4th European Symposium of Porcine Health Management

organised by the
European College of Porcine Health Management
&
European Association of Porcine Health Management

25-27 April 2012

Bruges, Belgium
Congress Centre Oud Sint-Jan

Programme & Abstract book

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Welcome

Dear Colleagues,

On behalf of the organizing committee, it is my great pleasure to welcome you to the 4th European Symposium of Porcine Health Management (ESPHM) in Bruges, Belgium.

This symposium has evolved as an important meeting for pig practitioners as well as other professionals working in porcine health management. For the past 3 years, the symposium has been organized by the European College of Porcine Health Management (ECPHM). As you may know, during the 2nd ESPHM in 2010 in Hanover, the European Association of Porcine Health Management (EAPHM) was established. The association and the college work closely together because both organizations share many similar goals. By joining forces, we can optimize veterinary expertise for the pig industry and for pig veterinarians in Europe. Unlike the College, the Association is open to non-diplomates since not everybody is willing or able to follow a residency training program and to sit the diplomate exam. In this regard, the Association has a much broader base than the college and, in some ways, the College can be considered as being embedded in the Association. It is also intended that the Association will play an important role in shaping EU-legislation that might affect the pig industry in the future.

The 4th ESPHM is the first major event that has been organized jointly by the College and the Association. Based on the number of participants and the number of abstracts, it is already destined to be a great success. Approximately 850 delegates have registered for the symposium, and 250 abstracts were submitted. The fact that the number has more than doubled compared to previous years is already proof of synergy between the College and the Association. In line with the previous successful symposia, the local organizing and scientific committee, together with the boards of the College and the Association, aimed to compile a program of high scientific quality. During the key-note sessions, internationally renowned speakers will focus on various practical aspects of porcine health management such as antimicrobial use and resistance, infectious diseases such as PRRSV, Brachyspira and Chlamydia, piglet vitality and reproduction. In contrast with previous years, we will work in two parallel sessions on the Thursday afternoon. This is because of the high number of abstracts we received and we wished to give those that submitted an abstract a reasonable chance to present their work orally. For the first time, there will also be an industry session for the platinum sponsors. The core of a scientific symposium is the quality of the program. The scientific committee reviewed all submitted abstracts, which were read by three independent reviewers and scored in a blinded way. Revisions were necessary for some abstracts, and unfortunately, some others could not be accepted.

The symposium will take place in the congress venue Oud Sint Jan (Old Saint John). In the Middle Ages, this was the site of one of the first hospitals in Europe and the building here served as a hospital until 1976. Apart from the scientific and professional aspects of the symposium, we hope that you will also enjoy the social program with the welcome reception, the farewell dinner that will take place in the former Jesuit Church Sacred Heart, and the guided visit of the city on Friday afternoon. Bruges has been declared a world heritage site by UNESCO. Apart from the extensive cultural fare, the city offers ample opportunity for shopping, to visit the numerous bars and restaurants, to enjoy the natural surroundings, etc.

The local organizing committee looks forward to welcoming you and will do its best to make your participation a successful and pleasant event.

Dominiek Maes
President 4th ESPHM

Committees

Local Organizing Committee

Congress President: Dominiek Maes

Members:
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Filip Boyen
Brigitte Cay
Guy Cluydts
Jeroen Dewulf
Alain Kanora
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Thomas Blaha (past-president)
Tomasz Stadejek (secretary)
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Dominiek Maes (secretary)
Jean-Luc Sevin (treasurer)
Antonio Palomo Aigüe

4th ESPHM Secretariat
Semico n.v.
Korte Meer 19, 9000 Ghent
Phone: + 32 (0)9 233 86 60
Fax: +32 (0)9 233 85 97
E-mail: ESPHM@Semico.be

General and Practical Information

Venue and Dates

The 4th ESPHM will take place at the Site Oud Sint-Jan, 25-27 April 2012 in Bruges, Belgium.

Address: (*pedestrian*) Mariastraat 38
8000 Brugge

(*vehicle*) Zonnekemeers
8000 Brugge

During the meeting:
Phone: +32 (0)9 233 86 60
Fax: +32 (0)9 233 85 97

House Rules

- The venue is a public non-smoking building. Those who need nicotine from time to time will find ashtrays in front of the main entrance.
- Switch off your mobile during sessions.
- When you take a cup, glass or plate into a room, please take it out as well.

Use of Internet

Wireless internet is available.
password: ESPHM
network: Bruges

Registration and Information desk

The registration and information desk will be open during the whole congress as follows:

Opening hours:

Wednesday, 25 April	10.00-21.00hrs
Thursday, 26 April	08.00-18.00hrs
Friday, 27 April	08.00-14.00hrs

Lost and Found

For lost and found personal belongings, please contact the Information desk.

First Aid

In case of emergency, please contact the Information Desk.

Name badge

Your personal badge is your entrance ticket to all sessions and the exhibition. Please, remember to wear your badge at the congress center and the social events. If you lose your badge, a new one can be purchased against proof of your original registration, at a cost of 4.00 Euros.

Coffee breaks and Meals

Coffee/tea and lunches (on Thursday and Friday) are included in the registration fee and will be served daily in the Mozart Room, Erasmus Room and Exhibition area.
An all day open beverage buffet can be found in the Exhibition area.

Banks and Post office

Most banks open at 09.00hrs and close around 16.00hrs Monday through Friday. They are generally closed for lunch between 12.00-14.00hrs. Post offices are open between 09.00 and 16.00hrs. Please, note that there will be no exchange facilities at the congress venue.

Climate and Dress

The Belgian climate is distinctly maritime and usually mild, and the city of Bruges is no exception to this. At this time of the year temperatures will be around 10-16°C. An umbrella might be useful as the most precipitation on average occurs in April. Dress will be informal throughout the symposium.

Electrical supply

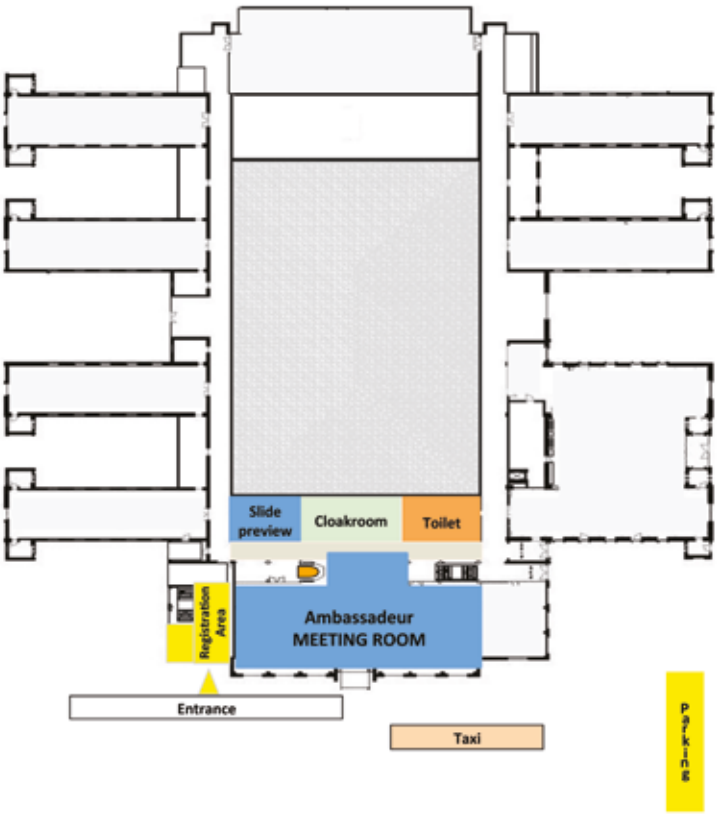
Electricity is supplied at 220 volts, 50 Hz. Some hotels provide 110 volts AC sockets for electric razors only. For all other equipment, an adaptor/converter is necessary.

Insurance and Liability

The 4th ESPHM committees and Semico n.v. do not accept liability for personal medical expenses/travel expenses/losses of whatever nature incurred by delegates and/or accompanying persons.

Floor Map Congress Venue

Level 0



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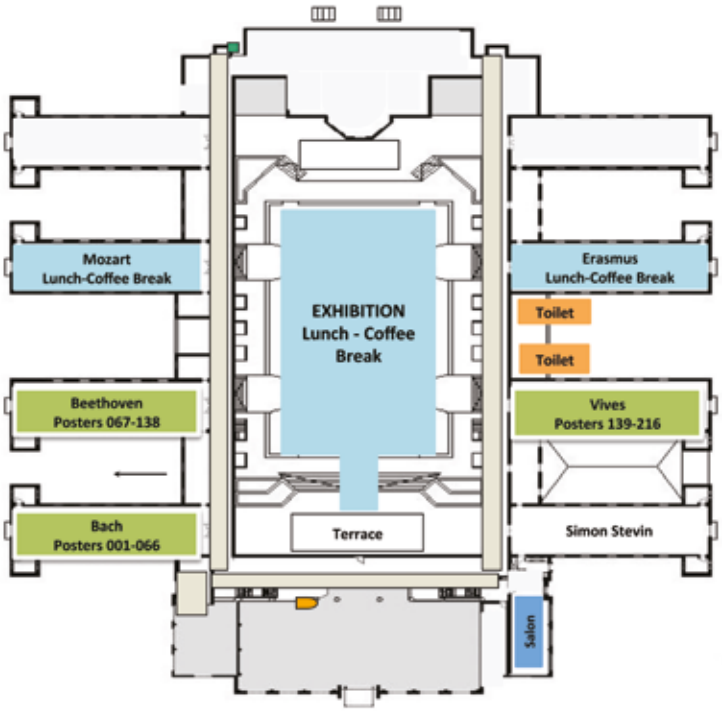

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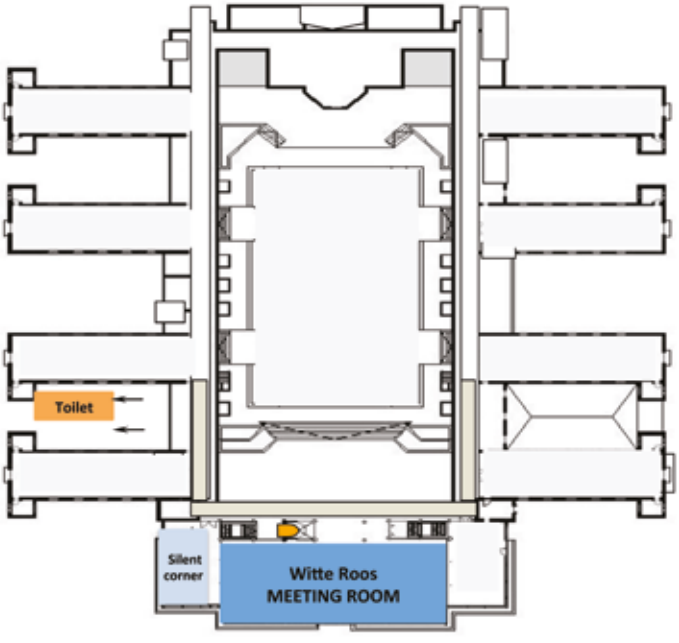

Social Programme

Welcome Reception

Wednesday, 25 April (19.00-20.30hrs)
(Oud Sint Jan, Bruges – Mozart Room, Erasmus Room & Exhibition area)

During this welcome reception, everybody will have the opportunity to meet old friends and make new ones.

Included in registration fee of delegate and accompanying person

Congress Dinner

Thursday, 26 April (19.30- hrs)
(Vlamingstraat 86, 8000 Bruges)

Take part in the wedding feast of Charles the Bold and Margeret of York. Fools, tourbadours, knights, dancers, a falconer, fire-eaters, witches,... cheer up to a merry dinner, sprinkled with beer and wine to your heart's content, all taking place in a former neo-gothic Jesuit church of the Sacred Heart in Brugge, desecrated since 1990.

Bruges, the Venice of the North

Friday, 27 April (14.00-16.00hrs)

Guided walk of Bruges
Departure Time at Oud Sint Jan: 14.00hrs

Price per person: € 10,00

Accompanying Persons' Tour

Thursday, 26 April (14.00-16.00hrs)

Departure Time at Oud Sint Jan: 14.00hrs

Included in registration fee of accompanying person

Acknowledgments

The members of the Local Organising and Scientific Committee ESPHM 2012, the European College of Porcine Health Management and the European Association of Porcine Health Management gratefully acknowledge the support of the FWO and the partners and wish to thank them for their contribution.

Institution

Fund for Scientific Research Flanders (FWO)

Fonds Wetenschappelijk Onderzoek
Research Foundation – Flanders

Partners

Platinum Partner (alphabetically listed)

BIOMIN GmbH

Industriestrasse 21, 3130 Herzogenburg, Austria
Tel: +43 2782 8030, Fax: +43 2782 803 30
URL: www.biomin.net
e-mail: office@biomin.net

BIOMIN, a leading company focusing on Health in Animal Nutrition, develops and produces feed additives, premixes and services to improve animal health and performance, in an economically viable way. Leveraging on the latest technologies and extensive R&D programs, BIOMIN offers sustainable quality products which include solutions for mycotoxin risk management, a groundbreaking natural growth promoting concept as well as other specific solutions which address dietary requirements for swine.

Established product range:
- Mycotoxin Risk Management (Mycofix®)
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- Acidifiers (e.g. Biotronic®)
- Preservation (e.g. Biomin® BioStabil)
- Dietary health supplements (Biomin® pHD)
- Premixes

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Based on our own research and the synergy with our human pharmaceutical expertise, Boehringer Ingelheim Animal Health delivers leading solutions to prevent, treat and cure animal diseases. We believe that it is necessary to focus to be world class. Therefore, we have made a conscious decision to make swine vaccines one of our focus areas. We strive to set standards and provide for unmet medical needs. We are driven by the wish to improve animal welfare as an integral part of a healthy future for mankind.

Elanco Animal Health

Elanco/Eli Lilly Benelux
Stoofstraat 52 Rue de l'Etuve, B-1000 Brussels, Belgium
URL: www.elanco.com

- Elanco **is** a division of Eli Lilly and Company , an innovation-driven pharmaceutical corporation and a world leader in developing products and services that enhance animal health, wellness and performance.
- Elanco´s vision is food and companionship enriching life.
- Elanco has its headquarters in Greenfield, Indianapolis, USA.
- Elanco has more than 2,500 employees worldwide and more than 35 agricultural and animal health products approved in more than 80 countries

Huvepharma NV

Uitbreidingstraat 80, 2600 Antwerp, Belgium
URL: www.huvepharma.com
e-mail: customerservice@huvepharma.com

HUVEPHARMA® is a fast-growing global pharmaceutical company with a focus on developing, manufacturing and marketing human and animal health products. The highlight is put on animal health products, such as animal health pharmaceuticals, anticoccidials, feed additives, veterinary medicated premixes, veterinary products, enzymes and enzyme complexes for feed and food application.
Huvepharma® has a marketing network of sales offices in Bulgaria, Belgium, Poland, China, Taiwan, Thailand, Russia, India, Brazil and the US. We also partner successfully with a vast chain of dedicated distributors all over the world, whose expertise and professionalism are time proven. Our manufacturing facilities are located in three various parts of Europe and one in the US.
Next to the branded products, Huvepharma® also markets and manufactures a broad range of Active Pharmaceutical Ingredients (APIs) and intermediates for human and animal health.
We emphasize on quality and safety control and invest in innovative formulations to meet customers' expectations and to always "Add performance to your business"!

MERIAL SANOFI COMPANY

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URL : www.merial.com.

Merial is a world-leading, innovation-driven animal health company, providing a comprehensive range of products to enhance the health, well-being and performance of a wide range of animals. Merial employs approximately 5,600 people and operates in more than 150 countries worldwide. Its 2011 sales were more than €2 billion ($2.8 billion).
Merial is a Sanofi company.
For more information, please see **www.merial.com**.

MSD Animal Health

Wim de Körverstraat 35,
5831AN Boxmeer, The Netherlands
URL: www.merck-animal-health.com
E-mail: animal-health-info@merck.com

MSD Animal Health offers veterinarians, farmers, pet owners and governments one of the widest ranges of veterinary pharmaceuticals, vaccines and health management solutions and services. MSD Animal Health is dedicated to preserving and improving the health, well-being and performance of animals. It invests extensively in dynamic and comprehensive R&D resources and a modern, global supply chain. MSD Animal Health is present in more than 50 countries, while its products are available in some 150 markets. For more information, visit www.msd-animal-health.com.

Novartis Animal Health

Schwazwaldallee 215, 4058 Basel, Switzerland
URL: www.ah.novartis.com
e-mail: ulrich.klein@novartis.com

Passionately saving, prolonging and improving animal lives

Novartis Animal Health is a leader in developing new and better ways to prevent and treat diseases in pets, farm animals and cultivated fish. Our innovative, high-quality medicines contribute to the quality of life, health and welfare of animals around the world.

For pets, our products are effective aids to prevent internal and external parasites and treat ailments such as arthritic pain and kidney, heart and allergic diseases. For farm animals, we offer therapeutic products to treat parasitic and bacterial diseases and are also continually developing new vaccines to prevent diseases in livestock and cultivated fish. Specific needs of food producers in the area of farm bioprotection are met by providing innovative fly control products and services.

Headquartered in Basel, Switzerland, and present in almost 40 countries, Novartis Animal Health employs nearly 2,900 associates worldwide.

Pfizer Animal Health

Pfizer Animal Health is the worldwide leader in animal health industry, not only on revenues, but also on market innovation since, over the last 60 years, we have been continuously reinforcing two exceptional strengths:

- Our unmatched effort to be our Customers partner of choice, thanks to our daily commitment to answer their needs, reinforced by our product breadth and our unrivaled field technical expertise.
- Our Investments in Research, the strongest in the industry, keeping our innovation steady and incremental.

This, together with our local organizations focused on meeting Customer expectations, allow us to remain at the top of Customer's mind, both in the mature and the markets under development, always aiming to provide an increased meat protein quality.
During the ESPHM Congress, Pfizer team will be pleased to share with all the Congress Participants the last info about our products and services. Our Congress motto is: "Listen to customize"

Gold Partner

HIPRA BELGIUM n.v.

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Adequat Business Center, Brusselsesteenweg 159, 9090 Melle, Belgium
URL: www.hipra.com
e-mail: belgium@hipra.com

HIPRA is a **veterinary pharmaceutical** company dedicated to the research, production and marketing of products for Animal Health.

We are a leading company in Animal Health, especially in **Biologicals**. Our history spans more than half a century. We currently occupy one of the top positions amongst pharmaceutical companies producing Biologicals for the veterinary industry worldwide.

Research is a priority at HIPRA. **We dedicate 9% of our annual turnover to R&D**, the activity of which is aimed at obtaining high-tech products, especially in the fields of immunology, microbiology, genomics, proteomics, molecular biology, pharmaceutical technology and pre-clinical and clinical trial

Silver Partner (alphabetically listed)

BioChek: Smart Veterinary Diagnostics

BioChek are specialists in veterinary diagnostic kits for poultry & swine. For easy data management we have developed a comprehensive, user friendly software.
BioChek also supplies reference control samples allowing users to validate the obtained test results. We offer quality products with professional technical support.

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Life Technologies

Life Technologies is a global biotechnology tools company dedicated to improving the human condition.

Our systems, consumables and services enable researchers to accelerate scientific exploration, driving to discoveries and developments that make life even better.
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Scientific Information

Abstract Book

All accepted abstracts are published in the ESPHM 2012 programme and abstract book, included in your congress bag.

Keynotes and Practical Talks

The Ambassadeur Room is the main plenary lecture hall. As the number of delegates exceeded all expectations we were forced to implement a mirror room (Witte Roos Room), where delegates can view life-transmission form the main hall. Interaction with the speakers will be possible.

Oral and Industry Sessions

Parallel sessions will take place in the Ambassadeur and Witte Roos Room.

Instructions for Oral Presenters

The slide preview room is located at the ground floor and will be open from half an hour before the first session until half an hour after the last session of the day.

- Please, hand in your presentation on (USB-stick) at the slide preview room at least two hours before your presentation is scheduled.
- Speakers are requested to come to the meeting room at least 5 minutes prior to the start of the session and identify themselves to the chair.
- Microphones will be under control of the technician all the time. There is no need to switch them on.
- Presenters must take place at seats in front of the room for the duration of the session. The chair will call you to the lectern in sequence. Delegates will be seated in theatre style.
- Allocated presentation time of 15 minutes, includes 3-minutes discussion time.

Poster Display

Posters will be displayed in the Bach, Beethoven and Vives Room.

Bach:	Welfare	P001-P009
	Reproduction	P010-P021
	Veterinary Public Health	P022-P049
	Miscellaneous	P050-P066
Beethoven:	Nutrition	P067-P084
	Immunology	P085-P096
	Parasitology	P097-P103
	Herd Health Management & Economy	P104-P138
Vives:	Bacteriology: Respiratory Diseases	P139-P158
	Bacteriology: Enteric Diseases	P159-P172
	Bacteriology: General Diseases	P173-P181
	Virology: PRRS	P182-P194
	Virology: PCV2	P195-P207
	Virology: Other	P208-P216

Instructions for Poster Presenters

- Posters should be mounted at the latest on Wednesday (25 April) before 15.00hrs and left on display till Friday (27 April) 12.00hrs.
- Presenting authors are asked to attend their poster during the Poster Walk on Thursday (26 April) from 13.15hrs till 14.15hrs.

Programme Overview

Wednesday 25 April 2012

10:00-21:00	Registration
13:30-13:40	**Welcome & Opening**
13:40-14:00	**Opening Lecture: Belgian Pig Industry**
14:00-15:00	**Session: Use of antimicrobial agents in pig production – part 1**
15:00-15:30	Coffee Break & Poster Viewing
15:30-16:10	**Session: Use of antimicrobial agents in pig production – part 2**
16:10-17:00	**Use of antimicrobial agents in pig production – Round table discussion**
17:00-	AGM ECPHM
19:00-20:30	*Welcome Reception (Oud Sint Jan)*

Thursday 26 April 2012

08:30-18:00	Registration / Information desk
08:30-09:50	**Keynote: Control or elimination of PRRS virus?** **Practical talk: PRRS control, practical approach after 20 years** **Round table discussion**
09:50-10:20	Coffee Break & Poster Viewing
10:20-11:40	**Keynote: Piglet vitality and neonatal pig losses** **Keynote: Large litter sizes – ethical challenges and ways of dealing with them in future breeding and management** **Round table discussion**
11:40-12:00	AGM EAPHM
12:00-13:15	Lunch
13.15-14.15	**Poster Walk**
14:15-15:15	**Parallel Sessions:** • **Resident session** • **Open Oral session 'Miscellaneous'**
15:15-15:20	Transition Time
15:20-16:20	**Industry Sessions**
16:20-16:45	Coffee Break & Poster Viewing
16:45-18:00	**Parallel Sessions:** • **Open Oral session 'Infectious'** • **Open Oral session 'Non-Infectious'**
19:30	*Dinner (Vlamingstraat 86)*

Friday, 27 April 2012

08:00-14:00	Registration / Information desk
08:30-09:50	**Keynote: Ante- and postmortem examination of the reproductive tract in sows** **Practical talk: Chlamydiaceae infections in pigs** **Round table discussion**
09:50-10:20	Coffee Break & Poster Viewing
10:20-10:50	**Scientific quiz** *(voting system only available in Ambassadeur Room)*
10:50-12:10	**Keynote: Brachyspira infections in pigs: update on pathogenesis and control** **Practical talk: Spanish experiences with swine dysentery** **Round table discussion**
12:10-12:15	IPVS 2012 ESPHM 2013 UK
12:15-12:20	Closing ceremony
12:20-14:00	Lunch
14:00-16:00	*Guided Walk*

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Huvepharma is a state-of-the-art european producer of animal health products. Our aim: surprise the market with the highest quality veterinary products at the best conditions. Discover our new water solubles, feed granules and medicated premixes. They cover a wide spectrum of respiratory and gastro-intestinal diseases in pigs and poultry. Use of the medicines should always be sought from a qualified medicine prescriber

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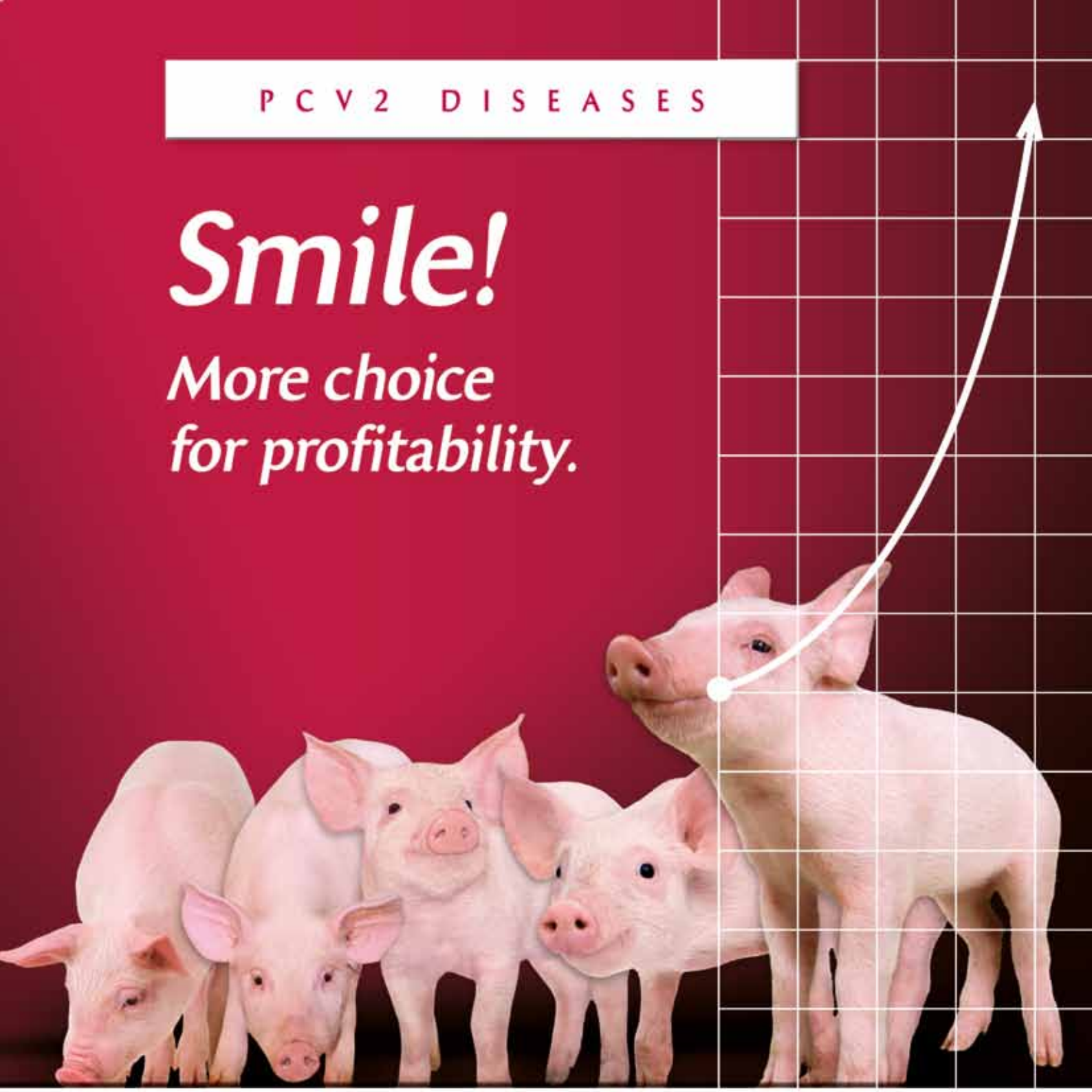

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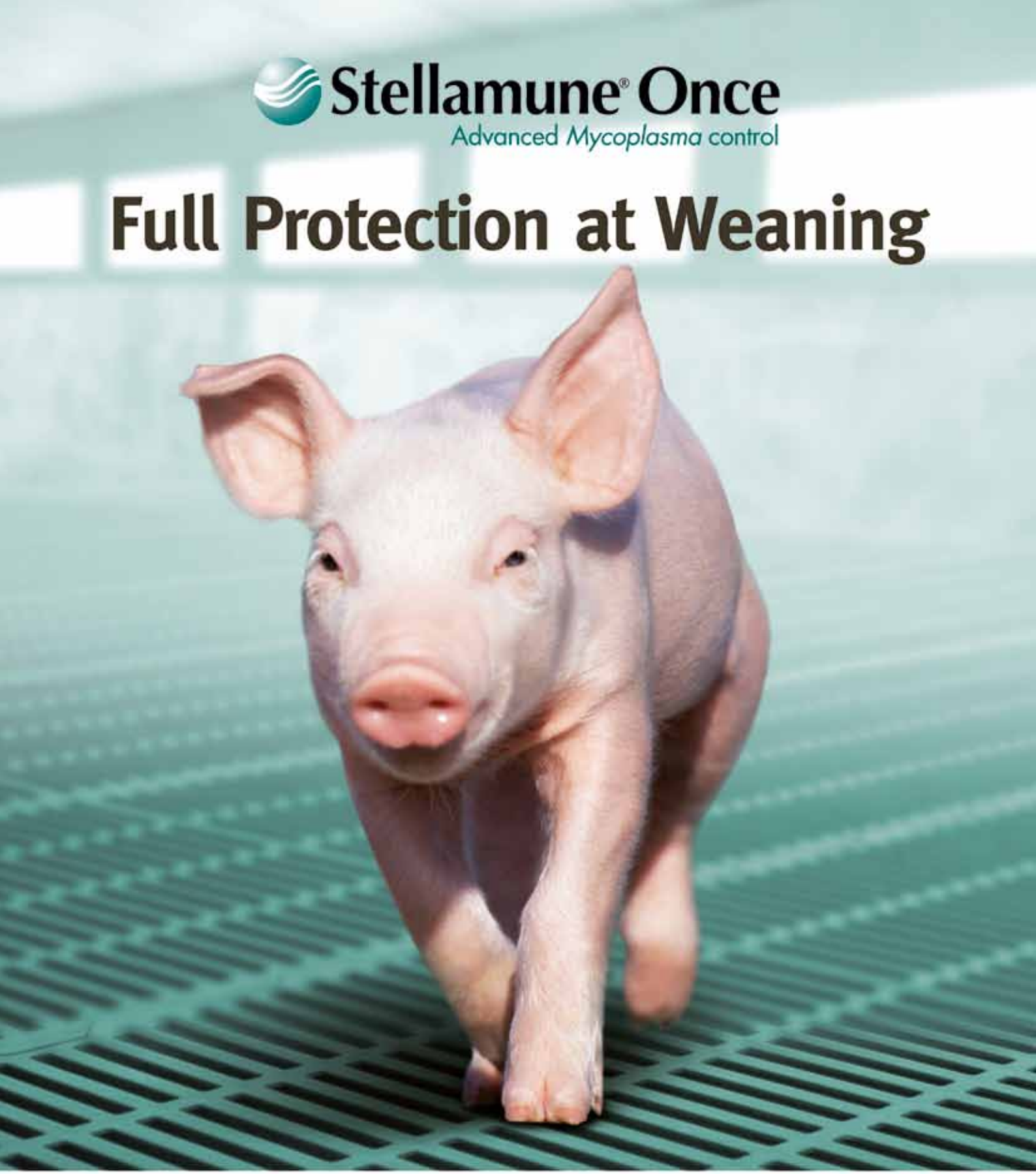

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Elanco

Scientific Programme

Programme in detail

Wednesday 25 April 2012

Rooms: Ambassadeur – Witte Roos

13.30 **Welcome & Opening**
Dominiek Maes

13.40 **Belgian Pig Industry**
Piet Vanthemsche, Belgian agricultural organization

14.00 **Use of antimicrobial agents in pig production - part 1:**

	Pig practitioners:	Anders Holm, *Denmark*
IL001	Pharmaceutical industry:	Valerie Thomas, *IFAH*
IL002	An European regulatory perspective:	Peter GH Jones, *UK*

15.00 Coffee break

15.30 **Use of antimicrobial agents in pig production - part 2:**

	View of human medicine:	Herman Goossens, *Antwerp, Belgium*
IL003	Experiences with Ab free systems:	Manon Houben, *Son, the Netherlands*

