results support the value of Suvaxyn PRRS MLV in reducing the TTS for PRRS. Improved sow immunity prevents trans-placental WT-PRRSv infection; early piglet vaccination induces early development of active immunity against WT-PRRSv infection. To achieve WT-PRRSv negative 9 week old piglets it is also essential to implement strict biosecurity measures.

## VVD-PP-13

### TITLE

PRRSV MOLECULAR EPIDEMIOLOGY IS ABLE TO AUDIT BIOSECURITY IN PIG PRODUCTION COMPANIES

Jordi baliellas<sup>1</sup>, Elena Novell<sup>1</sup>, Vicens Tarancon<sup>1</sup>, Carles Vilalta<sup>2</sup>, Lorenzo Fraile<sup>3</sup>

<sup>1</sup> Grup de Sanejament Porci, Lleida, Spain

<sup>2</sup> Swine Health Monitoring Project, University of Minnesota, USA

<sup>3</sup> University of Lleida, Lleida, Spain

### CONTENT

#### Introduction

Porcine reproductive and respiratory syndrome (PRRSV) is one of the most important viral diseases affecting pig production. The introduction of new PRRSV strains and/or the appearance of new outbreaks due to endemic PRRSV strains are key points to control this important disease under field conditions. The aim of this research work was to find out whether the incidence of PRRSV outbreaks is due to new or endemic PRRSV strains and associates it with external biosecurity score.

#### Material & Methods

One hundred PRRSV positive farms were included with, at least, two PRRSV outbreaks diagnosed by standard diagnostic procedures from 2015 to 2018. These farms belonged to ten pig companies. All positive samples were sequenced using Sanger technology for ORF5 and similarity analysis between strains was carried out using CLC Genomics Workbench 11.0®. Two strains were classified as different with a similarity lower than 97% in ORF5 sequence. The score of external biosecurity by farm was calculated using published methods.

#### Results

The incidence of PRRSV outbreaks was very variable between companies. In four companies, the incidence of new strains was significantly higher than the incidence due to strains detected previously in the same company whereas the contrary was observed for the other six companies. Moreover, it was observed a significant association between external biosecurity score and the probability to get infected with a new strain.

#### Discussion & Conclusion

Molecular epidemiology of PRRSV is able to monitorize the evolution of PRRSV strains in relation with pig companies. Standard operation procedures in relation with pig flow is a key point to disseminate PRRSV strains detected in individual farms belonging to the same pig production company. Thus, external biosecurity is a critical point to avoid the presence of new PRRSV strains in a pig production company.

## VVD-PP-14

### TITLE

CO-INFECTION BY PORCINE CIRCOVIRUS TYPE 2 (PCV2) AND PORCINE PARVOVIRUSES 1-7 (PPV1-7) IN SERUM OF PIGS

Dagmara Milek<sup>1</sup>, Aleksandra Wozniak<sup>1</sup>, Tomasz Stadejek<sup>1</sup>

<sup>1</sup> *Department of Pathology and Veterinary Diagnostics, Faculty of Veterinary Medicine, Warsaw University of Life Sciences, Warsaw, Poland*

### CONTENT

#### Background&Objectives

PPV1 is considered as a co-factor of porcine circovirus type 2 associated diseases (PCVD). A link between PCV2 and PPV2 or PPV4 was also suggested.

The aim of the study was to investigate the correlation between the presence of PCV2 and PPV1-7 in serum of pigs.

#### Material&Methods

The serum samples (n=740) were obtained from 3-21-week-old pigs, from 11 farms in Poland. From each age group 6-10 samples from random pigs were collected. DNA was extracted after pooling by 3-5. Real-Time PCR was performed to detect PCV2 and PPV1-7. The chi-square test was used to determine prevalence differences (statistical significance level was set at p<0.05).

#### Results

Overall, 60.7% of serum pools tested negative for PCV2 (NEG-PCV2). The positive pools (POS-PCV2) were divided into LOW-PCV2 (Ct>30, 21.3%), MEDIUM-PCV2 (Ct=25-30, 12.0%) and HIGH-PCV2 (Ct<25, 6.0%). PPV1-PPV7 DNA was detected from 6.0% (PPV1) to 54.7% (PPV2) of pools. All PPVs, except PPV4, were more prevalent in POS-PCV2 compared with NEG-PCV2, but the differences were significant only for PPV3, PPV5, PPV6 and PPV7 (PPV3–33.9% vs. 7.7%, PPV5–37.3% vs. 12.1%, PPV6–49.2% vs. 22.0%, PPV7–44.1% vs. 17.6%, respectively). PPV2, PPV5 and PPV7 were more prevalent in HIGH-PCV2 compared with LOW-PCV2 or MEDIUM-PCV2 (PPV2–77.8% vs. 56.3% or 55.6%, PPV5–55.6% vs. 31.3% or 38.9%, PPV7–66.7% vs. 43.8% or 33.3%), but no significant differences were noted.

#### Discussion&Conclusion

The prevalence of PPV3, PPV5, PPV6 and PPV7 was significantly higher in POS-PCV2 than in NEG-PCV2. Although PPV2, PPV5 and PPV7 detection was higher in HIGH-PCV2 than in LOW-PCV2 or MEDIUM-PCV2, it was not statistically significant. The striking differences between co-infections by PCV2 and PPVs warrant further studies on the possible role of such infections for pig pathology.

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## VVD-PP-15

### TITLE

MACROSCOPIC AND MICROSCOPIC EVALUATION OF CENTRAL NERVOUS SYSTEM OF PIGLETS EXPERIMENTALLY INOCULATED WITH BOVINE VIRAL DIARRHEA VIRUS DURING FOETAL PERIOD

Marina Lopes Mechler-Dreibi<sup>1</sup>, Felipe dos Santos Gomes<sup>1</sup>, Igor Renan Honorato Gatto<sup>1</sup>, Gabriel Yuri Storino<sup>1</sup>, Felipe Ferreira Barbosa Pires<sup>1</sup>, Luís Guilherme de Oliveira<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

### CONTENT

Background and objectives: Pestivirus can cause hypomyelination and cerebellar hypoplasia in the central nervous system (CNS) of different animal species. BVDV, an important pestivirus, is known to infect pigs naturally. Thus, our study aimed at evaluating if BVDV-2 could cause those injuries in the CNS of piglets. Material and Methods: Three groups of pregnant gilts were inoculated by different routes at the 45th day of gestation with a field strain of BVDV-2, titration of 105,5 TCID<sub>50</sub>/ml. One group (n=4) received oronasally 15 ml of the inoculum; the second (n=4) was submitted to surgical procedure for foetal inoculation by laparotomy, with inoculation of 0.25 ml in each amniotic pouch; the third constituted the control (n=2). A total of 45 neonates were physically evaluated for CNS impairment. At the third day of life, 30% of all piglets were euthanized, and the ratio between cerebellum and brain was obtained by weighing both organs individually. Fragments of brain lobes, thalamus, hypothalamus, cerebellum, medulla oblongata and spinal cord were histologically stained by Luxol Fast Blue (LFB) and Hematoxylin/Eosin (HE), for myelin and general evaluation, respectively. Results: Neurological reflexes did not evidenced characteristics of cerebellar hypoplasia. Macroscopically, 29.5% of the piglets of both infected groups showed a cerebellar:brain ratio lower than 9%, the rest presented ratios within a range considered either normal or above for the species. There was no statistical difference. Microscopically, LFB and HE did not indicate neither hypomyelination, tissue loss nor lesions characteristic of infection. Discussion and Conclusion: Results indicate variation even among unchallenged animals, which contradicts the literature. We concluded that, experimentally, BVDV-2 was not able to cause hypomyelination or cerebellar hypoplasia in the CNS of piglets, and that there is no pattern of cerebellar:brain ratio for determination of cerebellar hypoplasia ins swine. Grants #2016/21421-2 and #2016/02982-3, São Paulo Research Foundation (FAPESP).

## VVD-PP-16

### TITLE

EXPERIMENTAL INOCULATION OF BOVINE VIRAL DIARRHEA VIRUS IN PREGNANT GILTS DID NOT INDUCE CONGENITAL PERSISTENT INFECTION IN PIGLETS

Felipe dos Santos Gomes<sup>1</sup>, Marina Lopes Mechler-Dreibi<sup>1</sup>, Igor Renan Honorato Gatto<sup>1</sup>, Gabriel Yuri Storino<sup>1</sup>, Felipe Ferreira Barbosa Pires<sup>1</sup>, Luís Guilherme de Oliveira<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

### CONTENT

Background and objectives: Bovine viral diarrhea virus (BVDV) congenital persistent infection (PI) in cattle enables the spread of this virus in the herd, and interferes with the control of the disease. Classical swine fever virus (CSFV), a devastating virus in swine production, is also capable of causing PI animals. Due to the genetic and antigenic similarities between BVDV and CSFV, this study aimed to evaluate if the experimental inoculation of BVDV-2 in pregnant gilts may generate congenital persistently infected piglets. Material and Methods: Six gilts at the 45th day of gestation were divided into two groups. The first (n=4) received 15 mL of a field strain of BVDV-2, titration of 105,5 TCID<sub>50</sub>/ml, by the oronasal route. The second (n=2) composed the control. Blood samples of gilts were collected every 72h until delivery. At birth and before colostrum intake, blood samples and nasal swabs were collected from neonates. During 35 days post birth, all piglets were clinically evaluated, followed by collections of blood samples and nasal swabs every 72h. RT-PCR tests were performed for direct diagnosis in blood and swab samples, and the serum obtained from gilts and piglets were submitted to virus neutralization test. Results: Gilts seroconverted between the 17th day post-infection (dpi) and the 22nd dpi, but no viremia was detected. In addition, there was not detection of viral RNA in blood and nasal swab samples from piglets. At birth, no piglet presented antibodies anti-BVDV, but antibodies were acquired after colostrum immune transfer, and titers were observed until weaning. Discussion and Conclusion: Experimentally, transplacental transmission of BVDV-2 was not evidenced since the animals were born BVDV free. We conclude that BVDV may not play an important role in swine production, and congenital persistent infection was not observed. Grants #130298/2018-2 (CNPq), #2016/21421-2 and #2016/02982-3, São Paulo Research Foundation (FAPESP).

## **VVD-PP-17**

### **TITLE**

DETECTION OF PORCINE CIRCOVIRUS TYPE 2 (PCV2) IN DIFFERENT DIAGNOSTIC MATERIALS

Aleksandra Wozniak<sup>1</sup>, Dagmara Milek<sup>1</sup>, Tomasz Stadejek<sup>1</sup>

<sup>1</sup> *Department of Pathology and Veterinary Diagnostics, Faculty of Veterinary Medicine, Warsaw University of Life Sciences, Warsaw, Poland*

### **CONTENT**

Background&Objectives

The aim of the study was to compare the presence of PCV2 DNA in serum, feces and oral fluid from pigs from 10 Polish farms vaccinated against PCV2.

Material&Methods

Serum, feces and oral fluid samples from piglets, weaners and fatteners were obtained from 10 farms using different vaccines and vaccination protocols. Samples were analyzed with in house Real Time PCR for PCV2. Ct>37 was considered negative.

Results

PCV2 was detected in oral fluid from 9 out of 10 farms. On average 56.8% of tested oral fluid samples were positive for PCV2, but the prevalence ranged from 0% in farm 3 to 100% in farms 2 and 5. The mean PCV2 genome equivalent in oral fluid was  $1.6 \times 10^6$  (min.= $1.2 \times 10^4$ ; max.= $1.9 \times 10^7$ ) copies/ml. The virus was found in feces from 8 out of 10 farms. 37.9% of fecal samples reacted positive for PCV2 and the prevalence ranged from 0% in farms 1 and 3 to 75.0% in farms 2 and 4. Mean PCV2 genome equivalent was  $1.2 \times 10^5$  (min.= $1.2 \times 10^4$ ; max.= $4.0 \times 10^6$ ) copies/ml. PCV2 was detected in serum from 4 out of 10 farms. In farms 2, 4 and 7 viremia was detected in fatteners. In farm 6 it was detected only in 17-week-old pigs. On average PCV2 was detected only in 16.4% of serum samples and mean PCV2 genome equivalent was  $3.7 \times 10^6$  (min.= $1.1 \times 10^4$ ; max.= $7.5 \times 10^7$ ) copies/ml.

Discussion&Conclusion

Populations of pigs vaccinated against PCV2 can exhibit different patterns of the presence of PCV2 DNA in serum, feces and oral fluid. Even non-viremic pigs can shed PCV2 with feces. Oral fluid can be recommended for monitoring of PCV2 elimination from farms.

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## VVD-PP-18

### TITLE

RESULTS OF DIAGNOSTIC SAMPLES FROM SWINE FOR SWINE INFLUENZA A VIRUS IN THE NETHERLANDS AND BELGIUM IN 2018

Peter van der Wolf<sup>1</sup>, Verena Schüler<sup>2</sup>, Emile Libbrecht<sup>1</sup>, Marlies Olde Monnikhof<sup>1</sup>, Katrin Strutzberg-Minder<sup>3</sup>

<sup>1</sup> *IDT-Biologika Benelux*

<sup>2</sup> *IDT-Biologika GmbH*

<sup>3</sup> *IVD Innovative Veterinary Diagnostics (IVD GmbH)*

### CONTENT

Here we present the analysis of samples from swine gathered by veterinarians in The Netherlands and Belgium in 2018 and analysed by IVD GmbH, Innovative Veterinary Diagnostics, Seelze, Germany, for Swine Influenza A Viruses (IAV).

For sampling either IDT-sampling kits containing 20 swabs were used, swabs were sometimes pooled per 5 in tubes containing virocult media, or chewing ropes to collect saliva were used. Detection and typing of IAV was done by multiplex Real-Time PCRs (RT-qPCR). Typing is not possible at low virus concentrations.

In total there were 26 submissions with a total of 167 samples from Belgium and 34 submissions with 307 samples from The Netherlands. In Belgium there were 3 submissions of saliva of respectively 4, 2 and 2 samples each and one submission of 3 lung swabs. All other samples were nasal / nare swabs.

Four samples from one submission were not analysed, the other samples in this submission were all positive (n=8, not typed). All 3 lung samples were positive for H1huN2. Three out of 8 saliva samples were positive (1 out of 2, not typed, and 2 out of 2 typed as H1huN2).

Samples from 11 submissions from Belgium could be typed. H1avN1 was found in 6 submissions, H1huN2 in 4, H1pdmN1pdm in 1 together with H1huN2, and a H1avN2 reassortant in 1 submission. The case where H1pdmN1pdm and H1huN2 was found, will be presented separately, because it was the first time H1pdmN1pdm was found in Belgium.

Samples from 13 submissions from the Netherlands could be typed. H1avN1 was found in 7 submissions, H1huN2 in 5, including one herd where also H1avN1 was found, H1pdmN2 in 1, and an H1avN2 reassortant in 1 submission.

Pandemic IAV are found in swine in the Benelux. Co-infection with two types can occur within one herd.

## **VVD-PP-19**

### **TITLE**

**SUCCESS OF A NEW PRRS CONTROL PROGRAM, INCLUDING ROUTINE EARLY PIGLET VACCINATION, IN A PERSISTENTLY AFFECTED SPANISH FARM**

Juan Rodriguez<sup>1</sup>

<sup>1</sup> *Agropormanso*

### **CONTENT**

#### **Background and Objectives**

Effective control of Porcine Reproductive and Respiratory Syndrome (PRRS) remains a priority in most commercial pig farms. The study objective was to assess the efficacy of an improved PRRS management program, including vaccination of sows and routine vaccination of newborn piglets, in a PRRS endemic farm.

#### **Materials and Methods**

A two-site farm was selected, which had experienced four PRRS outbreaks in the previous 5 years, with 3 different strains (ORF 5 sequence). Site 1 had 1,250 sows (60% ACMC + 40% Danbred genetics) with batch farrowing every week. Site 2 had 4,800 weaning pigs. Four month herd closure for replacement gilts and was implemented the management of the farm to 3 week bands (farrowing every three weeks). Suvaxyn® PRRS MLV (Zoetis) was used for mass and routine vaccination of piglets at processing. Strict McRebel rules were implemented and sick pigs were treated with Draxxin® (Zoetis).

#### **Results**

After the program implementation, the farrowing rate improved a 8.2% (78,4% to 86,6%) and total newborn piglets 0.8 per sow (15.2 to 16.0). Preweaning mortality decreased 1.1% (12.6% to 11.5%) and weaned pigs per sow improved 1.4 (11.4 to 12.8). Post-weaning mortality decreased 7.6% (9.4% to 1.8%). Negative PRRS DIVA PCR results indicated no-circulation of field PRRS virus in the farrowing and weaning zone (at 20, 40 and 60 days of age). A reduction of secondary bacterial infections and consequent antibiotic treatments was also reported.

#### **Discussion and Conclusion**

The control program, including the new vaccination protocol with Suvaxyn PRRS MLV, resulted in elimination of field PRRSv circulation in farrowing and weaning zone and a significant improvement of productive parameters. The farm has not experienced a new PRRS outbreak, confirming the on-going success of the program.



## **VVD-PP-20**

### **TITLE**

PREVALENCE OF PRRS VIRUS IN NURSERY PIGS IN DUTCH FARMS IN BETWEEN OCTOBER 2017 AND MARCH 2018

Anke Verhaegen<sup>1</sup>, Tom Meyns<sup>2</sup>, An Vanderzeypen<sup>2</sup>

<sup>1</sup> ZOETIS B.V., Rivium Westlaan 74, Capelle ad IJssel, The Netherlands

<sup>2</sup> ZOETIS Benelux, Mercuriusstraat 20, 1930 Zaventem, Belgium

### **CONTENT**

#### Introduction

PRRS (Porcine Reproductive and Respiratory Syndrome) is one of the most important pig diseases, and its significance in the Netherlands seems to be increasing, especially during the early nursery period. To gain insights about the extent of the problem, PRRS virus prevalence was evaluated at start, mid and the end of the nursery period in 30 farms.

#### Material and methods

Between October 2017 and March 2018, 30 farms not vaccinating piglets against PRRS, were selected by herd veterinarians based on their interest to participate in the project. In each of the 30 farms, 45 piglets were sampled as follows: 20 at start, 15 at mid and 10 at the end of the nursery period. Samples were pooled per 5 and investigated by PRRS PCR. A survey was conducted to identify risk factors for the prevalence of PRRS virus.

#### Results

The presence of PRRSv was confirmed in young piglets just after weaning in 37% of the farms. At mid of the nursery period PRRSv presence increased to 50%, and at the end of the nursery it reached 63% of the farms. The overall presence of the virus in the nursery period was confirmed in at least one of the three time points in 67% of the farms.

The prevalence of PRRSv was higher in farrow to finish farms (81%) than in breeding farms (piglets kept to end of nursery) (60%). The PRRS vaccination strategy in the sows did not seem to have any influence on the prevalence of the virus.

#### Conclusions

The results of the Zoetis PRRS prevalence project demonstrate a high prevalence of PRRSv in very young piglets just after weaning, which clearly increases during the nursery period. These results are in line with prevalence data obtained in other studies in Belgium (DGZ, Biggenmonitor).

## VVD-PP-21

### TITLE

#### EVALUATION OF SERUM PORCINE TESCHOVIRUS TITER IN GROWER PIGS WITH NEUROLOGICAL SIGNS – A LONGITUDINAL STUDY

Niels Grützner<sup>1,2</sup>, Maike Walther<sup>1</sup>, Sven Reiche<sup>3</sup>, Katja Goller<sup>3</sup>, Christina Bredtmann<sup>4</sup>, Corinne Gurtner<sup>4</sup>, Kerstin Albrecht<sup>5</sup>, Patricia Scheer<sup>6</sup>, Heiko Nathues<sup>2</sup>

<sup>1</sup> IAEW, Martin Luther University, Halle-Wittenberg, Germany

<sup>2</sup> Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland

<sup>3</sup> Department of Experimental Animal Facilities and Biorisk Management, Friedrich-Loeffler-Institute, Riems island, Germany

<sup>4</sup> Institute of Animal Pathology, Department of Infectious Diseases and Pathobiology, Vetsuisse Faculty, University of Bern, Switzerland

<sup>5</sup> State Institute for Consumer Protection of Saxony-Anhalt, Department of Veterinary Medicine, Stendal, Germany

<sup>6</sup> SUISAG, Division: Pig Health Service, Bern, Switzerland

### CONTENT

#### Background & Objectives

In an organic fattening pig herd in Switzerland growers presented with anorexia, inappetence, poor growth, fever and neurological signs. After necropsy of affected pigs, porcine teschovirus (PTV) had been identified in the gastrointestinal tract and related lymph nodes. However, it was unclear when the infection of the pigs occurs. Therefore, a longitudinal study was performed in both piglet producing and fattening farm to identify the time of the PTV-infection in these pigs.

#### Material & Methods

Serum samples of pigs (n=15) were obtained beginning with 3 weeks of age five-times every four weeks, whereas the first two serum collections were conducted at the piglet producer and the remaining collections at the fattener. The PTV-neutralisation-titer (NT) was analysed for all 75 serum samples using a PTV-specific neutralization test. A Friedman test and the corresponding posttest were used to compare the PTV-NT of the pigs among the different timepoints to identify the time of infection.

#### Results

The PTV-NT differed significantly among the timepoints ( $p < 0.0001$ ), whereas the first (median PTV-NT: 33) and second (median PTV-NT: 90) timepoint at the piglet producing site had significantly lower PTV-NT than the third (median PTV-NT: 288, for both:  $p < 0.01$ ), fourth (median PTV-NT: 226; for both:  $p < 0.05$ ) and fifth (median PTV-NT: 422; for both:  $p < 0.001$ ) timepoint at the fattening site. The two timepoints at the piglet producer were significantly different ( $p > 0.01$ ); however, the data showed a three to six time higher PTV-NT in the pigs at the fattener than piglet producer.

#### Discussion & Conclusion

The longitudinal study showed a three to six times higher PTV-NT in pigs at the fattening site, which might indicate that the time of PTV-infection occurs rather here than at the piglet producing site. Therefore, the fattener should take action to prevent PTV-infection in the subsequent pig batches.