16.10 **Use of antimicrobial agents in pig production - part 3:**
Round table discussion:
Chairman Ambassadeur: John MacKinnon
Chairman Witte Roos: Jeroen Dewulf

17.00 AGM ECPHM

19.00 Welcome reception

Thursday 26 April 2012

Rooms: Ambassadeur – Witte Roos

08.30 IL004 **Keynote: Control or elimination of PRRS virus?**
Robert Morrison, Minnesota, MN, USA

09.10 IL005 **Practical talk: PRRS control, practical approach after 20 years**
Albert Heras, Lleida, Spain

09.30 **Round table discussion**
Chairman Ambassadeur: Joaquim Segalés
Chairman Witte Roos: Hans Nauwynck

09.50 Coffee break

10.20 IL006 **Keynote: Piglet vitality and neonatal pig losses**
Emma Baxter, Edingburgh, UK

10.55 IL007 **Keynote: Large litter sizes – ethical challenges and ways of dealing with them in future breeding and management**
Peter Sandøe, Copenhagen, Denmark

11.20 **Round table discussion**
Chairman Ambassadeur: Guy-Pierre Martineau
Chairman Witte Roos: Jens Peter Nielsen

11.40 AGM EAPHM *(Ambassadeur Room - members only)*

12.00 Lunch
13.15 **Poster Walk**

14.15-15.15 **Parallel Sessions**

Ambassadeur Room

Resident session

Chairmen: Paolo Martelli and Peter Høgedal

14.15 001 **Comparison of methicillin resistant Staphylococcus aureus (MRSA) isolates derived from different animal species by testing the minimum inhibitory concentration**
Buntenkoetter V. 1, Meemken D. 1, Tegeler R. 1, Fetsch A. 2, Kreienbrock L. 3, Blaha T. 1
1 Field Station for Epidemiology, University of Veterinary Medicine Hannover, Germany; 2 Federal Institute for Risk Assessment (BfR), Berlin, Germany; 3 Institute of Biometry, Epidemiology and Data Information Processing, University of Veterinary Medicine Hannover, Germany

14.30 002 **Antimicrobial resistance of Escherichia coli F4+ strains isolated from swine in the period 2008-2011**

Luppi A. 1, Bonilauri P. 1, Gherpelli Y. 1, Maioli G. 1, Dottori M. 1, Rugna G. 1, Merialdi G. 1, Martelli P. 2
1 Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna, Reggio Emilia, Italy; 2 Faculty of Veterinary Medicine, University of Parma, Parma, Italy

14.45 003 **Lesional and microbiological analysis of lymphadenitis in free-range pigs**

Cardoso Toset F. 1, Gómez-Laguna J. 3, Amarilla S.P. 2, Maldonado A. 1, Carrasco L. 2, Astorga R.J. 1, Luque I. 1
1 Department of Animal Health and 2 Department of Anatomy and Comparative Pathology, University of Córdoba, International Excellence Agrifood Campus 'CeiA3' University Campus of Rabanales, Córdoba, Spain; 3 Department of R&D, CICAP, Córdoba, Spain

15.00 004 **Infection with influenza A(H1N1)pdm09 in Norwegian swine nucleus and multiplier herds: a case-control study on clinical impact**

Groentvedt C.A. 1, Er C. 2, Gjerset B. 2, Germundsson A. 2, Framstad T. 1, Brun E. 2, Joergensen A. 3, Lium B. 2
1 Norwegian School of Veterinary Sciences, Oslo, Norway; 2 Norwegian Veterinary Institute, Oslo, Norway; 3 Animalia, Oslo, Norway

Witte Roos Room

Open Oral session 'Miscellaneous'

Chairmen: Tore Framstad and Sam Millet

14.15 005 **Claw lesions of piglets kept in different farrowing systems**

Baumgartner J., Winkler U.
Institute of Animal Husbandry and Animal Welfare, University of Veterinary Medicine Vienna, Austria

14.30 006 **Comparative on-farm study of alternatives for surgical castration of male pigs: consequences for boar taint and carcass quality**

Aluwé M., Millet S., De Brabander D.L., Tuyttens F.A.M
Institute for Agricultural and Fisheries Research (ILVO), Animal Sciences Unit, Melle, Belgium

14.45 007 **Impact of fenbendazole on shedding and embryonation of Ascaris suum eggs in gestating sows**

Pittman J.S.
Murphy-Brown LLC, North Division, Waverly, Virginia, USA

15.00 008 **Longitudinal study on methicillin resistant Staphylococcus aureus (MRSA) nasal colonization in a farrow to finish pig herd**

Merialdi G. 1, Galletti E. 1, Rugna G. 1, Granito G. 2, Franco A. 3, Battisti A. 3, Luppi A. 1, Martelli P. 3
1 Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna, Bologna, Italy; 2 Azienda Unità Sanitaria Locale (AUSL) di Reggio Emilia, Servizio Veterinario, Reggio Emilia, Italy; 3 Istituto Zooprofilattico Sperimentale delle Regioni Lazio e Toscana, Italy; 4 Faculty of Veterinary Medicine, University of Parma, Italy

15.15-15.20 **Transition Time**

15.20-16.20 Industry Sessions

Ambassadeur Room

Chairmen: Thomas Blaha and Antonio Palomo Yagüe

15.20 009 Plasma pharmacokinetics of a new 450 mg/ml florfenicol formulation administered intramuscularly once to pigs
Hellot E. 1, Le Traon G. 1, Hartmann M. 2, Nuernberger M. 2, Thomas E. 2
1 Intervet Pharma R&D, known as MSD Animal Health, Beaucouzé, France; 2 Intervet Innovation GmbH, known as MSD Animal Health, Schwabenheim, Germany

15.35 010 Fermented potato protein reduces pre-weaning mortality and improves IgG levels in just born piglets
Smulders D., Kanora A.
Huvepharma, Antwerp, Belgium

15.50 011 CIRCOVAC piglet vaccination improves homogeneity of pigs and production parameters up to slaughter
Vila T. 1, Joisel F. 1, Chevalier M. 2, Fischer L. 1, Cozette V. 1
1 Merial SAS, Lyon, France; 2 Merial CRSV, St Vulbas, France

16.05 012 Individual Pig Care (IPC), a new management tool for improved responsible use of medicines
Doncecchi P. 1, Dereu A. 1, Maccarilla J. 2, Banholzer E. 3, Wuyts N. 1, Marsinach O.A. 1
1 Pfizer International Operations, Pfizer Animal Health EuAfME; 2 Pfizer Animal Health, Spain; 3 Pfizer Animal Health, Germany

Witte Roos Room

Chairmen: Philippe Leneveu and Yves Van der Stede

15.20 013 PK/PD assessment of Strenzen (amoxycillin & clavulanic acid) soluble against porcine systemic and respiratory pathogens
Burch D.G.S. 1, Klein U. 2
1 Octagon Services Ltd, Old Windsor, Berkshire, UK; 2 Novartis Animal Health Inc., Basel, Switzerland

15.35 014 Effect of an acid blend, a phytochemical and a permeabilising substance on bacterial growth and pig performance
Riemensperger A.V. 1, Padoan D. 1, Bachinger D. 2, Urbaityte R. 1, Pasteiner S. 1
1 Biomin Holding GmbH, Herzogenburg, Austria; 2 Biomin Holding GmbH, Biomin Research Center, Tulln, Austria

15.50 015 Prevalence of Mycoplasma hyopneumoniae infections at weaning age in European pig herds
Labarque G. 1, Trindade J. 2
1 Elanco Animal Health, Suresnes, France; 2 Elanco Animal Health, Lissabon, Portugal

16.05 016 How to reduce antimicrobial use in pig production
Bundgaard H. 1, Bak H. 2, Brüggemann D. 3
1 Porcus Pigpractice, Odense, Denmark; 2 Boehringer Ingelheim Vetmedica, Copenhagen, Denmark; 3 Boehringer Ingelheim, Ingelheim, Germany

16.20 Coffee break

16.45-18.00 Parallel Sessions

Ambassadeur Room

Open Oral session 'Infectious'

Chairpersons: Catherine Belloc and Eric Cox

16.45 017 Estimation of time-dependent infectiousness of pigs infected by the Porcine Reproductive and Respiratory Syndrome virus (PRRSV): correlation with the viral genome load in blood, nasal swabs and the serological response

Charpin C. 1, Mahé S. 1, Keranflec'h A. 1, Madec F. 1, Belloc C. 2, Cariolet R. 1, Le Potier M-F. 1, Rose N. 1

1 Anses, Ploufragan, France; 2 UMR BioEpAR, Oniris, INRA, LUNAM, Nantes, France

17.00 018 Torque Teno sus virus type 2 (TTSuV2) loads in serum are increased in the background of diseases affecting the immune system

Aramouni M. 1, Segalés J. 1,2, Nieto D. 1, Ganges L. 1, Tarradas J. 1, Jiménez-Melsió A. 1, Muñoz M. 1, Kekarainen T. 1

1 Centre de Recerca en Sanitat Animal (CReSA), UAB-IRTA, Campus de la Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain; 2 Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain

17.15 019 Diagnostic perspectives on mesocolon edema syndrome of neonatal pigs: laboratory case incidence in the north central United States (2002-2011)

Knudsen D., Daly R.

Animal Disease Research and Diagnostic Laboratory, South Dakota State University, Brookings SD, USA

17.30 020 Associations between mutations in L3 and 23 s r-RNA and minimum inhibitory concentrations of Pleuromutilins in 64 German field isolates of B. hyodysenteriae

Hillen S. 1, Willems H. 1, Herbst W. 2, Rohde J. 3, Reiner G. 1

1 Department of Veterinary Clinical Sciences, JLU Giessen, Germany; 2 Institute for Hygiene and Infectious Diseases of Animals, JLU Giessen, Germany; 3 Institute for Microbiology, Department of Infectious Diseases, University of Veterinary Medicine, Hannover, Germany

17.45 021 Vaccination reduces macrophage infiltration in bronchus-associated lymphoid tissue in pigs infected with a highly virulent Mycoplasma hyopneumoniae strain

Vranckx K. 1, Maes D. 2, Marchioro S. 1, Villarreal I. 2, Chiers K. 1, Pasmans F. 1, Haesebrouck F. 1

1 Department of Pathology, Bacteriology and Avian Diseases and 2 Department of Reproduction, Obstetrics and Herd Health, Ghent University, Faculty of Veterinary Medicine, Merelbeke, Belgium

Witte Roos Room

Open Oral session 'Non-Infectious'

Chairpersons: Heiko Nathues and Jean-Luc Sévin

16.45 022 **Litter size at nursing and maternal parity did not affect future fertility in the gilt**
Thorup F.
Pig Science Centre, Agriculture and Feed, Copenhagen, Denmark

17.00 023 **Field evaluation of pig's heterogeneity: key points to understand our ability to evaluate pigs and consequences for herd management**
Leneveu Ph. 1, Pagot E. 2, Voisin F. 2
1 ISPAIA, Zoopole développement, Ploufragan, France; 2 CTPA, Zoopole développement, Ploufragan, France

17.15 024 **Investigation of the relationship between biosecurity measures and production, health- and treatment-characteristics in pig herds**
Laanen M. 1, Persoons D. 1,2, Ribbens S. 3, de Jong E. 1, Callens B. 1, Strubbe M. 3, Maes D. 1, Dewulf J. 1
1 Ghent University, Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Herd Health, Unit of Veterinary Epidemiology, Merelbeke, Belgium; 2 Pharma.be, Belgian Association for the Pharmaceutical Industry, Brussels, Belgium; 3 Animal Health Care Flanders, Drongen, Belgium

17.30 025 **Fear on the farm: management of an electronic feeding system in group housed gilts**
Kuller W.I., Stouten J.M., Van Nes A.
Dept. of Farm Animal Health, Faculty of Veterinary Medicine, Utrecht University, The Netherlands

17.45 026 **Unusual peripheral hypomyelinating neuritis in growing pigs causing incoordination - A novel disease?**
Williamson S. 1, Scholes S. 2, Jeffrey M. 2, Dastjerdi A. 3
1 Animal Health and Veterinary Laboratories Agency (AHVLA), Suffolk, England; 2 AHVLA Lasswade, Midlothian, Scotland; 3 AHVLA Weybridge, Surrey, Englan

19.30-… Symposium dinner

Friday 27 April 2012

Rooms: Ambassadeur – Witte Roos

08.30 IL008 **Keynote: Ante- and postmortem examination of the reproductive tract in sows** *Johannes Kauffold, Leipzig, Germany*

09.10 IL009 **Practical talk: Chlamydiaceae infections in pigs**
Daisy Vanrompay, Ghent, Belgium

09.30 **Round table discussion**
Chairman Ambassadeur: Olli Peltoniemi
Chairman Witte Roos: Tomasz Stadejek

09.50 Coffee break

10.20 **Scientific quiz** *(voting system only available in Ambassadeur Room)*

10.50 IL010 **Keynote: Brachyspira infections in pigs: update on pathogenesis and control**
David John Hampson, Perth, Australia

11.30 IL011 **Practical talk: Spanish experiences with swine dysentery**
Pedro Rubio, León, Spain

11.50 **Round table discussion**
Chairman Ambassadeur Room: Claes Fellström
Chairman Witte Roos: Freddy Haesebrouck

12.10 IPVS 2012
ESPHM 2013 UK

12.15 Closing ceremony

12.20 Lunch

Poster Sessions

Welfare

P001 The number of treatments for lameness in growing pigs
Ala-Kurikka E., Peltoniemi O., Heinonen M.
Faculty of Veterinary Medicine, Helsinki University, Finland

P003 Design principles and practical evaluation of the PigSAFE free farrowing pen
Edwards S.A. 1, Brett M. 1, Ison S. 2, Jack M. 2, Seddon Y.M. 1, Baxter E.M. 2
1 School of Agriculture, Food & Rural Development, Newcastle University, Newcastle, UK; 2 Animal and Veterinary Sciences, Scottish Agricultural College, Edinburgh, UK

P004 Effect of housing system during pregnancy on welfare of gilts kept in farrowing crates and on offspring thermoregulation and performance
Muns R. 1, Ruiz de la Torre J.L. 2, Manzanilla E.G. 1, Manteca X. 2, Gasa J. 1
1 Departament de Ciència Animal i dels Aliments, Universitat Autònoma de Barcelona, Barcelona, Spain; 2 Departament de Biologia Cel·lular, Fisiologia i Inmunologia, Universtitat Autònoma de Barcelona, Barcelona, Spain

P005 Assessment of mechanical nociceptive thresholds in lame versus non-lame sows with two methods
Nalon E. 1, Maes D. 2, Devleeschauwer B. 3, Millet S. 1, Van Riet M. 1, Janssens G. 4, Tuyttens F. 1
1 Institute for Agricultural and Fisheries Research (ILVO), Melle, Belgium; 2 Department of Obstetrics, reproduction and herd health, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium; 3 Department of Virology, Parasitology and Immunology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium: 4 Department of Animal nutrition, genetics and ethology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium

P006 Impact of essential oils on ammonia and odour emissions of growing-finishing pigs
Zentner E. 1, Steiner T. 2, Padoan D. 2
1 Agricultural Research and Education Centre Raumberg-Gumpenstein, Irdning, Austria; 2 Biomin Holding GmbH, Herzogenburg, Austria

P007 Oral meloxicam (Metacam®) improved sow welfare and piglet performance
Hernández-Caravaca I. 1, Lopez J.A. 2, Lopez J. 3, Martos A. 1, Coll T. 1
1 Boehringer-Ingelheim España, Spain; 2 Agropecuaria Casas nuevas. Murcia, Spain; 3 Farma Higiene. Murcia, Spain

P008 Immunological castration decreases aggression in male pigs co-penned with females in the late a fattening period
Morales J. 1, Piñeiro C. 1, Wilson S. 2, Manzanilla E.G. 3, Nanjiani I. 2, Wuyts N. 2
1 PigCHAMP Pro Europa, Segovia, Spain; 2 Pfizer Animal Health, Belgium; 3 Department of Animal Science, Universitat Autonoma de Barcelona, Spain

P009 Effects of NSAIDs on pain, stress and discomfort in male piglets during and after surgical castration
Reiner G., Schollasch F., Hillen S.
Veterinary Clinical Sciences, Justus-Liebig-University, Giessen, Germany

Reproduction

P010 Partus induction and birth assistance as important factors in piglet production
Bardehle D. 1, Preißler R. 1, Looft H. 2, Kemper N. 1
1 Institute of Agricultural and Nutritional Science, Martin-Luther-University, Halle (Saale), Germany; 2 PIC Germany GmbH, Schleswig, Germany

P011 Piglet uniformity and survival in organic sows: effects of pre-mating nutrition
Wientjes J.G.M. 1, Soede N.M. 1, Van der Peet-Schwering C.M.C. 2, van den Brand H. 1, Kemp B. 1
1 Adaptation Physiology Group, Wageningen University, Wageningen, The Netherlands; 2 Wageningen UR Livestock Research, Lelystad, The Netherlands

P012 Characterization of "second parity syndrome" profiles and associated risk factors in French sow herds
Boulot S. 1, Després Y. 1, Badouard B. 1, Sallé E. 2
1 IFIP Institut du porc, Le Rheu, France; 2 MSD Santé Animale, Beaucouzé, France

P013 Supplementing new born piglets with 50 ml sow colostrum failed to influence piglet survival
Müller R. 1, Thorup F. 2, Hansen C.F. 1
1 Department of Large Animal Sciences, Faculty of Life Sciences, University of Copenhagen, Denmark; 2 Pig Science Centre, Agriculture and Feed, Copenhagen, Denmark

P015 Weaning management practices associated with sow reproductive performance in commercial pig herds
de Jong E. 1, Laanen M. 1, Dewulf J. 1, Jourquin J. 2, de Kruif A. 1, Maes D. 1
1 Department of Reproduction, Obstetrics and Herd Health, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium; 2 Elanco Animal Health, Brussels, Belgium

P016 Effect of a GNrh analogue (Maprelin®) on estrus and reproductive performance in gilts and sows
de Jong E. 1, Jourquin J. 3, Kauffold J. 2, de Kruif A. 1, Maes D. 1
1 Department of Reproduction, Obstetrics and Herd Health, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium; 2 Faculty of Veterinary Medicine, Leipzig, Germany; 3 Elanco Animal Health, Brussels, Belgium

P017 Factors associated with piglet uniformity
Wientjes J.G.M. 1, Soede N.M. 1, Knol E.F. 2, van den Brand H. 1, Kemp B. 1
1 Adaptation Physiology Group, Wageningen University, Wageningen, The Netherlands; 2 IPG, Institute for Pig Genetics BV, Beuningen, The Netherlands

P018 The use of trans-abdominal B-mode ultrasonography to assess uterine involution in sows: validation of the technique
Thilmant P. 1, Paniagua S. 2, Farnir F. 3, Maes D. 4, Beckers J.F. 5, Laitat M. 2
1 Centre Provincial Liégeois de Productions Animales, Argenteau, Belgium; 2 Swine Clinics, University of Liège, Liège, Belgium; 3 Department of Animal Production, University of Liège, Liège, Belgium; 4 Laboratory of Animal Endocrinology and Reproduction, University of Liège, Liège, Belgium; 5 Department of Reproduction, Obstetrics and Herd Health, Ghent University, Ghent, Belgium

P019 Ghrelin in the perinatal development of runt and normal weight piglets
Willemen S., De Vos M., Huygelen V., Van Peer E., Verbueken E., Vergauwen H., Van Cruchten S., Van Ginneken C.
Department of Veterinary Sciences, Laboratory of Applied Veterinary Morphology, University of Antwerp, Belgium

P020 Analysis of selected biochemical components in boar seminal plasma and their relation to semen quality
López Rodríguez A. 1, Rijsselaere T. 1, Beek J. 1, Vyt P. 2, Van Soom A. 1, Maes D. 1
1 Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium; 2 Veterinary practice, Belsele, Belgium

P021 Urinary acidifiers to reduce urine pH and leucocytes
Riemensperger A.V., Urbaityte R., Pasteiner S.
Biomin Holding GmbH, Herzogenburg, Austria

Veterinary Public Health

P022 An innovative long acting florfenicol formulation for the treatment of swine respiratory disease
Embrechts J. 1, Löhlein W. 2, Wolf O. 2, Ocak M. 3, De Busser J. 1
1 Emdoka bvba, Hoogstraten, Belgium; 2 Löhlein & Wolf Vet Research., München, Germany; 3 MD Research, Pullach i. Isartal, Germany

P023 The yellow card initiative in Denmark - Its effect on the consumption and choice of antimicrobials
Andreasen M., Alban L.
Agriculture and Food Council, Copenhagen, Denmark

P024 Boar taint: Ability of official veterinarians and auxiliaries to perceive androstenone and/or skatole
Riehn K. 1, Jäger J. 2, Sattler T. 2, Schmoll F. 3, Lücker E. 1
1 Institute of Food Hygiene, Faculty of Veterinary Medicine, University of Leipzig, Germany; 2 Austrian Agency for Health and Food Safety (AGES), Mödling, Austria; 3 Large Animal Clinic for Internal Medicine, Faculty of Veterinary Medicine, University of Leipzig, Germany

P025 Efficacy of Pracetam® 20% oral solution in swine in the treatment of an episode of acute respiratory disease in comparison with an antibiotic and placebo
Anty A. 1, Capdevielle N. 1, Trotel A. 2, Voisin F. 2, Pagot E. 2, Keïta A. 2, Bolloch J.R. 2
1 Laboratoire SOGEVAL, Laval, France; 2 ZOOPOLE développement, CTPA, Ploufragan, France

P026 Internet based checklist for the risk assessment of Salmonella control in finishing pig herds, abattoirs and cutting plants
Van der Wolf P. 1, Schulte-Wulwer J. 2, Ibald R. 3, Mack A. 4, Ehlers J. 5, Heckrath G. 6, Heres L. 7, Hanssen M. 8, Berns G. 6
1 Pig Health Department, Animal Health Service, Deventer, the Netherlands; 2 Pig Health Department, Animal Health Service, Oldenburg, Lower Saxony, Germany; 3 Wibfin GmbH, Koblenz, Germany; 4 GIQS e.V., Bonn, Germany; 5 Lower Saxony State Office for Consumer Protection and Food Safety, Oldenburg, Germany; 6 Dr. Berns Laboratory, Neukirchen-Vluyn, Germany; 7 VION Food Group, Eindhoven, The Netherlands; 8 Product Board for Livestock and Meat, Zoetermeer, The Netherlands

P027 Trends in sales of antimicrobials for pigs in Sweden
Sjölund M., Greko C.
Department of Animal Health and Antimicrobial Strategies, National Veterinary Institute, Uppsala, Sweden

P028 Cost-effectiveness of Salmonella control strategies along the pork supply chain
Krebs S., Belloc C.
UMR Biology, Epidemiology and Risk Analysis in Animal Health, Oniris, INRA, Nantes, France

P029 Preliminary results on prophylactic and curative antimicrobial usage on 20 pig herds and advices on improvement
Postma M. 1, Persoons D. 1,3, Maes D. 2, Dewulf J. 1
1 Ghent University, Faculty of Veterinary Medicine, Department of Reproduction, Obestretics and Herd Health, Unit of Veterinary Epidemiology, Merelbeke, Belgium; 2 Ghent University, Faculty of Veterinary Medicine, Department of Reproduction, Obestretics and Herd Health, Unit Porcine Health Management, Merelbeke, Belgium; 3 Pharma.be, Brussel

P030 MRSA prevalence and spread between livestock species
Pletinckx L.J. 1, 2, Verhegghe M. 3,4, Crombé F. 4,6, Dewulf J. 5, De Bleecker Y. 1, Rasschaert G. 3., Butaye P. 4,6, Goddeeris B.M. 2, De Man I. 1
1 Catholic University College South-West-Flanders, Roeselare, Belgium; 2 Catholic University Leuven, Department of Biosystems, Division of Gene Technology, Heverlee, Belgium; 3 Institute for Agricultural and Fisheries Research, ILVO, Melle, Belgium; 4 Ghent University, Faculty of Veterinary Medicine, Department of Pathology, Bacteriology and Poultry Diseases, Merelbeke, Belgium; 5 Ghent University, Faculty of Veterinary Medicine, Veterinary Epidemiology Unit, Department of Reproduction, Obstetrics and Herd Health, Merelbeke, Belgium; 6 Department of Bacteriology and Immunology, Veterinary and Agrochemical Research Centre, Ukkel, Belgium

P031 Effect of two non-antibiotic growth promoters on weight gains of weaned pigs
Link R., Reichel P., Novotny J., Soročinova J., Kovačocyova K., Seidel H., Macak V., Huska M.
Clinic of Swine, University of Veterinary Medicine and Pharmacy, Košice, Slovakia

P032 The effect of probiotics on sows' metabolism and the benefits in suckling piglets
Link R., Reichel P., Novotny J., Soročinova J., Kovačocyova K., Seidel H., Macak V., Huska M.
Clinic of Swine, University of Veterinary Medicine and Pharmacy, Košice, Slovakia

P033 Occurrence of antibodies against selected infectious agents with zoonotic potential (Salmonella and Trichinella spp.) in wild boars in some regions in Southern Germany
Sattler T. 1, Sailer E. 1, Schmoll F. 2
1 Large Animal Clinic for Internal Medicine, University of Leipzig, Germany; 2 Institute for Veterinary Disease Control, AGES, Mödling, Austria

P034 Possible association between meat inspection lesions in finisher pigs and the yellow card antimicrobial scheme in Denmark
Alban L., Dahl J., Andreasen M., Petersen J.V., Sandberg M.
Danish Agriculture & Food Council, Copenhagen, Denmark

P035 Incidence of mycobacterial infections in wild boars (Sus scrofa) in Germany
Schollasch F., Capellmann C., Willems H., Reiner G.
Department for Veterinary Clinical Sciences, Clinic for Swine, Justus Liebig University, Giessen, Germany

P036 Testing and validating a monitoring system based on "meat juice multi-serology" for optimizing food safety in pork and animal health in pigs
Tangemann A. 1, Klein G. 1, Meemken D. 1, Meermeier D. 2, Mischok D. 3, Gundlach S. 4, Blaha T. 1
1 University of Veterinary Medicine of Hannover, Hannover, Germany; 2 Veterinary Authority for Meat Inspection of Paderborn, Paderborn, Germany; 3 Veterinary Service Westfleisch, Münster, Germany; 4 State Veterinary Laboratory for Northrhine-Westfalia, Münster, Germany

P037 Impact of administering organic acids, salts of sodium and bioflavonoids on Salmonella excretion in sows
Corrégé I. 1, Pupin. P. 2, Beaujean F. 3, Pinsard J.L. 4
1 IFIP-Institut du porc, Le Rheu, France; 2 Synthèse Élevage, Pleumeleuc, France; 3 Perstorp Waspik BV, Waspik, The Netherlands; 4 BIO-Chêne Vert, Châteaubourg, France

P038 Evolution of medication costs over a 10 years period from national technical-economic database on French pig farms
Corrégé I., Badouard B., Hémonic A.
IFIP – Institut du porc, Le Rheu, France

P039 Classical swine fever in wild boars as a permanent threat for pig herd health: success of official control measures

Roemelt M. 1, Braun B. 1, Klingelhoefer I. 1, Koenig A. 1, Zimmer K. 1, Reiner G. 2
1 Rhineland-Palatinate Veterinary Investigation Office (LUA-RLP), Koblenz, Germany; 2 Department of Veterinary Clinical Sciences, Clinic for Swine, Justus Liebig University, Giessen, Germany

P041 Long term European epidemiologic survey of sensitivity to antimicrobials of bacteria isolated from reproductive, respiratory or digestive disease in pigs (1998-2009)

Giboin H. 1, Kroemer S. 2, Galland D. 2, El Garch F. 2, Woerhle F. 2
1 Vetoquinol SA, Paris, France; 2 Vetoquinol R&D, Lure, France

P042 Seroprevalence for Toxoplasma gondii infection in wild boar and finishing swine in Northern Italy

Rugna G. 1, Merialdi G. 1, Renzi M. 1, Galletti E. 1, Luppi A. 1, Moscardini E. 2, Martelli P. 3
1 Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna, Modena, Italy; 2 Azienda Unità Sanitaria Locale (AUSL) di Modena, Servizio Veterinario, Modena, Italy; 3 Faculty of Veterinary Medicine, University of Parma, Parma, Italy

P043 The prevalence and genetic basis of antimicrobial resistance among isolates of Haemophilus parasuis in the UK

Luan S-L., Shen F., Chaudhuri R., Wang J., Peters S.E., Maskell D.J., Tucker A.W.
Department of Veterinary Medicine, Cambridge University, Cambridge, UK

P044 Evaluation of a DIVA vaccine and feed with coated butyrate to reduce the transmission of Salmonella Typhimurium in pigs

De Ridder L. 1, Maes D. 2, Dewulf J. 2, Pasmans F. 3, Boyen F. 3, Haesebrouck F. 3, Leyman B. 3, Butaye P. 1,3, Van der Stede Y. 1,4
1 Department of Bacteriolgy, CODA-CERVA-VAR, Ukkel, Belgium; 2 Department of Obstetrics, Reproduction and Herd health, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium; 3 Department of Pathology, Bacteriology and Avian diseases, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium; 4 Laboratory of Immunology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium

P045 Implementing PCV2 vaccination results in reduction of antibiotic use and improved technical results on a Dutch farrow-to-finish farm

Koenders K. 1, Wertenbroek N. 2
1 Veterinary practice, Nederweert, The Netherlands; 2 Boehringer Ingelheim Vetmedica, Alkmaar, The Netherlands

P046 The effect of the application of mono-lauric acid with glycerol mono-laurate in weaned piglets, on the use of antimicrobials in sow herds

De Snoeck S. 1, Heijman E. 2, Swart W. 3, van der Wolf P. 4
1 Veterinary Practice "Lintjeshof", Nederweert, The Netherlands; 2 Daavision, Oss, The Netherlands; 3 Department of Epidemiology and Statistics, Animal Health Service (AHS), Deventer, The Netherlands; 4 Pig Health Department, Animal Health Service, Deventer, The Netherlands.

P047 Antibacterial and antioxidant activity of oregano essential oil

Mellencamp M.A. 1, Koppien-Fox J. 1, Lamb R. 1, Grim E. 2
1 Ralco Animal Health, Marshall, MN, USA; 2 Ralco Europe BV, Rosmalen, The Netherlands

P048 European surveillance network for influenza in pigs 3 (ESNIP 3)

Reid S.M. 1, Simon G. 2, Larsen L.E. 3, Kellam P. 4, ESNIP 3 consortium, Loeffen W. 5, van Reeth K. 6, Brown I.H. 1
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P049 Veterinary advisory tool to reduce antibiotic use in pig production

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Miscellaneous

P050 Chronic hyperproliferative process with major involvement of mast cells at ear tag sites of sows
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P051 Physiological ranges of rectal temperature values, respiratory rate, and pulse rate in growing and adult Pietrain boars
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P052 Physiological ranges of rectal temperature values of piglets and fattening pigs at different ages
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P053 Acute rear limb paresis induced by fibrocartilaginous embolism in sows
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P055 Skin disease in fattening pigs macroscopically resembling fat necrosis
Hennig-Pauka I. 1, Wolf P. 2, Hoeltig D. 1, v. Altrock A. 1, Waldmann K.-H. 1, Hewicker-Trautwein M. 3
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P056 Bacterial pathogens associated with lung lesions in slaughter pigs: a cross-sectional study in 125 herds
Fablet C. 1, Marois C. 2, Dorenlor V. 1, Eono F. 1, Eveno E. 1, Jolly J.P. 1, Le Devendec L. 2, Madec F. 1, Rose N. 1
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P057 Coal tar poisoning in grower pigs exposed to road surfacing used as a straw yard base
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P058 Back-test is not predictive for mortality rate in underweight piglets
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P059 Post mortem inspection criteria for pleuritis in swine differs between slaughterhouses
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P061 Real-time PCR testing for Porcine Circovirus Type 2 and Lawsonia intracellularis to assess diarrhoea status
Holyoake P.K. 1, Hjulsager C. 2, Larsen L.E. 2, Pedersen K.S. 3, Johansen M. 4, Stege H. 3, Moore K. 1, Ståhl M. 2, Angen Ø. 2, Nielsen J.P. 3
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P062 You can pool faecal samples from individual pigs to test for Porcine Circovirus Type 2 and Lawsonia intracellularis using real-time PCRs
Holyoake P.K. 1, Hjulsager C. 2, Larsen L.E. 2, Pedersen K.S. 3, Johansen M. 4, Stege H. 3, Moore K. 1, Ståhl M. 2, Angen Ø. 2, Nielsen J.P. 3
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P063 Immunocastration - Control at slaughter
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P064 MUC4 expression is not related to susceptibility of piglets to enterotoxigenic Escherichia coli-F4
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P065 Integrative analysis based on expressed QTL and interaction networks identifies candidate genes for resistance/susceptibility to Actinobacillus pleuropneumoniae in swine

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P066 Worldwide occurrence of mycotoxins in components intended for animal feed in the years 2010 and 2011

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Nutrition

P067 Inhibitory action of analytical grade zinc oxide and of a new potentiated ZnO on the ex vivo growth of porcine small intestine bacteria

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P069 Effect of a fibrous diet for fattening pigs on growth performance, carcass characteristics and gut health

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P070 The effect of Actigen™ on post-wean pig performance compared with an antibiotic growth promoter

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P071 Models to study the effect of immune system activation on amino acid metabolism in pigs

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P072 The effect of echium oil or linseed oil in the diet of gestating sows on the fatty acid composition of piglets' tissues

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P073 The effect of Sangrovit®, a natural feed additive, on the performance and health status of weaned piglets

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P074 The effect of Sangrovit®, a natural feed additive, on the performance and health status of growing / finishing pigs

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P075 Clay minerals bind endotoxins in vitro

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P076 Dietary inclusion of attapulgite improves the performance of pigs in the post-weaning, growing and finishing periods
Kanoulas V. 1, Papadopoulos G.A. 1, Arsenos G. 1, Bramis G. 1, Tzika E. 2, Fortomaris P. 1
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P077 Effect of different sources and doses of zinc on plasma levels of zinc, iron, and copper after weaning in a commercial farm
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P078 A blend of chelated trace minerals improved sow cumulative reproduction performance and farrowing rate
Zhao J. 1, Greiner L. 2, Allee G. 3, Vazquez-Anon M. 1, Knight C.D. 1, Harrell R.J. 1, Decoux M. 4
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P079 Improved retention rate and reduced culling for lameness in sows fed a chelated trace mineral blend
Zhao J. 1, Greiner L. 2, Allee G. 3, Vazquez-Anon M. 1, Knight C.D. 1, Harrell R.J. 1, Decoux M. 4
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P080 Improved progeny performance from sows fed a chelated trace minerals blend
Zhao J. 1, Vazquez-Anon M. 1, Knight C.D. 1, Harrell R.J. 1, Decoux M. 2
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P081 The influence of the mannanoligosaccharide Bio-Mos on sow and piglet performance
Close W.H. 1, Taylor-Pickard J.A. 2, Nollet L. 3
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P082 Fish oil improves weaning piglet's performances and health status
De Vos S., Aelbers L., De Jaeger F.
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P083 Sow factors affecting colostrum quantity
Decaluwe R. 1,2, Maes D. 1, Cools A. 1,2, Janssens G.P.J. 2
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P084 Effect of Improvac vaccine on entire male pig performance and carcass quality
Prust H.G. 1, Gerritsen R. 2, Wuyts N. 1, van der Aar P. 2
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Immunology

P085 Comparison of two different vaccination programmes for controlling M. hyopneumoniae in pigs slaughtered at 9 months of age
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P086 Study on cell mediated immune response induced by concurrent vaccinations to PRRSV and PCV2 in naturally infected pigs
Ferrari L. 1, De Angelis E. 1, Morganti M. 1, Saleri R. 2, Cavalli V. 2, Ardigò P. 1, Guazzetti S. 3, Borghetti P. 1, Martelli P. 1
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P088 Comparison of health and production efficiency of beta-glucane administration and Enterisol vaccination in swine
Reichel P., Soročinová J., Kovačocyová K., Seidel H., Húska M., Link R., Macák M., Novotný J., Brenesselová M.
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P089 Protection of piglets against edema disease by maternal immunization with Stx2e toxoid
Oanh N.T.K. 1, Nguyen V.K. 2, De Greve H. 3, Goddeeris B.M. 1
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P090 How adjuvant formulation can control vaccines stability
Ben Arous J., Deville S., Bertrand F., Gaucheron J., Dupuis L.
SEPPIC, Puteaux, France

P092 Vaccination of piglets against PCV2 and M. hyopneumoniae infections under field conditions using two vaccines (Porcilis PCV and Porcilis Mhyo) either in separate simultaneous injections or in a single injection of the mixed vaccines
Salle E. 1, Liber M. 2, Auvigne V. 3, Duivon D. 1
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P093 Interest of serological diagnostic use for understanding of enzootic pneumonia in swine farms
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P094 Serological marking of various commercial vaccines against enzootic pneumonia in a mycoplasma-free farm
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Parasitology

P098 Dose determination and confirmation studies of a new fenbendazole drinking water formulation against Ascaris suum in swine
Kissel G. 1, Eggen A. 2, Sommer M. 1
1 Intervet Innovation GmbH, known as MSD Animal Health, Schwabenheim, Germany; 2 MSD Animal Health, Boxmeer, The Netherlands

P099 The simultaneous infection with Toxoplasma gondii strains affects the parasitic load in tissues of experimentally infected pigs
Jennes M. 1, De Craeye S. 2, Verhelst D. 1, Dorny P. 3, Dierick K. 2, Melkebeek V. 1, Cox E. 1
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P100 Efficacy of a new toltrazuril product (Toltranil) in an experimental Isospora suis challenge trial
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P101 Cevazuril® in the control of coccidiosis as a part of multi-infectious neonatal diarrhea
Dupuis J. 1, Thorel S. 1, Robert N. 2, Krejci R. 2, Lopez A. 2
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P102 Efficacy and safety of a new fenbendazole drinking water formulation against Ascaris suum in swine under field conditions
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P103 Impact of larval migration of Ascaris suum on lung pathology and consequently on technical performance
Marchand D. 1, Rémigereau O. 2, Retureau M., Guillemet A. 1, Perrin P. 1, Jourquin J. 3, Goossens L. 3
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Herd Health Management and Economy

P104 The value of the coughing index in diagnosing enzootic pneumonia in groups of fattening pigs
Nathues H. 1,2, Spergser J. 3, Rosengarten R. 3, Kreienbrock L. 4, grosse Beilage E. 1
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P105 Effects of tiamulin (Denagard®) treatment in nursery pigs suffering from respiratory disease in a field trial
Miljkovic V. 1, Viehmann M. 1, Langhoff R. 1, Palzer A. 2, Spergser J. 3, Ritzmann M. 1
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P106 Thermography: a novel way to mesure vitality?
Waret-Szkuta A. 1, Bruni M. 1, Sacy A. 2, Martineau G.P. 1
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P107 Concurrent vaccinations to PRRSV and PCV2 induces clinical protection in naturally infected pigs
Ardigò P. 1, Bonilauri P. 2, Luppi A. 2, Caleffi A. 3, Guazzetti S. 4, Ferrari L. 1, De Angelis E. 1, Borghetti P. 1, Martelli P. 1
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P108 PCV2 piglet vaccination allows French swine herds to reduce their overall veterinary expenses
Lewandowski E., Jagu R., Adam M.
Boehringer Ingelheim, France

P109 Effects of Ingelvac CircoFLEX® in 87 French farrow-to-finish herds
Lewandowski E., Jagu R., Adam M.
Boehringer Ingelheim Santé Animale, France

P110 Paracetamol and respiratory diseases of pigs
Novotný J., Reichel P., Húska M., Link R., Macák V., Soročinová J., Kovačocyová K.
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P111 Bacillus subtilis PB6 positively influences performance efficiency in post-weaned piglets
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P112 The impact of lameness on (re)production results of sows
Pluym L.M. 1,2, Van Nuffel A. 1, Van Weyenberg S. 1, Maes D. 2
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P113 Comparison of the Idexx HerdChek PRRS X3 to the Civtest Suis PRRS E/S with special respect to false positive outliers
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P114 Movement restrictions for the control of the porcine reproductive and respiratory syndrome virus in a farms' network
Rat-Aspert O. 1, Lurette A. 2, Belloc C. 1
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P115 Occurrence of diarrhoea in non.medicated growing pigs in Denmark: a cross-sectional study
Jakobsen A.J., Pedersen K.S., Nielsen J.P.
Department of large Animal Sciences, University of Copenhagen, Denmark

P116 Elimination of porcine reproductive and respiratory syndrome (PRRS) on four small farms by herd closure and natural exposure in Slovenia
Stukelj M., Valencak Z.
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P117 Prevention of an iron gap in modern pig production
Van Gorp S. 1, Segers H. 1, von der Recke C. 2
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P118 Birth weight influences gastric emptying and small intestinal functional parameters
De Vos M., Huygelen V., Willemen S., Van Peer E., Van Cruchten S., Van Ginneken C.
Laboratory of Applied Veterinary Morphology, Antwerp University, Belgium

P119 Idexx app-ApxIV Ab test: reliable screening tool for better health management
Ballagi A., Dib A., Nivollet S.
IDEXX Switzerland AG, Liebefeld-Bern, Switzerland

P120 Ascaris suum causing coughing and Brachyspira pilosicoli causing diarrhea in finishers in an organic pig herd - A case report
Haugegaard J.
Lejre, Denmark

P121 Cutting costs and saving CO2 emissions with energy saving techniques in lactation barns
Cordero G. 1, Morales J. 1, Aparicio M. 1,2, Manso A. 1, Díaz I. 1, Piñeiro C. 1
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P122 Cost of post-weaning multi-systemic wasting syndrome and porcine Circovirus type 2 subclinical infection – A stochastic economic model
Alarcon P., Rushton J., Wieland B.
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P123 Diagnostic performance of the PRRS oral fluid IgG ELISA
Kittawornrat A. 1, Wang C. 1,2, Olsen C. 1, Panyasing Y. 1, Ballagi A. 3, Rice A. 3, Lizano S. 3, Johnson J. 1, Main R. 1, Rowland R. 4, Zimmerman J. 1
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P124 Ring test evaluation of the PRRS oral fluid IgG ELISA
Kittawornrat A. 1, Wang C. 1,2, Ballagi A. 3, Lizano S. 3, Johnson J. 1, Doolittle K. 4, Nelson E. 5, Broes A. 6, Zimmerman J. 1
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P125 Towards the application of Lactococcus lactis as a delivery vehicle of oral vaccines in pigs
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P126 Biomarkers for lung soundness and disease in swine - step 1: advanced clinical and pathological findings
Kronenberg C., Lange S., Hillen S., Willems H., Reiner G.
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P127 Subclinical PVC2 infection can have dramatic consequences in non-vaccinated herds
Poulsen H.
Danvet Pig Practice, Hobro, Denmark

P128 Study of factors affecting mortality in growing-finishing pigs in Spain
Agostini P.S., Manzanilla E.G., Gasa J.
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P129 An attempt to eradicate PRRS in Wallonia (Belgium), a low density area of swine production
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P130 Economical evaluation of the impact of PRRS in a Walloon farrow-to-finish farm
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P131 Factors affecting pre-weaning mortality in pigs
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P132 The economics of on-farm Salmonella control
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P133 Identification of factors at the farm, sow and piglet level associated with the colostrum intake per kg piglet
Declerck I., Piepers S., Dewulf J., de Kruif A., Maes D.
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P134 Numerical and functional anatomical characterization of mammary glands of breeding sows in Hungary
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P135 Combined vaccination against PCV2 and Mycoplasma hyopneumoniae reduced feed conversion in weaners and finishers
Agerley M. 1, Heisel T. 2, Bak H. 3, Rathkjen P.H. 3
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P136 New feedstuff based on fermented potato protein increases weaning pig performance; comparison with sulfadiazine and trimethoprim
Smulders D., Kanora A.
Huvepharma, Antwerp, Belgium

P137 Influence of fermented potato protein on IGF-1 levels and mortality in just born piglets
Kanora A., Smulders D.
Huvepharma, Antwerp, Belgium

P138 The effect of a fermented potato protein on the performance and lean meat percentage in fattening pigs
Kanora A., Smulders D.
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Bacteriology: Respiratory Diseases

P139 Serological testing for Actinobacillus pleuropneumoniae
Broes A.
Biovet, Saint-Hyacinthe, Quebec, Canada

P140 Onset of immunity of an inactivated Mycoplasma hyopneumoniae vaccine when administered to MDA positive or MDA-negative piglets at one week of age
Wilson S. 1, Runnels P. 2, Fredrickson D. 2, Taylor L. 2, Neil G. 1, Biot T. 3, Wuyts N. 4
1 Pfizer Animal Health, Zaventem, Belgium; 2 Pfizer Animal Health, Kalamazoo, USA; 3 Pfizer Animal Health, Sandwich, UK; 4 Pfizer Animal Health, Paris, France

P141 A randomised cross-sectional study on herd specific risk factors for Mycoplasma hyopneumoniae infections in suckling pigs
grosse Beilage E. 1, Woeste H. 1, Doehring S. 1, Fahrion A.S. 2, Doherr M.G. 2, Nathues H. 1,3
1 Field Station for Epidemiology, Bakum, University of Veterinary Medicine Hannover, Foundation, Germany; 2 Veterinary Public Health Institute, Department of Clinical Research - Veterinary Public Health, Vetsuisse Faculty, University of Bern, Switzerland; 3 Veterinary Epidemiology and Public Health Group, Veterinary Clinical Sciences, Royal Veterinary College, London, United Kingdom

P142 The impact of environmental risk factors and management on the occurrence of enzootic pneumonia in fattening pigs

Nathues H. 1,2, Rechter G. 3, Spergser J. 4, Rosengarten R. 4, Kreienbrock L. 3, grosse Beilage E. 1
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P143 Efficacy of florfenicol injection in the treatment of Mycoplasma hyopneumoniae induced respiratory disease in pigs

Del Pozo Sacristán R. 1, Thiry J. 2, Vranckx K. 3, López Rodríguez A. 1, Chiers K. 3, Haesebrouck F. 3, Thomas E. 4, Maes D. 1
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P144 Atrophic rhinitis in France in 2010: assessment of the prevalence of lesions observed at the slaughterhouse and its relationship with features of farm characteristics

Auvigne V. 1, Volant L. 2, Sallé E. 2
1 EKIPAJ, Angers, France; 2 MSD Santé Animale, Beaucouzé, France

P145 Repeatability and reproducibility of the scoring of atrophic rhinitis lesions at the slaughterhouse

Rolland A-C. 1, Auvigne V. 1, Sallé E. 2, Belloc C. 3
1 Ekipaj, Angers, France; 2 MSD Santé Animale, Beaucouzé, France; 3 Oniris, INRA, LUNAM, Nantes, France

P146 Evidence of Mycoplasma hyopneumoniae following partial eradication at a sow herd in Switzerland

Kuemmerlen D.F. 1, Zeeh F. 2
1 TAP Celsius AG, Switzerland; 2 SUISAG, Switzerland

P147 In vitro activity of florfenicol against porcine respiratory disease pathogens isolated in Europe between 2002 and 2010

Thomas V., Wilhelm C.
Intervet Innovation GmbH, known as MSD Animal Health, Schwabenheim, Germany

P148 Actinobacillus pleuropneumoniae seroprevalence is low in farmed wild boars in Finland

Hälli O., Laurila T., Ala-Kurikka E., Wallgren P., Heinonen M.
Production animal medicine, Faculty of Veterinary Medicine, University of Helsinki, Hämeenlinna, Finlandcillus

P149 The susceptibility study of porcine Mycoplasmas isolated from pig farms in Thailand

Makhanon M. 1, Thongkamkoon P. 2, Prapasasakul N. 1
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P150 Comparison of the efficacy of Suvaxyn MH One® and Ingelvac MycoFlex® in a 26-week duration of immunity study

Wilson S. 1, Wuyts N. 2, Nutsch B. 3, McLaughlin C. 3
1 Pfizer Veterinary Medicine Research and Development, Zaventem, Belgium; 2 Pfizer Animal Health EuAfme, Paris, France; 3 Pfizer Veterinary Medicince Research and Development, Kalamazoo, USA

P151 Prevalence of Mycoplasma hyopneumoniae infections at weaning age in Spanish pig herds

Bringas J. 1, Nuñez P. 1, Sibila M. 2, Segalés J. 2,3, Labarque G. 4
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P152 Efficacy of a new florfenicol formulation administered once intramuscularly in the treatment of swine respiratory disease under field conditions

Thiry J. 1, de Haas V. 1, Thomas E. 2
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P153 Prevalence of Mycoplasma hyopneumoniae infections at weaning age in Italian pig herds
Ferro P. 1, Alborali G. 2, Labarque G. 3
1 Elanco Animal Health, Sesto Fiorentino, Italy; 2 Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna, Brescia, Italy; 3 Elanco Animal Health, Suresnes, France

P154 Efficacy of a new 450 mg/mL florfenicol formulation in the treatment of an experimentally induced Actinobacillus pleuropneumoniae respiratory infection in pigs
Thomas E. 1, Ramage C. 2, Reddick D. 2, Fraser S. 2, de Haas V. 3
1 Intervet Innovation GmbH, known as MSD Animal Health, Schwabenheim, Germany; 2 Moredun Scientific, Midlothian, United Kingdom; 3 Intervet Pharma R&D, known as MSD Animal Health, Beaucouzé, France

P155 Mycoplasma hyopneumoniae prevalence in Belgian pig herds using a tracheo-bronchial swab technique
Vangroenweghe F. 1, Maes D. 2, Labarque G. 3
1 Elanco Animal Health, Brussels, Belgium; 2 Ghent University, Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Herd Health, Merelbeke, Belgium; 3 Elanco Animal Health, Suresnes, France

P156 Mycoplasma hyopneumoniae prevalence in Dutch pig herds using a tracheo-bronchial swab technique
Vangroenweghe F. 1, Maes D. 2, Labarque G. 3
1 Elanco Animal Health, Brussels, Belgium; 2 Ghent University, Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Herd Health, Merelbeke, Belgium; 3 Elanco Animal Health, Suresnes, France

P157 Bactericidal activity and post-antibiotic effect (pae) of florfenicol against porcine respiratory disease pathogens
Wilhelm C.
Intervet Innovation GmbH, known as MSD Animal Health, Schwabenheim, Germany

P158 Determination of the in vitro activity of florfenicol against Mycoplasma hyopneumoniae
Wilhelm C. 1, Gautier-Bouchardon A.V. 2, Boyen F. 3, Spergser J. 4
1 Intervet Innovation GmbH, known as MSD Animal Health, Schwabenheim, Germany; 2 Anses, Mycoplasmology-Bacteriology Unit, BP53, Ploufragan, France; 3 Ghent University, Merelbeke, Belgium; 4 University of Veterinary Medicine Vienna, IBMH, Wien, Austria

Bacteriology: Enteric Diseases

P159 Investigations on a novel vaccine against edema disease in field studies
Bastert O., Fricke R., Lüder O.
IDT Biologika GmbH, Dessau-Rosslau, Germany

P161 Occurrence of intestinal infections in non-medicated growing pigs in Denmark: a case control study
Pedersen L.L. 1, Pedersen K.S. 1, Angen Ø. 2, Nielsen J.P. 1
1 Department of Large Animal Science, University of Copenhagen, Copenhagen, Denmark; 2 National Veterinary Institute, Technical University of Denmark, Copenhagen, Denmark

P162 Antimicrobial susceptibility of Finnish Brachyspira hyodysenteriae isolates in years 2007-2011
Raunio-Saarnisto M. 1, Laine T. 2, Haltia L. 1
1 Finnish Food Safety Authority Evira, Seinäjoki, Finland; 2 Finnish Food Safety Authority Evira, Helsinki, Finland

P163 Detection of viable Helicobacter suis bacteria in pork samples
De Cooman L., Flahou B., Smet A., Houf K., Ducatelle R., Pasmans F., Haesebrouck F.
Laboratory of Veterinary Bacteriology and Mycology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium

P164 Lawsonia intracellularis infection patterns in French pig herds presenting with digestive disorders
Morel Saives A. 1, Auvigne V. 2
1 Elanco Animal Health France, Suresnes, France; 2 EKIPAJ, Angers, France

P165 Early weaning impairs gut mucosal defenses and exacerbates clinical disease in F18 E. coli infection
McLamb B.L., Moeser A.J.
North Carolina State University College of Veterinary Medicine, Raleigh NC, USA

P166 Medium dependent decrease of viability in a pig specific Escherichia coli exposed to glycine and monoethanolamine under alkaline conditions
Vanhauteghem D. 1,2, Meyer E. 2, Cox E. 3, Lauwaerts A. 4, Janssens G.P.J. 1
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P167 A new methodology to detect some pathogenic bacteria involved in swine neonatal diarrhoea
Valls L., Mesonero J., Maldonado J.
HIPRA, Amer-Girona, Spain

P168 Towards identifying porcine F4 ETEC receptors by comparison between F4-binding brush border membrane proteins of different groups
Nguyen V.U. 1, Goetstouwers T. 2, Van Poucke M. 2, Coddens A. 1, Melkebeke V. 1, Peelman L. 2, Cox E. 1
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P169 An investigation into the association between C. perfringens type A and diarrhea in neonatal piglets
Farzan A. 1, Kircanski J. 2, DeLay J. 3, Soltes G. 2, Friendship R.M. 1, Prescott J.F. 2
1 Department of Population Medicine, University of Guelph, Guelph, ON, Canada; 2 Department of Pathobiology, University of Guelph, Guelph, ON, Canada; 3 Animal Health Laboratory, University of Guelph, Guelph, ON, Canada

P170 Comparison of live yeast and zinc supplement on the occurrence of pathogenic E. coli in weaned piglets
Bernardy J. 1, Kumprechtova D. 2, D'Inca R. 3, Auclair E. 3
1 Swine clinic, University of Veterinary and Pharmaceutical Sciences Brno, Czech Republic; 2 Czech University of Life Sciences, Prague, Czech Republic; 3 Lesaffre Feed Additives, France

P171 PK/PD of Denagard (tiamulin) in drinking water for the treatment of ileitis
Burch D.G.S. 1, Klein U. 2
1 Octagon Services Ltd, Pld Windsor, Berkshire, UK; 2 Novartis Animal Health Inc, Basel, Switzerland

P172 Correlation of clinical diarrhea, histopathological lesions and diagnostic tests for grow-finish enteritis with a focus on Brachyspira hyodysenteriae
Pittman J.S. 1, Lowe H.C. 2, Hammer J.M. 3, Stevenson G.W. 4
1 Murphy-Brown, LLC – Waverly Division, Waverly, Virginia; 2 Virginia Maryland Regional College of Veterinary Medicine, Blacksburg, Virginia; 3 Novartis Animal Health US, Greensboro, North Carolina; 4 Veterinary Diagnostic Laboratory, Iowa State University, Ames, Iowa

Bacteriology: General Diseases

P173 An outbreak of S. Choleraesuis in Belgium
Strubbe M., Miry C., De Graef E., Bertrand S., Vandersmissen T.
DGZ Vlaanderen, Torhout, Belgium

P174 Antimicrobial susceptibility monitoring of respiratory and enteric tract pathogens isolated from diseased swine across Europe between 2004 and 2006
Klein U. 1, Thomas V. 1, De Jong A. 1, Simjee S. 1, Maher K. 2, Moyaert H. 1, Valle M. 1, Marion H. 1, Rigaut D. 1, Butty P. 1
1 VetPath Study Group, CEESA, Brussels, Belgium; 2 Quotient Bioresearch, Fordham, United Kingdom

P175 The role of Escherichia coli in the pathogenesis of coliform mastitis in sows: do virulence gene profiles give any hints?
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1 Institute of Animal Breeding and Husbandry, Christian-Albrechts-University, Kiel, Germany; 2 PIC Germany GmbH, Schleswig, Germany; 3 Institute of Agricultural and Nutritional Science, Martin-Luther-University, Halle (Saale), Germany

P176 Quantification of methicillin-resistant S. aureus ST398 adhesion to porcine intestinal epithelial cells
Crombé F. 1,2, Trouillet S. 3, Rasigade J-P. 3, Laurent F. 3, Hermans K. 2, Haesebrouck F. 2, Butaye P. 1,2
1 Veterinary and Agrochemical Research Centre, Belgium; 2 Ghent University, Faculty of Veterinary Medicine, Department of Pathology, Bacteriology and Avian diseases, Belgium; 3 National Reference Centre for Staphylococci, University of Lyon, France

P177 Identification of new surface protein vaccine candidates against Streptococcus suis by proteomics
Gómez-Gascón L. 1,3, Luque I. 1, Olaya-Abril A. 2,3, Tarradas C. 1, Jiménez-Munguía I. 2,3, Huerta B. 1, Bárcena J.A. 2,3, Rodríguez Ortega M.J. 2,3
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P178 Prevalence of antibodies to Salmonella spp., and Leptospira pathogens in Lithuanian wild boar (Sus scrofa) population
Buitkuviene J. 1,2, Valanciute J. 1, Cepulis R. 3, Stankevicius A. 1
1 Lithuanian University of Health Sciences, Veterinary Academy, Kaunas, Lithuania; 2 National Food and Veterinary Risk Assessment Institute, Vilnius, Lithuania; 3 Intervet /Schering-Plough AH, Lithuania

P179 Characterisation of Klebsiella species isolates from outbreaks of Klebsiella species septicaemia: an emerging pathogen?
Bidewell C.A. 1, Williamson S.M. 1, Rogers J.P. 1, Hunt B.W. 1, Davis N.J. 1, Ellis R. 2, AbuOun M. 2, Woodward M.J. 2
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P180 Longitudinal study for livestock-associated methicillin-resistant Staphylococcus aureus (MRSA) in piglets
Verhegghe M. 1,2, Pletinckx L.J. 3, Bekaert M. 4, Crombé F. 2,5, Haesebrouck F. 2, Butaye P. 2,5, Heyndrickx M. 1,2, Rasschaert G. 1
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P181 Endotoxins and pigs
Schaumberger S., Ganner A., Schatzmayr G.
Department of Research, BIOMIN, Tulln, Austria

VIrology: PRRS

P182 Oral fluid testing of feeder pigs for Porcine Reproductive and Respiratory Syndrome virus (PRRSV)
Ménard J. 1, Laplante B. 1, Bélanger M. 2, Broes A. 2
1 F. Ménard, L'Ange-Gardien, Québec, Canada; 2 Biovet, Saint-Hyacinthe, Québec, Canada

P183 Circulation of porcine reproductive and respiratory syndrome virus in Polish farrow to finish farms
Stadejek T., Jablonski A., Skrzypiec E., Szymanek K., Podgorska K., Pejsak Z.
NVRI, Department of Swine Diseases, Pulawy, Poland

P184 Innate and adaptive cytokine mRNA expression profile in lungs and tonsils of experimentally infected pigs with Porcine Respiratory and Reproductive Syndrome Virus (PRRSV)
García-Nicolás O. 1, Quereda J.J. 2, Ramis G. 3, Pallarés F.J. 1, Rodríguez-Gómez I.M. 4, Gómez-Laguna J. 5, Muñoz A. 3
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P185 Immunomodulatory cytokine gene expression in lungs and tonsils of pigs experimentally infected with Porcine Reproductive Respiratory Syndrome Virus (PRRSV)
García-Nicolás O. 1, Quereda J.J. 2, Ramis G. 3, Pallarés F.J. 1, Barranco I. 4, Carrasco L. 4, Muñoz A. 3
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P186 Does PRRSV use a Caspase-3 independent pathway to induce apoptosis phenomena?
Barranco I. 1, Gómez-Laguna J. 2, Rodríguez-Gómez I.M. 1, Quereda J.J. 3, Salguero F.J. 4, Pallarés F.J. 5, Carrasco L. 1
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P187 Downregulation of major histocompatibility complex class II and CD3 T cells by PRRSV in lymphoid organs of experimentally infected-pigs
Rodríguez-Gómez I.M. 1, Gómez-Laguna J. 2, Barranco I. 1, Salguero F.J. 3, García-Nicolás O. 4, Ramis G. 5, Carrasco L. 1
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P189 Evaluation of a local pilot PRRSv elimination program in Brittany (France)
Masset N. 1, Auvigne V. 2, Chatelier N. 3, Gouvars B. 3, Belloc C. 1
1 Oniris, INRA, LUNAM, UMR BioEpAR, Nantes, France; 2 Ekipaj, Angers, France; 3 UGPVB, Rennes, France

P190 Seroprevalence of antibodies to porcine reproductive and respiratory syndrome virus (PRRSV) in Lithuanian pigs and wild boars
Valanciute J., Buitkuviene J., Cepulis R., Stankevicius A.
Department of Anatomy and Physiology, Lithuanian University of Health Sciences, Kaunas, Lithuania

P191 Is tilmicosin useful in reducing viremia and the clinical impact of porcine reproductive and respiratory syndrome (PRRS)?
O'Sullivan T. 1, Friendship R. 1, Johnson R. 2, Carman S. 3, Delay J. 3, Poljak Z. 1, Blackwell T. 4
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P192 Reliable detection and typing of PRRSV using multiplex real-time RT-PCR
Gaunitz C., Schroeder C., Labitzke M., Knoop E., Gabert J.
Labor Diagnostik GmbH, Leipzig, Germany

P193 Development and evaluation of performances of novel oral fluid sampling technologies with the use of real PCR detection kit for the diagnostic of porcine respiratory and reproductive syndrome
Boss C.B. 1, Bar F.B. 2, Lenguas O.L. 3
1 Life Technologies, Germany; 2 Life Technologies France; 3 Life Technologies Spain

P194 Prevalence of Genotype 2 PRRSv in The Netherlands and the influence of PRRSv sow vaccination
Geurts V.N.A.M. 1, Cruijsen A.L.M. 1, Cornelis H.J.M. 2
1 MSD AH Intervet Nederland bv, Boxmeer, The Netherlands; 2 Dierenkliniek De Kempen, The Netherlands

VIrology: PCV2

P195 IL-4 gene expression in PCV2 vaccinated and unvaccinated piglets born from PCV2 vaccinated and unvaccinated sows
Quereda J.J. 1,2, Ramis G. 2, Pallarés F.J. 3, Chapat L. 4, Goubier A. 5, Joisel F. 4, Charreyre C. 4, Muñoz A. 2
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P196 Benefits of vaccination with Ingelvac CircoFLEX® on weight at slaughter and carcass quality
Ramis G. 1, Perelló C. 1, Quereda J.J. 1, Toledo M. 2, Pallarés F.J. 3, Coll T. 4, Hernández-Caravaca I. 4, Muñoz A. 1
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P197 PCV2 viremia and performance in vaccinated and unvaccinated animals inside a long-term vaccinated herd with Ingelvac CircoFLEX®
Ramis G. 1, Perelló C. 1, Quereda J.J. 1, Toledo M. 2, Pallarés F.J. 3, Coll T. 4, Hernández-Caravaca I. 4, Muñoz A.1
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P198 Field study on the level and variability of PCV2 antibody titers of sows and 3 week old piglets in 5 Belgian farms
Fockedey M. 1, De Backer P. 2, De Jonghe E. 2
1 Dierenartsenpraktijk Vedanko, Wingene, Belgium; 2 SCS Boehringer Ingelheim Comm.V., Brussels, Belgium

P199 Field study of PCV2 infection using serology and RT-PCR on rectal swabs before and after piglet vaccination
Retureau M. 1, Marchand D. 1, Guillemet A. 1, Dupuis J. 1, Werner L. 1, Houlbert J. 1, Maniaval O. 1, Duivon D. 2, Rigaut M. 2
1 Réseau Cristal Services, Les Herbiers, France; 2 MSD Santé Animale, Beaucouzé, France

P200 Investigation of PCV2-status in a Danish herd – Two year longitudinal study
Kristensen C.S. 1, Hjulsager C.K. 2, Larsen L.E. 2
1 Pig Research Center, Danish Agriculture & Food Council, Kjellerup, Denmark; 2 National Veterinary Institute, Technical University of Denmark, Copenhagen, Denmark

P201 Improvement of technical results by the use of Ingelvac CircoFLEX® in a Dutch organic breeding and fattening farm: a case report
Schlepers M. 1, Gelauf J.S. 2
1 Department of Epidemiology, Utrecht University, Utrecht, The Netherlands; 2 ULP Ambulatory clinic, Harmelen, The Netherlands