## VVD-PP-22

### TITLE

MONITORING THE EFFICACY OF A NEW PRRS VACCINATION PROGRAM IN A FARM EXPERIENCING AN OUTBREAK USING A NEW DIVA PCR PRRS TEST

Juan Grandía<sup>1</sup>, Teresa Montull<sup>1</sup>, Rocío Sarasa<sup>2</sup>, Beatriz Aznar<sup>2</sup>, Javier Abadías<sup>3</sup>

<sup>1</sup> *Agro-Test-Control, S.L*

<sup>2</sup> *Inbiotic-Esmedagro, S.L*

<sup>3</sup> *Zoetis Spain, S.L*

### CONTENT

#### Background and Objectives

The Porcine Reproductive and Respiratory Syndrome wild type virus (WT-PRRSv) typically spreads in nursery pigs when passive maternal immunity wanes, resulting in viremia peaks at around 7 weeks of age. The objective was to evaluate the efficacy of a new PRRS vaccination program in controlling WT-PRRSv infection and disease.

#### Materials and Methods

A PRRS-positive (serology and PCR) 1,300 sow farm with severe clinical signs was selected. All sows were vaccinated with Suvaxyn® PRRS MLV (Zoetis), and all piglets were vaccinated at 1-3 days of age. For 6 consecutive weeks 12 farrowing sows were enrolled (n=72) and 2 newborn piglets from each sow (n=144) were ear-tagged and sampled at birth, weaning, 7 and 9 weeks of age to determine IgG levels (PRRS-Idexx) and PRRSv viremia (Real Time-PCR). Specific primers were used to develop a DIVA (differentiates-infected-from-vaccinated-animals) PCR PRRS test, which discriminates vaccine and field viruses.

#### Results

7 weeks after the initial sow mass vaccination reproductive parameters improved significantly and no newborn piglet showed viremia. The percentage of PCR-positive pigs rose from weaning to the 9th week of age. The DIVA PCR test confirmed PRRSv vaccine viremia that lasted until the 7th week of age, without presence of WT-PRRSv in sera. 75% of samples taken at 9 weeks tested PCR negative to both vaccine and WT-PRRS viruses, none to vaccine and 25% to WT-PRRSv.

#### Conclusion

The new PRRS control program combining mass vaccination of sows and on-going vaccination of 1-3 day-old piglets with Suvaxyn PRRS MLV resulted in a very effective protection in a farm with high PRRSv prevalence and severe clinical signs, including control of WT-PRRS viremia in nursery. The new DIVA-PCR differentiates PRRS vaccine virus from wild type PRRSv, and is a very promising tool to monitor the efficacy of PRRS control programs in commercial farms.

## VVD-PP-23

### TITLE

ABSENCE OF BOVINE VIRAL DIARRHEA VIRUS EFFECT ON THE SEMINAL QUALITY OF EXPERIMENTALLY INFECTED BOARS

Gabriel Yuri Storino<sup>1</sup>, Marina Lopes Mechler-Dreibi<sup>1</sup>, Eduarda Bellini Xavier<sup>1</sup>, Artur Simonatto Fioroto<sup>1</sup>, Igor Renan Honorato Gatto<sup>1</sup>, Maria Emilia Franco Oliveira<sup>1</sup>, Luís Guilherme de Oliveira<sup>1</sup>

<sup>1</sup> *São Paulo State University (Unesp), School of Agricultural and Veterinarian Sciences, Jaboticabal, São Paulo, Brazil*

### CONTENT

Background and objectives: Viral infections in pigs may result in loss of reproductive performance because they can affect factors related to seminal quality. The aim of the present study was to promote the experimental infection of boars with BVDV-2a and evaluate the viral shedding by the reproductive pathway, as well as the effects of infection on the seminal quality. Material and Methods: Six two years old boars were inoculated with a total of 11.5 ml of BVDV-2a noncytopathic strain LVB 16557/15, titrated  $1 \times 10^{5.5}$  TCID<sub>50</sub> / ml by oral, nasal, intramuscular and intravascular routes. From inoculated boars were collected samples of semen, preputial swab and blood for RT-PCR every four days from day (D)-16 to D52, with inoculation on D0. The semen collected was evaluated for total motility, vigor, agglutination, sperm concentration, membrane integrity, and total defects. Results: No clinical signs were observed in any of the inoculated males. The only parameter that presented differences over the period evaluated was the percentage of total defects between D-12 ( $5.5a \pm 2.5\%$ ); D-8 ( $5.2a \pm 2.1\%$ ) and D40 ( $1.0b \pm 0.8\%$ ); D44 ( $1.5b \pm 0.5\%$ ) by Friedman's test ( $p < 0.05$ ). It was not detect BVDV-2 viral RNA in any sample collected throughout the experimental period. Discussion and Conclusion: The observed results suggest that BVDV-2a strain LVB 16557/15 has no relevance on reproductive performance. The occurrence of total defects was higher in the pre-inoculation period and it is not related to infection. The observation of significant changes in factors related to seminal quality might be associated with infections caused by other pestivirus species more virulent, like Classical Swine Fever Virus and Atypical Porcine Pestivirus Virus, or even strains of BVDV-2 that are more adapted to the swine host. Grants #2017/00950-0 and #2016/21421-2, São Paulo Research Foundation (FAPESP).

## VVD-PP-24

### TITLE

SAFETY AND EFFICACY OF PRRS VACCINATION IN PIGLETS AT 1 TO 4 DAYS OF AGE IN A FLEMISH FARM

Stefan De Groot<sup>1</sup>, Patrick Rabaey<sup>1</sup>, An Vanderzeypen<sup>2</sup>, Anke Verhaegen<sup>3</sup>, Tom Meyns<sup>2</sup>

<sup>1</sup> DAP Vedanko, Keukelstraat 66A, 8750 Wingene, Belgium

<sup>2</sup> ZOETIS Benelux, Mercuriusstraat 20, 1930 Zaventem, Belgium

<sup>3</sup> Zoetis B.V., Capelle ad IJssel, The Netherlands.

### CONTENT

#### Background and Objectives

PRRS is an important swine disease and piglet vaccination is being increasingly used in control programs. The current field trial was designed to evaluate the safety and efficacy of early piglet vaccination using a new vaccine.

#### Materials & Methods

On an 1800 sow farm two batches of 90 sows were selected. Piglets from one (S) were vaccinated with Suvaxyn® PRRS MLV at 1-4 days of age (D) and against Mhyo and PCV2 at around 17D. Piglets from the second group (C) were vaccinated around 17D with another PRRS vaccine and the same Mhyo and PCV2 vaccines. Safety of PRRS vaccination was evaluated in S and efficacy in both groups up to slaughter. Production parameters were measured and economic calculations made. Groups were housed separately but in similar conditions.

#### Results

1065 group S piglets were vaccinated for PRRS at 1-4D. No reactions were observed. Body temperature was measured in 30 piglets at vaccination and after 2, 4, 6, 24, 48 and 96h, showing no impact on average temperature and no individual temperature of > 40.5°C. Piglets were weighed at 6, 24 and 48h, showing 45g, 230g and 464g weight gain respectively.

620 pigs per group were followed during the fattening phase, housed at the same farm at the same time in identical units. Pigs from group S spent 127 days in fattening vs 135 for group C. ADWG in S was 31g higher, while corrected FCR (20-100kg) was 0.11 lower. Economic calculation showed a financial improvement of 4.45€ per pig for group S. Circulation of PRRS field virus was confirmed in both groups.

#### Conclusion

Vaccination of piglets with Suvaxyn PRRS mlv at 1-4D was safe. Clinical efficacy of Suvaxyn PRRS MLV was confirmed during fattening.

## VVD-PP-25

### TITLE

#### DIAGNOSIS OF PORCINE CYTOMEGALOVIRUS BY QPCR

Lola Tolstrup<sup>1</sup>, Charlotte Kristiane Hjulsager<sup>2</sup>, Lars Erik Larsen<sup>2</sup>, Svend Haugegaard<sup>3</sup>, Tim Kåre Jensen<sup>2</sup>, Mette Sif Hansen<sup>2</sup>, Charlotte Sonne Kristensen<sup>3</sup>

<sup>1</sup> *SEGES Pig Research Center*

<sup>2</sup> *National Veterinary Institute*

<sup>3</sup> *SEGES Pig Research Centre*

### CONTENT

#### Background and Objectives

Porcine cytomegalovirus (PCMV) inhabit the nasal cavity of pigs and can cause rhinitis. Detection of inclusion bodies by histopathology has been the gold standard when diagnosing PCMV. As PCMV are present in the nasal fluid of a high proportion of healthy pigs, detection of the virus by conventional PCR is inconclusive. The hypothesis is that the amount of PCMV in the nasal secretions are higher in pigs with inclusion bodies compared to healthy pigs. Thus, the objective of this study was to compare the quantitative results of qPCR on nasal swabs with the histopathological examinations.

#### Material & Methods

Nasal swabs and nasal mucosa from piglets with signs of upper respiratory disease were tested by real-time qPCR and histopathology. The qPCR results were reported on a continuous log<sub>10</sub> scale, and the histopathology was reported on a qualitative scale, declaring no pathological signs of PCMV, inconclusive signs or definite signs of PCMV. Results were compared by ROC-curves with area under the curve (AUC), stating the overall test validity. The optimal cut-off value for the PCR test was established using plots of sensitivity (Se) and specificity (Sp) at different qPCR cut-off values.

#### Results

In total, 46 piglets were examined. The prevalence of piglets with inconclusive or definite signs of PCMV was 65%, whereas 41% of the piglets had definite histopathological signs. When including both the suspected and definite pathological signs, the ROC curve AUC were 0.83, Se=0.70, Sp=0.89 and the optimal cut-off of 5.83log<sub>10</sub>. The ROC curve only including definite histopathological signs of PCMV showed an AUC=0.96, Se=0.89, Sp=0.96 and an optimal cut-off of 7.16log<sub>10</sub>.

#### Discussion & Conclusion

The conclusion is that qPCR on nasal swap samples can be used as a diagnostic tool for diagnosing PCVM in piglets with a cut-off for the PCR test between 5.83log<sub>10</sub> and 7.16log<sub>10</sub>.

## VVD-PP-26

### TITLE

PRRS 'PIGLET MONITOR' IN NORTHERN BELGIUM

Tamara Vandersmissen<sup>1</sup>, Willem Van Praet<sup>1</sup>, Caroline Bonckaert<sup>1</sup>, Marylène Tignon<sup>2</sup>, Herman Deschuytere<sup>1</sup>

<sup>1</sup> *Animal Health Care Flanders, Lier, Belgium*

<sup>2</sup> *Sciensano, Brussels, Belgium*

### CONTENT

Pig farms in Northern Belgium (Flanders) are often endemically infected with PRRSV. DGZ developed "Piglet Monitoring", a voluntary project, to provide swine veterinarians with a tool to determine the PRRS status of the herds.

Twice a year, the veterinarian sampled 30 nursery piglets: three groups of ten piglets of approximately four, eight and twelve weeks old. Blood samples were individually examined for the presence of PRRS antibodies (ELISA) and pooled per three for the presence of the virus (PCR). Within every sampling, the positive pool with the lowest Ct-value was sequenced (ORF5).

This study shows the results from the start of the project (January 2015) until November 2017.

One hundred and eighty participating herds performed 409 samplings. PRRS antibodies were detected in 98% of the herds (n=180, at least one animal with an S/P ratio > 0.4). Almost 80% tested PCR positive (at least one pool) in their first sampling. More than 1/3 of the herds had PRRS PCR positive piglets at the age of four weeks and 1/3 became PCR positive from eight weeks onwards. In their second sampling, 71% of the herds (n=137) were PCR positive.

A total of 38 herds had at least two samplings and didn't have PCR positive samples in the last sampling.

Twenty eight of these herds evolved from at least one PCR positive age category to no PCR positive results. A total of seven herds remained negative during sequential samplings, three had alternating results.

The sequencing of 762 PCR positive samples (pools or individuals from pools) provided 446 valid sequences.

Among them, 83.4% corresponded to genotype 1 (clustered within subtype 1.1) and 16.6% to genotype 2.

These results confirmed PRRSV is present on most Flemish herds. Continued monitoring and guidance by the veterinarian can result in the control of PRRS on farm level.

## VVD-PP-27

### TITLE

INTRODUCTION OF PCV2-VACCINATION IN A SOW FARM AND EFFECTS ON VIRUS LOAD IN BLOOD AND SALIVA SAMPLES

Annette Gass-Cofré<sup>1</sup>, Astrid Pausenberger<sup>2</sup>, Katharina Schlessmann<sup>1</sup>, Robert Tabeling<sup>2</sup>

<sup>1</sup> *vet practice*

<sup>2</sup> *MSD Animal Health*

### CONTENT

#### Background and Objectives

Due to good herd health in a herd of 600 SPF sows porcine Circovirus Type2 (PCV2) vaccination was deferred. Four years later and after diagnosis of porcine Circovirus disease (PCVD), intradermal vaccination was started with Porcilis® PCV ID. Aim of the study was to test the feasibility of single saliva samples (SSS) for the monitoring of virus circulation and to evaluate the differences in PCV2 virus load between different sample types from vaccinated and unvaccinated animals.

#### Material and Methods

For diagnostic and monitoring purposes blood and saliva samples from 20 animals of different age groups were collected before and after introduction of vaccination. SSS were individually collected from the same animals that had been bled and chewing ropes (CR) were used in parallel in the same pens. All samples were examined by quantitative Polymerase Chain Reaction (qPCR) in the Institut fuer Innovative Veterinaerdiagnostik mbH (IVD), Seelze, Germany.

#### Results

Virus load in SSS laid in similar proportions as in the according CR. Saliva samples tested positive earlier, longer and higher than the blood samples. Before vaccination viremia was detectable from a peak of 5,02 log PCV2 GE mean at 10 weeks of age and dropped in the fattening groups. SSS tested positive in 95% of weaners already and virus load dropped slower than in blood samples after the 10-weeks-peak. Samples from vaccinated groups had statistically significant lower virus loads in nearly all sample types and age groups compared to unvaccinated groups.

#### Discussion and Conclusion

SSS are easy to take and can replace chewing ropes in younger animals. According to other publications virus load in saliva is higher and longer detectable than in bloods so it is a practicable approach for monitoring of virus circulation. Vaccination is an effective tool to reduce virus load in blood and saliva samples.



## VVD-PP-28

### TITLE

EVALUATION OF PORCINE EPIDEMIC DIARRHEA VIRUS (PEDV) SEROPREVALENCE IN FRANCE IN 2018

Isabelle Corrége<sup>1</sup>, Roxane Rossel<sup>1</sup>, Béatrice Grasland<sup>2</sup>, Nicolas Rose<sup>2</sup>

<sup>1</sup> ANSP – 5 rue Lespagnol, 75020 Paris

<sup>2</sup> Anses Laboratoire de Ploufragan-Plouzané-Niort, 22440 Ploufragan

### CONTENT

#### Background and Objectives

In France, four cases of porcine epidemic diarrhea (PED) were detected from 2014 to 2017 caused by moderate pathogenic “S-InDel” strains. PED caused by highly pathogenic “S-non-InDel” PEDV strains is notifiable in France and no case has been reported.

A national serological survey was implemented in 2018 to assess the PEDV prevalence in order to evaluate if PEDV strains have been circulating without clinical signs in herds.

#### Material & Methods

Blood samples (10 samples/farm) were collected from 540 farms representative of the french pig production stratified on farm type and region. In each herd, no PED typical clinical signs were reported at the time of sampling. Each serum was analyzed with the ELISA IDScreen® PEDV spike competition (PEDV Elisa) (specificity: 99.4%, sensitivity: 90%). Sera which tested positive with Elisa were retested with the same kit (PEDV Elisa repetition) and by IPMA.

#### Results

0.7% of the sera analyzed with PEDV Elisa (n=5 399) tested positive. 5.9% of the farms had one or more (3 maximum for two herds) sera positive with PEDV Elisa. In all these cases, either only one serum per farm was positive or the results with other tests (PEDV Elisa repetition and IPMA) did not allow to conclude on the positivity (discordant results or close to the positive cut-off of the test).

#### Discussion & Conclusion

The nature of the results and the knowledge on the disease (high contagiousness) allow to conclude that the positive results are false positives inherent to the analysis methods and to the very low prevalence of PEDV in our territory. Our survey shows that the PEDV prevalence in France is less than 0.6%.

To preserve this very favorable situation with PEDV, French pig organizations must now define protective measures when importing animals and management measures in case of PED outbreaks.

## VVD-PP-29

### TITLE

#### SWINE INFLUENZA - RESULTS FROM ROUTINE DIAGNOSTICS

Astrid Tschentscher<sup>1</sup>, Jan Böhmer<sup>1</sup>, Verena Schüller<sup>2</sup>, Stefan Pesch<sup>2</sup>, Katrin Strutzberg-Minder<sup>1</sup>

<sup>1</sup> *IVD Innovative Veterinary Diagnostics (IVD GmbH)*

<sup>2</sup> *IDT Biologika GmbH*

### CONTENT

Influenza A virus (IAV) causes a respiratory disease in swine with high morbidity but low mortality. IAV is divided into subtypes defined by the combination of the surface glycoproteins hemagglutinin (18 HA) and neuraminidase (11 NA). In Europe, the most prevalent subtypes are H1avN1, H1huN2, H3N2, H1pdmN1, and (recently) H1pdmN2, with reassortments possible.

This survey analyzed routine diagnostic results both serologically, by ELISA and hemagglutination inhibition (HI) test, and by real-time RT-PCR.

During the first half of 2018, a total of 4566 and 9874 swine serum samples was tested by competitive ELISA or HI, respectively; a further 5453 samples (66.0% nasal swabs; 19.1% oral fluids; 10.4% lungs) were tested by SIV-PCR. Another 816 samples were subtyped by multiplex real-time PCR targeting different genes for HA and NA. Different Influenza A strains of the 5 most predominant subtypes in Europe were used as antigens for HI testing. Data were analyzed according to age group and country of origin.

The percentage of positives ranged from 26.3% (HI) to 56.9% (ELISA). Most of the sera analyzed by HI were from sows (64.7%), whereas most tested by ELISA were from fatteners (50.3%). Most samples tested by PCR were from piglets (40.6%) and fatteners (31.1%). The distribution of subtypes differed both according to testing method (HI or PCR) and country of origin. In Germany, the dominant subtypes in HI results were H1avN1 and H3N2. The most frequent subtypes found by PCR were H1avN1 in Germany, France, and the Netherlands, followed by H1huN2 and H1avN2 in Germany and France.

These data represent a concise overview of the occurrence of different SIV subtypes in domestic swine in Germany and other European countries.

However, the reasons for the variation in subtype distribution should be analyzed further, considering countries, vaccination status, multiple Influenza infections, and animal age.

## **VVD-PP-30**

### **TITLE**

**DISCOVERING THE DOOR OPENER FOR PRRS IN TWO NEGATIVE FARMS WITH BIOPORTAL: CASE REPORT**

Iván Hernández-Caravaca<sup>1</sup>, Sebastián Figueras-Gourgues<sup>1</sup>, Victor Rodriguez-Vega<sup>1</sup>, Eugenio Sánchez Tarifa<sup>1</sup>, Gloria Abella<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim Animal Health España*

### **CONTENT**

Background and Objectives

During the last 8 years, Boehringer Ingelheim Vetmedica, Inc. in collaboration with UC Davis -and other institutions like Iowa State University- have improved the program Disease Bioportal to aligned sequences of PRRSV. The aims of this work is monitoring new isolates in company level by using Bioportal and try to identify the route that PRRS used to get into the farms.

Material & Methods

Two integrated negative farms (A and B) were become positive in early 2018 detecting PRRS virus by PCR. These two viruses were sequenced and introduced in Bioportal to be compared with the company database. The Disease BioPortal software (<http://bioportal.ucdavis.edu/>) was used to generate the phylogenetic trees and evaluated the genetic distances between the sequences. To determine that a sequence is different to other all the sequences were compared assuming the threshold of 2 %. Very restricted biosecurity rules were applied by the integrator company to avoid the cross contamination of the farms

Results

Comparing farm A sequence with the database of the company we obtained a 0,61% heterology with other isolate within this integrator's database. This isolate correspond to another positive farm owned by the same owner of the farm A in a different location but the same area.

When farm B sequence was aligned we found as in the previous case, that the isolate was related (1,8% heterology) to other farm owned by the same owner of farm B.

Discussion & Conclusion

These results suggest, a biosecurity violation was committed by the owners of these two negatives farms, becoming both positives with the same viruses of their positive farms.

Bioportal was able to analyze the strains within a farm and company level as in this study is showed, clarifying same of the questions on how the new isolates entered to the farms.

## VVD-PP-31

### TITLE

#### OVERCOMING THE PRACTICAL LIMITATIONS OF PRRS ORF5 SEQUENCING

Laura Valls<sup>1</sup>, Alba Sánchez<sup>2</sup>, Elena Navas<sup>2</sup>, Jaime Maldonado<sup>2</sup>

<sup>1</sup> *HIPRA, Amer (Girona), Spain*

<sup>2</sup> *HIPRA*

### CONTENT

#### Background and Objectives

Porcine Respiratory and Reproductive Syndrome Virus (PRRSV) genomic variation determined by sequencing is used to understand virus epidemiology and to drive control strategies, with nucleotide sequence analysis of the ORF5 gene as the cornerstone of virus characterisation. The main limitations are primer design due to high genetic variability, cost and waiting time for results. The aim of this study is to report on the way to overcome some of the practical limitations of PRRSV ORF5 sequencing in a diagnostic laboratory.

#### Material & Methods

A total of 28 type-1 (EU) and type-2 (NA) PRRSV isolates and 61 field samples (serum and tissues ORF7-qPCR positive coming from 5 European countries) were analyzed. Three different primer-pair RT-PCR protocols (2 EU and 1 NA) previously described were adapted to SybrGreen methodology and used to amplify complete ORF5 gene of all the samples. The purified PCR products were sequenced using Sanger methodology, and nucleotide sequences were analyzed.

#### Results

Complete ORF5 gene from 84/89 (94.4%) specimens were successfully amplified after attempting with the tested protocols. Phylogenetic analysis of obtained nucleotide sequences allowed the characterization of all of them. Results were obtained in 24-72 hours, although the ORF5 gene from 2 viral isolates and 3 field samples (5.6%) were not amplified with any of the protocols. Also, different kind of samples such as oral fluids had been tested with successful results.

#### Discussion & Conclusion

Despite the high genetic variation of ORF5 in PRRSV, sequencing can be performed with high success rate in a short time, and at an affordable cost. However, several primer pairs are needed to get valid sequences from most samples. These results encourage continuing testing more samples, and new technologies such as Next Generation Sequencing are being tested as an alternative to characterize strains that would otherwise remain unknown.