P202 The association between the PCVAD outbreak in Ontario and the positivity of porcine reproductive and respiratory syndrome virus (PRRSV) elisa and PCR test results
O'Sullivan T. 1, Friendship R. 1, Pearl D.L. 1, McEwen B. 2, Dewey C. 1
1 Department of Population Medicine, University of Guelph, Canada; 2 Animal Health Laboratory, Laboratory Services Division, University of Guelph, Canada

P203 Additional benefits of Circovac® sow vaccination on top of piglet vaccination under Bulgarian conditions: a case report
Stoykov H. 1, Groseva M. 2
1 DVM, farm Brashlen, Rousse, Bulgaria; 2 DVM, SAM BS Ltd., Bulgaria

P204 Evolution of the sero-epidemiological pattern of PCV2 after vaccination of the sows with Circovac®
García-Rabanal J. 1, Llamazares J. 1, Callen A. 2, Vila T. 3, Joisel F. 3
1 PROGATECSA, Spain; 2 Merial Laboratorios S.A., Barcelona, Spain; 3 MERIAL SAS, Lyon, France

P205 Evaluation of the synergic effects of DeviGuard® feed supplementation and CIRCOVAC® sow vaccination in prevention of PMWS
Beattie V. 1, Charreyre C. 2, Pasini M. 2, Joisel F. 2
1 Devenish Nutrition Limited, Belfast, Northern Ireland; 2 MERIAL SAS, Lyon, France

P206 Effect of PCV2 piglet vaccination on FCR in 24 Spanish farms
Coll T. 1, Martos A. 2, Hernández-Caravaca I. 1
1 Boehringer Ingelheim España S.A. Spain; 2 Universitat Autònoma de Barcelona, Spain

P207 PCV2 antibody status of gilts before entering swine commercial farms: preliminary results of a survey performed in France
Perreul G. 1, Herin J-B. 1, Joisel F. 2, Vila T. 2
1 MERIAL SAS, Ancenis, France; 2 MERIAL SAS, Lyon, France

VIrology: Other

P208 African swine fever eradication in Brazil, 1978: laboratory and surveillance service integrate action
Freitas T.R.P. 1, Lyra T.M.P. 2
1 LANAGRO-MG, Ministry of Agriculture, Livestock and Supply, Pedro Leopoldo, Minas Gerais, Brazil; 2 Animal Health and Epidemiology Adviser, Brazil

P209 Classical swine fever eradication in progress in Brazil
Freitas T.R.P. 1, Souza, A.C. 2, Lyra T.M.P. 3
1 LANAGRO-MG, Ministry of Agriculture, Livestock and Supply, Pedro Leopoldo, Minas Gerais, Brazil; 2 Suidae Section, Ministry of Agriculture, Livestock and Supply, Brazil; 3 Animal Health and Epidemiology Adviser, Brazil

P210 Serological survey and molecular investigation on pseudorabies virus latency in Italian pigs
Bresaola M., Canelli E., Giacomini E.
Department of Virology, IZSLER, Villafranca, Italy

P211 Reminder on classical swine fever: recent outbreaks in Serbia
Milicevic V., Maksimovic J.
Virology Department, Institute of Veterinary Medicine of Serbia, Belgrade, Serbia

P212 Outbreak of swine influenza in France: a case report
Lebret A.
Chene Vert Conseil, Porc. Spective, Pontivy, France

P213 Merial flu kit: first results of a survey performed in France and Benelux
Meyns T. 1, den Hartog P. 1, Perreul G. 2, Herin J-B. 2, Joisel F. 3, Vila T. 3
1 MERIAL, Benelux; 2 MERIAL SAS, Ancenis, France; 3 MERIAL SAS, Lyon, France

P214 First tentative diagnosis of periweaning failure-to-thrive syndrome (PFTS) in Spain
Segalés J. 1, Bragulat J. 2, Finestra A. 3, Quintilla C. 4, Martínez J. 1, Vidal E. 1, Kekarainen T. 1
1 CReSA - UAB, Bellaterra, Spain; 2 Agrocat, Manresa, Spain; 3 Pig veterinary consultant, Lleida, Spain; 4 Copinsa, Almacelles, Spain

P215 Cross-reactivity of hemagglutinin from recent porcine Parvovirus to serum from pigs vaccinated or vaccinated and then experimentally infected

Maldonado J., Valls L., Mesonero J., Pujol R., Cesio M.
HIPRA, Amer - Girona, Spain

P216 Current Classical Swine Fever (CSF) situation in domestic pigs and wild boars and report of the first sequence of CSF solate from Macedonia

Djadjovski I. 1, Krstevski K. 1, Acevski S. 2, Mitrov D. 1, Mrenoski S. 3
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Keynotes and Practical Talks


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IL001 Use of antimicrobials in pig production. View of the pharmaceutical industry

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The common goal for animal health industry and its stakeholders with regard to antibiotics is to protect human health, animal health and animal welfare and to ensure their effectiveness now and in the future for relevant indications in all animal species.

The pig production was approximately 250 million in the EU in 2008. With the steady growth of world population the demand in meat is rising e.g. it is expected that the demand for pork will increase by 23% up to 2019[1]. While good animal husbandry and biosecurity play an important role in good farming practices, diseased animals still need to be treated. Antibiotics are predominantly used for therapy and prevention of bacterial infections; the most common indications being respiratory and intestinal diseases.

The development of resistance is seen as a growing problem, receiving attention internationally at scientific, public health and political levels. Some proposals to minimize the risk of resistance development are directed towards the overall reduction of use of veterinary antimicrobials. The complete ban of certain critically important antibiotics is also discussed as a measure. But what are the facts and what are the real risks? There are several key actions related to the use of antibiotics which are of relevance for minimizing the development of resistance.

Responsible use is probably the most crucial aspect when using antibiotics this concept is highly promoted by the animal health industry[2] together with other stakeholders in a collaborative approach within the EU (EPRUMA). Of particular relevance is the strict adherence to label instructions.The use of the cascade should be the exemption only.

Surveillance activities, both of antibiotic volumes and of resistance are also key actions for generating scientific data for risk assessment purposes.

Animal health industry supports the collection of antibiotic volumes both at the national and European level with the ESVAC program. However, in order to avoid misleading interpretation on use, emphasis is given to the appropriate analysis of data by taking contextual data into account.
Veterinarians are knowledgeable professionals, skilled in making balanced clinical judgments and decisions that determine the appropriate treatment. The animal health industry is also supportive of data collection at the end user level. It is also to be emphasized that recent publications [3] infer that “the sympatric animal population is unlikely to be the major source of resistance diversity for humans.” The conclusion of the authors is “the current policy emphasis on restricting antibiotic use in domestic animals may be overly simplistic “. Controversially, various national measures are in preparation to reduce the overall use of veterinary antimicrobials. As an example the Dutch Ministry of Agriculture has declared to reduce the use by 50% until 2013 as compared to 2009.

The risk to human health for potential food-borne transmission can be evaluated by monitoring the susceptibility of zoonotics and commensals sampled at slaughter on healthy animals. At national level Denmark is running such a program with DANMAP for more than 15 years and The Netherlands with MARAN for 10 years. At the European level, the animal health industry program EASSA is running since 1999 and EFSA is publishing reports since 2004. While the merits of these programs are within the early identification of trends in resistance development, harmonization (sampling, MIC testing and particularly of interpretation criteria) is needed for proper risk evaluation.

As an example, while an EFSA scientific opinion[4] recommended to discontinue or restrict all use of 3rd and 4th generation cephalosporins in all food producing animals as mitigation measure to stop the spread of ESBL and AmpC resistance in animal production, it is interesting to note that in the same report experts specified that cephalosporin resistance prevalence remain low to very low in cattle and pigs. This is observed after two decades of use of these molecules. In contrast to these findings higher resistance rates were observed for poultry and could correspond to an off-label use of cephalosporins. It is emphasized that this practice, as not corresponding to the label of the

products, is not supported by the animal health industry. It is however the opinion of the animal health industry that the recommendations of this EFSA report are going a step beyond scientific evidence for cattle and pigs. The risk assessment seems to be biased in this case.

Pig production is a sector faced with a worldwide growing demand for meat. While animal husbandry and biosecurity are improving, the need to fight bacterial diseases will remain. In that context, and since no new antibiotic families have been developed since the end of the 1970s, the use of antibiotics has to be responsible. Surveillance in volumes and of resistance trends are important tools to be considered for science based decisions by regulatory bodies and politicians.

References

1. OECD-FAO Agriculture outlook 2010-2019
2. IFAH-Europe Policy Paper 'Antimicrobials– Taking the path of least resistance', to be published
3. Reid, S. et al, 2011, An ecological approach to assessing the epidemiology of antimicrobial resistance in animal and human populations, Proceedings. Royal. Society. B, doi:10.1098/rspb.2011.1975, Published online
4. EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on the public health risks of bacterial strains producing extended-spectrum β-lactamases and/or AmpC β-lactamases in food and food-producing animals. EFSA Journal 2011;9(8):2322. [95 pp.] doi:10.2903/j.efsa.2011.2322. Available online: www.efsa.europa.eu/efsajournal

IL002 Use of Antimicrobial Agents in Pig Production ~ A European Regulatory Perspective

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Antimicrobials are essential for the treatment and prevention of infectious and zoonotic diseases in both animals and man. They are fundamental to animal health and welfare, the safety of food products derived from animals, and global food security. The risk of antimicrobial resistance is a real one and it is inevitable that the continued use of antimicrobials in animals will lead to resistance and there is certainly potential for its transfer to man, and some evidence indeed that this has already happened. However any measures to manage such a risk must always be based on a rigorous assessment of that risk, firmly based on sound scientific arguments

In response to this threat to the continued efficacy of these medicinal products across the European Community, the regulatory authorities are understandably concerned, and are actively engaged in taking all necessary steps to minimise the threat that resistance to antimicrobials poses both in veterinary and human medicine. This paper will examine critically the controls imposed to date on use of these products in animals within the European Community and question whether the controls currently in place are having the desired effect, and based on this experience examine the latest proposals from the Commission in its **"Action plan against the rising threats from Antimicrobial Resistance"** launched by Commissioner Dalli in November 2011. The Action Plan has much to commend it and the veterinary profession should find little to question in its content and a review of its main recommendations will be presented

The original premise used by policy makers in Brussels to limit the use of antimicrobials in animals in order to minimise resistance has rarely been challenged, and the paper will consider whether despite the ban on using these products as growth promoters initially, and more recently placing restrictions on the use of newer classes of these products in animals, such action by the regulators is having the desired effect of limiting the incidence of resistance in man.

Politicians and legislators in Europe continue to call for more restrictions on the use of these products in animals and the ability of vets to dispense them, and there is a real concern that vets will not have access to sufficient availability of products to treat bacterial infection in their animal patients. This has a serious potential knock-on effect, in that failure to treat such diseases in animals increases the risk of exposure to such infections in people that consume meat, eggs and milk from our livestock.

The preferred and more rational approach to managing this risk is to use antimicrobials responsibly. The veterinary profession represented by the Federation of Veterinarians in Europe (FVE) has been at the forefront of such a campaign, developing its own guidelines and recommendations to its members associations in all member states on how to use these products prudently, whilst at the same time encouraging veterinarians themselves work diligently with their farmer clients and pet owners, to make sure that they too understand how critically important such an approach will be in successfully tackling this problem

The paper will draw attention to the prevailing political climate that challenges the profession in its ability to control infectious diseases in practice. The attacks on veterinary use of antimicrobials continues apace especially in the European Parliament. In April 2011 a group of MEPs introduced an amendment to a resolution to restrict veterinary surgeons from dispensing veterinary medicines. The FVE lobbied against the amendment, which could restrict herd health planning, compromise animal health and welfare, and put the viability of large animal veterinary practice into question. In November 2011 MEPs voted in favour of an amendment to a resolution calling on the Commission to legislate against the prophylactic use of antibiotics (antimicrobials) in livestock farming. A ban could seriously compromise animal health and welfare by reducing the ability of veterinary surgeons to treat animals in a timely and appropriate fashion. It would risk situations whereby vets are unable to administer an antimicrobial to an injured animal to prevent infection, or to the pen-mates of sick animals on farm, which are likely to also be infected. The presentation will urge caution against a blanket ban on 'prophylactic' use, and propose alternative ideas that might allay the concerns of those charged with regulating the use of these medicinal products in animals.

Attention will also be drawn to the need to ensure that the medical profession is also playing its part in addressing the overprescribing of antimicrobials in man. It is only by working together that the two professions can undertake a united approach to meet the challenges of resistance development head on and avoid the polarisation of the arguments that hitherto have divided them

IL003 Experiences with AB free pig farming

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Although it is hard to make evidence based, the increasing prevalence worldwide of MRSA and ESBL in farm animals threatens human health, and resistance to antibiotics seems to spread from animals to humans. Therefore, the Dutch government announced that the use of antibiotics in farm animals had to be reduced. The first announcement of 20% reduction was rapidly changed into 50% reduction. Reduction of antibiotics can be measures in various ways. When actual use as well as reduction is expressed in kg of pure substance, efforts to reduce actual use may lead to a shift towards more potent antibiotics, which have to be restricted for human use. Therefore, antibiotic use is expressed as "defined daily dose" (DDD), which allows adding quantitative use of various antibiotics, with various doses, and used in various weight groups. DDD, defined by the World Health Organization, is a statistical measure that allows to calculate the consumption of different antibiotics and to compare the use on different farms. The quantity of each registered drug, delivered at a farm, is calculated onto treatment days per (standardized) animal, and allows to monitor and compare antibiotic use within time.

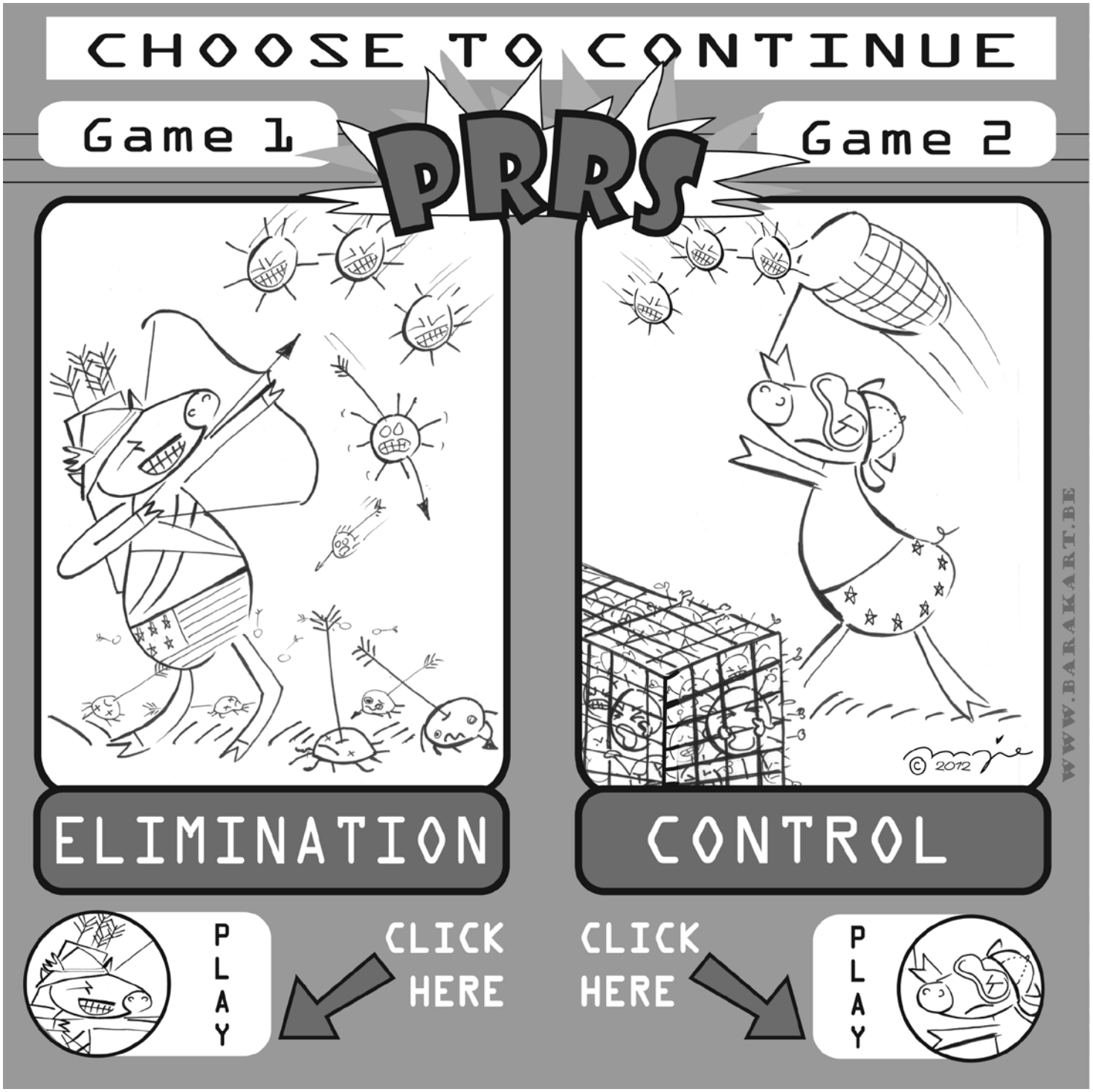
An increasing interest and attention from consumers towards antibiotic free pork production, is not translated yet in large scale production of antibiotic free pork. How should we define antibiotic free? Absence of residues antibiotics, as a basic quality characteristic, is already included in legislation and quality systems of most countries. When 'antibiotic free' is defined as the production of pork or meat from animals that were never treated with any antibiotic during their lives, doubt arises with respect to feasibility. Is it feasible at conventional commercial pig farms to produce pork or meat without use of antibiotics? To answer this question a pilot study was carried out in 2011. The study included 10 farms and farrow-to-finish operations were part of the study.

The pilot included:

1. An active and full cooperation of participating farmers, including all advisors that visit these farms, was a prerequisite to participate.
2. Assessment and improvement of daily work methods -improving the human factor- was embedded in a training program 'on the spot'.
3. Reduction of direct and indirect contact structures between pigs was an important tool to reduce transmission of endemic infections.
4. Water quality was examined, monitored and improved.
5. Climate conditions of compartments were examined and improved.
6. Implementation of changes was coached by an extern expert. The expert monitored whether all participants stick to the rules.

From this pilot we can conclude that a major reduction is achieved at most herds, even when there is already a very limited use of antibiotics. A well designed plan of action need to be ready to use by the farmer to prevent that his "old conduct" prevails in case of animal health problems.

At each farm there is always a risk for diseased animals that need to be treated for disease from animal welfare point of view. However, most pigs can be raised and most pork can be produced without any treatment with antibiotics. Antibiotic free production should be used as an incentive to define, control and guarantee good farming procedures.


CHOOSE TO CONTINUE
Game 1
PRRS
Game 2
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ELIMINATION
CONTROL
PLAY
CLICK HERE
CLICK HERE
PLAY

IL004 Control or Elimination of PRRS Virus?

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Porcine Reproductive and Respiratory Syndrome (PRRS) has been a devastating disease for pork producers since it was formally identified in 1991. PRRS infection can cause respiratory disease in weaned and growing pigs, reproductive losses and death in adult animals and can be the underlying cause for poor production efficiency within a herd. According to a recent economic assessment completed in 2011, production losses attributed to PRRS have totaled more than $664 million dollars in United States and other costs associated with PRRS have amounted to an additional $477 million to bring the combined costs to producers to exceed one billion dollars a year. According to a recent producer survey, PRRS virus is the most challenging disease that producers face and this challenge to production efficiency has been long-standing since the disease was first identified on-farm in the late 1980s.

Control at farm level is pursued through different management procedures (e.g. pig flow, gilt acclimation, vaccination). PRRSv is commonly eliminated from sow herds by a procedure called herd closure whereby the herd is closed to new introductions for a period of time during which resident virus dies out (Torremorell et al 2003, Schaefer et al, 2007). However, despite thorough application of biosecurity procedures, many herds become re-infected from virus that is present in the area. Consequently, some producers and veterinarians are considering a voluntary regional program to involve all herds present within an area (Corzo et al 2010).

The overarching goal of each project varies and it seems important to re-iterate definitions. A regional **control** program can be defined as "*reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts. Continued intervention measures are required to maintain the reduction*." A regional control program might just entail testing herds, surveillance, sharing information & acting accordingly. In contrast, a regional **elimination** program is a: "*reduction to zero incidence of a pathogen in a defined geographical area as a result of deliberate efforts. This requires continued measures to prevent re-establishment of virus transmission*." An **eradication program** usually refers to an effort, such as historical CSF and ADV programs to eliminate a pathogen with regulatory oversight and intervention. Disease eradication is driven by statutes and enforced by the authorities. Either control or elimination creates the opportunity to lessen the impact of PRRS. (http://www.cdc.gov/MMWR/preview/mmwrhtml/su48a7.htm)

The implementation of regional PRRS virus projects is motivated by a desire to increase profitability. The process is driven by communication, education and local leadership. Immediate benefits include improved biosecuity and an increased awareness of the impact of infectious disease. In the longer term, these efforts might culminate in the elimination of PRRS. In the much longer term, the infrastructure developed to eliminate PRRSV could lead to the elimination of other infectious diseases that impact animal health and profits. In a voluntary program there is no assurance of 100% participation. Therefore, a voluntary program cannot assure regional elimination and while regional elimination may be the ultimate goal, it may be overly optimistic. In contrast, achieving effective control is not dependent on 100% participation.

Some predictors of success include:
- Local unified leadership from producers and veterinarians,
- Good communication among participants,
- A long term commitment and willingness to adapt as new challenges arise,
- Few pigs entering the region from PRRS-positive or herds with unknown PRRSV status.
- The presence of natural borders (mountains, rivers, etc.) or a low density of herds at the perimeter of the region,
- Few exhibition pigs in the region or the willingness of hobby farmers to participate,
- In general, the higher the herd density in a region, the more difficult the process.

Brief history of PRRS projects:
The first regional project aimed at controlling PRRS virus spread started in 2002 in eastern Rice Cy, Minnesota. Some progress was made but in retrospect, the region did not have the ideal attributes to determine whether a **voluntary, regional, coordinated, PRRS control & elimination program** is feasible. A second regional project started in 2004 in Stevens County in west central Minnesota and the project has been a resounding success. Approximately 90% of the producers in the county have participated and the prevalence of PRRS has decreased from approximately 50% of sites to no known sites having PRRS. The project has expanded twice and now includes all of northern Minnesota.

Current Projects:
We count approximately 20 regional projects around United States with the goal of controlling and possibly eventually eliminating PRRS virus. This represents a phenomenal explosion since 2008 when there was just one region underway. Canada has also initiated several projects in Ontario and Quebec as has Mexico.

With the success of the N212MN project, USDA funded PRRS CAP allocated 10% of its budget to initiate six other regional projects around United States. One obligation of being part of the PRRS CAP is to share their progress and challenges with us.

The projects vary in their progress and challenges. For example, the northern MN project has an extremely large area with 3 clusters of pork production and the majority of the region being very low density. With Stevens county having no known sites being PRRS positive, the region employs a risk-based surveillance system to identify sites with higher risk that deserve more frequent testing. The north central IL project has the challenge of relatively large farrow to finish single sites. They are using attenuated PRRS vaccines in their region and will need to eliminate this virus as well in the long term. The west central IL project has struggled with participation rate and is in the process of designing a survey of attitudes so we can learn about factors affecting perceptions about adoption rate of regional, voluntary, coordinated PRRS control and elimination. The Iowa County project is trying to gain understanding of the impact of pigs entering the control region. The Cuming County project is working with Boehringer Ingelheim to incorporate a novel mapping program (BioPortal) that includes PRRS virus sequence as well as location and PRRS status of farms. And finally, the Pennyslvania project completed a study on the role of geographic location and topography on apparent lateral transmission of PRRS virus and has started a project incorporating meat juice sampling.

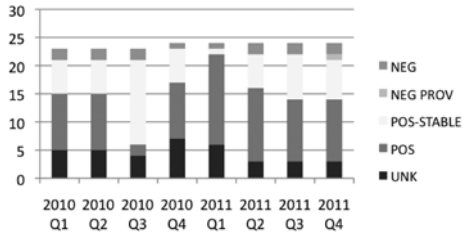
Each project coordinator submits quarterly progress reports which are available for review at PRRS.Org (http://prrs.org/default.aspx). The progress report includes a table summarizing herd inventory and PRRS status for the region and a bar chart showing change in PRRS status of sows. Although there is much variability, we are gradually moving towards common nomenclature for classifying sow herd status (Holtkamp et al 2010).

Table 1. Example of regional progress report from north-central Illinois.

	Sow herd Status by Size								
	<=100	**101-600**		**601-1500**		**1501-3000**		**>3000**	
Unknown	1	1						1	
Positive		4**		2***		4****		1	
Positive stable	1	2		1		1		2	
Negative provisional				1					
Negative				1		1			
TOTAL	**2**	**7**		**5**		**6**		**4**	**24**
	Nurseries (no sows or pigs >10 wks)								
	<=1200		**1201-2400**		**2401-4800**		**>4800**		
	Source		**Source**		**Source**		**Source**		
	IN	**OUT**	**IN**	**OUT**	**IN**	**OUT**	**IN**	**OUT**	
Unknown									
Positive	1*		1*		3^				
Negative									
Total	**1**	**0**	**1**	**0**	**3**	**0**	**0**	**0**	**5**

* - Positives are MLV strain ** - 2 of 4 are MLV strain *** - 1 of 2 are MLV strain **** - 3 of 4 are MLV strain

Figure 1. Quarterly PRRS classification status of sow herds participating in NC Illinois regional project.



Current challenges:

The AASV PRRS task force has been integrally involved in the progress and its first effort was the sow herd classification guideline (Holtkamp et al 2010). Its second project is the development of a standard operating protocol for managing sow herds in an effort to manage PRRS virus and potentially move herds from being positive and unstable to negative.

Additional challenges have been identified and working groups formed to address the following issues:

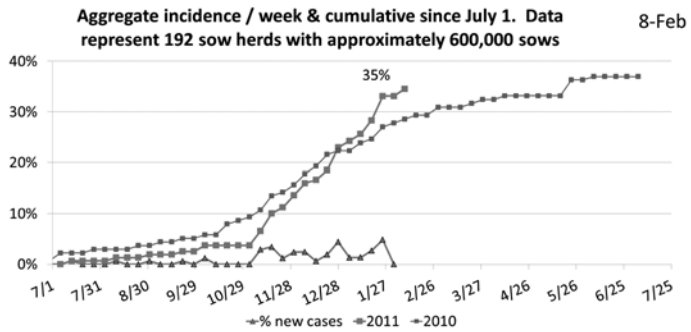
- Develop a program to monitor prevalence and incidence of PRRS virus infection
  - Led by Jim Lowe with group members being contacted
- Develop guidelines for managing confidentiality and the risk of disclosure

  - Led by Lisa Becton with group members Jim McKean & Bob Morrison
- Develop guidelines for eliminating PRRS virus from farrow to finish farms
  - Led by George Charbonneau with group members Jane Carpenter, Robert DesRosiers, Satoshi Otake, Manon St-Hilaire, Noel Garbes and Bob Morrison
- Develop oral fluid sampling guidelines
  - Led by Dale Polson with group members Jeff Zimmerman, Luc DuFresne and Jean Paul Cano
- Developing guidelines for implementing common reports, including mapping Legends for Regions
  - Led by Enrique Mondaca with group members being contacted
- Uniform guidelines for risk based surveillance & geostatistical mapping
  - Led by Bob Morrison with group members Derald Holtkamp, Leigh Rosengren, Zvonimir Peljak, Eric Bush, John Korslund, Paul Yeske, Enrique Mondaca & Dane Goede
- Develop guidelines for a certifying system for regions undergoing control / elimination projects
  - Led by Derald Holtkamp with group members Dale Polson, Leigh Rosengren, Paul Yeske, Eric Bush & Bob Morrison

Each of these working groups will report progress to AASV PRRS task force and ultimately to AASV membership.

A recent development is the weekly collection of incidence of infection in a sample of sow herds. Until now, the industry goes through an epidemic every fall, but we have had no data on extent of the epidemic. Although the data are from a purposeful selection of herds and therefore do not necessarily represent the industry, they do represent approximately 10% of the sow base. For the past two years, the industry has experienced a dramatic increase in incidence in approximately November. Approximately 2% of susceptible herds have been infected weekly.

Figure 2. Incidence of infection in a sample of sow herds.



Dramatic progress has been made in relatively few years and we are already seeing some regional projects coalesce. As projects continue to develop there will be increasing negative pig flow resulting from such effort, and one can optimistically imagine the industry entering a new era of voluntary, regional coordinated disease control & eventual elimination.

References:

Cesar A. Corzo, Enrique Mondaca, Spencer Wayne, Montserrat Torremorell, Scott Dee, Peter Davies, Robert B. Morrison. Control and elimination of porcine reproductive and respiratory syndrome virus. *Virus Research 154 (2010) 185–192*

Torremorell, M. et al., 2003. Eradication using herd closure. In: Zimmerman, J., Yoon, K.J., Neumann, E. (Eds.), *PRRS compendium. National Pork Board, Pork Checkoff, pp. 157–160.*

Schaefer, N., Morrison, R., 2007. Effect on total pigs weaned of herd closure for elimination of porcine reproductive and respiratory syndrome virus. *J Swine Health Prod. 15 (3), 152–155*.

Holtkamp D, Dale D. Polson, Montserrat Torremorell, committee members Bob Morrison, (chair); Dyneah M. Classen,; Lisa Becton,; Steve Henry, Max T. Rodibaugh, Raymond R. Rowland, Harry Snelson, Barb Straw, Paul Yeske, Jeff Zimmerman, Terminology for classifying swine herds by porcine reproductive and respiratory syndrome virus status. *J Swine Health Prod.* 2011;19(1):44–56.

IL005 PRRS control, practical approach after twenty years

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Introduction

I was graduated in veterinary science in 1991. Just before our graduation ceremony we started to listen about a new syndrome that caused reproductive and respiratory clinical signs. At that time we still did not know the microorganism involved and several names were given to the disease: Blue Ear Disease, Mistery Pig Disease, Blue Abortion…

Finally, in Lelystad, they were able to isolate the microorganism responsable for all those clinical signs. It was a single-stranded RNA virus and from then on the PRRSV.

I have never worked as a swine practitioner in a P.R.R.S. free environment. It has been already twenty years since then and although we have done some progress we are still far away from where we would like to be. In the meantime, other diseases have appeared and disappeared like Aujeszky (R.I.P.), Classical Swine Fever, Postweaning Multisystemic Wasting Syndrome… but PRRS is still here, very active, affecting our productions and being responsible for $ 550-660MM/year just in the USA. In fact, it is considered to be the most economically important disease for the United States swine industry (Neumann et al., 2005).

Vaccination for protection against PRRS virus has generally been unsuccessful due primarily to the high degree of antigenic and genetic drift in viral structural and non-structural viral proteins and the capacity of the virus to subvert early innate immune responses.

I have been perplexed watching how our best Isolated farms, with our highest biosecurity mesures seroconverted to PRRS several times. Sometimes I wonder if we already know all the different transmission risk factors between farms, since in most of our new infections, I´m still not sure what happened. In a retrospective study, Yeske/Polson 2008 showed that after three years 60 % of the negative herds had seroconverted to PRRS.

As a summary, we are under an unfavorable situation; it is very difficult to avoid transmission between farms and to fully protect the animals.

We know that to completely control the disease either you have a free farm in a very, very, very isolated area or you have air filtrated facilities, all these supported with an extremely high biosecurity protocol. Since in most of the cases this is not always possible, control measures need to be implemented in order to minimize the impact of PRRS in our systems.

Attempts to control PRRS

PRRS control in a negative farm

Keep it free. Location, location, location, this is the most important characteristic that you need to have if you want to have a PRRS free farm. After location, high biosecurity protocols need to be implemented.

Personal. Avoid as much as possible any visit, and if this isn't possible, allow two days of downtime, always shower and completely change all clothes. Any unavoidable visit or maintenance has to be done on Mondays. Several studies have shown that no downtime is necessary after a completely clothing change and shower, but my advice would be to never visit a negative farm after visiting a positive one without two days of downtime.