## VVD-PP-32

### TITLE

USE OF OROPHARYNGEAL SWABS FOR PORCINE RESPIRATORY AND REPRODUCTIVE SYNDROME VIRUS DIAGNOSTICS AND SURVEILLANCE

Carles Vilalta<sup>1</sup>, Jorge Garrido<sup>2</sup>, Juan Sanhueza<sup>1</sup>, Montserrat Torremorell<sup>1</sup>, Cesar Corzo<sup>3</sup>

<sup>1</sup> *Veterinary Population Medicine Department, University of Minnesota, USA*

<sup>2</sup> *garri098@umn.edu*

<sup>3</sup> *Background and Objectives*

### CONTENT

#### Background and Objectives

Porcine respiratory and reproductive syndrome (PRRS) is an important economic disease in the swine industry worldwide. PRRS virus (PRRSv) monitoring and surveillance is crucial in control and elimination programs. The use of oropharyngeal swabs (OP) and udder wipes (UW) are sampling strategies that have proven their value for detection of influenza virus during the suckling period. The purpose of this study was to evaluate the use of OP and UW for detection of PRRSv when compared to serum samples.

#### Material & methods

One sow farm that had a PRRS outbreak was conveniently selected. 20 litters were sampled at each sampling event, the 1st month and 4th month after the outbreak, to account for different prevalence levels. All piglets were individually bled and an OP was collected together with one UW per sow. Cohen's kappa statistic, Sensitivity (Se), specificity (Sp), and total percentage of agreement (TPA) were calculated.

#### Results

95% (19/20) of the litters had at least 1 positive piglet. 77.56% (159/205) of the piglets were RT-PCR serum positive. Estimated Kappa value was 0.75 (95% CI 0.62-0.89). OP Se was 89% (95% CI 83%-93%) in a high prevalence scenario. TPA between OP and serum was 90%.

Se of OP was 98.6%, 92% and 38.5% for those samples coming from animals with serum Ct values were <20, between 20-30 and over 30, respectively. Results of the low prevalence scenario will be presented in the congress.

90% (18/20) of the UW were positives.

#### Discussion & Conclusion

OP have been proved the best sample type when compared to nasal swabs or nasal wipes to diagnose influenza in pigs in breeding herds. OP would be a welfare friendly and reliable option to sample due-to-wean piglets for PRRSv. However, false negatives can occur, especially for Ct values higher than 30.

## VVD-PP-33

### TITLE

CHARACTERISTICS OF PCV2 INFECTION DYNAMIC RELATIVE TO THE AGE OF PIGS IN THREE EU COUNTRIES

Roman Krejci<sup>1</sup>, Sophie Brilland<sup>2</sup>, David Espigares<sup>3</sup>, Michael Albin<sup>4</sup>, Andrea Luppi<sup>5</sup>, Vilmos Palya<sup>6</sup>, Zalan Homonnay<sup>6</sup>

<sup>1</sup> Ceva

<sup>2</sup> Ceva, France

<sup>3</sup> Ceva, Spain

<sup>4</sup> Ceva, Denmark

<sup>5</sup> IZSLER, Regio Emilia, Italy

<sup>6</sup> Ceva Phylaxia, Budapest, Hungary

### CONTENT

The aim of this survey was to describe the prevalence of PCV2 and the infection patterns with the special attention to early infections in young piglets. The homogeneity and level of maternal immunity was studied. In total 20 farms in France, 13 in Spain and 18 in Denmark were examined. Laryngeal swabs from sows and piglets at 3WOA were tested by PCR. Serum was examined by specific ELISA. Oral fluids from pigs at 6,8,12,16,20,24 WOA were tested by PCR.

The overall farm positivity in Fr, Sp and Dk was 85%, 100% and 76,9% respectively. The percentage of farms with positive sows was 35%, 100% and 76,9% respectively with 5,5%, 19,2% and 3,1% positive individuals. The prevalence of farms with PCV2 positive weaners was 20%, 69,2% and 18,8% respectively with 1,25%, 11,2% and 3,8% of positive piglets. The prevalence in pigs reached its peak in weeks 16 and 20 in Fr and Dk, while remained stable 8-24WOA in Sp. The level of PCV2 excretion had farm specific patterns. The mean S/P values of MDAs in Dk ranged between 0,24 and 1,27; there was 16,7 % piglets seronegative (up to 80% in 1 farm). Only 5,5% farms had the mean values >1,2. In France piglets from vaccinated gilts have higher titers than those from non-vaccinated gilts and sows ( $p < 0.05$ ).

PCV2 infections can be described as late infections, which corresponds to low positivity in sows, the circulation of PCV2 reaches the peak between 12-20WOA. The levels of MDAs are on average within the range ensuring protection of piglets and not interfering with the vaccination at 3 WOA. There are differences between countries. PCV2 circulation patterns and also the levels of MDAs appeared highly farms specific. This implies the needs for appropriate farm diagnosis to set the efficient preventive and control measures.

## VVD-PP-34

### TITLE

PCV2D-2 VIRUS DETECTED IN THE NETHERLANDS

Susan Kars-Hendriksen<sup>1</sup>, Zalan Homonnay<sup>2</sup>, Manon Houben<sup>3</sup>, Karin Junker<sup>3</sup>, Han Smits<sup>2</sup>

<sup>1</sup> *Ceva Santé Animale B.V., Naaldwijk, The Netherlands*

<sup>2</sup> *Ceva Phylaxia, Budapest, Hungary*

<sup>3</sup> *GD Animal Health, Deventer, The Netherlands*

### CONTENT

Background and Objectives

At the moment PCV2 can be divided into five genotypes known as PCV2a, b, c, d and e. An ongoing shift from PCV2a to PCV2b to PCV2d has been reported in many countries. The objective of this study was to identify the strains present in some clinical cases in the Netherlands.

Material & Methods

Four PCV2 PCR highly positive lymph node samples from seven fattener pigs ranging from 12 weeks to 7 months, pooled per herd, collected in August 2018 at GD Animal Health were investigated by the research lab of Ceva Phylaxia. The samples were retested using real-time PCR using QuantiNova Probe PCR Kit in a Rotor-Gene Q instrument. Full genome sequencing was performed using CBB1, CBB2, CBB3, and CSZ2 primers. DNA sequences were aligned and phylogenetic analyses were performed using MEGA 7.0 software.

Results

Microscopic examination of the lymph nodes revealed aggregates of macrophages in the parafollicular areas, mild to moderate lymphoid depletion and histiocytic infiltration of the follicles and chronic reactive hyperplasia.

The complete circular DNA sequences comprised of 1767bp, is encoding mainly for 2 ORFs. From sample 4 a sequence with 942 bp (314 aa) long ORF1 and 699 bp (233 aa) long ORF2 was identified. According to this sequence information sample 4 belonged to genotype PCV2b.

Samples 1, 2 and 3 resulted in sequences with 942 bp (314 aa) long ORF1 and 702 bp (234 aa) long ORF2. According to these sequences sample 1, 2 and 3 belonged to genotype PCV2d-2. The ORF2 was encoding for the amino acids considered as PCV2d-specific, e.g. Phe8, Ile53, Lys59, Asn68, and Lys234.

Discussion & Conclusion

This is the first report of PCV2d-2 in the Netherlands. Further research is needed for the prevalence of the different PCV2 genotypes in the Netherlands and their clinical relevance.

## VVD-PP-35

### TITLE

EPIDEMIOLOGICAL SURVEILLANCE AND CHARACTERIZATION OF INFLUENZA A VIRUSES (IAV) IN SPANISH AND PORTUGUESE PIG FARMS

Silvana Sosa<sup>1</sup>, Martí Cortey<sup>1</sup>, Carlos Casanovas<sup>2</sup>, Sergio Barrabés<sup>2</sup>, Susana Mesonero-Escuredo<sup>2</sup>, Montserrat Tello<sup>1</sup>, Enric Mateu<sup>1</sup>, Gerard Martín-Valls<sup>1</sup>

<sup>1</sup> *Departament de Sanitat i Anatomia animals, Universitat Autònoma de Barcelona (UAB), 08193, Barcelona*

<sup>2</sup> *IDT Biologika SL, Gran Vía Carles III, 84, 3º, 08028 Barcelona*

### CONTENT

#### Background and Objectives

The aim of this study was to determine the diversity of IAV from clinical outbreaks in pig farms of Spain and Portugal as well as from active surveillance.

#### Material & Methods

Nasal swabs (NS; 10-20 animals/farm) were collected from 141 outbreaks of respiratory disease compatible with swine influenza. Additionally, 20 NS from suckling piglets, weaners and fatteners were collected in 17 farms. Presence of IAV and lineage determination were initially assessed by RT-qPCR. For 39 isolates genotyping of IAV was determined after sequencing with the Illumina MiSeq® Plattform.

#### Results

IAV was confirmed in 93/141 (65.9%) outbreaks of which 48 happened in weaners. In active surveillance, 14/17 (82.3%) farms were positive for IAV. The most commonly detected lineages were H1avN2 (28.03%) and H1avN1av (15.89%). Since October 2018, H1 and N1 of the 2009 pandemic lineage have been detected in (3 cases) for the first time in the last 2 years. Six different genotypes (A, B, C, D, M and N) have been identified so far. Nonetheless, 4 cases did not fit into the European classification system and contained one or more genes derived from human lineages.

#### Discussion & Conclusion

The present results show that IAV is widely spread in pig farms causing both outbreaks and apparently subclinical infections. The most frequent lineage, H1avN2 was undetected in Spain until 2013, indicating a rapid spread within the pig population. The recent re-emergence of H1 and N1 2009 pandemic, and the high presence of human-IAV origin genes detected by genotyping emphasise the close relationship between human and swine influenza. Also, genotyping is the cornerstone for understanding the circulation dynamics and variations of this virus in swine. As this is an ongoing research, more results are expected within the next months.



## VVD-PP-36

### TITLE

DETECTION AND GENOTYPING OF PCV-2 AND DETECTION OF PCV-3 IN SERUM SAMPLES FROM DIFFERENT EUROPEAN FARMS

Viviane Saporiti<sup>1</sup>, Marina Sibila<sup>1</sup>, Florencia Correa-Fiz<sup>1</sup>, Bernd Grosse Liesner<sup>2</sup>, Joaquim Segalés<sup>3,4</sup>

<sup>1</sup> IRTA, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>2</sup> Boehringer Ingelheim Vetmedica GmbH AH Swine, Ingelheim, Germany

<sup>3</sup> Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193 Bellaterra, Barcelona, Spain.

<sup>4</sup> UAB, Centre de Recerca en Sanitat Animal (CReSA, IRTA-UAB), Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.

### CONTENT

**Introduction.** Besides the considered non-pathogenic Porcine circovirus 1 (PCV-1) and PCV-2 as the cause of systemic and reproductive problems, a novel circovirus (PCV-3) with an unknown infection outcome was described in 2015. The present work aimed at the detection and genotyping of PCV-2 and detection of PCV-3 in fattening pigs from 9 European countries.

**Material and Methods.** A total of 624 pig (10 and 25 week-old) sera from 64 farms (10 sera/farm) were analyzed by PCV-2 and PCV-3 PCR methods. Studied farms were from Spain (11), Belgium (10) France (8), Germany (8), Italy (7), Denmark (7), The Netherlands (5), Ireland (5) and Sweden (3). Frequency of genome detection was calculated globally, per country and per farm. In addition, two PCV-2 positive samples per farm were selected to be genotyped by sequencing the ORF2 gene. The phylogenetic analyses were conducted using the Neighbor-joining method in MEGA 7.

**Results.** PCV-2 DNA was present in 131 out of 624 analyzed sera (21%) coming from 29 farms (45%); it was detected in a variable proportion of pigs from all tested countries (ranging from 6% in the Netherlands to 70% in France), but Sweden. From the 58 PCV-2 sequenced samples, 45 were successfully genotyped. Globally, PCV-2a (n=9), PCV-2b (n=9) and PCV-2d (n=27) genotypes were found across the countries. PCV-3 DNA was found in 52 out of 624 studied sera (8%) coming from 30 farms (47%) and in a variable proportion of pigs from all countries (ranging from 4% in Ireland and Italy to 14% in The Netherlands). Only 3% of the totally tested sera were positive to both viruses.

**Discussion and conclusion.** PCV-2 and PCV-3 were found in 8 and 9 European countries, respectively, although with a variable percentage, and rarely in co-infection in the tested pigs. The most frequently PCV-2 genotype found was PCV-2d.

## VVD-PP-37

### TITLE

USE OF BIOPORTAL IN A PRRSV OUTBREAK IN A SPANISH FARM

Roberto Bautista<sup>1</sup>, Alberto García<sup>1</sup>, Sebastián Figueras<sup>2</sup>, Gloria Abella<sup>2</sup>, Ivan Hernández<sup>2</sup>, Victor Rodríguez<sup>2</sup>, Eugenio Sánchez<sup>2</sup>

<sup>1</sup> *Inga Food S.A., Zaragoza, España*

<sup>2</sup> *Boehringer Ingelheim Animal Health España, Spain.*

### CONTENT

Background and objectives

New introduction of isolates and the evolving dynamics of the PRRS virus can be monitored by the consistent sequence of the diagnosis. Thus, the aim of this work is monitoring the isolates in a farm level by using Bioportal software.

Materials and Methods

The study was conducted in a 775 sows farrow-to-wean farm located in Zaragoza (Spain). Since the last outbreak in December 2015 the farm was under a 5 step process PRRS control program. An ORF5 PRRS virus resident strain sequence “A” was identified. The heterology with the “Lelystad” PRRS virus strain was 13.9% and 15% with the Ingelvac PRRSFLEX EU® vaccine.

From May 2016 to June 2018 no virus was detected in 30 due-to-wean piglets monthly sampled.

In July 2018 PRRSv PCR positive serum samples from aborted sows were detected and ORF5 sequence was obtained. The Bioportal software was used for epidemiological analyze purposes.

Results

Compared to the farm resident strain the recent sequence heterology was 16.8% and 3.8% with the closest sequence from a sow farm of the same production system. The heterology was ranged between 10.9% and 14.2% among all licensed PRRS vaccines in Spain. A new wild-type virus strain was introduced in the herd.

When the benchmark was performed within the entire Spanish Bioportal database (1829 sequences), we found a range between 0.8% and 3% heterology with strains detected in farms from five other swine companies located up to 250 km distance. Some of them shared the same pig transportation company.

Discussion and Conclusions

Bioportal was a crucial tool to track easily a newly introduced PRRSv sequence in a negative farm by comparisons within a huge sequences database. The main conclusion is that pig transportation represents a very high risk factor for PRRSv dissemination among different production systems in Spain.

## VVD-PP-38

### TITLE

MOLECULAR CHARACTERIZATION OF ROTAVIRUS B AND ROTAVIRUS C STRAINS ISOLATED FROM NEONATAL DIARRHEA OUTBREAKS IN CATALONIA.

Anna Vidal<sup>1</sup>, Margarita Martín<sup>1,2</sup>, Laila Darwich<sup>1,2</sup>, Enric Mateu<sup>1,2</sup>, Martí Cortey<sup>1</sup>

<sup>1</sup> *Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona (UAB), 08193, Cerdanyola del Vallès, Spain.*

<sup>2</sup> *Centre de Recerca en Sanitat Animal (CRESA), UAB-IRTA, Campus de la Universitat Autònoma de Barcelona, 08193, Cerdanyola del Vallès, Spain.*

### CONTENT

#### Background and objectives

Rotaviruses B (RVB) and C (RVC) have been reported to cause neonatal diarrhea worldwide. Nevertheless, there are few reports concerning the molecular characterization of porcine isolates in Europe. The aim of this study was to deep-sequence and characterize seven positive samples to RVB and six to RVC in order to obtain their complete genome sequences and compare the genetic diversity with the published sequences available.

#### Materials and methods

Diarrheic and non-diarrheic samples from 31 farms suffering outbreaks of neonatal diarrhea were analyzed for a panel of enteric pathogens. Seven positive samples to RVB and six to RVC showing, by qRT-PCR, viral loads high enough to perform a next-generation sequencing (NGS) analysis (Ct values below 25), were selected. Total RNA was extracted using Trizol™ reagent and deep sequenced using the Illumina platform. Considering the segmented nature of the Rotavirus genome, the outputs were filtered gene by gene against a reference sequence, and a consensus sequence was generated for every genome fragment (VP1, VP2, VP3, VP4, VP6, VP7, NSP1, NSP2, NSP3, NSP4 and NSP5).

#### Results and Discussion

The NGS protocol was successfully applied to all samples. Complete genome sequences were obtained for seven RVB and six RVC strains. A salient feature was the great diversity observed among strains and, especially for RVB, the great differences reported with the genomes available at GenBank. For some genes, the highest nucleotide identities reported were below 80%. Actually, the strains characterized in this work might represent new RVB genotypes applying the nucleotide and aminoacidic thresholds published for several genome fragments.

#### Conclusion

Altogether, the results highlight the huge amount of hidden diversity not described for several species of Rotavirus.

## VVD-PP-39

### TITLE

CELL DEATH PHENOMENA ASSESSMENT IN THE THYMUS OF PIGLETS INFECTED WITH PRRSV-1 STRAINS OF DIFFERENT VIRULENCE

Inés Ruedas Torres<sup>1</sup>, Irene Magdalena Rodríguez Gómez<sup>1</sup>, Jose María Sánchez-Carvajal<sup>1</sup>, Francisco José Pallares<sup>2</sup>, Inmaculada Barranco<sup>1</sup>, Jaime Gómez Laguna<sup>1</sup>, Librado Carrasco<sup>1</sup>

<sup>1</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Spain*

<sup>2</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Murcia, Spain*

### CONTENT

#### Background and Objectives

In the last decade, the number of outbreaks caused by virulent PRRSV strains has increased in Europe, Asia and North America. The virulence of these strains is not only evident in the lung, but also in the lymphoid organs, mainly in thymus and bone marrow. The present study aims to evaluate the impact of PRRSV-1 strains of different virulence in the thymus of infected piglets.

#### Material & Methods

To carry out this study, 70 four-week old piglets were distributed in three different groups: control, 3249 strain (low virulent; 105 TCDI50 intranasal) and Lena strain (high virulent; 105 TCDI50 intranasal). Animals were euthanized at 1, 3, 6, 8 and 13 days post-infection (dpi) and thymus samples were collected and fixed in 10% formalin for histopathology, histomorphometry and immunohistochemistry analyses to detect PRRSV N-protein, TUNEL and iNOS labelling.

#### Results

Both infected groups exhibited a progressive increase in the severity of the lesions in the thymus, especially in Lena-group at 8dpi. PRRSV positive cells were detected in Lena-infected pigs as soon as 1dpi, peaking at 8dpi in both groups but reaching highest values for Lena-infected animals. Similar kinetics were observed for TUNEL expression, which was mainly detected in the cortex of Lena group. In contrast, iNOS expression was principally detected in the medulla of thymuses. Compared to control animals, the expression of this marker was lower in case of both infected-groups, being more evident in Lena-infected pigs mainly in the cortex at 6 and 8dpi.

#### Discussion & Conclusion

According to our results, an earlier and stronger impact of virulent PRRSV strains on the development of cell death phenomena in the thymus was observed in association with virus antigen and indirect mediators, such as iNOS. More studies are needed to widen the knowledge of cell death phenomena in this organ.

## VVD-PP-40

### TITLE

PCV2 GENOTYPE DISTRIBUTION IN ORGAN SAMPLES COLLECTED FROM PCVD CLINICAL CASES IN FLANDERS

Caroline Bonckaert<sup>1</sup>, Emily Rolly<sup>1</sup>, Liesbeth Allais<sup>1</sup>, Steven Van Colen<sup>2</sup>, Eva De Jonghe<sup>2</sup>, Han Smits<sup>3</sup>, Peggy De Backer<sup>2</sup>

<sup>1</sup> *Dierengezondheidszorg Vlaanderen, Hagenbroeksesteenweg 167, 2500 Lier, Belgium*

<sup>2</sup> *Ceva Santé Animale, Metrologielaan 6, 1130 Brussels, Belgium*

<sup>3</sup> *Ceva Phylaxia, SSIU, Budapest, Hungary*

### CONTENT

#### Background and objectives

Porcine circovirus type 2 (PCV2) is an economically important swine pathogen causing a wide range of clinical problems, collectively named Porcine Circovirus Diseases (PCVD). Since the discovery of the virus, 2 major genotype shifts have been described. The prevalent PCV2a genotype was replaced by the PCV2b genotype in the mid-2000s. In recent years, the PCV2d genotype has been increasing in prevalence in many regions around the world. The aim of this study was to investigate the PCV2 genotype distribution in samples collected from PCVD clinical cases in Flanders.

#### Materials & methods

In order to identify the current PCV2 field strains causing PCVD, samples were selected from the Flemish Animal Health Service (DGZ Vlaanderen) sample bank. The samples were organs submitted for analysis with PCV2 quantitative PCR (July 2017 – Sept 2018). Samples were used for sequencing in case of a viral load  $\geq 1,00 \text{ E}+08$  DNA copies/g. The PCV2 genotypes were identified by full genome sequencing at Ceva-Phylaxia (Hungary).

#### Results

In total, 54 viruses were sequenced, originating from 19 weaned piglets and 35 fattening pigs from 54 different Flemish swine farms. 35 samples originated from lung tissue, 16 from lymph node tissue, 1 from heart tissue, 1 from spleen tissue and 1 from a mixture of lung and lymph node tissue. The PCV2 viral load detected in the organs ranged from  $1,82 \text{ E}+08$  to  $7,56 \text{ E}+15$  DNA copies/g. Of the 54 sequenced PCV2 viruses, 7 strains (13,0%) were identified as PCV2a, 2 strains (3,7%) were identified as PCV2b and 45 strains (83,3%) were identified as PCV2d genotype (9 as PCV2d-1 and 36 as PCV2d-2).

#### Discussion & Conclusion

The results of this study confirm the presence and emergence of PCV2d in Flanders and are indicative that PCV2d might be the predominant PCV2 genotype involved in PCVD clinical cases.

## **VVD-PP-41**

### **TITLE**

**PREVALENCE AND SEASONAL VARIATION OF INFLUENZA A VIRUS - SWINE CIRCULATION IN NURSERY PIGS OVER A 5-YEAR PERIOD IN BELGIUM AND THE NETHERLANDS**

Frédéric Vangroenweghe<sup>1</sup>

<sup>1</sup> *BU Food Animals, Elanco Animal Health Benelux*

### **CONTENT**

**Background & Objectives** – Influenza A Virus - Swine (IAV-S) is present in pigs worldwide. In contrast to the general perception that IAV-S is predominantly a disease in finishing pigs, recent research has observed continuous circulation of IAV-S among piglets during the post-weaning period, especially when maternal immunity is fading from 4-5 weeks of age onwards. The objective of this study was to determine prevalence of IAV-S through tracheo-bronchial swab (TBS) sampling in piglets during early and later nursery period and to analyze differences across seasons.

**Material & methods** – A total of 878 Belgian and Dutch pig herds, showing respiratory disease during the post-weaning period, were included in this study, which was conducted from January 2011 to December 2015. In every herd, TBS were collected of at least 15 coughing piglets in each of the age groups during the nursery period (at 3-5 and 6-11 weeks of age). TBS were subsequently tested for the presence of IAV-S using PCR (IVD GmbH, Germany). PCR results were reported as negative or positive. Results were categorized and analyzed according to the season of sampling.

**Results** – The average prevalence of IAV-S was 21.9% through the entire 5-year study period. In 3-5 weeks of age, prevalence was at 28.4%, whereas in 6-11 weeks of age, it was slightly lower (20.5%). Prevalence was significantly higher in spring (33.8%) and autumn (33.9%) than in other seasons in piglets of 6-11 weeks of age (24.8%).

**Discussion & Conclusion** – A significant seasonal variation in IAV-S prevalence was observed through the 5-year study period under the local geographical conditions. Overall prevalence of IAV-S within the post-weaned piglets sampled was 21.9%. Therefore, we can conclude that in herds suffering respiratory problems during the post-weaning period, IAV-S may be associated with these problems in Belgium and The Netherlands.

## VVD-PP-42

### TITLE

#### BENCHMARKING ON DIFFERENT SAMPLE TYPES FOR EARLY DETECTION OF PRRSV INFECTION

Philipp Könighoff<sup>1</sup>, Isabel Hennig-Pauka<sup>1</sup>, Elisabeth große Beilage<sup>1</sup>, Andrea Menrath<sup>1</sup>, Tim Snider<sup>2</sup>, Anna Romagosa<sup>2</sup>, Kathrin Siebert<sup>2</sup>

<sup>1</sup> Field Station for Epidemiology, University of Veterinary Medicine Hannover, Bakum, Germany

<sup>2</sup> Pig Improvement Company, Sant Cugat del Valles, Barcelona, Spain

### CONTENT

**Introduction:** Alternative diagnostic sampling for detection of Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) might be advantageous with respect to easy transportation (dry swabs) or animal friendly stress less sampling without the need for fixation. However, the alternative sampling technique is requiring an equal or even better sensitivity of the sample, at least in monitoring of herds free from PRRSV.

**Material and Methods:** PRRSV PCR testing was validated on blood samples and saliva collected with serum tube, GenoTube® swabs or polyester swabs. Twenty PRRSV naive gilts were randomly assigned to four groups. Mimicking a PRRSV infection two groups of 5 pigs each received a PRRSV genotype 1 vaccine intranasally (IN) or intramuscularly (IM), and correspondingly two groups got a PRRSV genotype 2 vaccine. Gilts were sampled before vaccination and at day 0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 6 after exposure.

**Results:** The first gilts became positive in serum from the jugular vein by 12h, in GenoTube® soaked with blood from ear vein by 36 h. One standard swab soaked with blood from the ear vein was positive at one day. Standard swabs soaked with saliva were positive earliest by day 5 post vaccination. All exposed pigs were detected positive in serum on day 6, while GenoTubes® resulted in 20-75% positive pigs. Oral swabs were only positive for genotype 1 in 20-40%. Pen-wise oral fluids were earliest positive for genotype 1 on day 5 and for genotype 2 on day 6 after exposure.

**Discussion and Conclusion:** Compared to serum from jugular veins, GenoTube® swabs soaked with blood from ear veins are less sensitive in the early detection of PRRSV infection mimicked by administration of PRRSV vaccine. The lack of sensitivity might be less important for screening PRRSV infected herds but cannot be recommended for the monitoring of PRRSV-free herds.

## VVD-PP-43

### TITLE

ENVIRONMENTAL MONITORING OF ENTEROBACTERIACEAE CAN BE USED TO DETERMINE WEAKNESSES IN FEED MILL BIOSECURITY FOR PORCINE VIRUSES

Savannah Stewart<sup>1</sup>, Cassandra Jones<sup>1</sup>

<sup>1</sup> *Kansas State University*

### CONTENT

Weaknesses in feed mill biosecurity may serve as an entry point for porcine viruses into the swine feed supply and subsequently impact herd health. Enterobacteriaceae is commonly used as an indicator of facility hygiene in the human and pet food industries, but its use has thus far been limited in livestock feed mills. The objective of this experiment was to determine the association between Enterobacteriaceae prevalence and distribution with porcine deltacoronavirus (PDCoV) in a swine feed mill to determine its ability to identify biosecurity weaknesses. Initially, 375 samples comprising both environmental swabs from surfaces and feed samples were collected from 11 different United States swine feed mills. Samples were analyzed for Enterobacteriaceae using selective media. In response to a PDCoV outbreak at a sow farm, 1 of these 11 facilities was subsequently swabbed and samples analyzed for PDCoV. Samples were analyzed at Iowa State University Veterinary Diagnostic Laboratory for PDCoV via quantitative real-time polymerase chain reaction. Data were analyzed using the GLIMMIX and CORR procedures of SAS. The prevalence of PDCoV varied across the different surface types swabbed ( $P = 0.026$ ), with non-animal food contact surfaces having greater ( $P < 0.05$ ) contamination levels than animal food contact surfaces or in the feed sample. However, there were no differences detected in the Ct level across surfaces ( $P = 0.301$ ). Enterobacteriaceae prevalence appears to be a strong indicator of PDCoV Ct; a higher proportion of Enterobacteriaceae-positive surfaces was associated with lower PDCoV Ct, which indicates a higher level of virus ( $R = -0.631$ ). Additionally, Enterobacteriaceae prevalence is an indicator of PDCoV prevalence ( $R = 0.456$ ) across surfaces. These results indicated that environmental monitoring of Enterobacteriaceae in feed manufacturing facilities may be used to determine weaknesses in biosecurity and potential for swine virus entry.



## VVD-PP-44

### TITLE

#### IMPLEMENTATION OF PIGLET VACCINATION AT PROCESSING IN A PRRS UNSTABLE HERD

Caroline Van de Veire<sup>1</sup>, Martin Fockede<sup>1</sup>, An Vanderzeypen<sup>2</sup>, Anke Verhaegen<sup>3</sup>, Tom Meyns<sup>2</sup>

<sup>1</sup> DAP Vedanko, Keukelstraat 66A, 8750 Wingene

<sup>2</sup> ZOETIS Benelux, Mercuriusstraat 20, 1930 Zaventem, Belgium

<sup>3</sup> Zoetis B.V., Capelle ad IJssel, The Netherlands.

### CONTENT

#### Background and Objectives

PRRS is an economically important swine disease and piglet vaccination is being increasingly used in control programs. The objective of this field trial was to assess the impact of a new PRRS piglet vaccination program at around 2-3 days of age (D) in a PRRS unstable herd.

#### Material and Methods

A 700 sow farrow-to-finish herd experiencing a PRRS outbreak causing reproductive symptoms, intensive PRRSv circulation in new-born piglets and clinical problems in the nursery. In February 2018 the farm started the vaccination of all piglets with Suvaxyn® PRRS MLV at 2-3D. Six month follow-up of vaccinated piglets was done to compare results with those from 6 months before implementation of vaccination. 2 groups of fattening pigs were compared: the last batch of non-PRRS-vaccinated pigs and the first batch with PRRS-vaccinated pigs. Production parameters were compared during nursery and finishing phases.

#### Results

The average start weight, end weight, days in the nursery and ADWG (average daily weight gain) were 5.95kg, 22.36kg, 46.5 days and 353g respectively for the vaccinated group, vs 6.00kg, 22.33kg, 47.6 days and 343g/day for the PRRSv non-vaccinated. Overall monthly mortality in nursery was reduced from 48.3 before vaccination to 23.3 after starting the vaccination ( $p < 0.05$ ). During the fattening period, ADWG increased 22g/day while FCR (20-100kg) was reduced by 0.19, both in favour of the vaccinated group. Mortality was reduced by 0.47% in the vaccinated group and the total number of individual treatments with antibiotics by 45%. The estimated net financial return improved by €4.59 per fattening pig in the vaccinated group.

#### Conclusion

Vaccination of piglets with Suvaxyn PRRS MLV at processing improved the production parameters and the health of pigs in the nursery and fattening periods. The new PRRS vaccination strategy can help producers to improve PRRS control.

## VVD-PP-45

### TITLE

COMPARISON OF CONTEMPORARY STRAINS OF DIFFERENT PCV2 GENOTYPE VIRUSES BY EXPERIMENTAL INFECTION OF PIGS

Vilmos Palya<sup>1</sup>, Zalan Homonnay<sup>1</sup>, Steven Van Colen<sup>2</sup>, Tamas Mato<sup>1</sup>, Tibor Farkas<sup>1</sup>, Istvan Kiss<sup>1</sup>

<sup>1</sup> *Ceva Phylaxia, Budapest, Hungary*

<sup>2</sup> *Ceva Santé Animale B.V., Naaldwijk, The Netherlands*

### CONTENT

Background and objectives.

Knowledge on the pathogenic characteristics of different genotypes/strains of PCV2 is important for evaluating vaccine efficacy. Our recent survey indicated that PCV2a, PCV2b, and PCV2d genotypes are circulating in Europe. The aim of this study was to evaluate and compare the infection characteristics of representative Belgian and Hungarian isolates of these strains in pigs.

Materials and methods.

Eight weeks old non-vaccinated pigs were inoculated with ~ 10<sup>6</sup> viral copy number/microliter of a PCV2a, two PCV2b (high/low passage, and having 8 amino acids difference), a PCV2d-1 and a PCV2d-2 isolate by nasal route. Throughout four weeks post-challenge viremia, fecal shedding, and humoral antibody responses were measured weekly. At the end of the study, viral load was determined in mediastinal and mesenteric lymph nodes.

Results.

One week pre-challenge, the pigs had no or very low levels of antibodies against PCV2. IgM response was first measurable two weeks post-challenge for the PCV2a, the low passage PCV2b, and the PCV2d-1 strains. IgG response was first detected three weeks post-challenge, for all isolates. Both viremia and fecal virus shedding was measurable already one week after challenge approximately in 20 percent of the animals in each group. The measured PCV2 copy numbers increased for both viremia and fecal excretion throughout the course of the trial. Before slaughter, the high passage PCV2b group excreted significantly lower amount of virus, and had lower viral load in the lymph nodes than the rest, which difference was significant in the case of the mesenteric lymph node.

Discussion and conclusion.

All five recent PCV2 strains evoked humoral antibody responses, induced viremia and were excreted by the inoculated pigs. The highest numerical figures were measured for the PCV2a, the low passage PCV2b, and the two PCV2d strains.

## VVD-PP-46

### TITLE

FIRST DETECTION OF ANTIBODIES AGAINST PORCINE RESPIRATORY CORONAVIRUS IN NORWAY

Carl Andreas Grøntvedt<sup>1</sup>, Siv Klevar<sup>1</sup>, Anne Nordstoga<sup>1</sup>, Malin Jonsson<sup>1</sup>, Siri Løtvedt<sup>2</sup>, Solfrid Åmdal<sup>2</sup>, Madelaine Norström<sup>1</sup>

<sup>1</sup> *The Norwegian Veterinary Institute*

<sup>2</sup> *The Norwegian Food Safety Authority*

### CONTENT

#### Background and objectives

The emergence and spread of porcine respiratory coronavirus (PRCV) during 1980s, resulted in an endemic manifestation of the infection in most European countries. Due to negligible imports of live pigs to Norway, the commercial Norwegian pig population is essentially closed. An active serological surveillance program for specific viral infections in swine has been conducted annually since 1994, and 126,761 individual pigs have tested negative for PRCV since then. In August 2018, however, antibodies against PRCV were detected in seven herds in the county of Rogaland in southwest Norway. An outbreak investigation was initiated by the Norwegian Food Safety Authority (NFSA) in collaboration with the Norwegian Veterinary Institute (NVI).

#### Material and methods

Ten blood samples per farm and epidemiological data including questionnaires were collected from 42 pig holdings between the 4th and 19th September 2018. Herds were included in the investigation based on trade of live pigs to/from PRCV antibody positive farms and/or distance less than 3 km from positive holdings. Serum was sent to NVI and analyzed using a commercial blocking ELISA from Svanovir (SVANOVIR® TGEV/PRCV-Ab).

#### Results

Antibodies against PRCV were detected in 79% (n=33) of the herds sampled through the outbreak investigation. Signs of respiratory disease were not reported from any of the herds. The outbreak investigation did not identify a primary case herd nor a likely route of PRCV introduction to the Norwegian pig population.

#### Discussion and conclusion

Based on surveillance data, it is likely that the introduction of PRCV occurred during 2018. The virus spread rapidly to a high proportion of herds included in the outbreak investigation, both those connected by trade of live pigs but also herds located <3km from PRCV antibody positive herds. The route of introduction was not identified, but further virological investigations and continued serological surveillance is ongoing.

## VVD-PP-47

### TITLE

EFFICACY OF INGELVAC PRRSFLEX® EU AGAINST EXPERIMENTAL CHALLENGE WITH PRRSV AUT15-33 (“ACRO” PRRSV)

Sophie Dürlinger<sup>1</sup>, Gyula Balka<sup>2</sup>, Poul Henning Rathkjen<sup>3</sup>, Christian Kraft<sup>4</sup>, Rebecca Morgenstern<sup>5</sup>, Till Rümenapf<sup>6</sup>, Andrea Ladinig<sup>1</sup>

<sup>1</sup> *University Clinic for Swine, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Austria*

<sup>2</sup> *University of Veterinary Medicine Budapest*

<sup>3</sup> *Boehringer Ingelheim Vetmedica GmbH*

<sup>4</sup> *Boehringer Ingelheim Veterinary Research Center GmbH & Co. KG*

<sup>5</sup> *Boehringer Ingelheim RCV GmbH & Co KG*

<sup>6</sup> *Institute of Virology, Department for Pathobiology, University of Veterinary Medicine Vienna, Vienna, Austria*

### CONTENT

Background and Objectives: Porcine reproductive and respiratory syndrome virus (PRRSV) is still one of the economically most important viruses often combatted by the use of modified live virus vaccines (MLV). The aim of the present study was to test the efficacy of a PRRS MLV against a virulent PRRSV-1 isolate (PRRSV AUT15-33) causing severe clinical problems in the field. Material and Methods: Vaccinated (Ingelvac PRRSFLEX® EU) and non-vaccinated piglets (4 groups, n=16 per group) at four weeks of life (D0) were intranasally infected with a low dose ( $1 \times 10^3$  TCID<sub>50</sub>) or a high dose ( $1 \times 10^5$  TCID<sub>50</sub>) of PRRSV (AUT 15-33) at D28. One additional group of ten vaccinated piglets served as vaccination control group (vacc ctrl). Body weight was recorded on day of vaccination (D0), day of challenge (D28) and two weeks after challenge (D41) for calculating average daily weight gain (ADG). Serum samples were collected at different time points throughout the study to assess the viremia levels by qRT-PCR. Piglets were euthanized on D42 and lungs were examined macroscopically and histologically. Results: ADG from D28 to D41 was highest in vacc ctrl (0.74 kg). ADG of vaccinated infected pigs (low dose: 0.64 kg; high dose: 0.61 kg) differed numerically from non-vaccinated infected pigs (low dose: 0.48 kg; high dose: 0.41 kg). The intranasal infection with AUT15-33 led to long lasting viremia in all inoculated piglets. Delayed titer increase was measured in vaccinated infected pigs compared to non-vaccinated infected pigs. Nevertheless, on D39 all infected pigs reached approximately same viremia levels. Macroscopic and histologic lung lesions were significantly lower in vacc ctrl pigs compared to all infected groups and even lower in vaccinated compared to non-vaccinated pigs. Conclusion: Vaccination of piglets with PRRS MLV had a positive effect on ADG and reduced severity of lung lesions after experimental PRRSV infection in our study. AUT15-33 reproducibly causes clinical disease and viremia.

## VVD-PP-48

### TITLE

IMMUNOPATHOGENESIS OF LUNG LESIONS DURING THE EARLY PHASE OF INFECTION WITH PRRSV1 STRAINS OF DIFFERENT VIRULENCE

Jose María Sanchez-Carvajal<sup>1</sup>, Irene Magdalena Rodríguez-Gómez<sup>1</sup>, Francisco José Pallarés<sup>2</sup>, Inés Ruedas-Torres<sup>1</sup>, Ivan Díaz<sup>3</sup>, Enric Mateu<sup>4</sup>, Gerard Martín<sup>4</sup>, Jaime Gómez-Laguna<sup>1</sup>, Librado Carrasco<sup>1</sup>

<sup>1</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Cordoba, Spain*

<sup>2</sup> *Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Murcia, Murcia, Spain*

<sup>3</sup> *CRESA-IRTA, Bellaterra, Spain*

<sup>4</sup> *Department of Animal Health and Anatomy, Faculty of Veterinary Medicine, Autonomous University of Barcelona, Bellaterra, Spain*

### CONTENT

Background and objectives

Outbreaks caused by very virulent PRRSV strains have been reported worldwide. The aim of the present study was to evaluate the immunopathogenesis of lung lesions caused by two PRRSV1 strains, one of low and the other of high- virulence.

Material & Methods

Seventy-four-week old piglets were randomly distributed in 3 groups and inoculated intranasally with 10<sup>5</sup> TCID<sub>50</sub> of either PRRSV1 strain 3249 (low virulence) or Lena strain (highly virulent), a group of pigs was mock inoculated (controls). Clinical signs were recorded daily, and animals were sequentially euthanized from day 1 to 8 post-inoculation. At necropsy, lung lesions were recorded, and lung samples were collected for histopathological and immunohistochemical studies against PRRSV N protein, CD163, FoxP3 and iNOS. Sera were collected to evaluate viremia (RT-qPCR). In addition, PRRSV-specific antibodies haptoglobin, lipopolysaccharide binding protein (LBP), soluble CD163, interferon  $\gamma$  (IFN- $\gamma$ ), interleukin-10 (IL-10) and IL-6 were determined in sera by using commercial ELISAs.

Results

Lena-infected pigs showed the highest clinical scores, gross and microscopic lesions. Most of them had bronchopneumonia, with a maximum at 8 dpi. The number of PRRSV positive cells was always higher in Lena, peaking at 6 dpi. FoxP3 and iNOS immunolabelled cells progressively increased in both groups from 3 dpi onwards. However, CD163+ cell counts dropped intensely in Lena-infected piglets. In Lena-infected pigs viremia peaked at 6 dpi concurrently with the highest concentrations of IFN- $\gamma$  and IL-6 (6-8 dpi) compared to the 3249-group. For Hp, LBP, sCD163 or IL-10 in serum no differences between groups were observed.

Discussion and Conclusion

The virulent PRRSV-1 strain Lena caused severe clinical signs and lung lesions associated to earlier and higher PRRSV replication, lower frequency of CD163+ cells and an increased iNOS expression, reflecting a higher concentration of IFN- $\gamma$  and IL-6 in serum.

## VVD-PP-49

### TITLE

#### FIRST DETECTION OF PDMH1N1(2009) IN A SWINE HERD IN BELGIUM

Emile Libbrecht<sup>1</sup>, Marlies Olde Monnikhof<sup>1</sup>, Verena Schüler<sup>2</sup>, Stephanie De Cuyper<sup>3</sup>, Peter van der Wolf<sup>1</sup>

<sup>1</sup> *IDT-Biologika Benelux*

<sup>2</sup> *IDT-Biologika GmbH*

<sup>3</sup> *DAP Mervet*

### CONTENT

Influenza A virus (IAV) subtypes H1N1, H1N2 and H3N2 circulate in swine herds in Belgium. Shortly after the emergence of the human pandemic H1N1 2009 IAV (pdmH1N1(2009)), variants of this strain occurred in global swine populations. Here we describe the first detection of pdmH1N1(2009) in a swine herd in Belgium. As part of IDT Biologika's ongoing diagnostic service for vets, nasal swabs from clinical cases of presumed Swine influenza are sent to IVD GmbH, Innovative Veterinary Diagnostics, Seelze, Germany for detection and typing of IAV by Real-Time Quantitative PCRs (RT-qPCR).

In March 2018 in an IAV-non-vaccinated 1,200 sow herd, clinical signs in the piglets were light coughing and sneezing shortly after weaning, which could persist throughout the nursery period. These symptoms diminished during the fattening period. No clinical signs were observed in the gilts or sows. Nasal swabs were taken from 8-week old weaned piglets. Swabs from 17 out of 20 piglets were positive for IAV and the subtype pdmH1N1(2009) was determined in 7 swabs with sufficient virus load for typing.

To our knowledge, this was the first detection of pdmH1N1(2009) in Belgium in pigs.

According to published data and European data from our diagnostic service, sows, gilts and suckling piglets are also susceptible to infection with human pandemic IAV strains and their reassortants.

Commercial European influenza vaccines against the non-pandemic strains of IAV do not confer sufficient cross protection against the pandemic strains of IAV. However, there is a recent vaccine made by IDT Biologika called RespiPorc® FLUpan H1N1, which protects swine against pandemic influenza.

Conclusions

- H1N1, H1N2 and H3N2 most commonly circulate in Belgium
- pdmH1N1(2009) was found for the first time in swine in Belgium
- pdmH1N1(2009) was associated with clinical respiratory problems in weaned piglets

## VVD-PP-50

### TITLE

H1N1PDM09 INFECTION IN PIGS – SUBCLINICAL BUT IMMUNOLOGICALLY RELEVANT

Charlotte Schröder<sup>1</sup>, Theresa Schwaiger<sup>1</sup>, Alexander Schäfer<sup>2</sup>, Julia Sehl<sup>1</sup>, Claudia Karte<sup>3</sup>, Bernd Köllner<sup>2</sup>, Thomas C. Mettenleiter<sup>4</sup>, Reiner Ulrich<sup>1</sup>, Ulrike Blohm<sup>2</sup>

<sup>1</sup> *Department of Experimental Animal Facilities and Biorisk Management, Friedrich-Loeffler Institute, Greifswald*

<sup>2</sup> *Institute of Immunology, Friedrich-Loeffler Institute, Greifswald*

<sup>3</sup> *Institute of Diagnostic Virology, Friedrich-Loeffler-Institut, Greifswald*

<sup>4</sup> *Institute of Molecular Virology and Cell Biology, Friedrich-Loeffler-Institut, Greifswald*

### CONTENT

#### Background and Objectives

Intensive pig husbandry offers optimum transmission conditions for pathogens. Especially undetected influenza A virus (IAV) infections cause immense financial losses in pig production and poses a risk to human health. Correlation of clinical signs and pathological parameters with hematological data during experimental H1N1pdm09 infection might identify subclinical influenza infections in pigs.