Trucks, feed and animal movement, manure-handling vehicles should all be restricted to Mondays, after two days of downtime. Trucks should not enter in the fenced area of the farm to unload the feed or load out the animals. Rendering trucks are very dangerous, they should pick up dead animals as far as possible from the farm.

All the windows have to be bird proof. Rodent and pest control programs need to be implemented, as well as a water sanitation strategy.

PRRS control in a positive farm

Avoid new introductions

The only Golden rule is to make sure that we do not introduce a new strain in our farms. Semen has to come from a negative boar stud and gilts have to be PRRS negative at the arrival. Accepting positive gilts as long as they come from the same farm it is correct although there is a higher risk of introducing a new strain. Introducing negative gilts will open a new challenge that could be as bad as a PRRS outbreak if we are not proficient in designing an acclimatization protocol for those negative incoming gilts.

The negative gilts will have to be exposed to the PRRS virus in the Isolation Farm. We only have three possible alternatives; either to expose them to a vaccine PRRS virus, to the field strain present in the farm or to both of them. The way to do it will depend on the isolation barn, distance, cooling down time, etc. Expose them to a vaccine virus is safe, fast and easy. To do it to a field virus can be slightly better but it requires a consistent source of infectious material to be sure that seroconvertion happens every time during the acclimatization protocol and obviously this is not as safe as the vaccine virus.

This protocol could work as long as there is not a new strain introduced in the farm. If a new strain is introduced, we open a wide number of unpredictable situations.

External biosecurity. Although most of the new infections are entering in the farms through animal movement, basic biosecurity rules need to be implemented to avoid new infections.

Internal biosecurity. In a PRRS positive farm we have to be continuously implementing the MCREBEL strategy. All in/ all out implemented continuously, limited fostering and never move fall behind pigs backwards.

Neighborhood. If the farm is located in a heavily pig populated area, our beloved neighbors are very important. I believe that in the future, regional control programs will be critical if we want to improve our PRRS control capacity. There is an area in Tauste, a little town in the north east of Spain, where the local health organization called ADS of Tauste, has started a regional approach to control the disease. We are still at the beginning. Now we have started reporting outbreaks and we are trying to isolate and identify the strains involved in these. We are already making some progress and we are able to take decisions based on the area spread of the disease. Outbreaks do not seem to be distributed randomly in the area. The higher is the capacity to understand and predict the outbreaks the better are our chances to succeed.

Enhance the immune system

Then the next question that comes to my mind is… can we build a protective universal immunity against the disease? The answer is not!. No matter the way we are trying to booster the immune system, either with vaccines or natural exposure to the virus, when a different strain enters we have some chances to have an outbreak. Then, we have to assume that in high pig dense areas we can´t completely control the disease.

In these heavily pig populated areas short-term questions are: Do I vaccinate the sows? Is it cost effective? Although I´m not completely sure about the answers I should say that vaccinating the sows is becoming more popular in our system and I can see the reasons behind:

It is not very expensive
It is mentally healthy... It´s all we can do
I will never know exactly how much it helps me or not

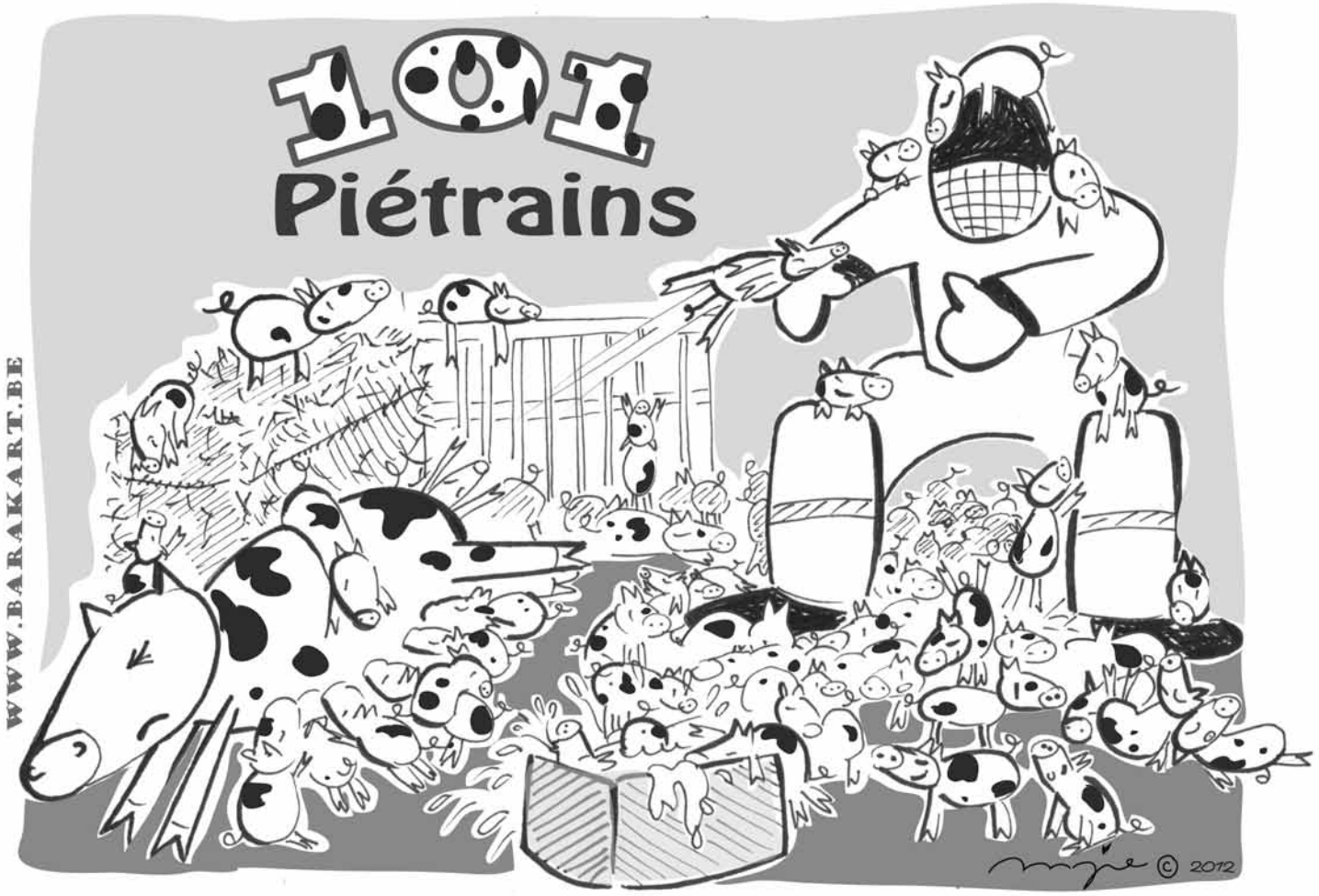
I´m not completely sure if vaccination is cost effective, I´m responsable for the production of 80.000 sows, most of them located in areas heavily pig populated. Approximately 50 % of the sows are being vaccinated and I can´t see a big difference.

In these areas long-term questions need to be brought on the table. Would regional PRRS control programs increase our capacity to control the disease? I do not know it, but to me, it looks as a very interesting approach that it is worth to try.

Summary

New research is being done in the genetic resistance to the PRRS virus. Weight gain and viremia after experimental PRRSV challenge of piglets were moderately heritable (30%). Therefore, genetic selection to reduce the impact of infection is possible. Some researches say that we will do much more progress via genetic resistance than finding universal vaccines.

PRRS has been continuously challenging the pig production. It has been a great professor, most of the progress in management practices have been developed in order to minimize the effect of PRRS and this has also helped us to control other diseases also very important for the business. I´m afraid that short-term we will not have much progress controlling the disease via vaccines or genetic resistance, but regional control programs could be a reasonable alternative to increase our PRRS fighting capacity.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IL006 Piglet vitality and neonatal piglet losses

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Neonatal piglet mortality continues to be both a welfare and economic concern. National herd recording statistics for pre-weaning piglet mortality in selected countries highlight an average pre-weaning mortality level (live-born mortality) of 12.9% (Figure 1). With the inclusion of those piglets that are born dead, total mortality averages 16-20% (Leenhouwers et al., 2002; BPEX 2011), with the data sets showing considerable between-farm variation.

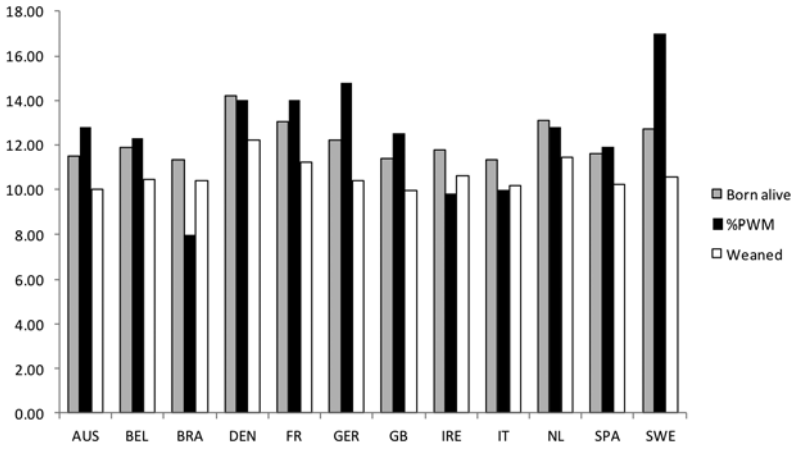

Figure 1. Summary of average numbers born alive, % pre-weaning (liveborn) mortality (PWM) and average number weaned per litter in selected countries (Source: Fowler 2009).

Attempts to decrease piglet mortality have mainly focused on improvement of the farrowing environment and husbandry procedures. However, despite efforts to better understand and reduce piglet mortality, the average losses per year have not changed significantly. Recent figures, particularly from top pig producing nations such as Denmark, show an increase in mortality, which has been associated with genetic selection strategies to increase litter size (Figure 2).

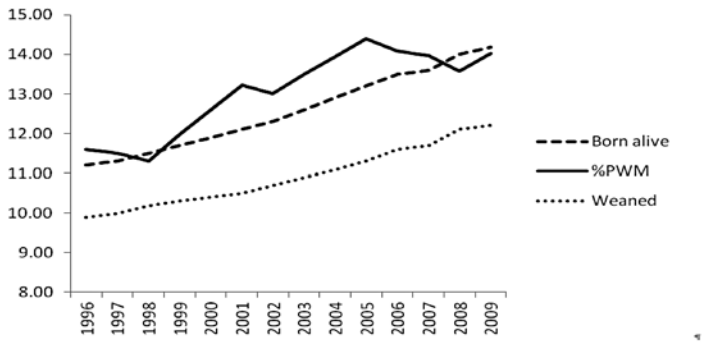

Figure 2. Changes in litter size, numbers weaned per litter and percentage pre-weaning (liveborn) mortality in Denmark.

As the pig is a polytocous species, some piglet mortality is pre-disposed and inevitable. The evolutionary strategy adopted by the sow is to over-produce, thus allowing insurance offspring in the event of good rearing conditions with little investment in piglets which might die early if conditions are unfavourable. Agriculture has exploited this natural ability to produce a large number of offspring in order to increase the efficiency of pig production, and

meet the pressure to provide affordable food for an ever growing human population. However, large litter sizes and piglet mortality are strongly inter-related, presenting a challenge to achieve efficiency without compromising piglet survival. A sustainable strategy, and an important goal for the industry, is to improve piglet vitality, thus reducing neonatal losses in conjunction with litter size increase.

Vitality – what gives the newborn piglet the capacity to survive?

Prenatal survival

The first requirement for the piglet is to survive the birth process. Typically, stillbirths account for 8% of total piglets born (Leenhouwers et al., 1999; BPEX, 2011). Stillbirth is associated with dystocia and resulting piglet hypoxia, and influenced by long farrowing durations, high litter size and being born later in the birth order (Alonso-Spilsbury et al., 2005; Baxter et al., 2008). Stillborn piglets have also been shown to have different physical characteristics to survivors, often being smaller and disproportionately long and thin, giving lower ponderal and body mass indices (Baxter et al., 2008). These characteristics are indicative of some degree of *in utero* growth retardation, suggesting poor placental quality as a predisposing factor. Hypoxia may not always result in stillbirth but it can weaken a piglet, thus rendering it ill-equipped for postnatal survival. Herpin et al. (1996) found a relationship between asphyxia at birth and reduced neonatal vitality; hypoxic piglets were slower to reach the udder and had lower rectal temperatures after 24h, as well as a slower growth rate and poorer survival over the first 10 days post-partum.

Postnatal survival

Survival of the live-born piglet depends on its behavioural capabilities and its ability to overcome the physiological challenges associated with the extrauterine environment. These include the ability to adequately thermoregulate, the ability to find and defend a functional teat, suckle and absorb vital nutrients from the mother's colostrum, and are facilitated by an optimum birth weight, physiologically mature organs and functions maintaining homeostasis, and behavioural competitiveness. There are certain aspects of the extrauterine environment that have the potential to challenge survival: the 15-20°C decrease in ambient temperature on expulsion from the thermoneutral intrauterine environment, the posture changes and behaviour of an unpredictable mother, often 250 times the piglet's size, and the presence of numerous competitive siblings potentially out-numbering the available functional teat capacity and thus limiting essential colostrum supply. It is therefore not surprising that the major causes of neonatal piglet death centre on the hypothermia-starvation-crushing complex (Edwards, 2002). Crushing by the sow is often reported as the ultimate cause of death, but frequently the underlying cause is hypothermia and starvation leading to piglet lethargy and then subsequent crushing (Weary et al., 1996). Piglet vitality is critical to avoid any, or all, of these fates.

Physical vitality – optimum size and shape

It is widely thought that birth weight is the most important factor for piglet survival (Kerr and Cameron, 1995; Roehe and Kalm, 2000; Knol et al., 2002). Roehe and Kalm (2000) reported 40% pre-weaning mortality in pigs with a birth weight of lower than 1kg, 15% between 1-1.2kg and only 7% when birth weight was above 1.6kg. However the piglet's level of development, as well as its size, has a major impact on survival. Recent studies involving morphological measures indicative of growth retardation have emphasised the importance of shape as a predictor of survival (Baxter et al., 2008), predisposing piglets of the same weight to different survival outcomes. Morphological characteristics of pathological growth retardation (Sacy et al., 2010) can distinguish piglets that are simply small for gestational age from those runt piglets with poor survival chances. However, even the perfectly-formed newborn piglet is more physiologically vulnerable than most other livestock neonates; born virtually hairless and with no brown adipose tissue to facilitate metabolic heat production (Herpin et al., 2002), a piglet operates at the limits of its physiological capabilities and consequently has poor thermoregulatory capacity (Herpin et al., 2002; Mellor and Stafford, 2004). It is the most cold-sensitive ungulate (Herpin & Le Dividich, 1995), so its capacity to produce heat is crucial to its survival and is dependent on the co-ordinated functions of various organs and processes. Thermal challenge is closely related to birth weight, with smaller piglets at a greater risk from hypothermia because heat loss per unit of body weight is inversely related to body size (Herpin et al., 2002). Piglets must rely on behavioural adaptation to gain colostrum and increase core body temperature, and thus behavioural vitality is a critical component of survival.

Behavioural vitality

Colostrum ingestion is crucial to sustain thermoregulation, as well as providing the piglet with immune protection to fight infection. If piglets fail to take in adequate amounts of colostrum soon after birth, there will be a sub-optimal transfer of maternal immunoglobulins to the neonate, and an increased susceptibility to disease (Rooke & Bland, 2002; Salmon et al., 2010). Post-mortem analysis of dead piglets, presumed crushed, often shows the stomach to be empty indicating that starvation is part of the piglet mortality complex involving hypothermia and crushing. Many researchers have shown that so-called "landmark" behaviours are those most critical – piglets that are quicker to reach the udder, find a functional teat and suckle colostrum are those which survive (Tuchscherer et al., 2000; Herpin et al., 2002; Baxter et al., 2008). Subsequently, lactational output of the sow partly determines how much milk the piglets receive; however the piglets also have an active role in determination of meal size. They will fight to gain access to a teat and then to maintain teat fidelity and, if they are unable to perform optimal massaging and suckling behaviours at the udder, teat yield and piglet survival may be impaired. Piglets failing to establish teat fidelity grow more slowly (De Passillé et al., 1988), with inability to gain access to the most productive teats resulting in starvation or low intake from opportunistic suckling. De Passillé and Rushen (1989) found that heavier piglets, born earlier in the birth order, won more teat disputes, established teat fidelity quicker, suckled more frequently and ultimately were at a distinct advantage over less vigourous littermates. Variability in vigour at birth and immediately post-partum has rarely been quantified (Zaleski & Hacker, 1993; Herpin et al., 1996), yet the influence that vigour appears to have on the latency to perform landmark behaviours has been commented on by many authors (Tuchscherer et al., 2000; Herpin et al., 2002). Baxter et al. (2008) developed a test of vigour, using the willingness and strength with which piglets manipulated an artificial teat to quantify the teat seeking behaviour seen in new-born piglets (rooting response). Importantly, such vigour was found to be independent of birth weight, indicating that small piglets, provided they are physiologically mature and vigorous, can survive the vulnerable perinatal period.

The influence of litter size

In general, larger litters have higher piglet mortality (Blasco et al., 1995; Sorensen et al., 2000) and lower piglet weights (Kerr and Cameron, 1995; Roehe, 1999; Sorensen et al., 2000). Quiniou et al. (2005) showed that increasing litter size from £ 11 to ³ 16 resulted in a reduction of mean birth weight from 1.59Kg to 1.26Kg. This corresponded to a mean decrease of 35g for each extra piglet born. The negative relationship between litter size and birth weight (Wolf et al., 2008) is of critical importance to many aspects of piglet survival already discussed. There is evidence that increased hyper-prolificacy has increased the number of growth-retarded piglets (not just lowered birth weight). These runt piglets are attached to proportionately less placenta with less placental blood flow (Wootton et al., 1977), have altered muscle development (Handel and Stickland, 1987), impaired growth potential, and impaired thermoregulatory abilities (Hayashi et al., 1987). The physiological maturity of the newborn also has an impact on its immune system and consequently its ability to maintain health. Increasing litter size also increases the heterogeneity of the litter, and this imposes a further mortality risk. Thus increasing litter size raises a series of ethical and welfare concerns which need to be actively addressed in the future (Rutherford et al., 2011).

How can we improve piglet vitality?

Nutritional and environmental solutions

Various managerial interventions can assist the newborn piglet. Nutritional interventions to improve embryo quality and subsequent birth weight and uniformity have included use of fermentable ingredients in sow diets prior to breeding (Wu et al., 2009; Van den Brand et al., 2009), and essential fatty acid supplementation in late gestation has been used to increase piglet vitality (Rooke et al., 2001). Since the piglet loses heat rapidly at birth and chilling impacts on the ability to find the udder and suckle colostrum, providing a suitable microclimate for the piglets can limit the routes of heat loss and offer some thermal protection. In order to ensure that all piglets ingest vital colostrum soon after birth, targeted inputs by stockpeople can assist with piglet landmark behaviours. This is of particular importance when litter size exceeds functional teat number and when a greater number of low vitality, growth-retarded piglets require intervention. Improving maternal behaviour and farrowing progression by reducing levels of stress in the periparturient sow can also indirectly assist the piglet. Farrowing duration, and risk of hypoxia, may be reduced by ensuring appropriate sow condition, minimising heat stress and providing enrichment to allow nest-building behaviour and reduce frustration.

Genetic solutions

There continues to be selection pressure to increase the number of piglets born, in order to offset the high incidence of piglet mortality and increase annual output (Ollivier, 1998). Such strategies can be counterproductive, with detrimental effects on maternal behaviour (Lund et al., 2002) and stillbirth rate (Canario et al., 2007; Rosendo et al., 2007) in addition to those discussed previously. Adjusting selection criteria to select for number weaned, rather than number born, is a more sustainable strategy and one that has achieved success in improving piglet survival rates (Roehe et al., 2009, 2010). The Danish pig industry, renowned for its success in increasing litter size (Figure 2 – an increase of 4 pigs born per litter has been achieved over a 13 year period), has recognized the accompanying significant increase in pre-weaning mortality (5% increase in total mortality). In 2004 it changed its selection criterion from total born to 'live piglets at day 5' (LP5) and, although mortality is still high, the net effect has still been an increase of 2.3 pigs weaned/litter. This may reflect successful management of these surplus piglets or indicate that selecting for survival may not result in as many compromised piglets (e.g. pathologically growth retarded) as selecting for number born. Future investigation of strategies for breeding a more robust piglet could improve survival. Reducing intra-litter variability, particularly with respect to birth weight, is an additional important breeding goal discussed by numerous authors (Rydhmer, 2000; Knol et al., 2002; Damgaard et al., 2003). Furthermore, breeding for improved maternal behaviour (Grandison, 2005; Baxter et al., 2011) also has the potential to reduce neonatal losses.

Conclusion

Newborn piglets must get to the udder, show vitality and vigour at acquiring and maintaining a functional teat and thus ingest vital colostrum to aid energy needs, preserve homeothermy and ultimately survive. This set of guidelines fails to take into account an unpredictable mother and environment, which are important elements in the multifactorial nature of piglet survival. Reducing neonatal losses will involve targeting both environmental and biological factors via augmentation of existing managerial solutions and progression in genetic selection strategies which incorporate survivability within breeding goals.

Further reading:

Alonso-Spilsbury,M., Mota-Rojas,D., Villanueva-Garcia,D., Martinez-Burnes,J., Orozco,H., Ramirez-Necoechea,R., Mayagoitia,A.L. & Trujillo,M.E. 2005. Perinatal asphyxia pathophysiology in pig and human: A review. Animal Reproduction Science, 90**,** 1-30.

Baxter,E.M., Jarvis,S., D'Eath,R.B., Ross,D.W., Robson,S.K., Farish,M., Nevison,I.M., Lawrence,A.B. & Edwards,S.A. 2008. Investigating the behavioural and physiological indicators of neonatal survival in pigs. Theriogenology, 69**,** 773-783.

Baxter,E.M., Jarvis,S., Sherwood,L., Farish,M., Roehe,R., Lawrence,A.B. & Edwards,S.A. 2011. Genetic and environmental effects on piglet survival and maternal behaviour of the farrowing sow. Applied Animal Behaviour Science, 130**,** 28-41.

Blasco,A., Bidanel,J.P. & Haley,C.S. 1995. Genetics and Neonatal Survival. In: The Neonatal Pig Development and Survival (Ed. by M.A.Varley), pp. 17-38. CAB International.

BPEX (British Pig Executive) 2011. The Pig Yearbook 2011. Stoneleigh, UK.

Canario,L., Rydhmer,L., Gogue,J., Tribout,T. & Bidanel,J.P. 2007. Estimation of genetic trends from 1977 to 1998 for farrowing characteristics in the French Large White breed using frozen semen. Animal, 1**,** 929-938.

Damgaard,L.H., Rydhmer,L., Lovendahl,P. & Grandinson,K. 2003. Genetic parameters for within-litter variation in piglet birth weight and change in within-litter variation during suckling. Journal of Animal Science, 81**,** 604-610.

De Passille,A.M.B. & Rushen,J. 1989. Suckling and teat disputes by neonatal piglets. Applied Animal Behaviour Science, 22**,** 23-38.

De Passille,A.M.B., Rushen,J. & Harstock,T.G. 1988. Ontogeny of teat fidelity in pigs and its relation to competition at suckling. Canadian Journal of Animal Science, 68**,** 325-338.

Edwards,S.A. 2002. Perinatal mortality in the pig: environmental or physiological solutions? Livestock Production Science, 78**,** 3-12.

Fowler,T. 2009. Pig cost of production in selected countries. BPEX, Stoneleigh, UK.

Grandinson,K. 2005. Genetic background of maternal behaviour and its relation to offspring survival. Livestock Production Science, 93**,** 43-50.

Handel,S.E. & Stickland,N.C. 1987. The effects of low birth weight on the ultrastructural development of 2 myofiber types in the pig. Journal of Anatomy 150, 129-143.

Hayashi,M, Ingram,D.L. & Dauncey,M.J. 1987. Heat production and respiratory enzymes in normal and runt newborn piglets. Biology of the Neonate **51**, 324–331.
Herpin,P., Damon,M. & Le Dividich,J. 2002. Development of thermoregulation and neonatal survival in pigs. Livestock Production Science, 78**,** 25-45.
Herpin,P. & Le Dividich,J. 1995. Thermoregulation and the Environment. In: The Neonatal Pig Development and Survival (Ed. by M.A.Varley), pp. 57-95. CAB International.
Herpin,P., LeDividich,J., Hulin,J.C., Fillaut,M., DeMarco,F. & Bertin,R. 1996. Effect of the level of asphyxia during delivery on viability at birth and early postnatal vitality of newborn pigs. J Anim Sci, 74**,** 2067-2075.
Kerr,J.C. & Cameron,N.D. 1995. Reproductive-performance of pigs selected for components of efficient lean growth. Animal Science, 60**,** 281-290.
Knol,E.F., Leenhouwers,J.I. & van der Lende,T. 2002. Genetic aspects of piglet survival. Livestock Production Science, 78**,** 47-55.
Leenhouwers,J.I., van der Lende,T. & Knolt,E.F. 1999. Analysis of stillbirth in different lines of pig. Livestock Production Science, 57**,** 243-253.
Leenhouwers,J.I., Knol,E.F., de Groot,P.N., Vos,H. & van der Lende,T. 2002. Fetal development in the pig in relation to genetic merit for piglet survival. Journal of Animal Science, 80**,** 1759-1770.
Lund,M.S., Puonti,M., Rydhmer,L. & Jensen,J. 2002. Relationship between litter size and perinatal and pre-weaning survival in pigs. Animal Science, 74**,** 217-222.
Mellor,D.J. & Stafford,K.J. 2004. Animal welfare implications of neonatal mortality and morbidity in farm animals. Veterinary Journal, 168**,** 118-133.
Ollivier,L. 1998. Genetic improvement of the pig. In: The Genetics of the Pig (Ed. by M.F.Rothschild & A.Ruvinsky), pp. 511-540. Oxford: CAB Int.
Roehe,R. & Kalm,E. 2000. Estimation of genetic and environmental risk factors associated with pre-weaning mortality in piglets using generalized linear mixed models. Animal Science 70, 227-240.
Roehe,R., Shrestha,N.P., Mekkawy,W., Baxter,E.M., Knap,P.W., Smurthwaite,K.M., Jarvis,S., Lawrence,A.B. & Edwards,S.A. 2009. Genetic analyses of piglet survival and individual birth weight on first generation data of a selection experiment for piglet survival under outdoor conditions. Livestock Science, 121**,** 173-181.
Roehe,R., Shrestha,N.P., Mekkawy,W., Baxter,E.M., Knap,P.W., Smurthwaite,K.M., Jarvis,S., Lawrence,A.B. & Edwards,S.A. 2010. Genetic parameters of piglet survival and birth weight from a two-generation crossbreeding experiment under outdoor conditions designed to disentangle direct and maternal effects. Journal of Animal Science, 88**,** 1276-1285.
Rooke,J.A. & Bland,I.M. 2002. The acquisition of passive immunity in the new-born piglet. Livestock Production Science, 78**,** 13-23.
Rooke,J.A., Sinclair,A.G., Edwards,S.A., Cordoba,R., Pkiyach,S., Penny,P.C., Penny,P., Finch,A.M. & Horgan,G.W, 2001. The effect of feeding salmon oil to sows throughout pregnancy on pre-weaning mortality of piglets. Animal Science 73, 489-500.
Rosendo,A., Druet,T., Gogue,J., Canario,L. & Bidanel,J.P. 2007. Correlated responses for litter traits to six generations of selection for ovulation rate or prenatal survival in French Large White pigs. Journal of Animal Science, 85**,** 1615-1624.
Quiniou,N., Mourot,J., Richard,S., Etienne,M. and Coudray,L. 2005. Influence de la nature de l'energie allouée à la truie pendant la gestation et la lactation sur ses performances de lactation et celles de sa portée et sur la composition corporelle des porcs au sevrage et à l'abattage. Journées Recherche Porcine 37, 203-210.
Rutherford,K.M.D., Baxter,E.M., Ask,B., Berg,P., D'Eath,R.B., Jarvis,S., Jensen,K.K., Lawrence,A.B., Moustsen,V.A., Robson,S.K., Roehe,R., Thorup,F., Turner,.S.P. & Sandøe,P. 2011. The ethical and welfare implications of large litter size in the domestic pig: challenges and solutions. Project report 17. Danish Centre for Bioethics and Risk Assessment and SAC (Scottish Agricultural College).
Rydhmer,L. 2000. Genetics of sow reproduction, including puberty, oestrus, pregnancy, farrowing and lactation. Livestock Production Science, 66**,** 1-12.
Sacy, A. Le Treut, Y. Schmidely, P & Chevaux, E. 2010. Caractérisation de l'immaturité des porcelets à la naissance. Journées Recherche Porcine, 259-260.
Salmon,H., Berri,M., Gerdts,V. & Meurens,F. 2009. Humoral and cellular factors of maternal immunity in swine. Developmental & Comparative Immunology, 33**,** 384-393.
Sorensen,D., Vernersen,A. & Andersen,S. 2000. Bayesian analysis of response to selection: a case study using litter size in Danish Yorkshire pigs. Genetics 156, 283–295.

Tuchscherer,M., Puppe,B., Tuchscherer,A. & Tiemann,U. 2000. Early identification of neonates at risk: traits of newborn piglets with respect to survival. Theriogenology, 54**,** 371-388.
Weary,D.M., Pajor,E.A., Thompson,B.K. & Fraser,D. 1996. Risky behaviour by piglets: A trade off between feeding and risk of mortality by maternal crushing? Animal Behaviour, 51**,** 619-624.
Wolf,J., Žáková,E. & Groeneveld,E. 2008. Within-litter variation of birth weight in hyperprolific Czech Large White sows and its relation to litter size traits, stillborn piglets and losses until weaning. Livestock Science 115, 195-205.
Wootton,R., McFadyen,I.R. & Cooper,J.E. 1977. Measurement of placental blood-flow in pig and its relation to placental and fetal weight. Biology of the Neonate 31, 333-339.
Wu,G., Bazer,F.W., Burghardt,R.C., Johnson,G.A., Kim,S.W., Li,X.L., Satterfield,M.C. & Spencer,T.E. 2010. Impacts of amino acid nutrition on pregnancy outcome in pigs: Mechanisms and implications for swine production. Journal of Animal Science, 88**,** E195-E204.
Van den Brand,H., Soede,N.M., & Kemp,B. 2006. Supplementation of dextrose to the diet during the weaning to estrus interval affects subsequent variation in within-litter piglet birth weight. Animal Reproduction Science 91, 353-358.
Zaleski,H.M. & Hacker,R.R. 1993. Comparison of viability scoring and blood-gas analysis as measures of piglet viability. Canadian Journal of Animal Science, 73**,** 649-653.

IL007 Large litter sizes – ethical challenges and ways of dealing with them in future breeding and management

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This paper presents some key results and conclusions from a review (Rutherford et al. 2011) undertaken regarding the ethical and welfare implications of breeding for large litter size in the domestic pig and about different ways of dealing with these implications. Focus is primarily on the direct adverse consequences for animal welfare of Danish breeding for large litter sizes due to increased piglet mortality and the subsequent attempts to reverse these consequences by breeding for number of live piglets at day five rather than number of piglets born. By this change of breeding goal it seems possible to achieve a drop in relative piglet mortality and the related welfare problems. However, there will be a growing problem with the need to use foster or nurse sows which may have negative effects on both sows and piglets. This gives rise to new challenges for management.

Background

The pig industry is subject to numerous drivers, but ultimately its aim is to produce a quality product at low cost and in a socially acceptable way. The move towards increased litter size through genetic selection and management techniques has been driven by a desire to improve production efficiency by increasing the number of slaughter animals produced, given the relatively high fixed costs associated with intensive pig farming. Increasing litter size therefore improves the efficiency of pork production, maximising financial gains and also reduces the environmental impact of pork production, all of which explains the continued interest in increasing litter size.