#### Material and Methods

Twenty-six German landrace piglets (seven weeks old) free from acute H1N1 infection and corresponding antibodies were infected twice (second infection at day 21 after first) intranasally by mucosal atomization device with IAV A/Bayern/74/2009 (H1N1pdm09). Three non-infected animals served as controls. Every day, behavior and clinical signs were scored and body temperature was assessed. Viral load in nasal swabs and counts of white blood cells were determined on following days after infection (dpi): 2, 4, 7, 14, 21, 22, 25 and 31. Necropsies were performed on day 4, 7, 21, 25 and 31 pi.

#### Results

Pigs did develop neither fever nor clinical signs related to infection with H1N1pdm09. Viral shedding started at day 2 pi in 60% of infected animals, peaked at day 4 and was cleared until day 7 pi. During necropsies, macroscopic influenza-associated lung lesions were detected on day 4 and 7 pi. Immunohistochemistry confirmed IAV M protein on day 4 pi in the lungs and ongoing infiltration of leukocytes starting on the same day. Blood counting device revealed increased numbers of monocytes on day 4 pi and decreased lymphocyte count until day 14 pi. After second infection, lymphocyte count increased in blood.

#### Discussion and Conclusion

Although pigs were clinically inapparent, IAV infection occurred in the lungs. The immune response was characterized by decreasing numbers of lymphocytes in blood and subsequent influx of leukocytes in the lungs, confirming ongoing inflammatory processes. Increased lymphocyte count after second infection indicates a memory response.

## VVD-PP-51

### TITLE

EFFICACY OF A NOVEL VACCINE AGAINST PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) IN NEONATAL PIGLETS

Heinrich Kreutzmann<sup>1</sup>, Gyula Balka<sup>2</sup>, Sophie Dürlinger<sup>1</sup>, Marta Cabana<sup>3</sup>, Monica Balasch<sup>3</sup>, Lucas Taylor<sup>4</sup>, Andrea Ladinig<sup>1</sup>

<sup>1</sup> *University Clinic for Swine, Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine Vienna, Austria*

<sup>2</sup> *University of Veterinary Medicine Budapest*

<sup>3</sup> *Zoetis Manufacturing and Research Spain S.L.*

<sup>4</sup> *Global Development & Operations, Zoetis*

### CONTENT

**Background and Objectives:** PRRSV is still one of the most important viruses in the global swine industry and is often controlled by the use of modified live virus (MLV) vaccines in sows and piglets. Recently, a novel MLV for active immunization of clinically healthy piglets from the first day of age onwards has been approved in Europe (Suvaxyn® PRRS MLV). The aim of the present study was to test the efficacy of this vaccine against experimental infection with a recent, virulent PRRSV-1 field isolate (PRRSV AUT15-33 or Acro PRRSV) by evaluating lung lesions and weight gain after infection.

**Material and Methods:** Forty-one piglets, either vaccinated with 2ml Suvaxyn® PRRS MLV intramuscularly or sham-treated on the first day of life, were intranasally infected with PRRSV AUT15-33 at 28 days of age.

Piglets were followed for two weeks after challenge before necropsy was performed. Five different histologic lung lesions (pneumocytic hypertrophy and hyperplasia, septal infiltration with mononuclear cells, necrotic debris, intraalveolar accumulation of inflammatory cells and perivascular accumulation of inflammatory cells) were scored according to their severity and extension within each of the seven lung lobes by a blinded investigator.

**Results:** Differences between the two groups were statistically significant for all five investigated histologic lesions. Median scores for all five lesions ranged between 12-13 for vaccinated piglets and 29-30 for non-vaccinated pigs. Vaccinated piglets also showed significantly higher average daily gain (ADG) during the two weeks after infection (mean ADG 250 grams) compared to non-vaccinated piglets (mean ADG 170 grams).

**Conclusion:** A single dose of Suvaxyn® PRRS MLV administered to one-day-old piglets was able to significantly reduce lung lesions and increase ADG after experimental infection with a virulent PRRSV-1 field isolate in comparison to non-vaccinated challenged pigs.



## VVD-PP-52

### TITLE

CASE STUDY OF PRRSV ERADICATION BY COMBINING A MLV AND KV PRRS VACCINE ON A HUNGARIAN SWINE FARM

Gabor Schindler<sup>1</sup>, Tamas Revesz<sup>1</sup>, Han Smits<sup>2</sup>, Preben Mortensen<sup>3</sup>

<sup>1</sup> *Ceva Hungary & EU zone, Budapest, Hungary*

<sup>2</sup> *Ceva Phylaxia, SID, Budapest, Hungary*

<sup>3</sup> *Ceva Sante Animale, Libourne, France*

### CONTENT

#### Background and Objectives

PRRS to control in the modern swine industry. The clinical impact has not declined since the appearance in the early 90's. More and more countries are working on control or even eradication of the virus. Hungary started in 2014 with a national PRRS eradication program.

In this program all the swine farms were monitored and a tailor made program was initiated.

#### Material & Methods

A Hungarian 1.000 sow farrow-to-finish farm, was PRRSV-infected in 2015. With reproductive problems and a high mortality in the piglets (to 10% in piglets with the sows, 9% in the weaners and 14% in the finishers). Mass vaccination gilts and sows, 4 times/year with a Modified Live Virus (MLV) vaccine and the piglets at 14 DOA. Reproductive problems were controlled, not the mortality. January 2017 circulating viruses sequenced as European field strain and vaccine strain.

The Progressis® Prime-Boost Concept (PBC) started in June 2017 with PRRS MLV 7th week of pregnancy and killed virus (KV; Progressis®) 3 weeks prior to farrowing. Gilts in isolation MLV+KV, 4 weeks apart, finalized 3 weeks before first insemination.

#### Results

The mortality in the piglets decreased after the start of the Progressis® PBC 7+3 program; 5% in the piglets with the sow, 3% in the weaners. For the first time 50 weaners were tested negative on PCR in March 2018. At the monitor of November 2018 all nursery piglets sampled, 10x 4-6-8-10 weeks, were tested PCR negative.

#### Discussion & Conclusion

This Hungarian 1.000 sows farrow-to-finish farm, a PRRS-outbreak had a big impact on the technical results. Massive MLV vaccination did not solve the problems. After introduction of the Progressis® PBC 7+3 program, the clinical problems declined and PRRSV was eliminated from the nursery. In the National PRRS program the Progressis® PBC has proven its strong efficacy.

## VVD-PP-53

### TITLE

PORCINE RESPIRATORY AND REPRODUCTIVE SYNDROME (PRRS) CONTROL IN 6 FATTENING TO FINISH (FF) HERDS: BENEFIT OF A WHOLE HERD APPROACH

Ingrid Messager<sup>1</sup>, Aline Lefèbvre<sup>2</sup>, Rémy Jagu<sup>1</sup>

<sup>1</sup> *Boehringer Ingelheim*

<sup>2</sup> *SELAS vétérinaire HYOVET*

### CONTENT

Background and Objectives

PRRS control remains a challenge and needs a whole herd approach to be successful. The aim of this study was to evaluate the benefit of the “5-step” process, which has been developed by Boehringer Ingeheim (BI), to control PRRS in 6 French FF herds.

Material & Methods

Six FF herds, with a confirmed circulation of PRRS virus, were included in this study. In each farm, the 5-step process has been followed and a specific action plan has been implemented including biosecurity measures and MLV vaccination. All the herds were mass-vaccinated (sows with Reprocyc®PRRS EU and growing pigs with Ingelvac PRRSFLEX®EU) twice, 4 weeks apart. Then, the breeding herd was mass vaccinated every 3 months and a batch vaccination was implemented on growing pigs, between 4 and 7 weeks of age. The PRRS status of each herd was evaluated according the AASV guidelines. The reproductive and growth performances were assessed by recording batch data.

Results

In most farms, the breeding herd remained positive and stable. One farm evolved from an “instable” to a “stable” status. Regarding the growing pigs, the status improved in most of the herds. Globally, the reproductive performances improved with a significant increase of weaned piglets per sow in 5 farms. The growing performances improved as well with a significant increase of the wean to slaughter Average Daily Gain (ADG) in 2 farms. The standard deviation for ADG was reduced in 5 farms.

Discussion and conclusion

This study showed the benefit of the implementation of the “5-step” approach in 6 FF farms. The whole herd vaccination, with Reprocyc®PRRS EU and Ingelvac PRRSFLEX®EU, and the implementation of biosecurity measures improved the reproductive and growing performances in most of the herds. In addition a decrease of the variability was observed allowing a more stable production.

## VVD-PP-54

### TITLE

PRRSV1 INFECTION IMPACT IN THE INTESTINAL MICROBIOME COMPOSITION: A COMPARATIVE STUDY WITH STRAINS OF DIFFERENT VIRULENCE

HECTOR ARGUELLO<sup>1</sup>, Irene Magdalena Rodríguez-Gómez<sup>2</sup>, Jose María Sánchez-Carvajal<sup>3</sup>, Francisco José Pallares<sup>4,5</sup>, Fiona Crispie<sup>6</sup>, Raúl Cabrera<sup>6</sup>, Enric Mateu<sup>7</sup>, Gerard Martín-Valls<sup>8</sup>, Librado Carrasco<sup>3</sup>, Jaime Gómez-Laguna<sup>9</sup>

<sup>1</sup> Grupo genómica y mejora animal. Departamento de Genética. Universidad de Córdoba.

<sup>2</sup> Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Cordoba, Spain.

<sup>3</sup> Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Spain

<sup>4</sup> Dpto. Anatomía y Anatomía Patológica Comparadas. Facultad de Veterinaria. Universidad de Murcia. Spain

<sup>5</sup> Instituto Murciano de Investigación Bisoanitaria IMIB). Murcia.

<sup>6</sup> Teagasc

<sup>7</sup> Centre de Recerca en Sanitat Animal, Universitat Autònoma de Barcelona

<sup>8</sup> Departament de Sanitat i Anatomia animals, Universitat Autònoma de Barcelona (UAB), 08193, Barcelona

<sup>9</sup> Department of Anatomy and Comparative Pathology, Faculty of Veterinary Medicine, University of Cordoba, Cordoba, Spain

### CONTENT

#### Background and Objectives

Porcine reproductive and respiratory syndrome virus (PRRSV) infection is characterised by respiratory lesions, viral replication in alveolar macrophages and lymphoid organs and a strong early local inflammatory response together with a loss of the global condition of the animal. Infection outcome depends on PRRSV strain virulence and clearly impacts the respiratory tract microbiome directly. Here we aim at deciphering the indirect impact of an experimental infection with highly pathogenic PRRSV strain (Lena) and a low pathogenic strain (3249) in the intestinal microbiota through the first 13 days post-infection.

#### Material & Methods

Seventy four-week old piglets were distributed in three different groups: (i) control, (ii) 3249 strain (low virulent) and (iii) Lena strain (high virulent). Animals were euthanised at 1, 3, 6, 8 and 13 days post-infection (dpi) to analyse lung lesions and blood and faeces samples were collected and routinely processed to determine viraemia (RT-qPCR) and analyse the microbiome by 16S rRNA amplicon sequencing (MiSeq) (Illumina Inc., Cambridge, UK).

#### Results

Study results showed that PRRS infection ( $p=0.02$ ) and strain virulence ( $p=0.05$ ) alter the diversity of the faecal gut microbiota, with clear changes in microbiome richness and evenness from 6 dpi onwards. Similarly, the infection altered the ordination of the microbiome composition, although no apparent differences were observed between strains. These global microbiome changes were reproduced at taxonomic level. Significant differences in operational taxonomic units (OTUs) belonging to genera Ruminococcus, Prevotella or Oscillibacter were observed between infected and non-infected pigs. There were also differences in abundance of OTUs such as Fusobacterium, Cloacibacillus or Anaerovibrio between Lena- and 3249- infected groups.

#### Discussion & Conclusion

Our results reflect the indirect impact of PRRSV infection and strain virulence in faecal microbiome composition. Further analysis are addressed to correlate early inflammatory response to microbial changes in the gut.



# WELFARE AND NUTRITION

POSTER ABSTRACTS

## **AWN-PP-01**

### **TITLE**

**IN VIVO EFFECT OF A COMPOUND FEED THAT IS BENEFICIAL FOR INTESTINAL HEALTH AND GROWTH IN WEANING PIGLETS IS PREDICTED BY IN VITRO ANALYSES**

Yvonne Schilder<sup>1</sup>, Bart Engelen<sup>1</sup>, Daniëlle Fiechter<sup>2</sup>, Stefan Vaessen<sup>2</sup>, Rob Bleumink<sup>3</sup>, Robert Jan Veldman<sup>2</sup>, Bert Meijer<sup>1</sup>, Raymond Pieters<sup>2</sup>

<sup>1</sup> *Dopharma Research BV*

<sup>2</sup> *Hogeschool Utrecht*

<sup>3</sup> *Utrecht University*

### **CONTENT**

#### **Background & Objective**

We analyzed whether a compound feed based on maternal milk fatty acids and cholesterol increases piglet performance. A randomized controlled study and two field trials were preceded by in vitro analyses.

#### **Materials & Methods**

Transwell cell culture analysis comprising of Caco-2 cells was used to study effects of an in vitro digested compound feed on trans epithelial electrical resistance (TEER) and interleukin-8 (IL8) secretion after challenge with mycotoxin deoxynivalenol (DON). After that, effects on health and growth were analyzed in a controlled in vivo trial and two controlled field trials. In the field trials, the compound feed was administered from day 4 of life, until 5 days after weaning, i.e. day 33.

#### **Results**

In vitro the compound feed counteracted the reduction of TEER and the increase of IL8 excretion in Caco-2 cultures challenged with DON. In a controlled in vivo trial, the compound feed led to increased average daily weight gain before weaning as compared to control. Plasma alkaline phosphatase and IL8 and intestinal villi length were improved in the experimental group as compared to the controls. For the field trials, compound feed was mixed with a semolina of puffed wheat. In field trial 1, this increased feed uptake before weaning by over 50% and body weight at day 61 by 2 kg. In field trial 2, compound feed was compared to a premium milk replacer. Slaughter weight was 2.5 kg higher in the compound feed group as compared to the milk replacer group.

#### **Discussion & Conclusion**

Positive in vivo results of the compound feed on health parameters in pigs were predicted by in vitro tests, indicating the translational value of such tests.

## **AWN-PP-02**

### **TITLE**

POSITIVE EFFECT OF PORCESTIN ON ZOOTECHNICAL PARAMETERS (AVERAGE DAILY FEED INTAKE AND GROWTH) AND GUT HEALTH PARAMETERS (ILEAL VILLI LENGTH AND TOTAL ANTIOXIDANT CAPACITY) OF WEANED PIGLETS

Silvia Giorgi<sup>1</sup>, Marcello Comi<sup>1</sup>, Matteo Ghiringhelli<sup>1</sup>, Angelo Lauwaerts<sup>2</sup>, Tim Vandecasteele<sup>2</sup>, Valentino Bontempo<sup>1</sup>

<sup>1</sup> *Department of Health, Animal Science and Food Safety, Università degli Studi di Milano, Via Celoria 10, 20133 Milan, Italy*

<sup>2</sup> *Proviron Industries n.v., G. Gilliotstraat 60, 2620 Hemiksem, Belgium*

### **CONTENT**

#### Background and Objectives

The increasing need for antibiotic reduction in swine production implied the development of alternatives. Therefore, short- and medium-chain fatty acids (FA) have been extensively studied due to their supporting effect on piglet's growth and gut health. FA can be protected via glycerol esterification in order to obtain an even release of their free forms along the entire small intestine. This study investigated the dietary effects of Porcestin (mixture of esterified FA) on growth performance, mortality rate and gut health.

#### Material & Methods

The study used 192 weaned Topigs piglets (24 days old, average weight  $8.41 \pm 1.90$  kg), which were randomly allocated to one of three treatments with 16 replicates per treatment (4 piglets/replicate): T1 (neither antimicrobials nor FA), T2 (400 mg/kg amoxicillin) and T3 (5 kg/ton Porcestin). The feeding scheme was divided in a prestarter (0-14 days) and starter phase (15-42 days). T2 diet was only administered during prestarter phase. Piglets were individually weighed at weaning, 14, 28 and 41 days after weaning. Average daily feed intake (ADFI), growth (ADG), feed conversion ratio (FCR) was calculated and mortality numbers were recorded. Morphometrical analysis, inflammatory parameters (IL-6, IL-10) and total anti-oxidant capacity (TAOC) assessment was performed on small intestinal mucosa.

#### Results

ADFI and ADG were significantly higher in T3 between days 15 and 41 ( $P < 0,05$ ). FCR and mortality ratio was similar in all groups. Morphometric analysis indicated a significant longer average ileal villi length in T3 ( $P < 0,01$ ). TAOC was significantly higher in T3 ( $P < 0,01$ ). No significant effect on the inflammatory parameters was observed.

#### Discussion & Conclusion

Porcestin had a positive effect on the porcine gut health, protecting the intestinal epithelium from oxidative stress caused by weaning. Moreover, Porcestin enhanced piglet's growth performance, supported by the increase of the ileal villi length which enlarged the nutrient absorption surface.

## **AWN-PP-03**

### **TITLE**

**IN VITRO PREBIOTIC PROPERTIES OF ARABINOXYLAN-RICH INGREDIENTS IN THE GASTROINTESTINAL TRACT OF WEANED PIGLETS**

Julie Uerlings<sup>1</sup>, Martine Schroyen<sup>1</sup>, Els Willems<sup>2</sup>, Geert Bruggeman<sup>2</sup>, Jérôme Bindelle<sup>1</sup>, Nadia Everaert<sup>1</sup>

<sup>1</sup> *Precision livestock and Nutrition Unit, TERRA teaching and research centre, Gembloux Agro-Bio Tech, ULiège, Passage des Déportés 2, 5030 Gembloux, BE*

<sup>2</sup> *Royal Agrifirm Group, Landgoedlaan 20, 7325 AW Apeldoorn, NL*

### **CONTENT**

Due to weaning stress, the piglet's intestines become more susceptible to the invasion of pathogens. Gut health could be supported through the use of dietary strategies, based on fermentable carbohydrate fractions, to minimize post-weaning associated disorders and thus, the use of antibiotics. To date, mainly purified fractions have been tested for their prebiotic properties at weaning while trials on potential health promoting effects of cereals and corresponding by-products remain rare. In this study, arabinoxylan-rich feed ingredients (wheat, rye, their bran and wheat distillers grains) and arabinoxylan-oligosaccharides (AXOS) have been tested for their prebiotic activities via an in vitro enzymatic digestion and fermentation model. In addition to fermentation kinetics, short-chain fatty acids (SCFA) were analysed by HPLC after 6, 12 and 24h and the abundance in butyryl-CoA : acetate-CoA transferase gene was measured by qPCR after 12h. Rye and wheat, in contrast to their corresponding by-products (rye and wheat brans) exhibited an extensive and rapid fermentation equivalent to the one of AXOS. After 12 and 24h of incubation, AXOS demonstrated the highest level of total SCFA while the brans, the lowest. Expressed as ratio of total SCFA, all arabinoxylan-rich ingredients except for wheat distillers grains induced high proportions of butyrate after 12 and 24h in comparison to AXOS, which expressed high acetate and propionate ratios. Wheat distillers grains were characterized by an elevated propionate proportion. Rye bran and wheat bran, which induced the highest proportions of butyrate, also demonstrated high levels of butyryl-CoA : acetate-CoA transferase after 12h, whereas wheat distillers grains displayed the lowest abundance of this transferase. It can be concluded that all arabinoxylan products and by-products, except for wheat distillers grains, reached interesting prebiotic potential based on SCFA profiles and therefore could be used as feed supplement to manipulate gut ecology for health purposes in piglets.

**AWN-PP-04**

**TITLE**

**EFFECTS OF DIETARY VITAMIN PREMIX LEVELS ON PHYSIOLOGICAL RESPONSES, BLOOD PROFILES AND REPRODUCTIVE PERFORMANCE IN GESTATING SOWS DIET**

Hong Jun Kim<sup>1</sup>

<sup>1</sup> *Seoul National University*

**CONTENT**

This study was conducted to evaluate the effects of dietary vitamin premix levels on physiological responses, blood profiles and reproductive performance in gestating sows. A total of 52 F1 multiparous sows (Yorkshire × Landrace) with average body weight (BW) of  $223.49 \pm 31.65$  kg, average backfat thickness of  $18.5 \pm 4.9$  mm, and an average parity of  $6.38 \pm 2.69$  were allotted to one of 4 treatments considering BW, backfat thickness, and parity in a complete randomized design with 13 replicates. Treatments are 1) V1: commercial diet with vitamin requirement in NRC (2012), 2) V3: commercial diet with 3 times of vitamin requirement in NRC (2012), 3) V6: commercial diet with 6 times of vitamin requirement in NRC (2012), 4) V9: commercial diet with 9 times of vitamin requirement in NRC (2012). In lactation period, all sows were fed the same commercial lactation diet. As a result, backfat thickness tended to increase as higher levels of vitamin premix was provided to gestating sows ( $P < 0.01$ ). The BW change of lactating sows was increased when sows were fed higher levels of vitamin premix ( $P < 0.01$ ). The feed intake of lactating sows tended to decrease when sows were fed increasing levels of vitamin premix ( $P = 0.06$ ). Different levels of dietary vitamin premix did not show any difference in the number of total born, born alive, and stillbirth piglets as well as BW of piglets. The blood concentration of serum 25(OH)D3 of sows at 90 day of gestation showed a linear increment as dietary vitamin premix increased ( $P < 0.01$ ). Furthermore, the serum vitamin E level of sows during gestation was higher linearly as dietary vitamin premix increased ( $P < 0.05$ ). Consequently, current vitamin requirement of NRC (2012) is enough for gestating sow and additional supplementation of vitamin premix in gestating diet did not show any beneficial response during gestation.



## **AWN-PP-05**

### **TITLE**

**EFFECTS OF DIETARY HY-D® ON PHYSIOLOGICAL RESPONSES, BLOOD PROFILES, REPRODUCTIVE PERFORMANCE AND THEIR PROGENY IN GESTATING SOWS DIET**

Hong Jun Kim<sup>1</sup>, Sung Min Yoo<sup>1</sup>

<sup>1</sup> *Seoul National University*

### **CONTENT**

This study was carried out to investigate the effect of dietary Hy-D® in diet of gestating sows on physiological responses, blood profiles, reproductive performance and their progeny growth. A total of 30 F1 gilts (Yorkshire × Landrace) with average body weight (BW) of  $149.91 \pm 10.83$  kg, average backfat thickness of  $23.1 \pm 4.3$  mm were allotted to one of 3 treatments considering BW, backfat thickness and parity in a complete randomized design with 10 replicates. All experimental diets for gestating gilts were formulated based on corn-soybean meal and Hy-D® was supplemented by treatment levels. Treatments are as followed: 1) CON: corn-SBM based diet, 2) HD5: CON diet with Hy-D® premix 0.05%, 3) HD10: CON diet with Hy-D® premix 0.10%. In lactation period, all sows were fed the same commercial lactating diet. As a result, backfat thickness of sows fed 0.10% Hy-D® was significantly increased ( $P < 0.01$ ). Litter weight on lactation, total litter weight of sows fed higher level of Hy-D® were significantly improved (linear,  $P = 0.041$ ). When gestating sows were fed Hy-D®, the concentration of 25(OH)D3 in blood of their piglets was significantly higher ( $P = 0.026$ ). Also, the elevated levels of 25(OH)D3 at 24 hours postpartum and 1,25(OH)2D3 at weaning were observed as maternal Hy-D® regimen was increased (linear,  $P = 0.013$  and  $P = 0.047$ , respectively). BW of weaning pig at 5 weeks was linearly increased when Hy-D® was provided to sows (linear,  $P = 0.041$ ). Average daily gain in late weaning period was significantly higher in the Hy-D® group. These results demonstrated that 0.1% of Hy-D® in gestating diet improved reproductive performance of sows and total litter weight. Also, supplementation of Hy-D® in diet of gestating sows improved blood concentration of 25(OH)D3 in both sows and piglets subsequently greater growth performance was observed in their progeny.

**AWN-PP-06**

**TITLE**

**CAN DIETARY FIBRE LEVEL AND A SINGLE ENRICHMENT TYPE REDUCE THE RISK OF TAIL BITING IN UNDOCKED PIGS?**

Jen-Yun Chou<sup>1,2,3</sup>, Rick B. D'Eath<sup>2</sup>, Dale A. Sandercock<sup>2</sup>, Keelin O'Driscoll<sup>1</sup>

<sup>1</sup> *Teagasc*

<sup>2</sup> *SRUC*

<sup>3</sup> *University of Edinburgh*

**CONTENT**

Tail docking has been banned in the EU as a routine practice to control tail biting since 2008. However solutions are still needed to prevent tail biting in undocked pigs in conventional housing systems. This study evaluated the effectiveness of different dietary fibre levels and enrichment types at controlling tail biting in undocked pigs housed on fully-slatted floors. The experiment had a 2x2x2 factorial design, using 672 pigs in 48 pens, at a commercial stocking density. Pigs were provided with either a rubber floor toy (N=24) or a soft wooden post (*Picea sitchensis*) (N=24) in the weaner stage. After transferring to the finisher house (7 weeks post-weaning), enrichment type was swapped in half of the pens (N=24) while the remainder kept the same (N=24). From weaning to finishing, pigs were fed a diet with either a standard (weaner 4.2%; finisher 6.6%; N=24) or a higher level of crude fibre (weaner 5.9%; finisher 13.1%; N=24). Behaviour observations and lesion scores were used to assess tail biting severity. Pigs interacted more with the toy than the wood (P<0.001), and these pigs performed less tail and ear directed behaviours (P<0.05). This implies that the rubber floor toy was more effective at diverting biting behaviours away from other pigs. Pigs fed the higher fibre diet were also observed to perform more tail directed behaviours (P<0.05), contrary to the hypothesis. There was no effect of enrichment type or diet on lesion scores. In total 26 severe tail biting outbreaks occurred and almost 70% of the pigs had some degree of tail amputation. The study showed that simply increasing dietary fibre level with minimal enrichment provision is not enough to control tail biting among undocked pigs on fully slatted floors.

**AWN-PP-07**

**TITLE**

EFFECT OF A NEW PROBIOTIC COMPOSITION (AQ02) ON NEWBORN PIGLETS

MARTA GARCIA-DIEZ<sup>1</sup>, HECTOR ARGUELLO<sup>2</sup>, JOAN MARCA<sup>1</sup>, ANA CARVAJAL<sup>3</sup>, PEDRO RUBIO<sup>3</sup>,  
EDGAR G. MANZANILLA<sup>4</sup>

<sup>1</sup> *AQUILON CYL S.L.*

<sup>2</sup> *Grupo genómica y mejora animal. Departamento de Genética. Universidad de Córdoba.*

<sup>3</sup> *Grupo DIGESPORC. Sanidad Animal. Facultad de Veterinaria. Universidad de León*

<sup>4</sup> *Pig development department. Teagasc Moorepark. Ireland*

**CONTENT**

**Background&Objectives**This study assessed the benefits of the use of a probiotic product on the productive performance and welfare status of the piglets up to weaning.**Material&Methods**AQ02 is a feed additive based on probiotic bacteria. The trial was conducted on a porcine commercial farm in Ireland. Thirty sows were allocated into two groups; piglets from the experimental group (n=216) received orally a single dose (2 mL) of the probiotic product after their first colostrum intake while piglets of the control group (n=203) received placebo. Productive performance, health parameters and welfare related behaviours were monitored in the piglets during the lactation period. Furthermore, faeces were collected for microbiota analysis by 16s rRNA high-throughput sequencing.**Results**No differences were observed in piglet's weight gain or average daily weight gain between groups. The incidence of diarrhoea (P=0.027) and bursitis (P=0.019) decreased in the treated group although the frequency of navel infections or mortality remain similar in both groups. Moreover, welfare behaviours such as "object play" or "total activity" increased among treated piglets (P=0.005). Treated animals exhibited a more homogeneous microbiota (alpha diversity) and higher abundance of strict anaerobes (family Ruminococcus or genus Blautia). In contrast, aerotolerant bacteria (Enterobacteriaceae or Lactobacillus) were more abundant in pigs from the control group.**Discussion&Conclusion**According to these results, this probiotic product improves some health issues and welfare behaviours in piglets. Differences in the incidence of common signs of disease may be related to its effect on the balance of intestinal microbiota or on intestinal immune system development. Also, general activity of the piglets was higher among treated piglets probably as a reflection of a better health. Finally, a significant effect on microbiota composition was also demonstrated. Among treated piglets, faecal microbiota was more stable and composed by bacteria related to gut health.

## **AWN-PP-08**

### **TITLE**

#### **MODELLING THE EFFECT OF BIOSECURITY PRACTICES ON KEY PIG WELFARE INDICATORS**

Maria Rodrigues da Costa<sup>1,2</sup>, Nienke van Staaveren<sup>3</sup>, Julia Calderón Díaz<sup>1</sup>, Gerard McCutcheon<sup>4</sup>, Edgar Garcia Manzanilla<sup>1,2</sup>, Laura Boyle<sup>1</sup>

<sup>1</sup> *Pig Development Department, Teagasc - Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland*

<sup>2</sup> *School of Veterinary Medicine, University College Dublin, Belfield, Dublin 4, Ireland*

<sup>3</sup> *Department of Animal Biosciences, University of Guelph, Guelph, N1G 2W1, Canada*

<sup>4</sup> *Pig Development Department, Teagasc Oak Park, Co. Carlow, Ireland.*

### **CONTENT**

Improved welfare and biosecurity are requirements of modern pig production. We hypothesized that improved biosecurity practices are related to better pig welfare. This study aimed to model the effect of biosecurity practices on pig welfare indicators such as tail, skin, and ear lesions, and lameness.

Irish farrow-to-finish farms (n=27) were assessed using Biocheck.UGent™ and their scores were related to the prevalence of lameness (LAME), and ear lesions (EAR) on-farm, and tail (TAIL) and skin lesions (SKIN) at slaughter. Multivariable linear regression was used to model the prevalence of welfare indicators based on scores for external and internal biosecurity's subdivisions. A forward regression approach was used with a 0.10 cut-off for predictors' inclusion in the model. Predictors are presented as coefficient ± standard error.

The models for LAME and EAR were not significant ( $P > 0.05$ ). The model for TAIL explained 45% of the variability. Farms with high internal biosecurity scores in the finisher unit (i.e. all-in-all-out management) had decreased TAIL ( $-0.24 \pm 0.051$  %,  $P < 0.001$ ), while farms with experienced managers tended to have decreased TAIL ( $-0.20 \pm 0.110$  %,  $P = 0.083$ ). Conversely, farms with good vermin and bird control had increased TAIL ( $0.13 \pm 0.057$  %,  $P = 0.031$ ). The model for SKIN explained 19% of the variability. Farms with experienced managers had increased SKIN ( $0.73 \pm 0.272$  %,  $P = 0.013$ ).

The experience of farm managers seemed to be positive in managing TAIL but detrimental for SKIN. This could be due to the (condemnation/financial) losses associated with tail lesions, which are major in comparison with those associated with skin lesions. Good internal biosecurity and management were related to lower prevalence of tail lesions, which are known to be welfare indicators of multifactorial cause. The improvement of biosecurity practices could have a protective effect of welfare.

## **AWN-PP-09**

### **TITLE**

**BACILLUS-BASED PROBIOTIC REDUCES FAECAL EXCRETION OF CLOSTRIDIUM PERFRINGENS IN SOWS AROUND FARROWING**

Antonia Schulte<sup>1</sup>, Birgit Keimer<sup>1</sup>, Carina Helmer<sup>2</sup>

<sup>1</sup> *Biochem Zusatzstoffe GmbH, Germany*

<sup>2</sup> *AniCon Labor GmbH, Germany*

### **CONTENT**

#### **Introduction**

*Clostridium perfringens* is a major pathogen in pig production and associated with health problems and high economic losses. An unbalanced microbiota of the sows is often stated as a trigger for clostridia excretion in the farrowing pen. Aim of the trial was to investigate the effect of bacillus-based probiotic supplementation on *Clostridium perfringens* shedding in lactating sows under farm conditions.

#### **Material and Methods**

The observation (off-on-design) was conducted on a farm in Germany rearing 420 DanBred sows. Sows were fed standard diets based on wheat, barley and soybean meal according to the requirements given by GfE (2006). All sows received a bacillus-based probiotic (*Bacillus subtilis* + *B. licheniformis*, 3.25 x 10<sup>9</sup> CFU/kg), dosed with 1000 g/t final feed during gestation and lactation period (Ø 26 d). At four different time points faecal samples were collected from sows (n = 8 per sampling day) at day 2 ± 1 after farrowing. Samples were incubated anaerobically in meat stock at 37°C for 24 h and then sub-cultivated on blood agar plate. Species identification was performed by MALDI-TOF MS and further typing by PCR. Statistical analyses were performed by ANOVA.

#### **Results**

Probiotic supplementation reduced faecal *Clostridium perfringens* from 5.63E+06 CFU/g to 1.71E+05 CFU/g (P < 0.05). Major toxin Alpha formation was detected by PCR. A numerically reduction in sow mortality (sudden death) by -90% and a decreased incidence of diarrhea in suckling piglets could be observed.

#### **Discussion and conclusion**

During trial period, a significant reduction of faecal *Clostridium perfringens* could be observed. It can be assumed, that a reduced shedding of *Clostridium perfringens* reduced pathogen transmission within the farrowing pen, which might lead to a lower incidence of suckling piglet diarrhoea. The supplementation of bacillus-based probiotics may decrease Clostridia counts in feces, which was already proven in different in-vivo and in-vitro trials.

## **AWN-PP-10**

### **TITLE**

**COMBINATION OF A BACILLUS-BASED PROBIOTIC AND YEAST-BASED PREBIOTIC IMPROVES FAECAL CONSISTENCY AND REDUCES INDIVIDUAL ANTIBIOTIC TREATMENT IN EARLY WEANED PIGLETS**

Birgit Keimer<sup>1</sup>, Antonia Schulte<sup>1</sup>

<sup>1</sup> *Biochem Zusatzstoffe GmbH, Germany*

### **CONTENT**

#### Background and Objectives

Synbiotic combination of pre- and probiotics show a high potential to prevent intestinal dysbiosis by stabilizing intestinal microbiota. This study aimed to investigate the effect of a combination of a defined probiotic and a yeast-based prebiotic on intestinal health (faecal consistency) and zootechnical performance in early weaned piglets

#### Material & Methods

Weaned piglets (DanZucht x Piètrain, 21 d of age,  $5.66 \pm 0.12$  kg BW, ? + ?) were randomly allocated into two treatment groups (n = 4, 45 piglets per replicate). Piglets were fed standard diets meeting the nutritional requirements given by GfE (2006). Diets were either without any pro- or prebiotic supplementation (control) or supplemented with a combination of bacillus based probiotic and yeast-based prebiotic (Triple P®) at a dosage of 1%. For faecal consistency a subjective scoring system from 1 to 4 was used. Score 1 and 2 were considered as signs of diarrhoea, whereby score 4 represent optimal faeces consistency.

#### Results

In the first week after weaning reduced faecal consistency was observed in both groups. However, dietary supplementation of Triple P® improved faecal consistency at d 7 ( $P < 0.05$ ) and reduced the time period of reduced faecal consistency compared with control. At d 7 after weaning Triple P®-fed piglets showed optimal faecal consistency, whereby faecal consistency from control piglets were reduced until d 15. Less individual antibiotic treatments were necessary in treatment groups compared with control. Average daily weight gain and average daily feed intake were numerically higher in treatment group.

#### Discussion & Conclusion

The synbiotic combination Triple P® improved faecal consistency and reduced the need for individual antibiotic treatments in early weaned piglets. It should be considered, that synbiotics are more potent to prevent and not to treat intestinal disturbances and supplementation before should be considered.

## **AWN-PP-11**

### **TITLE**

**EFFECT OF A COMMERCIAL ORGANIC ACID BLEND ON GROWTH PERFORMANCE, GUT MORPHOLOGY, MICROBIOTA COMPOSITION AND METABOLIC FUNCTION IN NURSERY PIGS UNDER DIETARY AND ENVIRONMENTAL CHALLENGES**

Ping Ren<sup>1</sup>, Juxing Chen<sup>1</sup>, Mercedes Vazquez-Anon<sup>1</sup>

<sup>1</sup> *Novus International, Inc., St. Charles, Missouri, USA*

### **CONTENT**

**Background and Objectives:** Due to antibiotic resistance threat, global changes in regulations and consumer preferences, the swine industry is moving towards antibiotic-free feeding programs. Consequently, there is a potential of increasing incidence of post-weaning diarrhea, leading to reduced production performance and increased economic loss. The objective of this study was to investigate the effect of a commercial organic acid blend based on 2-hydroxy-4-(methylthio)butanoate (HMTBa) on growth performance and gut health in nursery pigs.

**Materials and Methods:** A total of 520 weaning piglets (TR-4 × PIC C-22, BW = 6.40 ± 0.06 kg) were allotted to 1 of 2 treatments according to randomized complete block design, with 10 pens per treatment with 26 pigs per pen. The 2 dietary treatments included: 1) corn-soybean meal control diet without organic acid supplementation (CON); 2) CON diet supplemented 0.45% organic acids blend based on HMTBa (ACTIVATE® DA, Novus International Inc., St. Charles, MO) during phase 1 and 2 and 0.3% ACTIVATE® DA in phase 3 (ACTDA). The diets contained 37% soybean meal in phase 1 and 2. The pigs were raised for 42 d under dirty environment to reflect commercial condition and induce a gut health challenge.

**Results:** Pigs fed ACTDA tended to have greater ADG during d 0 to 42 (P = 0.08) and BW on d 42 (P = 0.07) compared with those fed CON. ACTDA supplementation increased villus height to crypt depth ratio in duodenum (P < 0.01), jejunum (P < 0.01) and ileum (P = 0.02) compared with CON. Additionally, ACTDA supplementation reduced abundance of *Dialister succinatiphilus* (P = 0.05), LPS biosynthesis protein (P = 0.01) and pores ion channels (P = 0.02).

**Discussion and Conclusion:** Results indicated that ACTDA supplementation could exert growth performance benefits, mediated via improving gut morphology, modulating gut microflora and metabolic function.

## **AWN-PP-12**

### **TITLE**

#### **COLLECTION AND COMPOSITION OF SALIVA FROM SUCKLING PIGLETS**

Floris Bikker<sup>1</sup>, Tijs J. Tobias<sup>2</sup>

<sup>1</sup> *Academisch Centrum Tandheelkunde Amsterdam*

<sup>2</sup> *Faculty of Veterinary Medicine, Utrecht University, the Netherlands*

### **CONTENT**

#### **Background and objectives**

The potential composition of saliva and the easy way in which it can be collected, makes it an important matrix for the diagnosis of several diseases or biomarkers. Therefore, the aim of this study was twofold: to develop best practices for saliva collection of individual suckling piglets and determine age- related protein patterns in saliva.

#### **Material and methods**

A randomized block design was used with 5 groups of 32 suckling piglets from 18 litters of different ages (1-2 days, 1, 2, 3 and 4 weeks old) which had to chew for 0.5, 1, 2 and 4 minutes on a Salivette for saliva collection. The quantity, protein concentration, protease activity and protein composition in the saliva samples were determined with a protein assay, protease assay and SDS-page.

#### **Results**

It was found that a minimal sampling time of 2 minutes is necessary to collect sufficient saliva in individual suckling piglets from ~2 weeks and older to perform the abovementioned analyses. In contrast, in younger piglets, saliva collection was hardly possible, even at 4 min collection time. Both amount of saliva collected and protein concentration increased with sampling time and both parameters were dependent on age. Protease activity was associated with saliva quantity, protein concentration and a random litter effect. Moreover, the protease activity was higher in piglets from 3 and 4 weeks old than in younger piglets. Finally, the longer the chewing time, the higher the probability that proteins with a mass of 110 and 20 kDa were detected in saliva samples. So far the identity of these proteins has not been revealed.

#### **Conclusion**

To obtain sufficient saliva from each piglet, individual saliva sampling is possible in pigs >2 weeks old and requires 2 minutes of chewing time per piglet. With these samples various biochemical analysis can be performed.



## **AWN-PP-13**

### **TITLE**

**PORK PRODUCER OUTREACH: COULD WE BE DOING BETTER? RESULTS OF A NORTH AMERICAN SURVEY**

Sarah H Ison<sup>1,2</sup>, Ronald O Bates<sup>2</sup>, Juan P Steibel<sup>2</sup>, Catherine W Ernst<sup>2</sup>, Janice M Siegford<sup>2</sup>

<sup>1</sup> *World Animal Protection*

<sup>2</sup> *Michigan State University*

### **CONTENT**

Changes to practices that improve pig welfare are often slow to be implemented, which could, in part, be due to methods of communicating information. To maximize impact of educational materials, we used online surveys to ask producers where they obtained information and veterinarians and research/extension professionals their perceptions on educating producers. Chi-square tests compared frequencies among question options and veterinarians with research/extension professionals. Producers (n=313) selected veterinarians (87%) more than other sources of information (P<0.05). National Hog Farmer (65%), other farmers (63%), and industry reps (60%) were similarly selected more often than university research (50%) and extension educators (43%). All other sources were selected more than the Pork Information Gateway (24%). Veterinarians (n=129) were asked about all topics more often than research/extension (n=162) professionals (P<0.05). Both reported being asked about health/disease most often (76% selected very/quite often; P<0.05), followed by production management (67%), reproduction (54%) regulatory compliance (52%), and nutrition (42%). Behaviour and welfare (34%) topics were asked about at a rate similar to breeding and genetics (36%); both of which were asked about more than building design (29%). Environmental sustainability (19%) and meat quality (11%) were asked about least often. As veterinarians were the biggest source of information, it is important they have broad and current knowledge. Most veterinarians (79%) and research/extension professionals (66%) agreed/strongly agreed they keep up-to-date with the latest literature on swine management practices. However, further research is needed to understand what sources these experts use and topics they devote time to. Topics not emphasized during North American veterinary courses, such as animal behaviour and animal welfare, require self-education by veterinarians. As good welfare is more than good physical health, producer outreach may need a more holistic emphasis to ensure successful changes of production practices that impact pig welfare.

## **AWN-PP-14**

### **TITLE**

#### **CHARACTERIZATION OF DEPOSITS IN DRINKING WATER PIPES IN PIGLET NURSERIES**

Johanna Vogels<sup>1</sup>, Jost Wingender<sup>2</sup>, Jaqueline Uphoff<sup>2</sup>, Kai Aumann<sup>3</sup>, Gabriela Schaule<sup>4</sup>, Diana Meemken<sup>5</sup>, Isabel Hennig-Pauka<sup>1</sup>

<sup>1</sup> *Field Station for Epidemiology, University of Veterinary Medicine Hannover, Bakum, Germany*

<sup>2</sup> *Biofilm Centre, Aquatic Microbiology, University of Duisburg-Essen, Essen, Germany*

<sup>3</sup> *Aumann Hygienetechnik, Vechta, Germany*

<sup>4</sup> *IWW Water Centre, Mülheim, Germany*

<sup>5</sup> *Institute for Food Safety and Food Hygiene, Freie Universiteat Berlin, Berlin, Germany*

### **CONTENT**

#### **Background and Objectives:**

Providing sufficient quantities of water of adequate quality is critical to welfare, health and performance of swine. The farmer himself is responsible for ensuring that drinking water is suitable for the animals in accordance with legislation and that technical installations are designed to minimize contamination of water. So far, there is no guidance for risk assessment for the strong chemical deposits and biofilms in drinking water installations on farms, although biofilms can cause a bad taste of drinking water and might be a reservoir for pathogens.

#### **Materials and Methods:**

Deposits in drinking water installations in 15 piglet rearing farms were sampled and characterized for their physical, chemical and microbiological composition. Different cleaning concepts were tested under laboratory conditions on the respective pipes containing farm-specific deposits. Based on results from analysis of deposits from the first five farms, a practical approach for a risk assessment on farms was elaborated and tested on ten farms. Deposits were classified visually, with respect to their inorganic proportion and by cultural microbiological methods.

#### **Results:**

No respiratory pathogens were detectable in biofilms from water pipes, while *Escherichia coli* and *Salmonella enterica* (predominantly *S. Typhimurium* var. Copenhagen) were found in a number of biofilms. Cleaning concepts based onto alternating applications of basic and acid cleaning substances combined with mechanical flow impulses were successful to remove most of the dominated deposits.