Concern has been expressed that increasing litter size may be detrimental to animal welfare. Welfare issues relating to litter size are potentially more complex than some other examples of intensive selection for production traits. Firstly, (until recently) changes in litter size have occurred slowly and have overall been less pronounced. Secondly, the consequences of selection for litter size are variable and affect different individuals in various ways and at different times. Unlike specific areas of welfare concern, such as housing conditions or husbandry interventions, the issue of breeding for increased litter size is a concept harder to consider from a welfare perspective.

Potential welfare issues, for either sow or piglets, relating to large litter size may derive either from biological consequences (aspects of large litter size that are bad for welfare *per se*) or from management responses (where poor management or failure to intervene could exacerbate a welfare issue). Biological consequences can be further divided into outcomes that are causally related to a crowded gestation environment and outcomes that are related to experiencing postnatal life in a large litter. These two do not perfectly co-vary since, either through early piglet mortality or active management responses, such as cross fostering to even up litter size, litter size experienced during neonatal life will be less variable than litter size experienced during foetal life.

The welfare impacts of litter size in pigs have not, until now, been the focus of much attention. However, public concerns have been expressed about the issue of selection for ever larger litter sizes. For instance, in 2003 the British press reported that a sow at a farm belonging to a British breeding company had given birth to 27 piglets ("And this little piggy gave birth to 27 piglets", The Telegraph June 10th 2003). In its headline the Daily Mail asked: "Scientific triumph – or yet another grotesque milestone in mankind's abuse of animals?" and a spokesperson for the Royal Society for the Prevention of Cruelty to Animals (RSPCA) was quoted as saying "The sow is likely to suffer discomfort through the pregnancy because she is carrying so many piglets". A representative of the animal welfare advocacy charity Compassion in World Farming (CIWF) said "It typifies what is wrong with modern factory farming. The industry should try to reduce litter size, not increase it".

More recently, in Denmark, the issue of large litter size drew media attention in 2010 when the Danish Animal Protection Society highlighted the issue of high levels of piglet mortality. By their calculations the relatively high level of piglet mortality in Denmark equated to nine million dead piglets per year and they challenged the practice of breeding for higher litter size on welfare and ethical grounds and also questioned whether the negative consequences in effect rendered the practice illegal.

A committee set down by the Danish government has in January 2012 issued a report on pig breeding with specific focus on the issue of breeding for large litter size.

New breeding goals to address the problem of high piglet mortality

An indirect selection strategy was implemented in the Danish breeding programme in 2004, where the selection criterion was changed from litter size (total number born) to LP5 (number of live piglets at day 5). An observable response is now apparent in the purebred gilts with an increase of ≥1.5 live piglets at day 5 in 2011 compared to 2004 (Figure 1; Rutherford et al. 2011). This improvement has been accompanied by a 6% better survival rate (corresponding to ≥20% less mortality; Figure 2; Rutherford et al. 2011). As dissemination of genes from the purebreds to the crossbred sows increases over the next years, this response should also become apparent at the production level. Dissemination of selection response to production herds is a slow process though. Based on gene-flow principles it is estimated that in herds pursuing replacement gilts in multiplier herds initially only small changes are seen until an equilibrium rate of change corresponding to the breeding nucleus is reached five to six years after changes in the breeding nucleus. So, genetics can help, but progress takes years and depends on the replacement strategies of the production herds.

The current strategy is to increase litter sizes simultaneously with reducing piglet mortality, because LP5 has a high, positive genetic correlation with number of weaned pigs as well as moderate, positive genetic correlations with survival rate at birth and survival rate until 5 days. Selection for LP5 should therefore increase both litter size and survival. Moreover LP5 is not genetically correlated to survival rate from day 5 until weaning, so selection for LP5 should not have negative effects on survival after day 5. So, LP5 appears to be a well-suited trait for selection. Other new breeding goals may help to further a positive development in the future.

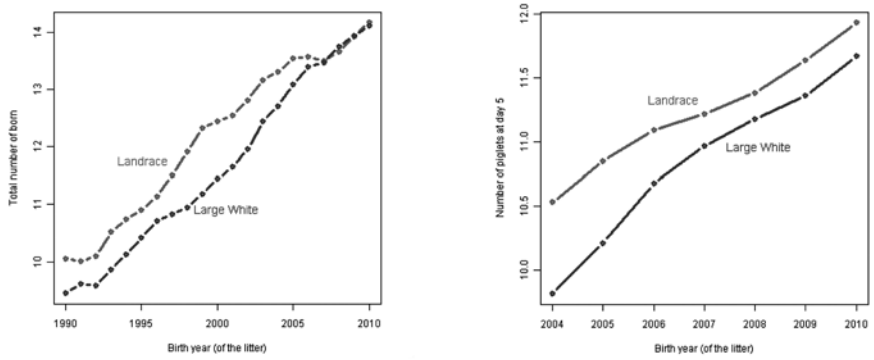


Figure 1: Development in the total number born and number of live piglets at day 5 from 1990/2004 to 2010. Based on litters from all purebred gilts (only first parity litters) in the Danish breeding and multiplier system.

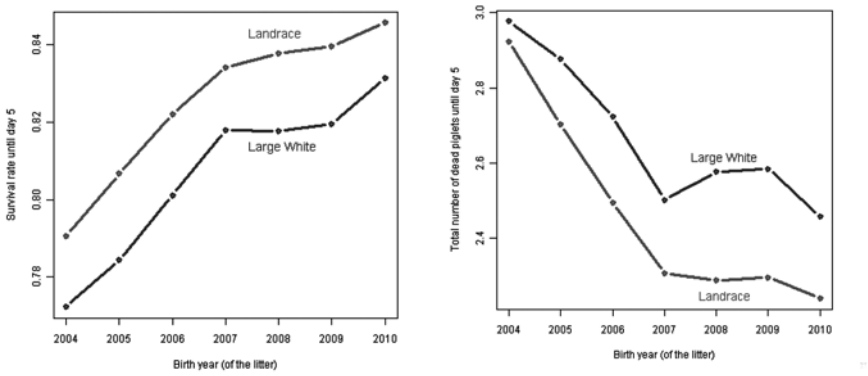


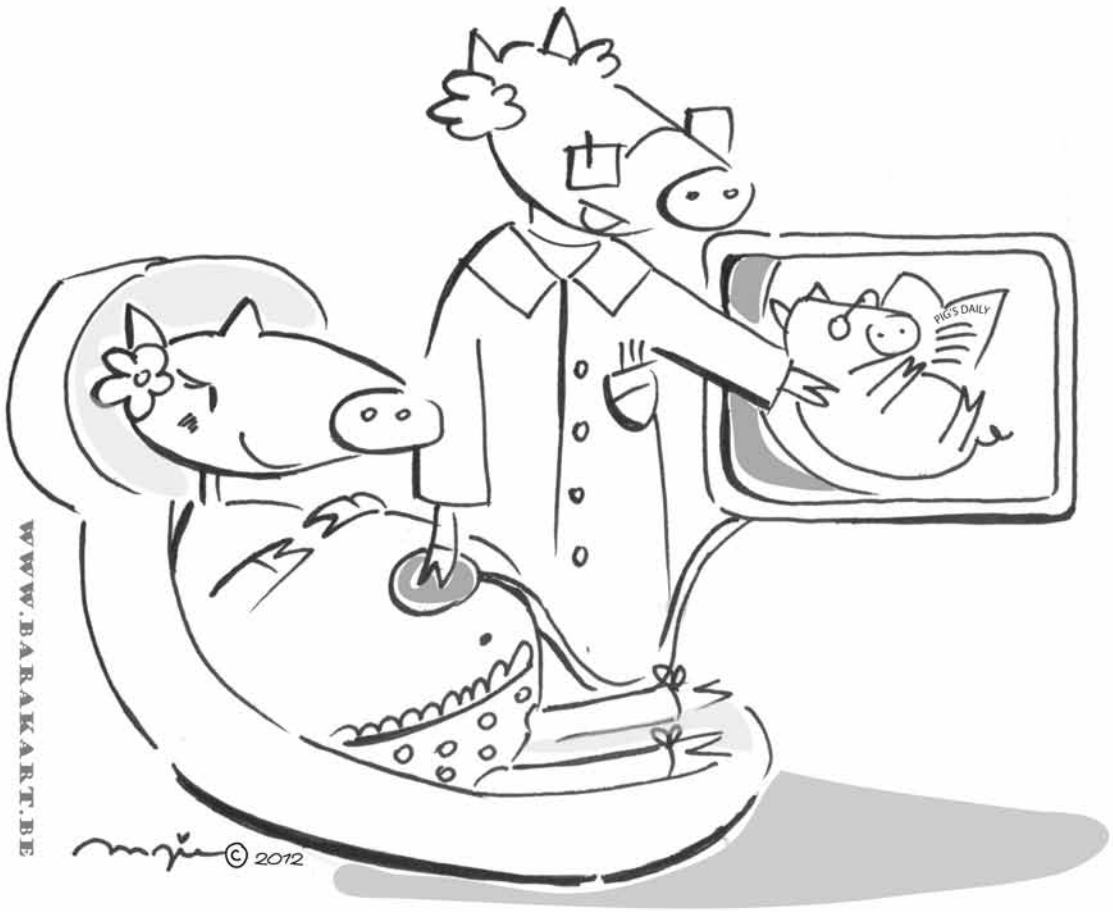
Figure 2: Development in the survival rate and number of dead pigs at day 5 from 2004 to 2010. Based on litters from all purebred gilts (only first parity litters) in the Danish breeding and multiplier system.

Challenges to management from dealing with larger litters in the future

Management interventions to deal with larger litters such as cross-fostering, the use of nurse sows and associated early weaning may have implications for piglet welfare, particularly when the herds are poorly managed. However, further studies are necessary to properly identify the welfare implications under current management conditions in Denmark and other countries (such as the Netherlands) where conditions are similar. There seem to be strategies for nurse sow production where neither piglet growth nor survival is impaired. Even when these strategies are pursued, however, a certain amount of hunger was experienced by the piglets as it according to investigations undertaken took approximately 6 hours before the transferred piglets had their first milk intake.
For the sows the main welfare implication of the increased use of nurse sows seems to be that the nurse sows will have to spend extra time confined in farrowing crates. A solution to this problem could be a move to farrowing and nurse systems where the sows are not confined.

References

Rutherford K.M.D.; Baxter E.M.; Ask B.; Berg P., D'Eath R.B.; Jarvis S.; Jensen K.K.; Lawrence A.B.; Moustsen V.A.; Robson S.K.; Roehe R.; Thorup F.; Turner S.P. & Sandøe P. 2011. The Ethical and Welfare Implications of Large Litter Size in the Domestic Pig: Challenges and Solutions. Project report 17 Danish Centre for Bioethics and Risk Assessment and SAC (Scottish Agricultural College). Available at:
http://curis.ku.dk/portal-life/files/37642367/17_Ethics_welfare_pig_litter_size.pdf



"He's developing well, Ma'am."

IL008 Ante and Post Mortem Examination of the Reproductive Tract in Sows

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1. Introduction

Reproductive failure is one of the most prevalent reasons for female swine for being culled from the sow herd. Based on field evaluation reports reproductively failed animals have been culled for e.g. “No Heat”, “Fail to farrow” or “Not-In-Pig” (Koketsu et al., 1997). At slaughter, culled females may have one or more genital abnormalities such as inactive or cystic ovaries, endometritis or salphingitis (Heinonen et al., 1998). Most of these abnormalities are however not being clinically obvious unless the animal is gynaecologically examined more closely such as using ultrasound (Kauffold & Althouse, 2007). Other cases would require post mortem examination of selected animals instead or in addition to the ante mortem check. This contribution will briefly review the procedure of ante and post mortem examination of the female reproductive tract in swine.

2. Ante mortem examination of the reproductive tract

2.1 Current procedure and technology

There are a few reasons why a physical examination of a living gilt or sow (i.e. ante mortem examination) is tougher compared to other larger animal species such as cows or mares. Reasons include: 1. Pigs cannot be really restrained unless using a snare or drugs for sedation/anesthesia. 2. The manual rectal examination of the genital organs is either impossible (such as in gilts due to a narrow pelvis), or possible, provided that the sow has a threshold size which would allow for rectal palpation. Also, rectal examination is not as well tolerated by pigs as it is e.g. by cows and mares which means that pigs usually start moving heavily during examination in order to “get rid” of this unpleasant manipulation. 3. The cervix with its unique anatomy makes a penetration difficult (e.g. for swabbing or biopsying). 4. A non-biological reason is the money value of a pig that is – compared to cows and mares – relatively low and thus doesn’t warrant an “in depth” and maybe costly examination.

Any person who is aiming to examine gilts or sows clinically for reproductive purposes has a variety of tools available that can be utilized. Part of the tools is, quite simply, external observation: the vulva and mammary gland (as long as it is considered part of the genital tract) are “assessable”. The second tool is internal observation (“inspection”) by using a speculum (re-usable or disposable; different materials are available, i.e. cardboard, plastic, metal etc). This tool may be helpful for the exploration of the vagina, cervix and the *orificium externum* of the urethra. The third tool is B-Mode ultrasonography (U/S), which is the only available tool to “look inside” the pig and the most powerful one among these three tools. With U/S it is possible to visualize the ovaries as well as the uterus (Kauffold & Althouse, 2007). U/S can be performed by using the transcutaneous or the transrectal route, both having advantages and disadvantages. For routine on-farm work the transcutaneous route seems to be more practical to this author. With U/S it is possible to determine all ovarian bodies except *corpora albicantia*. Estimation of the number of e.g. follicles is possible, however, an exact counting isn’t. With respect to the uterus it is possible to determine its size, echo-texture as well as echogenicity, which all are helpful parameters for the assessment of the uterus’s integrity and functionality. Acute or sub-acute inflammations can be diagnosed, while the chronic (i.e. clinically inconspicuous or subclinical) inflammation still isn’t diagnosable using the current ultrasound technology. There is indication that other insults to the uterus such as through the mycotoxin zearalenone also can be seen by using U/S. Finally, there is “pregnancy pathology” (such as abortion, embryonic mortality etc.) where U/S might by beneficial to a diagnosis. Since the uterine morphology changes with the stage of estrous cycle and concomitant with the ovaries it is imperative to determine the ovarian status whenever it comes to a uterine assessment. In other words, the assessment of the uterus is only possible when the ovarian status is known. For instance, a heterogeneous uterine echo-texture is only normal in estrus when large follicles are present and concentrations of estrogens are high (estrogens cause the endometrial edema which results in the heterogeneous uterine echo-texture), but it is completely abnormal in the presence of *corpora lutea* (when progesterone is high). Abnormal uterine echo-texture has been observed in cases of zearalenone intoxication as well as in some cases of endometritis.

2.2 Perspectives

There aren't really new (emerging) technologies for the examination of the female genital tract in swine to the author's knowledge, which is due to the anatomical and behavioural constrains of the pig. We have used the cytobrush methodology for uterine swabbing, but results are still preliminary and yet not conclusive. Also, we started using more current (new) ultrasound technology called "Zone sonography" for a better assessment of the genital tract which is possible due to an extremely high resolution and a perfect image quality. Finally, colour-Doppler ultrasound has been used for studying uterine perfusions but again, results are not conclusive yet.

3. Post mortem examination of the reproductive tract

3.1 Tissue collection and gross-morphology

Post mortem examination starts with selection of proper specimens that are going to be submitted. Those can be either fresh cooled, or fixed material. Fresh material is generally preferred if it's possible to submit within 24 hrs post collection. If transport will take longer, formaldehyde-fixation (4 – 10 %) prior to the shipment may be required. If fresh material is going to be submitted it is desirable to collect the entire reproductive tract (at least uterus together with oviducts and ovaries). The ovaries must be part of it, as it is necessary to know the stage of estrous cycle for uterine assessment as well (see above at U/S). As to whether other tissues or specimens such as blood or bile are additionally necessary depends on the reproductive problem that is investigated. Furthermore, there are situations when the urinary bladder may give useful information in order to help explaining a genital pathology. Generally, if the material is easily assessable then it would be reasonable collecting in order to have it available in case it would be needed later.

Examination usually starts with a morphological assessment using size, colour and consistency as parameters. The genital tract is then dissected into its compartments i.e. ovaries, oviducts and uterus, and each compartment then separately examined. Ovarian bodies will be determined and counted. It is always advised to be as correct as possible to get a proper estimation on the stage of estrous cycle/ovarian functionality. *Corpora albicantia* are an indicator of cyclicity and thus should be recognized too. The assessment of the oviducts isn't easy. Firstly, oviducts can tremendously vary in size, and a "normal" size hasn't been determined yet. Secondly, it is difficult to test the oviducts for patency. This would be necessary in case tubal occlusion is assumed, and adhesions leading to hydro- or pyo-salpinx are known to occur in swine. For testing, a liquid dye can be injected into the infundibulum; the tube is patent if the dye passes through the entire organ and appears at the utero-tubal junction. However, an "ideal" pressure for injecting the liquid hasn't been determined and it is most likely that tubal adhesions that maybe present are resolved due to injection. In contrast to the oviduct the uterus can be evaluated more easily. After being gross-morphologically assessed the uterus is usually weighed. The weight can add to other information in order to diagnose uterine pathology but by no means, is an indicator for "normality" or "abnormality" by itself. Cutting the uterus open in its longitudinal direction allows for the assessment of patency, and of the uterine epithelium in terms of colour/reddening (as an indicator for blood supply) as well as moisture/edema. Fluid has to be recognized; other then during pregnancy fluid is abnormal. However, urine reflux is possible during slaughter. The cervix also would need to be assessed, although cervical pathology is a rather single finding (e.g. cervical occlusion or inflammation).

3.2 Histology

Histology can be done on any genital organ. However, it is commonly the uterus that is histologically examined. In cattle it has been shown that collecting different uterine sides results in a different histology. Since a similar study hasn't been done in swine, this author recommends collecting specimens from both uterine horns. After a usually 24-hrs-fixation in formaldehyde and subsequent staining using haematoxillin-eosin as the stain, slides are commonly being evaluated by light-microscopy. Inflammation of the uterus (i.e. endometritis) is the most prevalent uterine disease in swine (Kauffold et al., 2006; Kauffold, 2008). Interpretation of histological results can be difficult, as there is still no valid nomenclature or stringent terminology for endometritis in swine (Kauffold, 2008). Currently, the diagnosis of endometritis is mostly based on the number and distribution of immune cells. When assessing

those cells it is imperative to consider the stage of the estrous cycle, as the number of immune cells fluctuates throughout the estrous cycle (Kaeoket et al., 2002). Besides the cells, the integrity of the uterine glands as well as of the uterine epithelium is usually being assessed. Furthermore, if there is an endometrial edema this would need to be documented as well, as this may be an indicator for a zearalenone exposure. Other procedures such as specific staining or the use of e.g. molecular markers (such as cytokines) are commonly not being used in routine diagnostics. Further studies are, however, clearly necessary into more precise markers for specific types of endometritis in order obtain a better definition of uterine inflammation in swine.

Endometrosis as a degenerative uterine disease that is frequently observed in mares hasn't been reported to occur in swine. There is a single report on occurrence of ademomyosis in swine, and uterine tumours can be seen too, albeit mostly in older pigs that are rescued or used as companions (such as potbellied pigs; Augustijn et al., 2010).

A histological examination of the oviduct may be necessary in case there is a specific question that involves the Fallopian tube. In fact tubal pathology can occur and has been linked to bacterial infection such as with Chlamydia (Kauffold et al., 2006). However, tubal disorders are usually seen in a much lower frequency than uterine pathology. As for the uterus, immune cells are the most indicative structures for a tubal inflammation, but like for the uterus, fluctuation in the number of cells depending on the stage of estrous cycle needs consideration during assessment.

4. Microbiology, Mycotoxicology and Serology

There are several aerobic and also a few anaerobic bacteria that have been associated with endometritis in swine. Fungi are suspected too in this regard but viruses are rather not considered as a primary cause of genital pathology in swine (unless pregnancy/embryos/fetuses are considered). Infection of the genital tract usually occurs retrograde through the cervix, but a systemic infection such as supposed to occur with Chlamydia by infected immune cells cannot be excluded. Genital infection is primarily a multifactorial disease complex, with bad hygiene being a major factor. However, immune suppression such as due to the mycotoxin DON also may contribute to a clinical manifestation of a genital disorder.
Whenever an infection of the uterus (or more distally such as of the cervix or vagina) is suspected, swabbing is the method of choice for the collection of specimens for bacterial examination. Double-guarded swabs used in equine gynaecology are the best option. Genital swabs are usually taken from the cervix and assumed to be representative for the entire reproductive tract. In contrast, preliminary data shows that the genital flora is different in comparison between the lower and upper genital tract in female swine, which is a finding that has been also demonstrated in cows and horses. Those results put some questions on the value of a genital microbiological examination.

Post mortem swabbing is also usually being done in order to detect uterine microorganisms. The way of collection is certainly crucial to the procedure: This author recommends swabbing after cauterization of the site where the uterus is going to by incised. Alternatively, a piece of the uterine horn may be ligated at both sides, then dissected from the rest of the uterus and submitted to the lab. As with any result from the microbiological examination, interpretation may be difficult. It is usually a mixed flora that is isolated which makes it then hard to determine what microorganism is the one that has caused the problem.

There are several mycotoxins that cause diseases in swine. Among those zearalenone is the one that can cause reproductive failure (e.g. embryonic loss, abortion, small litter) and thus should always be part of the differential diagnosis. However, dealing with zearalenone can be very difficult based on the following reasons: 1. There is no ideal biological (animate) substrate that is appropriate for analysis. 2. There is no concentration that is indicative for a fatal exposure. 3. Chronic and acute exposure cannot be distinguished. 4. There is no single method that can be used for detection. 5. Available methods (e.g. HPLC, MS) are expensive. DON has the same limitation as zearalenone, but also would be needed to be included into the differential whenever an immuno-suppression might be part of the problem (e.g. in cases of high incidence of vulval discharge; vaccinations aren't working properly).

Serology would be required in case a viral and a few bacterial infections are suspected. It won't make sense to have serology done in case of a genital inflammation except for *Chlamydiosis*. However, if there is abortion, embryonic death, mummified fetuses, high rates of stillborns, weak piglets etc. then serology is necessary and would include e.g. PRRSV, PPV, PR, SIV, and maybe also *Leptospira*. Paired samples, 10 – 14 days apart from each other, are then recommended in order to demonstrate sero-conversion.

5. Final remarks

More than 50 % of problems on a sow farm are related to reproduction to the author's estimate. For veterinarians working on a sow farm it is good to know what tools are available that can be used for an ante mortem (gynaecological) examination of female swine. Although the classical clinical instruments such as simple observation are still valuable, ultrasound has "so-to-say" revolutionized the whole area of ante mortem examination. The ante mortem examination may serve for the diagnosis of a reproductive problem in an individual animal with the goal of treatment and recovery, or for the pre-selection of animals for the post mortem examination. The post mortem check may be required if information additional to the ante mortem check is needed. It is usually done in the case of herd problems. Diagnosticians have to be aware of the multitude of different pathogens that may have caused a single problem and would require further analyses (such as microbiology, serology etc.). Finally, most reproduction problems are multifactorial and thus would also need investigations into those factors such as hygiene, feeding or general heath.

References

Augustijn M, Kuller W, Kimpfler S, van Nes A. Neoplasms of the genital tract in a Vietnamese potbellied pig. Tijdschr Diergeneeskd. 2010; 135: 4-7.

Heinonen M, Leppävuori A, Pyörälä S. Evaluation of reproductive failure of female pigs based on slaughterhouse material and herd record surveys. Anim Reprod Sci 1998; 52: 235-244.

Kaeoket K, Persson E, Dalin A.-M. The sow endometrium at different stages of the oestrous cycle: studies on morphological changes and infiltration by cells of the immune system. Anim Reprod Sci 2001: 65; 95-114. Corrigendum M&M: Anim Reprod Sci 2002: 73; 89-107.

Kauffold J, Melzer M, Berndt A, Hoffmann G, Hotzel H, Sachse K. Chlamydiae in oviducts and uteri of the repeat breeder pig. Theriogenology 2006; 66: 1816-1823.

Kauffold J, Althouse GC. An update on the use of B-mode ultrasonography in female pig reproduction. Theriogenology 2007; 67: 901-911.

Kauffold J. Nichtpuerperale Uteruserkrankungen beim Schwein. [Non-puerperal inflammations of the uterus in the pig.] Tierärztliche Praxis 2008; 36 (G): 189-199.

Koketsu Y, Dial GD, King VL. Returns to service after mating and removal of sows for reproductive reasons from commercial swine farms. Theriogenology 1997; 47: 1347-1363.

IL009 *Chlamydiaceae* infections in pigs

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Chlamydiaceae infections in pigs (reviewed in Schautteet and Vanrompay, 2011) have been known to occur since 1955 when Willingan and Beamer first isolated chlamydia from cases of arthritis and pericarditis in U.S. pigs. Massive outbreaks of chlamydiosis associated with bronchopneumonia or abortion in pigs kept under intensive animal production systems were reported in Eastern European countries and Russia between 1960 and 1970. In 1969, the first pig chlamydial strains were isolated in Western Europe from numerous Austrian pigs with polyarthritis, polyserositis, pneumonia, conjunctivitis or enteritis, from sows that aborted and from pigs with inapparent intestinal tract infection. In the 1980s, chlamydial strains were isolated from healthy and sick German pigs. In the 1990s, chlamydia was consistently isolated from pig herds in Nebraska and Iowa or detected in conjunctival specimens from pigs affected with conjunctivitis or keratoconjunctivitis in all phases of production. Many of the nursing and nursery pigs with conjunctivitis from these and other herds had diarrhoea, and at necropsy most of the diarrheic pigs also showed pneumonia. Although known pathogens were believed to be the cause of the diarrhoea and the pneumonia, chlamydia was isolated from or detected in the intestines and lungs of affected pigs. During the 1990s, chlamydia was also often isolated and/or detected in German and Swiss pig herds and infections were associated with return to oestrus, abortion, enteric disease and asymptomatic intestinal infections. Thus, as reported in the literature, chlamydial disease in pigs includes conjunctivitis, pneumonia and pseudomembranous or necrotizing enteritis, as demonstrated by experimental reproduction of infection in gnotobiotic pigs using clinical isolates. In addition, *C. suis* is associated with pericarditis, polyarthritis and polyserositis in piglets and numerous reproductive problems such as vaginal discharge, return to oestrus, abortion, mummification, delivery of weak piglets, increased perinatal and neonatal mortality as well as orchitis, epididymitis and urethritis in boars. For most of these disorders, the exact role of *Chlamydiaceae* still has to be determined. Researchers noticed a correlation between the occurrence of the periparturient dysgalactiae syndrome (PDS) in sows and the number of animals being seropositive for *Chlamydiaceae*. However, evidence that *C. suis* is causing PDS is lacking.

Chlamydiaceae were and still are considered as nonimportant pathogens of pigs because tests for *Chlamydiaceae* are not normally performed at most veterinary diagnostic laboratories and *Chlamydiaceae* are often found in association with other pathogens. Chlamydial infections in breeding sows, boars and piglets occur more often than originally thought. *Chlamydia abortus*, *Chlamydia pecorum*, *Chlamydia psittaci* and *Chlamydia suis* can infect pigs.

Diagnostic laboratories do not routinely test for *Chlamydiaceae* in pigs. Cell cultures are the most convenient method for the isolation of *Chlamydiaceae*. Serology is useful for monitoring the *Chlamydiaceae* status in pigs, at least when using a *Chlamydia*-specific target antigen. However, all current serological tests fail to identify the causative chlamydial species. Thus, more detailed information on the prevalence of *Chlamydiaceae* in pigs originates from newly developed species-specific molecular diagnostic research. Recently, species-specific nucleic acid amplification tests (NAATs) such as real-time PCR and microarray, detecting the ribosomal intergenic spacer and domain I of the 23S rRNA gene, have been designed. Moreover, a PCR for detecting the tetracycline resistance (TcR) gene, tet(C) was disigned. These methods have been recently applied to examine the occurrence of different chlamydial species in pigs. *Chlamydia psittaci* DNA was only sporadically found in pigs. *Chlamydia pecorum* was also less frequently found and has been identified, using ompA gene sequencing, in 2% of ompA gene-positive boar sperm samples, in 5% of ompA gene-positive foetuses and in 9% of ompA gene positive gut tissues. *Chlamydia abortus* was identified in the lungs of a Belgian pig that accidently died after blood sampling. Although, *C. abortus* is mainly linked to reproductive failure and abortions in pigs, it has previously been identified in lungs of pigs. Involvement of *C. suis* was reported in the vast majority of chlamydial intestinal infections in Belgian, German and Swiss pigs. *Chlamydia abortus* was rarely found in these studies. *Chlamydia suis* was predominantly associated with conjunctivitis in intensively kept German, Swiss and Estonian pigs. Furthermore, a German study reported a high prevalence of mixed infections with *C. suis* and *C. abortus* in the lung and gut of pigs. Chlamydial DNA has been discovered by nested PCR in 57.1% of the animals of a German wild boar population in Thuringia [44]. Organisms were predominantly detected in the lung. Sequencing of the amplified ompA segments revealed *C. psittaci*, *C. abortus* and *C. suis* in this wild boar population. These findings revealed a possible wildlife reservoir of these bacteria.

Chlamydiaceae are highly susceptible to chemicals that affect their lipid content or the integrity of their cell walls. Cleaning of equipment and stables of infected pigs is important because *Chlamydiaceae* can survive for up to 30 days in faeces and bed materials. Disinfection with most common detergents and disinfectants will inactivate *Chlamydiaceae*. The following disinfectants can be used to inactivate the organism: 1:1000 dilution of quaternary ammonium compounds, 70% isopropyl alcohol, 1% Lysol, 1:100 dilution of household bleach or chlorophenols. Common infection sources, infection routes, possible vectors and infection kinetics on the farm have not been examined.

Current infections are being treated by means of antibiotics. Generally, tetracyclines (chlortetracycline, oxytetracycline, doxycycline) are the drugs of choice to control the disease because they are most effective. Quinolones (enrofloxacin) or macrolides (erythromycin) can be administered, in case of an infection with a tetracycline resistant *C. suis* strain. Enrofloxacin might present a solution in case of tetracycline resistant *C. suis* strains. So far, no vaccines are available.

It is obvious that we need more progress in understanding protective and (possible) pathological immune mechanisms in pigs, before a potential vaccine candidate for *Chlamydiaceae* can be generated.

Reference

Schautteet, K. and Vanrompay D. (2011). *Chlamydiaceae* infections in pigs. Veterinary Research, 42:29. Review.

"I can recommend the bloody diarrhea."

IL010 *Brachyspira* infections in pigs: an update on pathogenesis and control

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Background

Interest in *Brachyspira* infections of pigs has intensified in the last few years. Reasons for this include the increased occurrence of tiamulin-resistant and multiple drug resistant strains in the European region; the recent re-emergence of *Brachyspira* infections in North America; and, importantly, an enhanced understanding about these bacteria, following the publication of genome sequences and the application of new technologies. Detailed information about these *Brachyspira* species still lags behind that available for many other bacterial pathogens of pigs, but the knowledge gap is being reduced and a more contemporary approach to their study is developing.

Introduction to the *Brachyspira*

Currently the genus *Brachyspira* includes seven officially named and several unofficially proposed species of anaerobic intestinal spirochaetes, all of which have adapted themselves to occupy specialized niches in the large intestines of various species of birds and animals. The close similarities between some of the species in their 16S rRNA sequences suggest that speciation in the genus has occurred relatively recently and rapidly. Indeed, in some cases, the boundaries between named species are not particularly well defined. The adaptation of these spirochaetes to an intestinal lifestyle appears to have included the acquisition of genes from other enteric bacterial species; for example, more of the predicted proteins of *Brachyspira hyodysenteriae* have similarities to proteins of the enteric *Escherichia coli* and *Clostridium* species than they do to proteins of other spirochaetes (Bellgard et al., 2009). Many of these genes are associated with transport and metabolism, and presumably have been acquired through horizontal gene transfer in the densely populated, complex and specialized environment of the large intestine.
Six of the *Brachyspira* species are known to colonize pigs, with the two main pathogenic ones being *B. hyodysenteriae*, the agent of swine dysentery, and *Brachyspira pilosicoli*, the cause of porcine intestinal spirochaetosis. Of the others, the proposed species "*Brachyspira suanatina*" and some strains of *Brachyspira murdochii* and *Brachyspira intermedia* occasionally have been reported to be associated with or have been shown experimentally to be able to induce colitis in pigs, while *Brachyspira innocens* is usually accepted as being a non-pathogenic commensal.

Species concepts

Originally it was believed there were two species of spirochaete that colonized the large intestine of pigs: the strongly haemolytic and pathogenic *B. hyodysenteriae* and the weakly haemolytic non-pathogenic *B. innocens.* An important advance followed the application of multilocus enzyme electrophoresis (MLEE) and other genetic methods to collections of isolates, with the recognition of several other *Brachyspira* species that colonized pigs, as well other species of animals and birds (Lee et al., 1993). This simple scenario is now changing, following the description of "atypical" isolates, and the use of new tools for examining bacterial populations. For example, in the last few years, isolates that do not easily conform to the currently described species have been described in North America, Australia and in various European and Scandinavian countries. Similarly, the application of multilocus sequence typing (MLST) to isolates identified as *B. intermedia* has demonstrated their extensive diversity, and the existence of groups of isolates that appear to be as deserving of being assigned to new species as are several other existing *Brachyspira* species (Phillips et al., 2009). In the case of *B. intermedia*, molecular diagnostic methods (PCR) have been specifically developed to identify all isolates with the phenotypic properties of the original *B. intermedia* - but now there is a need to develop additional simple diagnostic methods to supplement these, by differentiating the various subgroups. There is also an important need to reassess the pathogenic potential of the various "*B. intermedia*" subgroups, as well as other recently described "atypical" *Brachyspira* isolates. Unfortunately this process is not easy, because reproduction of disease in pigs is time consuming, expensive and difficult – even where known pathogenic species are used under standard conditions. In cases where disease can only be induced by using high doses of the spirochaetes in young pigs fed pro-inflammatory diets, the likely clinical significance and relevance of these infections in the field can be questioned.

The application of MLST also has demonstrated interesting differences between the population structures of the various *Brachyspira* species, with *B. hyodysenteriae* being essentially clonal (La et al., 2009), whilst *B. pilosicoli* is highly recombinant (Trott et al., 1997). There appears to be extensive genetic rearrangements within and between species, with sequence drift also generating genetic diversity. Even at a farm level, "microevolution" of *B. hyodysenteriae* strains has been recorded over relatively short periods of time. Besides rearrangements, novel genetic information may be acquired from other species or strains through the activity of a prophage-like gene transfer agent that is present in the genome of different *Brachyspira* species (Matson et al., 2006; Motro et al., 2009). In addition, horizontal gene transfer via bacteriophages with broad trophism, that have themselves undergone extensive gene remodelling, is likely to be a major force in the evolution of the *Brachyspira* species (Håfström et al., 2011).

Genomic sequencing

At the time of writing, the complete genome sequences of single strains of *B. hyodysenteriae* (Bellgard et al., 2009), *B. piloscoli* (Wanchanthuek et al., 2010), *B. murdochii* (Pati et al., 2010) and *B. intermedia* (Håfström et al., 2011) have been published, and other strains of these species and other *Brachyspira* species are being sequenced. This activity has provided new opportunities for investigation into disease mechanisms and identification of virulence factors - for example by comparing gene content and gene expression in pathogenic and non-pathogenic species, and in virulent and non-virulent strains of a species. Nevertheless, research in this area is still impeded by a lack of easy means for genetic manipulation, and without this it is still difficult to confirm the functional significance of individual genes or groups of genes.

Pathogenesis

Despite the economic importance of *B. hyodysenteriae* and *B. pilosicoli*, the pathogenesis of their respective diseases remains incompletely understood. The next section of this paper gives some background and outlines a few recent findings in this area.

In order for *Brachyspira* species to induce disease it is essential for them to be able to colonize the large intestine and to grow to large numbers. Their anaerobic metabolism and use of substrates has been fine tuned to allow them to thrive in the milieu of the large intestine. Nevertheless, there are complex physical and chemical interactions that occur between components of the pig's diet and the normal colonic microbiota: these profoundly influence the environment, and it has become clear that the resultant conditions can affect colonization by the spirochaetes. These influences are touched on later in this article, under "control of disease".

As part of the colonization process *Brachyspira* cells must move through the mucus overlying the epithelium of the large intestine. The corkscrew-like motility of *B. hyodysenteriae* has long been known to be an important virulence attribute, allowing it to penetrate the mucus. In the case of *B. pilosicoli,* this spirochaete shows increased motility under viscous conditions (Nakamaru et al., 2006), including mucin concentrations equivalent to those found in the colon (Naresh and Hampson, 2010). In addition to their motility, the cells of different *Brachyspira* species demonstrate a chemotactic attraction to colonic mucin. Comparison of the genome sequences of *B. hyodysenteriae* and *B. pilosicoli* has shown that *B. pilosicoli* has fewer methyl-accepting chemotaxis genes than *B. hyodysenteriae,* and completely lacks *mcpC* genes: hence these species are predicted to have different chemotactic responses, and this in turn may help to explain their different host ranges and colonization sites in the large intestine (Wanchanthuek et al., 2010). Experimentally, strains of *B. intermedia* and *B. innocens* have been shown to be less attracted to mucin than virulent strains of *B. hyodysenteriae* (Milner and Sellwood, 1994). On the other hand, while cells of both *B. hyodysenteriae* and *B. pilosicoli* were attracted to and entered mucin solutions, this was reduced at mucin concentrations above 6% for *B. hyodysenteriae* but not for *B. pilosicoli* (Naresh and Hampson, 2010). Even within a species there are substantial strain differences: for example, different *B. pilosicoli* strains vary in their motility and chemotactic responses to mucin (Naresh and Hampson, 2010), and two avirulent strains of *B. hyodysenteriae* were less attracted to mucin than were virulent strains tested under the same conditions (Milner and Sellwood, 2003).

Recently an *in vitro* study using Caco-2 cell monolayers has provided some insights into how *B. pilosicoli* interacts with colonic enterocytes to cause disease (Naresh et al., 2009). Similar detailed studies are required with *B. hyodysenteriae.* In the study the Caco-2 cell junctions were shown to be the initial targets of attachment by *B. pilosicoli.* Colonized monolayers then demonstrated a time-dependent series of changes, including accumulation of

actin at the cell junctions, loss of tight junction integrity and condensation and fragmentation of nuclear material consistent with the occurrence of apoptosis induced by the spirochaete. Using quantitative reverse transcription PCR, the colonized monolayers demonstrated a significant up-regulation of interleukin-1ß (IL-1ß) and IL-8 expression. These cytokines/chemokines are likely to be responsible for attracting inflammatory cells to the colonization site, and causing localized colitis. Mechanisms for inducing such cellular damage include the biological activity of lipooligosaccharides (LOS) and/or the action of membrane proteases.

The LOS in the cell envelopes of *Brachyspira* species have similar biological properties to lipopolysaccharides from other Gram-negative bacteria, and are likely to contribute to lesion production. Various studies have shown that LOS extracted from *B. hyodysenteriae* has a variety of effects that can induce local inflammation and tissue damage (summarized in Hampson et al., 2006). The LOS of other pathogenic *Brachyspira* species has not been studied to the same extent, although *B. pilosicoli* sonicates (likely to contain LOS) caused significant up-regulation of IL-1ß, TNF-a, and IL-6 in Caco-2 cells, whilst culture supernatants of *B. pilosicoli* and sonicates of non-pathogenic *B. innocens* did not alter cytokine expression (Naresh et al., 2009).

An unanticipated finding resulting from the sequencing of the genome of *B. hyodysenteriae* strain WA1 was the identification of a previously unrecognised plasmid: this contained 31 genes, including six *rfbA-D* genes that were predicted to be involved with rhamnose biosynthesis, and hence LOS structure, as well as others associated with glycosylation (Bellgard et al., 2009). Subsequently a set of PCRs was developed to amplify portions of nine of the plasmid genes, and when applied to DNA extracted from virulent strain B204 this generated the expected product (La et al., 2011). Unexpectedly however, no PCR products were generated with DNA from avirulent strain A1. Analysis of the DNA using pulsed field gel electrophoresis confirmed the presence of a plasmid band in strains WA1 and B204, but not in the avirulent strain A1. These results suggested that the lack of the plasmid might explain why strain A1 is avirulent. A total of 264 Australian field isolates of *B. hyodysenteriae* were then tested, and only one was found to lack the plasmid. This strain was predicted to have reduced virulence, and when used experimentally to infect pigs, significantly fewer became colonized and developed SD compared to the pigs infected with a control strain containing the plasmid. The results support the likelihood that plasmid-encoded genes of *B. hyodysenteriae* are involved in colonization and/or in disease expression. Interestingly, the *rfbA-D* gene cluster was not identified in the sequenced strains of *B. pilosicoli* or *B. murdochii* (Wanchanthuek et al., 2010), but the genes were identified in the genome of *B. intermedia* PWS/A^T (Håfström et al., 2011).

Another likely virulence determinant in *B. hyodysenteriae* is the strong haemolytic activity of this spirochaete. A number of studies on *B. hyodysenteriae* molecules with haemolytic activity have been conducted over the years (summarized in Hampson et al., 2006). Currently eight genes encoding proteins with predicted haemolytic activity have been described in *B. hyodysenteriae*, and all but one of these appears to be present in *B. pilosicoli* (Bellgard et al., 2009; Wanchanthuek et al., 2010). Further work is required to investigate the functional significance of the latter gene. In addition, the genetic basis of the strong haemolysis produced by "*B. suanatina*" and its potential contribution to virulence require investigation.

Control of disease

The emergence of *Brachyspira* strains with reduced susceptibility to key antimicrobial agents presents a major challenge for disease control. Fortunately some new approaches to control have emerged in recent years.

A recent interesting finding was the fact that *in vitro* exposure of *B. pilosicoli* to the stress hormone norepinephrine increases the spirochaete's growth, attraction to mucin and attachment to Caco-2 cells (Naresh and Hampson, 2011). Norepinephrine is released into the gut, and is likely to have a similar stimulatory affect on *B. pilosicoli* (and other *Brachyspira* species) *in vivo.* This finding provides an additional theoretical basis to advise that environmental and social stresses on pigs be minimized as far as possible in order to reduce their susceptibility to infection.

In the past bacterin and attenuated live vaccines have been used with varying success to help control experimental infections with *B. hyodysenteriae*, and autogenous bacterin vaccines are still used to aid disease control in some countries. Vaccines have tended to be better at reducing lesion formation than at preventing spirochaete colonization. Recently recombinant protein vaccines have received attention: for example, the use of recombinant outer-membrane lipoprotein Bhlp29.7 as an experimental vaccine provided a 50% reduction in the incidence of

disease compared to unvaccinated controls following experimental infection with *B*. *hyodysenteriae* (La et al., 2004). The recent availability of the genome sequence of *B. hyodysenteriae* WA1 has provided the opportunity to broaden this approach to vaccine development through the application of "reverse vaccinology", where scores of such predicted proteins can be identified from the genome sequence, screened and tested as vaccine candidates. The use of various recombinant proteins that were first identified using reverse vaccinology has already given similar levels of protection against swine dysentery as achieved with Bhlp29.7 (Song et al., 2009). It is anticipated that a new generation of commercial vaccines based on this new approach will become available in the next few years.

It has been known for some time that diet has a major influence on the expression of swine dysentery. Colonization of pigs by *B*. *hyodysenteriae* has been shown to be inhibited by feeding a highly digestible cooked-rice based diet that results in dry pellet-like faeces and minimal large intestinal contents and mucus, which presumably is an environment in which the spirochaete cannot easily survive (Pluske et al., 1996). Addition of rapidly fermentable fibre sources to this diet returns the contents and consistency of the large intestine to its normal appearance, and reinstated susceptibility to swine dysentery (Pluske et al., 1998). In a completely different dietary approach, addition of chicory root (containing inulin) and lupins to a pig diet also was shown to reduce susceptibility to experimental swine dysentery (Thomsen et al., 2007). Subsequent studies confirmed this protective effect and identified inulin as being the component most likely protective component (Hansen et al., 2010), although the diet needed to contain 80g/kg of inulin to achieve protection (Hansen et al., 2011). The composition of the diet is known to have a pronounced influence on the colonic microbiota of the pig (Leser et al., 2000), and in the case of the diet containing sugar beet and lupin the increased numbers of *Bifidobacterium thermacidophilum* and *Megasphaera elsdenii* that were found in the colonic microbiota might have acted to inhibit the spirochaete (Mølbak et al., 2007). On the other hand, some other species of anaerobic bacteria that form part of the microbiota can facilitate *B*. *hyodysenteriae* colonization and augment inflammation and lesion production (Whipp et al., 1979). Therefore getting an appropriate stable composition and balance of species in the colonic microbiota that act to inhibit spirochaete colonization and growth is likely to be difficult to achieve. Furthermore the experimental diets that have been used to reduce susceptibility to swine dysentery to date have been impractical for general commercial use due to their cost and limited availability. If there were a better understanding of which components of the microbiota were most important for inhibiting *B. hyodysenteriae,* and how they did this, it might be possible to develop other means to achieve the same end.

Interestingly, colonization and/or disease expression associated with *B*. *pilosicoli* is also influenced by diet, and hence dietary manipulation may assist with control of this infection. For example, an analysis of risk factors on farms revealed that using home-mixed and/or non-pelleted diets was associated with a reduced prevalence of *B. pilosicoli* infection (Stege et al., 2001). When carboxymethylcellulose was added to an experimental pig diet it resulted in an increased viscosity of the intestinal contents, and enhanced colonization with *B*. *pilosicoli* (Hopwood et al., 2002). High levels of soluble non-starch polysaccharide in grains like barley and rye may also increase viscosity, and therefore enhance *B*. *pilosicoli* colonization. Consistent with this, pigs fed diets based on cooked white rice (highly- digestible and low in soluble fiber) have shown reduced colonization with *B*. *pilosicoli* compared to pigs fed conventional diets (Hampson et al., 2000; Lindecrona et al., 2004). Feeding a pelleted diet rather than meal increased the risk of colonization, but fermented liquid feed or lactic acid had no influence on colonization (Lindecrona et al., 2004).

Summary

With the recent availability of *Brachyspira* genome sequences and new technologies we are beginning to get better insights into the growth requirements and pathogenic mechanisms of *Brachyspira* species. This information is of direct benefit for control, since, for example, information about growth and colonization requirements derived from metabolic reconstructions of the spirochaetes can help to predict what changes in the colonic environment are likely to reduce their growth. Further detailed studies are needed to determine how the porcine colonic microbiota is influenced by different dietary substrates, and how this impacts on colonization by *Brachyspira* species. The sequence data has also allowed the use of a reverse vaccinology approach to vaccine development. In the future we should see effective control achieved by the use of appropriately priced dietary components that reduce spirochaete colonization, together with recombinant vaccines that both reduce colonization and minimize lesion development.

References

Bellgard, M. I., P. Wanchanthuek, T. La, K. Ryan, P. Moolhuijzen, et al. 2009. Genome sequence of the pathogenic intestinal spirochete *Brachyspira hyodysenteriae* reveals adaptations to its lifestyle in the porcine large intestine. *PLoS ONE* 4(3): e4641.

Håfström, T., D. S. Jansson, & B. Segerman. 2011. Complete genome sequence of *Brachyspira intermedia* reveals unique genomic features in *Brachyspira* species and phage-mediated horizontal gene transfer. *BMC Genomics* 12:395.

Hampson, D. J., I. D. Robertson, T. La, S. L. Oxberry, & D. W. Pethick. 2000. Influences of diet and vaccination on colonisation of pigs with the intestinal spirochaete *Brachyspira (Serpulina) pilosicoli. Vet Microbiol* 73:75-84.

Hampson, D. J., C. Fellström, & J. R. Thomson.2006. Swine dysentery. In: *Diseases of Swine* 9th Ed. (Eds: Straw B. E., J. J. Zimmerman, S. D'Allaire & D. J. Taylor). Blackwell Publishing, Oxford, UK. pp. 785-805.

Hansen, C. F., N. D. Phillips, T. La, A. Hernandez, J. Mansfield, et al. 2010. Diets containing inulin but not lupins help to prevent swine dysentery in experimentally challenged pigs. *J Anim Sci* 88:3327-336.

Hansen, C. F., A. Hernández, J. Mansfield, Á. Hidalgo, T. La, et al. A high dietary concentration of inulin is necessary to reduce the incidence of swine dysentery in pigs experimentally challenged with *Brachyspira hyodysenteriae. Br J Nutr* 106:1506-1513.

Hopwood, D. E., D. W. Pethick, & D. J. Hampson. 2002. Increasing the viscosity of the intestinal contents stimulates proliferation of enterotoxigenic *Escherichia coli* and *Brachyspira pilosicoli* in weaner pigs. *Brit J Nutr* 88:523-532.

La, T., N. D. Phillips, B. L. Harland, P. Wanchanthuek, M. I. Bellgard, & D. J. Hampson. 2009. Multilocus sequence typing as a tool for studying the molecular epidemiology and population structure of *Brachyspira hyodysenteriae*. *Vet Microbiol* 138:330-338.

La, T., N. D. Phillips, P. Wanchanthuek, M. I. Bellgard, A. J. O'Hara, & D. J. Hampson. 2011. Evidence that the 36kb plasmid of *Brachyspira hyodysenteriae* contributes to virulence. *Vet Microbiol* 153:150-155.

Lee, J. I., D. J. Hampson, A. J. Lymbery, & S. J. Harders. 1993. The porcine intestinal spirochaetes: Identification of new genetic groups. *Vet Microbiol* 34:273-285.

Leser, T. D., R. H. Lindecrona, T. K. Jensen, B. B. Jensen, & K. Møller. 2000. Changes in bacterial community structure in the colon of pigs fed different experimental diets and after infection with *Brachyspira hyodysenteriae*. *Appl Environ Microbiol* 66:3290-3296.

Lindecrona, R. H., T. K. Jensen, & K. Møller. 2004. Influence of diet on the experimental infection of pigs with *Brachyspira pilosicoli*. *Vet Rec* 154:264-267.

Pati, A., J. Sikorski, S. Gronow, C. Munk, A. Lapidus, et al. 2010. Complete genome sequence of *Brachyspira murdochii* type strain (56-150). *Stand Genomic Sci* 2:260-269.

Milner, J. A., & R. Sellwood. 1994. Chemotactic response to mucin by *Serpulina hyodysenteriae* and other porcine spirochetes: Potential role in intestinal colonization. *Infect Immun* 62:4095–4099.

Matson, E. G., M. G. Thompson, S. B. Humphrey, R. L. Zuerner, & T. B. Stanton. 2005. Identification of genes of VSH-1, a prophage-like gene transfer agent of *Brachyspira hyodysenteriae*. *J Bacteriol* 187:5885-5892.

Mølbak, L., L. E. Thomsen, T. K. Jensen, K. E. Bach Knudsen, & M. Boye. 2007. Increased amount of *Bifidobacterium thermacidophilum* and *Megasphaera elsdenii* in the colonic microbiota of pigs fed a swine dysentery preventive diet containing chicory roots and sweet lupine. *J Appl Microbiol* 103:1853-1867.

Motro, Y., T. La, M. I. Bellgard, D. S. Dunn, N. D. Phillips, & D. J. Hampson. 2009. Identification of genes associated with prophage-like gene transfer agents in the pathogenic intestinal spirochaetes *Brachyspira hyodysenteriae, Brachyspira pilosicoli* and *Brachyspira intermedia. Vet Microbiol* 134:340-345.

Nakamura, S., Y. Adachi, T. Goto, & Y. Magariyama. 2006. Improvement in motion efficiency of the spirochete *Brachyspira pilosicoli* in viscous environments. *Biophys J* 90:3019-3026.

Naresh, R., & D. J. Hampson. 2010. Attraction of *Brachyspira pilosicoli* to mucin. *Microbiology* 156:191-197.

Naresh, R., & D. J. Hampson. 2011. Exposure to norepinephrine enhances *Brachyspira pilosicoli* growth, attraction to mucin and attachment to Caco-2 cells. *Microbiology* 157:543-547.

Naresh, R., Y. Song, & D. J. Hampson. 2009. The intestinal spirochete *Brachyspira pilosicoli* attaches to cultured Caco-2 cells and induces pathological changes. *PLoS ONE* 4(12): e8352.

Phillips, N. D., T. La, M. A. Amin, & D. J. Hampson. 2010. *Brachyspira intermedia* strain diversity and relationships to other indole-positive *Brachyspira* species. *Vet Microbiol* 143:246-254.

Pluske, J. R., P. M. Siba, D. W. Pethick, Z. Durmic, B. P. Mullan, & D. J. Hampson. 1996. The incidence of swine dysentery in pigs can be reduced by feeding diets that limit fermentation in the large intestine. *J Nutr* 126:2920-2933.

Pluske, J. R., Z. Durmic, D. W. Pethick, B. P. Mullan, & D. J. Hampson. 1998. Confirmation of the role of rapidly fermentable carbohydrates in the expression of swine dysentery in pigs after experimental infection. *J Nutr* 128:1737-1744.
Stege, H., T. K. Jensen, K. Møller, P. Baekbo, & S. E. Jorsal. 2001. Risk factors for intestinal pathogens in Danish finishing pig herds. *Prev Vet Med* 50:153-164.
Thomsen, L. E., K. E. Bach Knudsen, T. K. Jensen, A. S. Christensen, K. Møller & A. Roepstorff. 2007. The effect of fermentable carbohydrates on experimental swine dysentery and whip worm infections in pigs. *Vet Microbiol* 119:152–163.
Trott, D. J., A. S. J. Mikosza, B. G. Combs, S. L. Oxberry, & D. J. Hampson. 1998. Population genetic analysis of *Serpulina pilosicoli* and its molecular epidemiology in villages in the Eastern Highlands of Papua New Guinea. *Int J System Bacteriol* 48:659-668.
Wanchanthuek, P., M. I. Bellgard, T. La, K. Ryan, P. Moolhuijzen, et al. 2010. The complete genome sequence of the pathogenic intestinal spirochete *Brachyspira pilosicoli* and comparison with other *Brachyspira* genomes. *PLoS ONE* 5(7): e11455.
Whipp, S. C., I. M. Robinson, D. L. Harris, R. D. Glock, P. J. Matthews, & T. J. Alexander. 1979. Pathogenic synergism between *Treponema hyodysenteriae* and other selected anaerobes in gnotobiotic pigs. *Infect Immun* 26:1042-1047.

IL011 Spanish experiences with swine dysentery

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Is Spanish swine production different?

Spain is the second swine producing country in the EU, and it is important to note that currently are used in Spain a variety of production systems wider than those used in any other EU country, because each disease must be considered in its own context.

There is a special type of production, the "Iberian pig", which is produced in extensive systems based on the exploitation of natural resources in a special Mediterranean ecosystem, "la dehesa", which are mainly acorns and grass. On the other hand, the industrial production of white pigs is an intensive production carried out mainly by large companies. In Spain there are more than ten companies that own more than 50,000 breeding sows and there is one company that has 170,000 sows. Most of these companies produce with farms of 2,000 to 4,000 sows and they work with mutisite production systems. However, medium-size farms, with 200 to 800 sows, still are numerous.

It is important mentioning that whereas in some Spanish regions the density of swine farms is high, there are also very large areas with a low density of pigs.

For all these reasons, in Spain swine dysentery may show very different clinical presentations, which vary from severe clinical signs and mortality to mild outbreaks only with soft faeces and deterioration of productive indexes.

Epidemiological situation

In the last decade a continuous increase in swine dysentery incidence has been observed in our country. Our laboratory constantly receives samples from clinically suspected outbreaks of swine dysentery mainly from Spanish and Portuguese farms, and in many of them *Brachyspira hyodysenteriae* is isolated. Currently, we have more than 600 *B. hyodysenteriae* isolates from field samples

Therefore, swine dysentery is actually a great concern for Spanish swine production companies and farmers. The disease affects both white and "Iberian" pigs and big (>2,000 sows) and medium size farms, however the incidence is higher in medium size farms.

Control measures

The control of swine dysentery through treatment with usual antibiotics is becoming more difficult around the world. As happens in other countries, the Spanish *B. hyodysenteriae* isolates show a decreased susceptibility to antibiotics that is increasing.

In our laboratory, the MIC50 and MIC90 of *B. hyodysenteriae* strains isolated from 2000 to 2004 (n=50), from 2006 to 2007 (n=58) and from 2008 to 2009 (n=87) have been determined. Significant differences were found between the strains isolated in 2000-2004 and those isolated in 2008-2009 for MIC50 for tiamulin, valnemulin and tylosin. On the other hand, no statistically significant differences were observed for lincomycin. The MICs of strains isolated from 2008 to 2009 were also determined for tyvalosin, an antibiotic recently registered for treatment of swine dysentery in Spain.

The survival curves for the strains isolated from 2008 to 2009 were above from those obtained in previous years for all the antibiotics.

It is worth mentioning that 60 % of strains isolated from 2008 to 2009 showed MICs for tiamulin exceeding the microbiological breakpoint of 0.5 µg/mL proposed for monitoring decreased susceptibility to this antibiotic. This percentage is two-fold higher than that observed for strains isolated in previous years.
Consequently it is increasingly necessary make an antimicrobial susceptibility test with the strain isolated in each case in order to establish the most appropriate treatment. Antibiotic-sensitive strains coexist in the field with other strains of low sensitivity or even resistant to one or more antibiotics.

Alternative antimicrobials

Looking for alternatives for antibiotic treatments, the *in vitro* antimicrobial activity of a commercial product derived from garlic and composed of two molecules, propyl propane thiosulfinate and propyl propane thiosulfonate, has been evaluated in our laboratory.

The results of a first study to determine the inhibitory capacity of both molecules and the commercial product with 47 strains of *Brachyspira hyodysenteriae* were published in the 2nd ECPHM Symposium. No differences were found on the susceptibility of strains with low or high sensitivity to usual antibiotics. Currently, research work is in progress in order to assess the alterations induced by these molecules in bacterial cellular composition and structure.

Vaccination

In 2007 we could check the efficacy of an autovaccine in an Iberian swine farm with endemic dysentery. In this farm, all production steps, except farrowing and weaning, were carried out on soil, so our recommendation was to eradicate swine dysentery through depopulation. However, the owner argued that he was very interested in keeping the lineage, and, therefore, we proposed to test an autovaccine.

The autovaccine made from the strain of *B. hyodysenteriae* isolated on the farm contained 10^9 inactivated bacteria per dose.Breeding swine were vaccinated and twice revaccinated with a two-weeks interval. Afterwards, breeding sows were revaccinated three weeks before each farrowing and piglets were vaccinated a week after weaning and revaccinated two weeks later.The application of the autovaccine was effective to control swine dysentery and significantly reduce both the deaths and the cost of treatment.

A second test was carried out in a industrial white swine farm, with 2,400 sows which belongs to a company owning more than 50,000 sows. The same vaccination program was applied. A significant increase in live weight, daily gain and feed efficiency were observed along with decreased mortality and treatment costs.

The efficacy of autovaccines was also tested in Poland in 2011 under the control of Prof. Pejsak, with very promising results.

Nowadays, our laboratory has expertise of more than four years in the application of autovaccines in different types of swine farms in Spain and Portugal. We can affirm that an effective autovaccine is able to control swine dysentery, and reduces the need for antibiotic treatments, especially in fattening pigs from multisite farms.

Currently, our laboratory is performing preliminary trials with a vaccine against swine dysentery.

Future prospects

It is essential to find new alternatives for the control of swine dysentery that are not based solely on the use of traditional antibiotics. Some plant products with antimicrobial activity can be useful and it is also necessary to have effective vaccines.

In addition, modulation of gastrointestinal microbiota by using prebiotics and probiotics must be considered as an interesting and exciting strategy for prevention and control of swine dysentery and other gastrointestinal infections, which would contribute to reduce the use of antibiotics.

The advances in genomic and proteomic techniques and their availability are already helping us in the research about digestive infections of pigs and we are sure that we will see great innovations in this field in the next years.

Oral Session Abstracts

Resident session

001 Comparison of methicillin resistant Staphylococcus aureus (MRSA) isolates derivedfrom different animal species by testing the minimum inhibitory concentration (MIC)

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Objectives - The aim of the study was to identify differences in the resistance pattern of MRSA between different animal species.
Material and Methods - In our study we analysed 434 MRSA-isolates from pigs (n=351), poultry (n=52) and companion animals (n=31), which were taken from the nasal area, pathological lesions and dust from the direct animal environment. All isolates were spa- and mec-typed by the Federal Institute for Risk Assessment. First we tested the minimum inhibitory concentrations of all isolates according to the guideline M31-A3 of the CLSI (Clinical and Laboratory Standards Institute). The layout of the microtitre plate testing bacteria from food animals is according to the German Society for Veterinary Medicine. The isolates, tested for 19 antibiotics, are divided into “resistant” and “non-resistant” isolates by clinical breakpoints.
Results - Analyzing the 434 isolates we found 115 different resistance patterns (enumerated according to their frequency). The most frequent patterns 1-14 occurred in 63.5% of our isolates. More than 98% of all isolates showed at least the following basic pattern: resistance to Penicilline, Ampicillin, Erythromycin and Tetracycline.
Conclusion - Various different resistance patterns were identified. Minimum resistance was against three antibiotics (only seven isolates) and the maximum resistance pattern had 15 resistant antibiotics (only one isolate). The resistant patterns seem to be farm-specific. There is no significant difference between regions in Germany. Even isolates from organic pig husbandry systems do not differ in essential points from isolates from conventional pig husbandry systems, since we also found isolates in organic pig husbandry systems that were resistant to four antibiotics and one isolate was resistant to even 12 antimicrobial substances.

002 Antimicrobial resistance of Escherichia coli F4+ strains isolated from swine in the period 2008-2011

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Objectives - The aim of this study was to evaluate the antimicrobial trend in resistance of F4+ *Escherichia coli* isolated from pigs with *E. coli* diarrhea.
Materials and methods - One hundred-nineteen F4+ pathogenic *Escherichia coli* isolated from diseased pigs in Northern Italy from 2008 to 2011 were analyzed for their susceptibility to 14 antimicrobials by disk diffusion method. The trend of resistance was determined using the $\chi 2$ test grouping the strains into two groups (isolates 2008-2009 and 2010-2011).
Results - Isolates showed a statistically significant increasing trend of resistance to cefquinome (from 11% to 24%), danofloxacin (from 14% to 35%), enrofloxacin (from 27% to 32%) and florfenicol (from 21% to 32%). Resistance to the remaining 10 antimicrobial agents tested (aminosidine 33%-35%, gentamicin 27%-31%, flumequine 32%-34%, marbofloxacin 22%-28%, apramycin 45%-46%, colistin 9%-11%, trimethoprim-sulphonamide 48%-42%, thiamphenicol 82%-84%, tetracycline 95%-96%, erythromycin 90%-92% did not change significantly over the study period. On the basis of antimicrobial multi-resistance the strains were collected into three groups: 1. strains resistant to 1-5 antimicrobials (23/119); 2. to 6-10 antimicrobials (73/119); 3. > 10 antimicrobials (23/119). Over the study period, the number of isolates belonging to the first, second and third group showed a significant decreasing trend ($P<0.05$; R -0.89), no significant change and an increasing trend ($P<0.05$; R 0.84) respectively.
Conclusions - The results of this study indicate an increasing trend to cefquinome, danofloxacin, enrofloxacin and florfenicol in *E. coli* F4+ isolates. A significant increasing of multi-resistant strains was observed from 2008 to 2011. This indicates the need for continued surveillance studies so that appropriate strategies can be developed to contrast the development of resistance in these and other pathogens.