#### **Discussion and Conclusion:**

Chemical deposits and biofilms are farm-specific with a high variation between farms depending on water origin, pipe installation, dosage of substances by water, technical devices and operation. Detected microorganisms belonged to an unspecific ubiquitous and commensal microflora and might be of minor importance for the health status of pigs. If a high load of *E.coli* in pipes in nursery systems or *Salmonella* are detectable, a cleaning procedure might be recommendable.

## **AWN-PP-15**

### **TITLE**

**NORTH AMERICAN STAKEHOLDER PERCEPTIONS OF ISSUES AFFECTING THE MANAGEMENT, PERFORMANCE, AND WELFARE OF PIGS**

Sarah H Ison<sup>1,2</sup>, Kaitlin E Wurtz<sup>2</sup>, Carly I O'Malley<sup>2</sup>, Janice M Siegford<sup>2</sup>

<sup>1</sup> *World Animal Protection*

<sup>2</sup> *Michigan State University*

### **CONTENT**

Changes to practices that improve pig welfare are often slow to be implemented. This may be due to the perceived importance of issues affecting pigs by stakeholders. Online surveys of North American producers (P, n=249) investigated their perception and issues related to managing pigs. Surveys were also sent to veterinarians (V, n=108) and research/extension professionals' (RE, n=123) regarding their perceptions on educating producers. Questionnaires included the open-ended questions: 'what do you consider the top three most important issues affecting the management, performance, and well-being of breeding pigs' (sow issues); and 'market hogs' (hog issues). Three independent scorers conducted qualitative analyses identifying themes. These were combined into one scoring system applied to the whole data set. Raw text was analysed using 'tidy text' in R. Issues were categorised into general themes: basic health and functioning (BH), which was mentioned most often (46%), followed by human inputs (HI; 21%), environmental inputs (EI; 15%), human issues (HIS; 11%), and behaviour/welfare (BW; 7%). General themes were further categorised into specific themes, which were different between sows and hogs for all categories except HI. Most notably, 'space' (64 vs. 8), 'air quality' (58 vs. 13) and 'environment' (57 vs. 29) were mentioned as EI more often for hogs than sows, whereas, 'structure/soundness' (51 vs. 12) and 'productivity' (121 vs. 39) were mentioned more as BH for sows than hogs. When extracting the most used individual words (excluding stop words like 'a' and 'of') from the raw text, the word 'welfare' was used more often by RE (32 times) and V (25 times) than P (3 times). Survey respondents were concerned with all other issues above behaviour/welfare, which could explain why welfare improvements are slow. However, consumers increasingly prefer products from pigs treated humanely that can behave naturally, highlighting a mismatch between industry and consumer concerns.

## **AWN-PP-16**

### **TITLE**

#### **EFFECTS OF OIL ADMINISTRATION ON ENDOTOXIN TRANSLOCATION IN WEANING PIGLETS**

Nicole Reisinger<sup>1</sup>, Barbara Doupovec<sup>1</sup>, Caroline Emsenhuber<sup>1</sup>, Elisabeth Mayer<sup>1</sup>, Gerd Schatzmayr<sup>1</sup>

<sup>1</sup> *BIOMIN Research Center*

### **CONTENT**

In healthy pigs, the gut barrier prevents endotoxins reaching the blood flow. However, specific types of oil are described to promote the absorption of endotoxins, also known as lipopolysaccharides (LPS), from the gut. The aim of the study was to assess if administration of coconut oil alone or in combination with LPS can induce an increased endotoxin translocation to the blood.

Thirty-six weaning piglets (~7 kg) were allocated to metabolic cages. Animals were assigned to three different groups: oral administration of 0.9% saline (control), coconut oil (1 mL/kg b.w.) or coconut oil (1 mL/kg b.w.) combined with LPS (10 mg/kg b.w.). Animals were sampled at 4 or 8 hours after administration. Endotoxin activity (LAL assay), endotoxin concentration (HPLC-MS/MS) and acute phase proteins CRP, haptoglobin, SAA and pig-Map (ELISA) were assessed in the blood.

After 4 hours of administration, serum endotoxin concentration increased by 4-fold in the oil + LPS group compared to the control group ( $P < 0.05$ ). In addition, the blood endotoxin concentration was increased by two-fold in the oil group ( $P < 0.05$ ). The oil + LPS group showed a trend to increase the endotoxin concentration by two-fold ( $P < 0.1$ ). Haptoglobin and CRP concentrations were not affected by any treatment. However, the oil alone administration increased the pig-MAP concentration ( $P < 0.05$ ), and showed a trend to increase the SAA concentration by 3-fold ( $P < 0.1$ ). The oil + LPS administration significantly increased the SAA concentration by 2.5 fold ( $P < 0.05$ ). After 8 hours, no effect of any treatment was observed.

Results confirm that coconut oil alone and in combination with LPS had an effect on endotoxin translocation to the blood as well as on the acute phase response. However, the exact mechanism needs to be further investigated.

## **AWN-PP-17**

### **TITLE**

COMPARATIVE EFFICACY OF ORAL MELOXICAM (METACAM® 15 MG/ML ORAL SUSPENSION FOR PIGS) AND INJECTABLE KETOPROFEN AS METAPHYLAXIS TREATMENT IN POST-PARTUM SOWS

Ivan Galindo<sup>1</sup>, Paula Sánchez<sup>1</sup>, Sebastián Figueras<sup>2</sup>, Antonio Callén<sup>2</sup>, Gloria Abella<sup>2</sup>, Ivan Hernández<sup>2</sup>, Victor Rodríguez<sup>2</sup>, Eugenio Sánchez<sup>2</sup>

<sup>1</sup> *Agropor S.L., Murcia, Spain*

<sup>2</sup> *Boehringer Ingelheim Animal Health España, Spain.*

### **CONTENT**

#### Introduction

Mastitis-metritis-agalactia (MMA) is a complex syndrome in which hypogalactia or agalactia occurs in a clinical or subclinical way within the first hours postfarrowing. It can impact severely piglet performance and welfare. The aim of this study was to compare the efficacy of a single administration of oral meloxicam to injectable ketoprofen in sows as metaphylactic treatment on litter performance.

#### MATERIAL AND METHODS

The trial was conducted on a Spanish 2000-sow farrow-to-wean. A total of 340 sows was randomly allocated at farrowing (d0) to two treatments: One group (T, n=164) was treated with a dose of oral meloxicam (Metacam® 0.4mg/kg b.w.). The other one (C, n=176) was treated with injectable ketoprofen (3mg/kg b.w.). The treatments were applied once the parturition had finished. Performance of the two treatment groups was compared for: number of liveborn, piglet mortality rate and litter weights on the day of birth (d0) and on the 16th day of life. Crossfostering was allowed within treatment group and the litter weighted immediately thereafter.

#### RESULTS

Number of liveborn piglets (C=12.6 vs T=12.5) and litter weight of day-old piglets (C=17.7 kg vs. T=18.0 kg) were not statistically different between groups ( $p>0.05$ ). A significant reduction of losses (T=0.78 piglets vs C=1.03 piglets,  $p<0.05$ ) and a higher litter weight at 16 days of age (T=49.83 kg vs. C=47.76 kg,  $p<0.05$ ) was observed among the sows treated orally with meloxicam.

In spite of the random distribution a difference in parity rank between groups was observed (C=3.56 vs T=4.0,  $p<0.05$ ). Consequently, a contribution of different nursing capacities between groups to the outcome of the study could not be completely discarded.

#### CONCLUSION

Metaphylactic use of oral meloxicam had a positive impact on both piglet viability throughout lactation and on the weight gain of the litter. Calculated ROI was 7:1 for the Oral Metacam® group.

## **AWN-PP-18**

### **TITLE**

**SCORING CLAW LESIONS ON A DUTCH SOW HERD: USING INTERDISCIPLINARY KNOWLEDGE IN YOUR PRACTICE**

Aron Coenders<sup>1</sup>, Wikke Kuller<sup>1</sup>, Josine Gelauf<sup>1</sup>, Bas Kolpa<sup>1</sup>

<sup>1</sup> *University Farm Animal Practice, Harmelen, The Netherlands*

### **CONTENT**

**Background and objectives-** Lameness in sows is still a major reason for culling. Compared to cattle and horses, little research on pathogenesis and risk factors in sows is performed. Interdisciplinary knowledge from a ruminant claw specialist was used to score and interpret claw lesions in sows.

**Material and methods-** Fifty-two sows, seven gilts and one boar from a 350-sows rearing herd were scored for claw lesions and lameness. For clinical examination, each sow was led into a inspection box and lifted by a beam (Zinpro Corporation: Feet First® Chute). Claw or feet disorders were scored using two different scoring systems. At the abattoir, legs of nine sows culled for various reasons were collected and examined for gross pathological lesions.

**Results-** A prevalence of 98% was found for claw and skin lesions and of 53% for lameness. Claw lesions were found to be a bad predictor for lameness. 90% of the animals had heel horn proliferation, less than half showed lameness. All gilts and the claws of 6 out of 9 sows at the abattoir had white line defects in at least one foot.

Older sows were unfortunately not scored for white line defects

**Discussion and conclusion-** Heel horn proliferation in sows is a disease comparable to slurry heel in cattle and thrush in horses. White line defects are also common in these species. Literature in cattle and horses attributes these abnormalities mainly to a lack of hygiene in stables, and in cattle also to feeding errors. Both diseases can not be treated with trimming. Therefore, prevalence of claw lesions should be lowered by means of prevention. Since knowledge on claw lesions is far more developed in cattle and horses, using interdisciplinary knowledge within your veterinary practice is essential.

**AWN-PP-19**

**TITLE**

**RELATIONSHIP BETWEEN SKIN LESION SEVERITY AND PHYSIOLOGICAL STRESS INDICATORS, CARCASS AND MEAT QUALITY OF SLAUGHTER PIGS**

Nikola Šobanović<sup>1</sup>, Nedjeljko Karabasil<sup>1</sup>

<sup>1</sup> *Department of Food Hygiene and Technology, Faculty of Veterinary Medicine, University of Belgrade*

**CONTENT**

The aim of this study was to determine the effects of skin lesions on physiological stress indicators, carcass and meat quality of slaughter pigs.

A total of 60 pigs with live weight of approximately 112 kg and six months old were examined. Skin lesions were visually assessed at the slaughter-line in different parts of the carcass (ears, front, middle, hind-quarters, legs) using a 3-point scale. At exsanguination, blood samples were collected and blood lactate and glucose concentrations were determined. Six different carcass quality parameters including live, hot and cold carcass weights, backfat thickness, loin muscle thickness and lean meat content were measured. pH and temperature of *M. longissimus dorsi* (pH45LD; T45LD) and *M. semimembranosus* (pH45SM; T45SM) were measured 45 minutes post-mortem. Pork quality classes (PSE, normal, DFD meat) were determined using pH45LD value. Pigs having severe skin lesions had lower live weight (103.50 kg vs. 113.30 kg and 115.60 kg;  $P < 0.0001$ ), hot carcass weight (83.91 kg vs 94.43 kg and 95.58 kg;  $P < 0.0001$ ), cold carcass weight (81.92 kg vs. 91.36 kg and 93.96 kg;  $P < 0.0001$ ), loin muscle thickness (61.00 mm vs. 70.16 mm and 68.76 mm;  $P = 0.0007$ ) and lean meat content (50.46% vs. 54.89% and 56.73%;  $P = 0.0050$ ) than pigs having moderate skin lesions and pigs without skin lesions. Pigs with severe skin lesions had higher pH45LD (6.43 vs. 6.09 and 6.22;  $P < 0.0001$ ), pH45SM (6.40 vs. 6.12 and 6.18;  $P = 0.0011$ ) and prevalence of DFD meat (56.25% vs. 10.53% and 12.00%;  $P = 0.0013$ ), but lower prevalence of normal meat (31.25% vs. 73.68% and 84.00%;  $P = 0.0016$ ), blood lactate (5.81 mmol/L vs. 12.13 mmol/L and 11.03 mmol/L;  $P = 0.0008$ ) and glucose (3.50 mmol/L vs 7.71 mmol/L and 7.85 mmol/L;  $P = 0.0013$ ) concentrations than pigs in other two groups.

The presence of severe skin lesions on pig carcasses had detrimental effects on animal welfare, carcass and pork quality.

## **AWN-PP-20**

### **TITLE**

**FUNGAL FERMENTED PRODUCTS INCREASE GROWTH AND SLAUGHTER WEIGHT OF FATTENERS.**

Sara Sancho Knapik<sup>1</sup>, Juan Antonio Mesonero Escuredo<sup>2</sup>, Janneke Allaart<sup>3</sup>, Petra Roubos<sup>3</sup>, Nienke de Groot<sup>2</sup>

<sup>1</sup> *Inga Food I + D*

<sup>2</sup> *Trouw Nutrition*

<sup>3</sup> *Trouw Nutrition R&D*

### **CONTENT**

Fungal fermented products and their derivatives may play a role in replacing antibiotics in swine diets. Microbial enzymes produced by fungi can degrade polysaccharides of feed material resulting in indigestible oligosaccharides and disaccharides, which can bind intestinal pathogens and exhibit a prebiotic effect in the intestinal tract. On the other hand, fungal cell wall components including beta-glucans may reveal prebiotic as well as immunomodulatory properties, supporting intestinal health.

A combination of copra meal, enzymatically hydrolyzed by fungal derived beta-mannanase and rye fermented with mycelium of *Agaricus subrufescens* was fed to 440 piglets at a 0,2 % dietary inclusion level compared to a control diet. A 2x2 design was used, feeding either control feed or supplemented feed from 5 to 9 weeks of age and from 9 to 12 weeks of age. Pigs were moved from a nursery farm to a fattening farm at 9 weeks of age and slaughtered at 24 weeks of age. Feed intake was measured during both experimental phases and body weight gain was measured until slaughter.

Fatteners receiving feed additives had a higher feed intake (987 $\pm$ 25 vs 873 $\pm$ 28 gram/day) and body weight gain (571 $\pm$ 8 vs 496 $\pm$ 8 gram/day) during the experimental period. Pigs receiving feed additives in both experimental phases showed the biggest growth after the experimental period (784 $\pm$ 6 vs 740 $\pm$ 7 gram/day in the control group). Particularly small piglets (initial body weight <6 kg) and medium-sized piglets (initial body weight 6-7kg) did benefit from the feed additives resulting in a better growth during the experimental fattener phase (542 $\pm$ 11 vs 467 $\pm$ 11 and 568 $\pm$ 11 vs 489 $\pm$ 13 gram/day). Also, these piglets reached a higher slaughter weight when feeding feed additives during both experimental phases (107 $\pm$ 1,3 vs 99 $\pm$ 1,4 and 113 $\pm$ 1,2 vs 103 $\pm$ 1,5 kg).

These data show that pigs in general, but especially smaller piglets may benefit from fungal fermented feed.



## **AWN-PP-21**

### **TITLE**

USE OF BONE BIOMARKERS OSTEOCALCIN AND C-TELOPEPTIDE TO DIAGNOSE METABOLIC BONE DISORDERS IN PIGS

Theo Geudeke<sup>1</sup>, Godfried Groenland<sup>2</sup>, Sylvia Greijdanus<sup>1</sup>, Kikianne Kroeske<sup>1</sup>, Guillaume Counotte<sup>1</sup>

<sup>1</sup> *GD Animal Health, Deventer, The Netherlands*

<sup>2</sup> *De Heus Animal Nutrition, The Netherlands*

### **CONTENT**

#### Introduction

Lameness in growing pigs can be a serious health issue. About 2.5% of the submissions for post-mortem examination (PME) to GD Animal Health (Deventer, Netherlands) are diagnosed with lameness due to non-infectious causes like osteochondrosis or metabolic bone disease (e.g. osteoporosis). For these cases, GD investigated the practicality of diagnostic serological tests for lameness using bone biomarkers osteocalcin (OC) and C-telopeptide (CTx). The level of circulating OC indicates the rate of bone formation and the level of CTx bone resorption.

#### Material and Method

The GD laboratory uses quantitative ELISA tests for OC and CTx (nmid-osteocalcin ELISA and CrossLaps-ELISA, Nordic Bioscience Diagnostics). To establish reference values, test results were used from 148 healthy growing pigs aged between 1 and 6 months and compared to 245 pigs with lameness. Crippled growing pigs submitted for PME were included in the study when a non-infectious cause was diagnosed and concurrent results of bone biomarkers tests were known. Data from 10 well documented cases of lameness were used to determine the relation between metabolic disorders and bone biomarkers.

#### Results

In healthy growing pigs the average OC level was 27 µg/L and CTx level 0.30 µg/L. In pigs with clinical signs of lameness average bone biomarker levels were slightly decreased. In lame pigs with histologically confirmed osteochondrosis, OC and CTx levels did not differ significantly from healthy pigs. In crippled pigs with metabolic bone disease OC and / or CTx levels were significantly lower.

#### Discussion

We propose to use the OC/CTx ration as derived measurement for net bone formation and OC\*CTx as measure for bone turnover. In pigs with metabolic bone disease bone turnover appears to be at a low level.

#### Conclusion

Bone biomarkers can be useful tools to establish whether metabolic bone disease is likely to be the cause of lameness in pigs.

**AWN-PP-22**

**TITLE**

POST OPERATIVE INTRANASAL PAIN TREATMENT IN A MINIATURE PIG

Alexander Grahofner<sup>1</sup>, Alessandro Mirra<sup>2</sup>

<sup>1</sup> *Clinic for Swine, Vetsuisse Faculty, University of Bern, Switzerland*

<sup>2</sup> *Clinical Anesthesiology, Vetsuisse Faculty, University of Bern, Switzerland*

**CONTENT**

**Background**

Drugs administration through the intranasal route could offer considerable advantages, namely painless and rapid administration, compared to other treatment routes. To the authors' knowledge, this is the first case report documenting the use of intranasal buprenorphine for the treatment of post-operative pain in miniature pigs.

**Material & Methods**

An uncooperative miniature pig was presented at the clinic because of an extensive mass on the lower left jaw. The clinical and further examination revealed a root abscess of the left tusk and therefore a surgical extraction of the teeth was performed. To provide analgesia, butorphanol 0.2 mg kg<sup>-1</sup> and metacam 0.4 mg kg<sup>-1</sup> were intravenously administered before and immediately after the surgery, respectively. The day after surgery, the pig did not drink and eat, and showed severe pain-related behavior but it was not possible to administer further analgesia without inducing high levels of stress. In order to provide pain relief, an intranasal administration of buprenorphine 30 mcg kg<sup>-1</sup> every 12 hours was attempted with a nebulizing device applied on a syringe. The drug was equally divided in both ventral nasal conchae without fixation of the animal. Pain was scored with a modified visual analogue scale, ranging from 0-500mm (higher score indicating more severe impairment or pain).

**Results**

The treatment was well accepted by the animal. Within one hour after the administration, the pain-related behavior significantly improved from 440mm to 110mm. The following three days, further administration of intranasal buprenorphine were performed every 8 hours, with the same outcome.

**Discussion & Conclusion**

The intranasal route is a feasible, easy and effective way to administrate analgetic drugs in aggressive pigs and to improve their welfare. Further studies are needed to investigate the efficacy of different analgesic drugs after intranasal administration in pigs for post-operative pain control.

## **AWN-PP-23**

### **TITLE**

**SPECIFIC DIETARY AMINOACIDIC PROFILE MIGHT IMPROVE GROWTH PERFORMANCE OF PIGLETS FROM GILTS IN THE POST WEANING PHASE**

Carlos Pineiro<sup>1</sup>, Joaquín Morales<sup>1</sup>, Gema Montalvo<sup>1</sup>

<sup>1</sup> *PigCHAMP Pro Europa. C/Dámaso Alonso 14, 40006, Segovia, Spain*

### **CONTENT**

#### **Background/Objective**

Production results of piglets susceptible to poor performance can be improved by adjusting feeding, especially at early stages. In particular, specific amino-acid profile to optimize gut integrity and immune system maturation can be applied to these susceptible piglets. This study aims in the quantification of this association.

#### **Materials/Methods**

In this study, an individual follow-up of 64 piglets from 28 to 63 days of age was conducted to evaluate dietary amino acid (AA) profile on the productive performance of more sensitive piglets. Primiparous pigs (PP) were included as problem-pigs and compared with multiparous pigs (MP), included as healthy and high-growth potential pigs. A factorial design was applied with 2 main effects: susceptibility to disease (PP vs MP) and AA profile in feeds (high lysine-HL vs high tryptophan/threonine contents-TT), resulting in four experimental treatments. Data were analysed by ANOVA and treatment group means were separated using Tukey's test.

#### **Results**

In nursery period, MP pigs tended to show higher average daily gain (ADG) (21.0%; P=0.08) and showed higher average daily feed intake (ADFI) (21.9%;P=0.02) than PP pigs, while feed conversion ratio was not affected. As a result, at the end of the nursery period MP pigs showed higher BW (21.2%;P=0.03) than PP pigs. Dietary treatment did not ADG and ADFI. Parity x feed effect did not reach significance in the whole nursery period, but in prestarter phase TT feed improved ADG (34.8%) in PP pigs compared with HL feed, while in MP pigs HL feed promoted higher ADG than TT feed (8.9%) (P parity x feed < 0.05).

#### **Discussion/Conclusion**

This result observed in the immediate post-weaning phase supports the experimental hypothesis and a specific AA dietary profile in the post-weaning phase might improve growth performance in pigs more susceptible to disease, such as PP pigs.

Research based on EU-FP7/funded PROHEALTH-project (no.613574).

## **AWN-PP-24**

### **TITLE**

**INFLUENCE OF LIVE WEIGHT OF GROW-FINISH PIGS ON THE FEED INTAKE FED VIA A LIQUID FEEDING SYSTEM WITH DIFFERENT GROUP SIZE AND WITH A DIFFERENT PIG-TO-FEEDER RATIO.**

Martin Ziron<sup>1</sup>, Julia Aschebrenner<sup>1</sup>

<sup>1</sup> *FH SWF Soest*

### **CONTENT**

#### Background and Objectives

Liquid feeding is generally used in pig farms worldwide, but little is known about the individual behavior of pigs depending on their body weight using this mode of feeding. This study examined the influence of live weight, time of day, group size and pig-to-feeder ratio on feed-uptake.

#### Material & Methods

In a grow-finishing unit applying liquid feed via sensor feeding in 5 blocks/day behaviour of pigs at feeding was recorded with the software VideoSyncPro during all feeding times and over a 3-day period. Before start of the observation period pigs were individually weighed and marked with a color code. In total 97 pigs in 4 pens were investigated: Group A: 13, B: 19, C: 26, D: 39 pigs; group A and C: pig-to-feeder ratio 2:1, group B and D: 3:1. Software Mangold INTERACT was used to analyze.

#### Results

In all four groups independent of group size or pig-to-feeder ratio it was observed that each pig was taking up feed at least once in each of the feedings blocks. The individual body weight had no influence on the frequency of food intake. Pigs with a higher live weight in the groups do not stand more often at the feed trough than lighter pigs. It has been noted that heavy pigs more frequently at the start of feeding standing at the feed trough than lighter-weight pigs.

#### Discussion & Conclusions

This study demonstrated that all pigs took up feed in each feeding block independent of the individual body weight. It was observed in all groups that pigs showed highest activity in feed uptake during afternoon hours. This is in line with the biphasic biorhythm of swine, with a more active behaviour during the afternoon. Further studies on other farms are ongoing to confirm that observations are not farm-related.

## **AWN-PP-25**

### **TITLE**

**ANIMAL WELFARE ASSESSMENT IN GERMAN FATTENING PIG UNITS – CLINICAL EVALUATIONS (PART OF THE MULTIVIS-PROJECT)**

Ines Spiekermeyer<sup>1</sup>, Birte Wegner<sup>2</sup>, Julia Grosse-Kleimann<sup>3</sup>, Henning Meyer<sup>4</sup>, Heiko Plate<sup>4</sup>, Hendrik Nienhoff<sup>1</sup>, Michaela Fels<sup>2</sup>, Elisabeth grosse Beilage<sup>5</sup>, Lothar Kreienbrock<sup>3</sup>, Hubert Gerhardy<sup>6</sup>

<sup>1</sup> *Swine Health Service, Chamber of Agriculture Lower Saxony, Oldenburg, Germany*

<sup>2</sup> *Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour, University of Veterinary Medicine Hanover, Foundation, Hanover, Germany*

<sup>3</sup> *Department of Biometry, Epidemiology and Information Processing, University of Veterinary Medicine Hanover, Foundation, Hanover, Germany*

<sup>4</sup> *VzF GmbH Erfolg mit Schwein, Uelzen, Germany*

<sup>5</sup> *Field Station for Epidemiology, University of Veterinary Medicine Hanover, Foundation, Hanover, Germany*

<sup>6</sup> *Marketing Service Gerhardy, Garbsen, Germany*

### **CONTENT**

#### **Background and Objectives**

The holistic MulTiViS-project was launched to develop indicators to measure animal welfare. The project takes into account various data sources (information from fattening units and slaughterhouses and information on pig health and behaviour). As part of this approach the present study provides results of the experiences of the clinical evaluations on the farms and the impact of various factors on animal health.

#### **Material & Methods**

On approx. 200 fattening pig units, two veterinarians gathered basic information on housing, feeding, keeping, and pig health. In each fattening unit, a sample of eight pens was selected to assess behaviour of the pigs as well as clinical issues by means of ca. 20 variables like skin lesions or flank biting.

Concerning housing, information (e.g.) was recorded on ventilation system, number of pigs per pen, amount and kind of enrichment materials, feeding equipment and technology.

Using multi-factorial analysis the impact of these factors on animal welfare is analysed.

#### **Results**

Experiences of the clinical investigation and results of analysis of data will be presented with respect to impact of various factors on animal welfare. The figures for instance reveal a higher number of pigs per pen is associated with a higher number of skin lesions. The importance of flank biting does not differ between pens of different group sizes.

#### **Discussion & Conclusion**

The outcome of the analysis increases the knowledge about the production and health situation of pigs on the farms, on factors affecting on animal health as well as on skills to assess and improve animal welfare.

The project is supported by funds of the Federal Ministry of Food and Agriculture (BMEL) based on a decision of the Parliament of the Federal Republic of Germany via the Federal Office for Agriculture and Food (BLE) under the innovation support programme.

## **AWN-PP-26**

### **TITLE**

STATUS QUO ANALYSES OF NOISE LEVEL IN PIG FATTENING UNITS IN GERMANY

Birte Wegner<sup>1</sup>, Ines Spiekermeier<sup>2</sup>, Hendrik Nienhoff<sup>2</sup>, Julia Grosse-Kleimann<sup>3</sup>, Karl Rohn<sup>3</sup>, Henning Meyer<sup>4</sup>, Heiko Plate<sup>4</sup>, Hubert Gerhardy<sup>5</sup>, Lothar Kreienbrock<sup>3</sup>, Elisabeth grosse Beilage<sup>6</sup>, Nicole Kemper<sup>1</sup>, Michaela Fels<sup>1</sup>

<sup>1</sup> *Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour, University of Veterinary Medicine Hanover, Foundation, Germany*

<sup>2</sup> *Swine Health Service, Chamber of Agriculture Lower Saxony, Oldenburg, Germany*

<sup>3</sup> *Department of Biometry, Epidemiology and Information Processing, University of Veterinary Medicine Hanover, Foundation, Germany*

<sup>4</sup> *VzF GmbH, Uelzen, Germany*

<sup>5</sup> *Marketing Service Gerhardy, Garbsen, Germany*

<sup>6</sup> *Field Station for Epidemiology, University of Veterinary Medicine Hanover, Foundation, Germany*

### **CONTENT**

#### **Background & Objectives**

In fattening compartments, pigs and barn technologies are sources of noise. Since permanent noise can affect animal welfare, information on noise levels is important. The aim of the present study was to determine the sound levels in pig husbandry and consider various environmental effects as well.

#### **Material & Methods**

The study was carried out within the MultiViS-project as a general study framework to describe animal welfare both on-site and by general production data, based on around 200 German fattening farms. Within randomly selected compartments, the sound level was measured at the animals' body height. The equivalent sound level (LAeq) was recorded using a sound level meter (NTI Audio, Schaan, Liechtenstein). Multi-factorial analysis of variance was carried out considering sex, feeding system, ventilation, floor conditions, group size and number of pigs per compartment as fixed effects in order to detect potential influences on the noise level.

#### **Results**

The average sound level was  $70.09 \pm 4.23$  decibels [dB] (Min 52.5, Max 92.4 dB). Pigs in the second half of the fattening period were louder than pigs in the first half ( $p < 0.0001$ ). The feeding technique ( $p < 0.0001$ ), floor ( $p = 0.0047$ ), temperature ( $p = 0.0023$ ), number of pens per compartment ( $p < 0.0001$ ) and the interaction of number of animals per compartment and number of pens per compartment ( $p < 0.0001$ ) showed statistical significant effects on the sound level.

#### **Discussion & Conclusion**

Except some outliers, the measurements were in the range of the limit of 85 dB (A) specified in the Directive 2008/120/EC. To determine welfare impacts of noise level additional analyses on environmental effects and other confounding variables is necessary.

The project is supported by funds of the Federal Ministry of Food and Agriculture (BMEL) based on a decision of the Parliament of the Federal Republic of Germany via the Federal Office for Agriculture and Food (BLE).

**AWN-PP-27**

**TITLE**

**IRON DEFICIENCY IN NEWLY WEANED PIGS**

Robert Friendship<sup>1</sup>

<sup>1</sup> *University of Guelph*

**CONTENT**

Iron deficiency is common among newly weaned fast growing pigs and it is possible iron status is associated with immune function. Therefore it is important to investigate whether anemia is associated with poorer antibody production following vaccination. In addition there is some concern that high inclusion of zinc in starter diets might interfere with iron absorption and exacerbate anemia in the nursery. The objectives are to determine whether iron deficiency affects the pig's immune system and to determine if iron deficiency is corrected once pigs begin eating starter feed.

Three different iron treatment groups were created. Pigs received via intramuscular injection either 100 mg of iron dextran (Uniferon®, Pharmacosmos) at 3 days of age (n=76) (low-iron), or 200 mg of iron at 3 days of age (n=67) (medium-iron), or 200 mg of iron at 3 days and at 14 days of age (n=70) (high-iron). At weaning (3 wk of age) pigs were fed a diet containing 3000ppm of ZnO. Pigs were vaccinated against *M. hyopneumoniae*. Six weeks post-weaning the serum will be tested using IDEXX antibody ELISA.

The average hemoglobin levels for pigs in the 3 treatment groups at weaning were 76g/L, 102g/L, and 119.6g/L for low-iron, medium-iron and high-iron, respectively. At 3 weeks post-weaning hemoglobin levels were 101, 109, and 111g/L for low, medium and high iron treatment, respectively. The ELISA testing for antibody response has not yet been completed.

Iron status at weaning was improved by a second intramuscular injection of 200mg of iron dextran at 14 days of age, but average hemoglobin levels dropped after weaning in this group of pigs, possibly because of the presence of high zinc levels in starter feed. Pigs in the low-iron treatment group improved but anemia was still a concern 3 weeks post-weaning.

## **AWN-PP-28**

### **TITLE**

USE OF ANTIPIRETTIC, ANTI-INFLAMMATORY AND ANALGESIC MEDICATION IN BELGIAN SWINE INDUSTRY

Alexandra Schoos<sup>1</sup>, Eva De Jonghe<sup>2</sup>, Peggy De Backer<sup>2</sup>, Dominiek Maes<sup>1</sup>

<sup>1</sup> Ghent University, Faculty of Veterinary medicine, Porcine Health Management Unit

<sup>2</sup> Ceva Santé Animale, Metrologielaan 6, 1130 Brussels, Belgium

### **CONTENT**

The use of antipyretic, anti-inflammatory and analgesic medication gains importance for animal welfare reasons and in the context of antibiotic reduction. To better understand the use of these products for different indications in pigs, a survey was performed.

A questionnaire was distributed amongst 53 Belgian swine practitioners. Vets were asked about the use of different molecules for parenteral administration, i.e. meloxicam, ketoprofen, flunixin, metamizole, tolfenamic acid and different molecules for oral administration, i.e. paracetamol and salicylates. Respondents were asked for which of the following conditions the molecules are used: fever, inflammation, respiratory disorders, lameness, periparturient period, postpartum dysgalactia syndrome (PDS), prolapse, pre- and post-surgery and trauma. For each condition, multiple molecules could be chosen.

In total, 70% of the veterinarians responded. The % of vets choosing meloxicam for the different indications were: lameness 92%, pre- and post-surgery 86%, inflammation 70%, fever 54%, trauma 46%, periparturient period 43%, PDS 41%, prolapse 24%, and respiratory disorders 19%. The % of vets choosing ketoprofen for these indications were: fever 54%, inflammation 43%, respiratory disorders 38%, trauma 22%, lameness 19%, PDS 19%, periparturient period 16%, prolapse 11%, pre- and post-surgery 5%. Paracetamol was chosen for treatment of fever (62%), periparturient period (57%), respiratory disorders (51%), PDS (43%), inflammation (30%), lameness (8%) and pre- and post-surgery (5%). The % of vets choosing salicylates for following indications were: fever 76%, respiratory disorders 57%, inflammation 27%, periparturient period 16%, PDS 14% and lameness 5%.

Fever and respiratory disorders were mainly treated using oral administration, probably because these signs often affect a large number of animals, mainly piglets and fattening pigs. The preferred molecule to treat inflammation, lameness and pre- and post-surgery was meloxicam. For treatment of PDS and sows in the periparturient period, meloxicam was preferred as parenteral drug and paracetamol as oral drug.



## **AWN-PP-29**

### **TITLE**

**MICROBIOTA REGULATION IN INTESTINE OF PIGLETS FED DIFFERENT COPPER SOURCES AND DOSES**

Carmen Ambrosio<sup>1</sup>, Hauke Smidt<sup>1</sup>, Jurgen van Baal<sup>1</sup>, Rudi Forier<sup>2</sup>, Agathe Romeo<sup>2</sup>, Paul Bikker<sup>1</sup>

<sup>1</sup> *Wageningen University & Research, 6708 PB Wageningen, The Netherlands*

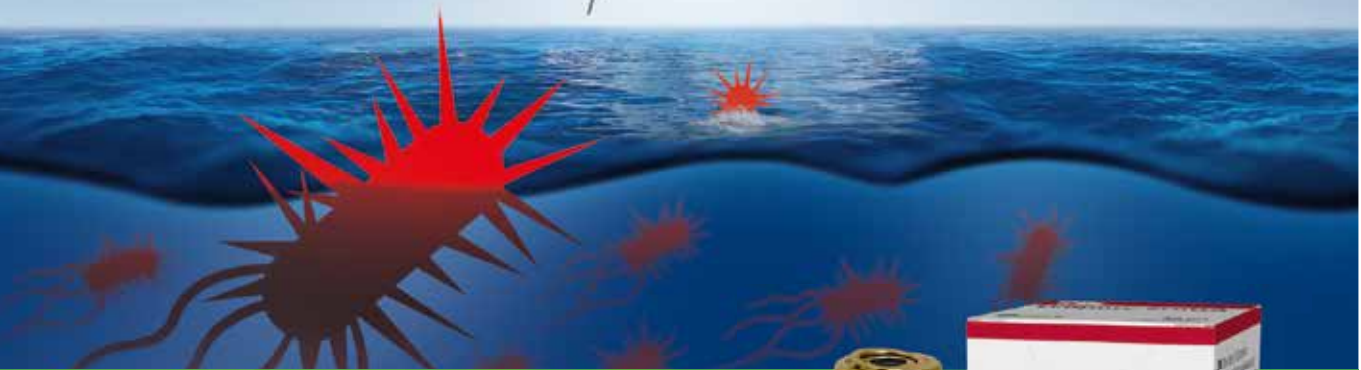
<sup>2</sup> *Animine, 74330 Sillingy, France*

### **CONTENT**

**Background and objectives** Copper (Cu) can improve piglet growth performance during the post-weaning period when it is supplied at a high dose (160 mg/kg) in the diet, but its mode of action is not fully elucidated. Its antimicrobial properties are under investigation. The aim of this study was to evaluate the effect of Cu supplementation in sulfate and in oxide forms on the gut microbiota of weaned piglets. **Material and methods** The trial was carried out with 600 piglets weaned at 26 days and divided into 6 experimental groups (10 pens per group, 10 piglets per pen). For 5 weeks, they were fed copper sulphate (CuSO<sub>4</sub>) or dicopper oxide (Cu<sub>2</sub>O; CoRouge®, Animine) at different Cu levels: 15 mg/kg, 80 mg/kg or 160 mg/kg of Cu. At the end of the experiment, 8 piglets per pen were sacrificed, ileum and colon contents were sampled and selected bacterial populations were analysed by pPCR targeting the 16S ribosomal RNA (rRNA) gene. **Results** The results showed no significant differences in total bacterial 16S rRNA gene copies. Increasing the Cu dose led to decreasing abundance of Firmicutes in the ileum. Compared to CuSO<sub>4</sub>, Cu<sub>2</sub>O at high dose decreased *Escherichia coli* abundance in the colon, but Cu<sub>2</sub>O tended to be more effective (0.010% vs. 0.047%, respectively; P = 0.053). **Discussion and conclusions** These results are in agreement with those obtained for growth performance: increased Cu dose was related to an increase in weight gain, with higher weight gain for Cu<sub>2</sub>O (P < 0.09). Therefore, Cu supplementation can regulate microbiota composition with positive effects on animal performance.



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## SOCIAL PROGRAMME

### WELCOME RECEPTION

The Welcome Reception takes place in Tivoli-Vredenburg on Floor 5 and 6 on Wednesday 22 May, 18h00, after the scientific programme.

Tivoli-Vredenburg has been striving to be as open as possible since its opening. A low-threshold and accessible place, from and for the city, for young and old. The wide programme attracts many different audiences to the different halls, but there is also room for meetings and liveliness in the spaces between them. The K.F. Hein Foyer and Plein 6 are such examples of how Tivoli-Vredenburg wants to implement this.

Join us for a drink and food bites on the first symposium day of the 11th ESPHM and take this opportunity to socialize with colleagues, friends and make new contacts in an informal environment.

### PUB CRAWL

After the Welcome Reception we invite you to discover the beauty of Utrecht with a Pub Crawl along different Pubs, hosted by official sponsors of the ESPHM2019.

Some of the sponsors have fully adopted a Pub in the heart of the city center. It is up to you to discover the city and find the Pubs (with guidance) to join them for a drink and some food bites. We will provide you with a map of the city center, some coins for your drinks and guidance along the way.



### SYMPOSIUM FAREWELL DINNER

The Farewell Dinner takes place in the Ronda, which is one of the unique halls of Tivoli-Vredenburg, on Thursday 23 May from 20h00.

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## PRACTICAL INFORMATION

### CONFERENCE VENUE

 The 11<sup>th</sup> European Symposium of Porcine Health Management (ESPHM) is held at Tivoli-Vredenburg in Utrecht, The Netherlands.

TIVOLI-VREDENBURG  
Vredenburgkade 11  
3511 WC Utrecht  
The Netherlands


### SYMPOSIUM SECRETARIAT

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### REGISTRATION DESK OPENING HOURS

 Wednesday May 22<sup>nd</sup>: from 11:00h to 17:00h  
Thursday May 23<sup>rd</sup>: from 08:00h to 18:00h  
Friday May 24<sup>th</sup>: from 08:00h to 13:00h

Please go to the registration desk upon arrival to collect your symposium documents.

### WARDROBE TIVOLI-VREDENBURG OPENING HOURS

 Wednesday May 22<sup>nd</sup>: 10h00 to 20h00  
Thursday May 23<sup>rd</sup>: 07h30 to 19h30  
Friday May 24<sup>th</sup>: 07h30 to 14h00

All items have to be picked up before closing. If not picked up, Tivoli-Vredenburg staff will bring it to the artists' reception at the end of the day.



## WIFI



The WiFi access is free for all the attendants to the symposium. This network will be broadcasted to all symposium venue areas. Access to this WiFi network is through the following network (no password needed):

**Network: ESPHM2019** (sponsored by FORCERIS by CEVA)

## APP



Stay tuned by downloading the App!

Search for the App ESPHM2019 in the Apple store or Google Play, download and you're ready!



## PUBLIC TRANSPORT



For up to date schedule information about trains and buses, we advise you to visit [www.9292.nl/en](http://www.9292.nl/en). This is the most common public transport planner in the Netherlands.

## MEDICAL ASSISTANCE AND INSURANCE



In emergency situations, you can contact the local police, ambulance service, fire department and other emergency services by calling 112.



Participants are advised to make their own arrangements regarding travel insurance and medical assistance during the symposium. Neither the Organization nor the Secretariat are able to accept any responsibility whatsoever for damage or injury to persons or their belongings during the symposium.

## BADGES AND SECURITY



It is essential that you wear your personal badge at all times while in the symposium venue.

## ATTENDANCE CERTIFICATE



Attendance Certificates will be issued by the Symposium Secretariat and can be downloaded after the symposium through your personal ESPHM2019 account.





# uniSTRAIN<sup>®</sup>

## PRRS

Live vaccine, Porcine Reproductive and Respiratory Syndrome (PRRS)

### SMART VACCINATION

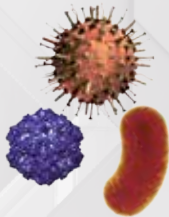


Sows & Gilts

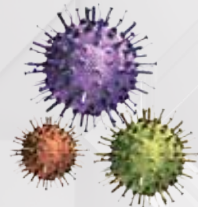


Piglets

### ONESTEP FORWARD on PRRS



True Fusion



ID & IM



Diagnosis &  
Knowledge

**UNISTRAIN<sup>®</sup>PRRS. Composition per dose:** Live attenuated Porcine reproductive and respiratory syndrome virus (PRRSV), strain VP-046 BIS 103.5-105.5 CCID50 (cell culture infectious dose). Phosphate buffer solution. **Indications:** **Breeding females:** For active immunisation of breeding females from farms affected with European PRRS virus to reduce reproductive disorders, incidence and duration of viraemia, transplacental virus transmission, virus tissue load and clinical signs associated with infection with strains of PRRS virus. Under laboratory conditions, vaccination of females reduced the negative impact of PRRS virus infection on piglet performance (mortality and weight gain) within the first 28 days of life. **Onset of immunity:** 30 days after vaccination. **Duration of immunity:** 16 weeks demonstrated by challenge. **Pigs from 4 weeks of age:** For active immunisation of pigs from farms affected with European PRRS virus to reduce clinical signs associated with a PRRS virus infection, the incidence and duration of viraemia and the duration of virus shedding by infected animals. Under experimental conditions, it was demonstrated that vaccination reduces the virus tissue load in the lungs. Under experimental conditions, where a PRRSV infection occurred during the fattening period, a reduction in mortality and in the negative effects of infection on daily weight gain was demonstrated. **Onset of immunity:** 4 weeks after vaccination. **Duration of immunity:** 24 weeks. **Administration route:** Intramuscular or intradermal route using a suitable device. **Dosage:** 2 ml intramuscular injection or 0.2 ml via intradermal administration. **Side effects & Contraindications:** Do not use in case of hypersensitivity to the active ingredient or to any of the excipients. Do not use in naive breeding herds in which the presence of European PRRS has not been established through reliable diagnostic virological methods. **Withdrawal period:** Zero days. **Interaction with other medicinal products:** Safety and efficacy data are available which demonstrate that this vaccine can be mixed with ERYSENG<sup>®</sup>PARVO and administered at one injection site. The product literature of ERYSENG<sup>®</sup>PARVO should be consulted before administration of the mixed products. **Special Precautions:** Vaccinate healthy animals only. For an optimal control of PRRS virus, it is advised to mass vaccinate all target pigs within a herd from the earliest recommended age onwards. Newly introduced PRRS-naïve females (e.g. replacement females from PRRS-negative herds) should be vaccinated prior to mating. Following vaccination of breeding females the vaccine strain may be shed for up to 9 days. Following vaccination of 4 week old pigs, shedding of the vaccine strain may last for up to 29 days. The vaccine strain can spread to non-vaccinated cohabitant animals, including the fetus during pregnancy and piglets after partum without any clinical consequence. Therefore, special precautions should be taken to avoid spreading to susceptible animals, if necessary. No information is available on the safety and efficacy of this vaccine when used with any other veterinary medicinal product except with ERYSENG<sup>®</sup>PARVO. **Packaging:** IM: vials of 10, 25, 50, 100 and 125 doses plus solvent. ID: vials 50, 100, 125 doses plus solvent. **Special storage precautions:** Lyophilisate: store and transport refrigerated (2°-8°). Solvent: store and transport below 25°C. Do not freeze. Protect from light. **Marketing Authorisation Holder:** LABORATORIOS HIPRA, S.A. Avda. la Selva, 135. 17170 Amer (Girona) SPAIN. **Marketing Authorization Number:** 2738 ESP. Under veterinary prescription. Use medicines responsibly.







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Please ask your local ECO Animal Health representative for more information about Aivosin<sup>®</sup> Water Soluble Granules and Premix.

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