003 Lesional and microbiological analysis of lymphadenitis in free-range pigs

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Introduction - Microorganisms responsible for lymphadenitis are especially important in pigs reared in free-range systems, where an interaction with other domestic and wild species is common. These infections originate purulent/caseous lymphadenitis that can be local or generalized, leading to partial or total carcass condemnation. A total of 301 samples belonged to 135 animals condemned at slaughterhouse were analyzed to describe the type of lesions and microorganisms involved in the development of lymphadenitis and associated lesions.
Materials and Methods - Each sample was divided into two pieces, one was fixed in 10% buffered formalin, routinely processed, paraffin embedded and stained with hematoxylin-eosin and Ziehl-Neelsen staining to carry out the histopathological study, and the other was used for microbiological analysis, to identify other microorganisms than *Mycobacterium* spp. Selective media and different biochemical test were used for microbiological identification.
Results - Microscopically, lesions corresponded primarily with pyogranulomas (71.82%), and less frequently with granulomas (27.27%), being common in both cases the presence of a connective tissue capsule, and occasionally the presence of giant cells and coalescent wide areas of necrosis with calcification. A total of 172 isolates were obtained from 91 (67.41%) animals. The most frequent microorganism recovered were coryneform bacteria (33.14%), being *Arcanobacterium pyogenes* (25.00%) the most frequently isolated bacteria, and different species of the genera *Streptococcus* spp. (26.16%), especially *Streptococcus suis* (11.04%).
Conclusion - These results highlight the necessity for implementing control measures against these pathogens in porcine free-range systems, in order to reduce economic losses and to obtain products of higher quality and lower health risk.

004 Infection with influenza A(H1N1)pdm09 in Norwegian swine nucleus and multiplier herds: a case-control study on clinical impact

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Objective - The Norwegian pig population was considered free from swine influenza (subtypes H1N1 and H3N2) until October 2009, when the influenza A(H1N1)pdm09 outbreak started [1-3]. The aim of this study was to investigate the clinical impact of this infection in the naïve nucleus and multiplier herds in Norway.
Materials and methods - All nucleus and multiplier herds were tested serologically or by rRT-PCR during the risk period (30th September 2009 until 31st Oct 2010). Information on clinical history of pigs was collected by questionnaire and telephone interview with farmers. Inference statistics were done by calculating the 95% confidence interval (CI) of the binomial proportions, or only as descriptive statistics when numbers were small.
Results - The response rate on the questionnaire was 100%. A total of 20 (43%) of the nucleus herds and 28 (41%) of the multiplier herds were classified as positive. Nineteen (40%) [95% CI of 26-55%] of the 48 positive herds reported clinical signs of pig ILI (influenza-like illness), and/or increased reproductive disturbances. The number of herds reporting signs of pig ILI in unweaned piglets, weaned piglets and growers/finishers / replacement sows were 8, 6 and 8 respectively. Seventeen herds reported signs in sows. Of these, 12 reported typical signs of pig ILI, and 9 reported an increase in reproductive disturbances. The proportion of animals affected, duration and type of clinical signs varied between herds [4].
Conclusion - This study shows that typical signs of pig ILI and/or increased reproductive disturbances were reported from 40% of herds infected with influenza A(H1N1)pdm09. The low morbidity could indicate mild or subclinical disease in uncomplicated cases.
References:
1. Hofshagen M., et al. (2009) Eurosurveillance 14, 45, 15-17.; 2. Er C., et al. (2009) Proc. 21st IPVS Congress, 256.; 3. Lium B., et al. (2009) Annual report. Oslo: National Veterinary Institute; 2010.; 4. Groentvedt C.A., et al. (2011) Influenza Research and Treatment (Accepted).

Miscellaneous

005 Claw lesions of piglets kept in different farrowing systems

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The floor condition in the farrowing system has a huge impact on health and welfare of pigs and on the economic outcome of the farm. Both crated systems and free farrowing pens are usually equipped with fully or partially slatted floor of different materials without straw bedding. Suckling piglets are highly susceptible for inadequate flooring. Different farrowing systems were tested with regard to the prevalence of feet lesions. Data collection took place in a commercial sow unit of 600 sows (LWxLR) which were batch farrowed. During lactation period pigs were kept in different commercially available farrowing systems. Four crate systems (C1-C4) and 3 free farrowing systems (F1-F3) were investigated with focus on the claws of suckling piglets. Systems differed in dimensions, design and flooring. 84 litters were clinically inspected twice (A: 5.4d; B: 18.7d) for claw injuries. Lesions were classified for type, location and quantity. PROC GLM_mult, Tukey-Test and PROC GLM_rep were used for statistical analyses ($p \leq 0.05$). Almost 90% of main claws showed heel bruising and 34% dorsal coronet erosion at inspection A, the prevalence decreased to 36% and to 1.5% respectively at inspection B. Hind limbs were more affected. The free farrowing pen with a separated non-slatted lying area (F1) resulted in a lower prevalence of claw lesions compared to both the smaller fully slatted free farrowing pens (F2, F3) and to the crated systems (C1-C4). Plastic-coated expanded metal slats with diamond-shaped openings induced less claw lesions than slatted steel with V-shaped bars. It is concluded that the quality of slatted floor elements for farrowing systems has to be improved with special emphasis to health and welfare of suckling piglets both in crated and in free farrowing systems.

006 Comparative on-farm study of alternatives for surgical castration of male pigs:consequences for boar taint and carcass quality

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Objectives - Different alternatives for surgical castration without anaesthesia were performed on 20 farms to evaluate the effect on boar taint and carcass quality.
Material and methods - 20 farms in Flanders performed: 1) castration (CONT) 2) castration with 100% CO2 anaesthesia (CO2), 3) castration with analgesia, given 10 to 15 minutes before castration (Metacam®, MET), 4) immunocastration (Improvac®, VACC), and 5) production of entire male pigs (EM) with 120 pigs raised in single sex groups per farm and per treatment. CONT, CO2 and MET were considered as barrows (BA).
Boar taint was measured on neckfat with the hot iron method on a scale from 0 to 4 for 2047 EM, 934 VACC and 649 BA. Cold carcass weight and meat percentage were evaluated at slaughter.
Results - Average slaughter weight did not differ, but variation was higher for EM (90.6±11.2kg) than for VACC (91.1±9.9kg) or BA (90.2±9.6kg). Meat percentage was 60.5±3.7% for BA, 61.1±3.6% for VACC and 62.4±3.3% for EM. On 6 farms, meat percentage of VACC was reduced (-0.7 to -1.8%), while on 9 farms meat percentage was increased by more than 1% (+3.6% maximum). For EM, meat percentage was reduced only on 1 farm (0.5%), while on 12 farms it was increased by more than 2%.
Boar taint prevalence (score >2) was on average 0.2% for BA, 0.5% for VACC and 3.0% for EM. On 9 farms, boar taint prevalence of EM was < 1%. On three farms, prevalence was > 10%
Conclusions - On nearly half the farms the prevalence of boar taint of EM was < 1. The improved carcass quality results of EM and VACC compared to BA are in line with literature. Carcass quality of EM and VACC as well as boar taint prevalence of EM varied widely between farms. So, optimisation of management might be needed to achieve good results.

007 Impact of fenbendazole on shedding and embryonation of Ascaris suum eggs in gestating sows

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Preventive treatment of swine breeding herds for *Ascaris suum* is a common practice in the US. In most situations, gilts are treated prior to or shortly after entry to the breeding herd and sows are treated prior to farrowing. The timing of the pre-farrow treatment is quite variable in the industry and often does not reflect the time period between treatment and cessation of egg shedding, resulting in potential transmission of ascarid eggs to offspring. Studies in experimentally infected gilts found ascarid egg shedding ceased 9 days following treatment with fenbendazole (9mg/kg). The objective of this study was to determine the shedding pattern and impact on embryonation of *A. suum* eggs of naturally infected gilts and young sows following treatment with fenbendazole.
Gestating gilts and first parity sows from two herds (A and B) were used for the study. Feces of gestating sows were evaluated using the Modified Wisconsin Sugar-Centrifugal Floatation Method for the presence of ascarid eggs. Positive sows were randomly assigned to treated or control groups. Treated sows were administered fenbendazole for 3 consecutive days as a feed top dress (9 mg/kg total). On day 0 and periodically thereafter, feces was collected for testing. In Herd B, samples were collected on day 8 post treatment for evaluation of embryonation rate.
In Herd A, treated sows were negative by d16 after treatment with reduction of egg counts starting at d12. In Herd B, egg counts were reduced by d12 as well but a few animals remained positive thereafter. These findings are similar to the previous study where animals were experimentally infested and egg shedding ceased by d9. In Herd B, there was a significant reduction in the percentage of eggs with successful embryonation to a larval stage at d8. In our study, the time period between treatment and cessation of shedding was several days longer and was not totally complete. To avoid sows shedding eggs into the farrowing facility, treatment should be done at least 14 days prior to movement into the farrowing facility.

008 Longitudinal study on methicillin resistant Staphylococcus aureus (MRSA) nasal colonization in a farrow to finish pig herd

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Objectives - To contribute to better understanding of age-related changes in MRSA nasal colonization (n.c.) in pigs.
Materials and methods - Thirty sows were submitted to nasal swabbing (n.s.) at d 80 of gestation. At d 3 post partum mammal skin was swabbed. Sixty pigs were submitted to n.s. at d3 of life, one day before weaning (wean.) (d27); last day of wean. (d75); first day of fattening (d120); approx. half of fattening (d180); slaughtering (approx. d270). Dust samples were collected with dry sterile gauzes. Gestation facilities were tested only once (30 samples). Farrowing (farr.) crates, weaning boxes, growing and fattening pens were tested twice: in the presence of animals (10 samples) and in cleaned and sanitized (C&S) rooms (10 samples).
Results - N. c. was recorded in 1/30 sows. No MRSA were detected from mammal skin swabs. At d3 of life 1/30 pig resulted colonized (1,7%): At d 27 all pigs tested negative. At d75 and at d120 all pigs (30/30) resulted MRSA colonized. At approximately d180 the number of colonized pigs decreased at 11/60 (18,3%) and at slaughter 14/59 tested positive (23,7%). MRSA environmental contamination was not detected in gestation pens and in farr. crates. Five out of ten dust samples were identified as MRSA positive in populated weaning boxes. After C&S, MRSA were detected in 4/10 weaning boxes. In growing boxes the rate of positive samples (p.s.) was 5/10 in populated boxes and 2/10 after C&S. In fattening boxes the rate of p. s. was 1/10 before and after C&S.
Conclusions - MRSA n. c. rate appeared age-related. A clear increase was registered during wean., with the rate reaching 100%, persisting in growers and decreasing in fatteners to approx. 20%. A similar trend was observed in environmental samples. The rapid colonization of all pigs followed their introduction in contaminated wean. boxes.

Industry sessions

009 Plasma pharmacokinetics of a new 450 mg/ml florfenicol formulation administered intramuscularly once to pigs

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Objectives - Nuflor® Swine Once 450 mg solution for injection (NSO, Intervet International bv, known as MSD Animal Health, The Netherlands) is a new formulation containing florfenicol (FFC) indicated for swine respiratory disease (SRD). The study was designed to describe the plasma pharmacokinetics of FFC following NSO single dosing to pigs.
Materials and Methods - Twelve healthy pigs (44-59 kg bw; males and females) received NSO at a single intramuscular dose of 30 mg FFC/kg bw. Blood samples were collected before treatment and over a 120-h post-dosing period. Plasma FFC concentrations were determined using a validated HPLC/UV method (LLOQ = 0.10 µg/mL); a non-compartmental system was used for pharmacokinetic analysis.
Results - Maximum FFC concentrations were measured at 2-6 h post-dosing and ranged from 1.74 to 4.09 µg/mL. Subsequently, FFC concentrations slowly decreased until 120 h post-dosing to levels <LLOQ. Within 1 h after dosing, FFC concentrations by far exceeded 0.50 µg/mL, the MIC90 value of SRD target pathogens [1] and then remained above this value for 3 to 4 days. The mean terminal elimination half-life was 22 h. The inter-individual variability was low.
Conclusion - A single intramuscular injection of the new 450 mg/mL formulation at the dose of 30 mg FFC per kg led to rapid systemic absorption of FFC and a slow elimination which is compatible with a single shot dosage regimen.
[1] CEESA, Veterinary Pathogens Monitoring Program 2004-2006.

010 Fermented potato protein reduces pre-weaning mortality and improves IgG levels in just born piglets

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Objectives - Due to increased prolificacy, one of the main contemporary issues in sow reproduction is decreasing piglet birth weight. In weaker farrowing piglets, colostrum intake is even more essential to guarantee a healthy immune status. A low birth weight hampers the ability to suckle which will result in lower colostrum intake. Previous research has demonstrated that Lianol® Colostro, based on a highly digestible fermented potato protein, was able to significantly reduce neonatal piglet mortality. One of the hypothesis is that this new feedstuff stimulates the suckling behaviour of just born piglets. In the current trial this hypothesis is tested by determining the plasma immunoglobulin G (IgG) level and pre-weaning mortality.
Material and Methods - This trial was performed at Pig Innovation Centre, Sterksel, The Netherlands. A group of 504 piglets was divided into a control and a Lianol® treatment. The control group received 1ml tap water within 2 hours after birth and 1ml 12 hours later. The Lianol® group received Lianol® Colostro instead of tap water. At day 4, the plasma IgG content was determined with a DAS-ELISA test (Colostrum Quality CounterTM). Statistical difference between treatments were determined by general analysis of variance method. Pre-weaning mortality was monitored and difference between treatments were analysed by binomial regression analysis.
Results - The IgG level in piglets increase significantly ($P<0.04$) from 26.4 mg/ml in the control to 30.8 mg/ml in the Lianol® group. The pre-weaning mortality was 17.9 and 14.5% in the control and Lianol® group respectively. This difference was significant $P<0.06$.
Conclusions - A large number of natural complementary feed products have been screened over the years. This trial demonstrates that Lianol® Colostro is able to significantly improve the IgG level in just born piglets; as a result reducing the pre-weaning mortality.

011 CIRCOVAC piglet vaccination improves homogeneity of pigs and production parameters up to slaughter

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Objective - The primary objective of this study was to assess the impact of CIRCOVAC piglet vaccination (0.5 ml, one shot at weaning) on production parameters in fattening period and homogeneity of pigs at slaughter.
Materials and methods - A controlled, randomised and blinded trial was conducted under good clinical practice (GCP) in 2 Spanish farms affected by PCVD (clinical signs and high mortality rate from weaning to slaughter: from 8 to 12%); a total of 1239 pigs were included and vaccinated (N= 619) or injected with placebo (N= 620) at weaning. Piglets were weighed individually before vaccination, at entry into the fattening unit and the final weighing of all animals was performed prior to shipment of the 1st batch of pigs to slaughter (168 days and 189 days of age respectively in site A and site B). A Kruskal-Wallis test was used site by site to compare both groups on their growth parameters (average daily weight gain=ADWG). The homogeneity of bodyweight at slaughter was compared using a Fisher's test. Chi square test was used to compare frequencies of "small pigs" at slaughter.
Results - In site A, the growth performance of vaccinated animals during the fattening period was significantly higher than in control group (600 versus 590 g/d, p=0.0306). Furthermore, homogeneity of bodyweight of vaccinated pigs at slaughter was significantly better in pigs vaccinated with CIRCOVAC (p=0.008). The percentage of "small pigs" at slaughter (< 80 kg of bodyweight) was significantly decreased in the vaccinated group (-10.5%, p=0.006). In site B, CIRCOVAC vaccinated piglets had a better growth during the fattening period than the control group: 670 versus 710 g/d (p<0.0001).
Conclusion - CIRCOVAC piglet vaccination improves growth performance during the fattening period.

012 Individual Pig Care (IPC), a new management tool for improved responsible use of medicines

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The objective of this study was to validate a new management tool for swine farmers in Europe. A multicentric trial in 10 different herds – 7 in Germany and 3 in Spain - was rolled out in the last part of 2011 to evaluate a new management protocol to early identify sickness in nursery and in grower phase pigs.
The IPC method includes daily observations and reporting in a methodical manner. In total 7 nursery herds (2,000 animals) and 3 growing-finishing herds (1,600 animals) were monitored over a period of 3 months. Parameters evaluated included respiratory-, enteric-, lameness-, neurological and biting signs. Specific actions are linked to the severity of the observed symptoms including decisions on type and route of treatment methods. All the data are digitally collected and transferred to a protected server in 'real time'. This system allows for daily feedback and progress monitoring.
The preliminary results demonstrate that this method (IPC) when compared to traditional management on the same farms allows for significant reduction in mortality in the nursery phase (observations ranged up to 40% reduction in mortality) with a decrease of amounts of antibiotics used (observations ranged up to 47%), and an increase in average daily weight gain (observations ranged up 8 % in certain periods) with a body weight homogeneity improvement within pens.

013 PK/PD assessment of Strenzen (amoxycillin & clavulanic acid) soluble against porcine systemic and respiratory pathogens

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Objectives - The objective of the study was to compare the pharmacokinetics (PK) of amoxicillin (AMX) in plasma with the pharmacodynamics (PD) of AMX alone and in combination with the beta-lactamase (BL) inhibitor, clavulanic acid (CA), against a variety of porcine systemic and respiratory pathogens such as *Streptococcus suis* (Ss), *Pasteurella multocida* (Pm) and *Actinobacillus pleuropneumoniae* (Ap).
Materials and methods - PK – pigs were administered the product via the drinking water at a rate to give 20mg/kg bwt of AMX and 5mg/kg bwt of CA/day for 5 days (Ross, 2004). Blood samples were taken at every 3 hours during day 1 and day 5 to see if there was any accumulation. PD – MIC data of AMX alone and in combination with CA was used from the VetPath II data (2009) which reported on the MICs of 110 Ss, 135 Pm and 129 Ap isolates from across the EU.
Results - PK – The amoxicillin results were similar on day 1 and day 5 – Cmax, 0.83 & 1.06µg/ml, AUC 24h 8.09 & 7.43µg.h/ml and Css 0.34 and 0.31µg/ml (Css = AUC/24h). Plasma protein binding was 24% giving an effective net Css of 0.26 and 0.24µg/ml, respectively. PD – the MIC 90 for AMX ± CA against Ss was 0.06µg/ml; MIC 90 for AMX ± CA against Pm was 0.25µg/ml and the MIC 50 and 90 for AMX against Ap was 0.5µg/ml but for AMX + CA was 0.25 and 0.5µg/ml, respectively. All the Ap isolates with MICs of AMX >1.0µg/ml (5.4%) fell to MIC ≤1.0µg/ml with AMX + CA suggesting their resistance was associated with BL production.
PK/PD – the net Css exceeded the MIC 90 for Ss by 4 times and the Time >MIC was almost 20h. The net Css was bordering the MIC 90 for Pm and the Time >MIC 15h. Regarding Ap, the net Css reached the MIC 50 for AMX + CA at 0.25µg/ml.
Conclusions - The combination of AMX + CA should prove exceptionally effective against Ss. Regarding Pm, free-drug concentrations reached the MIC 90 and should prove effective. However, the net Css reached only the MIC 50 against Ap. Resistance to AMX by Ap appears to be associated with BL production and can be overcome by the presence of CA.
References:
VetPath II report (2009) Internal CEESA report.;Ross, V. (2004) Novartis (Lek) Report.

014 Effect of an acid blend, a phytochemical and a permeabilising substance on bacterial growth and pig performance

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The presence of bacteria in the animal's gastro-intestinal tract (GIT) comes at a cost as host and bacteria compete for nutrients and it was reported that as much as 6% of the net energy in the pig diet is lost to the microflora sometimes resulting in impaired growth. Thus, it was hypothesized that if bacteria can be combated more effectively this would also improve growth performance *in vivo*. Therefore, two experiments were conducted to investigate the effects of an antimicrobial mixture (AM; blend of organic acids and cinnamaldehyde) combined with a permeabilizing substance (Biotronic® Top3, BIOMIN, Austria) in vitro on the inhibition of bacterial growth and on growth performance of weaned pigs.
For the in vitro test a microplate assay was carried out. Synergistic effects on the growth inhibition of Salmonella enteritidis (21.4 vs 99.3%), Salmonella typhimurium (-1.1 vs 89.7%), *E. coli* O55:K59 (B5):H (19.5 vs 97.7%) and *E. coli* O128:H2 (1.9 vs 100.2%) were found when adding the permeabilising substance to the AM.
For the *in vivo* trial, 60 mixed gender pigs of the same breed and weaned at 28 days, weighing 8.72 (± 1.15kg) were used in a 56 day experiment. Pigs were either fed a standard diet or the standard diet supplemented with Biotronic® Top3.
Pigs fed the diet containing Biotronic® Top3 had a significantly ($P<0.05$) higher final body weight (3.37 vs. 35.6kg) and daily weight gain (517 vs. 481g).
Results indicate that bacterial growth can be inhibited more effectively by the addition of a permeabilising substance to an AM. This resulted in an improved average daily gain as most likely bacterial load within the GIT was reduced and less energy was lost to the microflora and available for growth.

015 Prevalence of Mycoplasma hyopneumoniae infections at weaning age in European pig herds

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Mycoplasma hyopneumoniae (M.hyo) is the primary pathogen of enzootic pneumonia, a chronic respiratory disease in pigs. Infections with *M.hyo* are highly prevalent in almost all swine-producing areas and the disease causes major economic losses to the pig industry worldwide due to the reduced performance and the increased use of antimicrobials. Moreover, *M.hyo* is also considered to be one of the primary agents involved in the porcine respiratory disease complex (PRDC). It has been demonstrated by several research groups that infections with *M.hyo* may already occur starting from 3 weeks of age, as demonstrated by the detection of *M.hyo* in nasal swabs by polymerase chain reaction (PCR) (Calsamiglia & Pijoan, 2000; Ruiz et al., 2003; Sibila et al., 2007; Fano et al., 2007; Villarreal et al., 2010). Recent studies have shown that tracheo-bronchial swabs may be 3.5 to 4.5 times more sensitive for the detection of *M.hyo* than nasal swabs (Marois et al., 2007; Fablet et al., 2010). The aim of the present study was to estimate the detection rate of *M.hyo* infections in European piglets around weaning age by the use of tracheo-bronchial swabs. The study started in January 2011 and to date, 150 pig herds in Belgium, France, Germany, Italy, the Netherlands, Portugal, and Spain were included. In each herd, tracheo-bronchial swabs were collected from 3- to 5-weeks-old piglets and tested for the presence of *M.hyo*, using PCR. To date, 64 out of the 150 tested herds (42.7%) and 175 out of the 3118 tested piglets (5.6%) tested positive for *M.hyo*. The minimum within-herd detection rate was 0.0% and the maximum within-herd detection rate was 90.0%. In conclusion, the present study confirmed that 3- to 5-weeks-old piglets may already be infected with *M.hyo*.

016 How to reduce antimicrobial use in pig production

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Objective - The objective of this study was to compare the use of antimicrobials (AM) against gastrointestinal diseases in weaner pigs in *Lawsonia Intracellularis* (Li) vaccinated and non-vaccinated herds.
Materials and Methods- The analysis was based on 20 Danish pig farms. Their selection was blinded in regard to the AM use. A number of 10 farms were vaccinating against Ileitis with Enterisol® Ileitis, while the other 10 farms were not. The groups were balanced by the factors PCV2 vaccination, farm size and managment level to reduce a potential distortion.
The AM cosumption of the selected herds was derived from the Danish "VetStat" database. The animal daily doses (ADD per 100 pigs and day) were calculated for the period Jul to Oct 2011. The average ADD over this period was compared and further split up into injectable and oral administration. The Mann-Whitney-U test was carried out to stastistically evaluate the data.
Results - Weaner pig herds vaccinated against Li showed a lower consumption than non-vaccinated herds for gastrointestinal disease related AMs (-6.0 ADD) as well as for all AMs (-5.3 ADD). The former difference was based on a reduction of -5.7 ADD in oral and -0.3 ADD in injectable AMs. On a relative basis Li vaccination reduced AMs prescribed for gastro intestinal diseases by 58% with a probability of 84%.
Conclusions - In this study, herds vaccinating against Ileitis showed a lower consumption of antimicrobials used for gastrointestinal diseases. Also the overall AM consumption was reduced, which indicates that the positive effect of Enterisol® Ileitis was not compensated by the use of other AMs, e. g. for respiratory diseases. The results suggest that preventive vaccination represents an option for farmers to reduce their antimicrobial usage.

Infectious

017 Estimation of time-dependent infectiousness of pigs infected by the Porcine Reproductive and Respiratory Syndrome virus (PRRSV): correlation with the viral genome load in blood, nasal swabs and the serological response

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Introduction - The objective of this study was to estimate the time-dependent transmission rate of Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) in experimental conditions together with the evolution of virological parameters and antibody response.
Materials and methods - Seven successive transmission trials involving a total of 77 specific pathogen-free piglets were carried out from 7 to 63 days post inoculation (DPI). PRRSV inoculated pigs were mingled successively with susceptible pigs at 7, 14, 21, 28, 42, 56 and 63 days post infection. Once mingled, they remained for 2 days with the seeders and were then returned to their original room to be monitored for PRRSV infection. The PRRSV statuses of the inoculated and contact pigs were monitored until 63 days postinoculation (dpi) using an in-house real-time RT-PCR in blood or nasal swabs to assess the PRRSV genome load.

Results - Virus genome in blood was detectable in inoculated pigs from 7 to 77 DPI, whereas the viral shedding was detectable from nasal swabs from 2 to 48 DPI. The infectiousness of inoculated pigs increased from 7 to 14 DPI and then decreased slowly until 42 days post infection (3, 7, 2, 1 and 0 pigs infected at 7, 14, 21, 28 and 42 DPI, respectively). Using those data, the time-dependent infectiousness was modelled by a lognormal-like function with a latency period of 1 day and led to an estimated basic reproduction ratio, R0 of 2.6 [1.8, 3.3].
Conclusions - This experiment showed that the viral genome load of the PRRS virus was shed up to 48 DPI and detectable in blood up to 77 DPI even in presence of neutralizing antibodies. However the probability of virus transmission strongly decreased after 30 DPI and became negligible after 48 DPI.

018 Torque Teno sus virus type 2 (TTSuV2) loads in serum are increased in the background of diseases affecting the immune system

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Introduction - To investigate whether Swine Torque teno sus virus type 1 (TTSuV1) and 2 (TTSuV2) viral loads are modulated by the presence of other concomitant viral diseases such as porcine circovirus type 2 associated diseases (PCVD) and classical swine fever (CSF).
Materials and methods - In the first study, serum samples from 45 pigs suffering from postweaning multisystemic wasting syndrome (PMWS) and 34 cases of porcine dermatitis and nephropathy syndrome (PDNS) were selected together with those of 34 age-matched healthy pigs. In a second study, 56 healthy pigs were challenged with a highly pathogenic strain of CSF virus (CSFV) and they were grouped into 4 categories based on their immune response to CSFV and clinical outcome (no, mild, moderate and severe clinical signs). These pigs were bled before the challenge and at the day of necropsy. Quantitative TTSuV1 and TTSuV2 polymerase chain reaction (qPCR) was used to analyze serum extracted DNA from both studies.
Results - TTSuV2 was highly prevalent in all studied groups while TTSuV1 showed lower prevalence. Significant differences were observed when comparing TTSuV2 viral loads in PMWS ($p<0.05$) and PDNS ($p<0.06$) affected animals with healthy animals. Such differences were not observed for TTSuV1. In CSFV infected animals only significant differences in viral loads were observed for TTSuV2 in moderate CSF overall outcome and when comparing this group to non-infected animals at the time of necropsy.
Conclusion - These studies indicate that TTSuV2 load in serum is up-regulated in PCVD and CSF, while this did not happen with TTSuV1. Obtained results suggest that immunosuppression may differentially affect the replication capabilities of TTSuVs.

019 Diagnostic perspectives on mesocolon edema syndrome of neonatal pigs: laboratory case incidence in the north central United States (2002-2011)

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Mesocolon edema syndrome (MES) is characterized by localized edema and inflammation of the mesocolon in pigs less than 2 weeks of age. The syndrome is strongly associated with toxin production by either *Clostridium perfringens* or *Clostridium difficile*. This study sought to quantify a perceived increase in the incidence of MES in our region, and to describe any differences between the prevalence of the two potential etiologic agents.
The ADRDL case data archive was queried for signalement, tests performed, and results within the date range of interest. Cases were assigned to a defined dataset that reported a presenting complaint of neonatal diarrhea, had colon submitted with the case as either part of the carcass or as a tissue sample collected in the field, and had been tested both by anaerobic culture of the colon to isolate *C. perfringens* and by antigen capture ELISA testing of colon homogenate to detect A and B toxins of *C. difficile*. The dataset was then analyzed for several comparisons, including overall and annualized case incidence rates.
Over a nine year period at our laboratory (2002 through 2011), 909 defined dataset cases of neonatal pig diarrhea were submitted. Overall, (a) MES had a laboratory case incidence rate of 45.7%; (b) 78.6% of MES cases featured the isolation of *C. perfringens* from affected colons, and (c) the presence of *C. difficile* toxins were detected by antigen capture ELISA in 20.1% of MES cases.
Annualized data analysis suggested that MES has become more prevalent as a cause of neonate pig diarrhea over this interval, and that this rise in prevalence has been due to an increasing presence of *C. perfringens*. This annualized data will be presented, along with a brief discussion of diagnostic methods, pathology, and control strategies.

020 Associations between mutations in L3 and 23 s r-RNA and minimum inhibitory concentrations of Pleuromutilins in 64 German field isolates of B. hyodysenteriae

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Introduction - As the causative agent for swine dysentery, *Brachyspira hyodysenteriae* (B.hyo) is responsible for severe mucohaemorrhagic colitis with considerable financial loss in woldwide swine production. Recent investigations show increasing resistance to Pleuromutilins, resulting from excessive medication and prophylaxis - often without adequate diagnostics. Pleuromutilin resistance involves alterations of the peptidyl transferase center (PTC) of the ribosomes and the ribosomal protein L3 by methylation and point mutation. Knowledge of the underlying molecular mechanisms would allow *B. hyo* diagnostics by PCR, leading to faster and more reliable results.
Material and methods - We studied the ribosomal protein L3 und sequences of the PTC of the 23 s r-RNA for mutation patterns and compared them to minimum inhibitory concentrations (MIC) of the according strains. We applied a set of 64 German field isolates of *B. hyo*, collected between 1990 and 2011. MICs were determined by broth dilution method.
Results - We identified four single nucleotide polymorphisms (SNP) in L3 and four SNPs in 23 s r-RNA of the 64 strains. Two of the L3 SNPs were significantly associated with MIC for Pleuromutilins. Combined, these SNPs explained 80 percent of MIC variation, with respect to a threshold of > 0,625 µg Tiamulin/ml.
Conclusion - Our promising results need support by further examinations in the field. Their confirmation would improve velocity and comprehensiveness of *B. hyo* diagnostics in favour of a more prudent use of antibiotics.

021 Vaccination reduces macrophage infiltration in bronchus-associated lymphoid tissue in pigs infected with a highly virulent Mycoplasma hyopneumoniae strain

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Mycoplasma hyopneumoniae shows a high genetic diversity between herds, but also within a herd and even within a pig. To better understand the mode of action of a commercial, adjuvanted, inactivated whole cell vaccine and the influence of diversity on efficacy of vaccination, we investigated samples from vaccinated and non-vaccinated pigs experimentally infected with either a low (LV) or highly virulent (HV) *M. hyopneumoniae* strain. Non-vaccinated and sham-infected control groups were included. Lung tissue samples collected at 4 and 8 weeks (w) post infection (PI) were immunohistochemically tested for the presence of T-lymphocytes, B-lymphocytes and macrophages in the bronchus-associated lymphoid tissue (BALT). The number of M. hyopneumoniae organisms in bronchoalveolar lavage (BAL) fluid was determined using quantitative PCR at 4 and 8w PI. Serum antibodies against *M. hyopneumoniae* were determined at 0, 2, 4, 6 and 8w PI. The immunostaining revealed a lower density of macrophages in the BALT of the vaccinated groups compared to the non-vaccinated groups. The highest number of *M. hyopneumoniae* organisms in the BAL fluid was measured at 4w PI for the HV strain and at 8w PI for the LV strain. Vaccination reduced the number of organisms non-significantly, though for the HV strain the reduction was clinically more relevant than for the LV strain. At the individual pig level, a higher lung lesion score was associated with more *M. hyopneumoniae* organisms in the lungs and a higher density of the investigated immune cells in the BALT. In conclusion, infiltration of macrophages after infection with *M. hyopneumoniae* is reduced by vaccination. *M. hyopneumoniae* replication in the lungs is also reduced in vaccinated pigs, though the HV strain is inhibited more than the LV strain.

Non-Infectious

022 Litter size at nursing and maternal parity did not affect future fertility in the gilt

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Objective - In gilt piglets the oocytes continue to mature untill day 35 after birth (1). Maternal parity and litter size during nursing may affect gilt piglet energy balance, and thus affect the subsequent fertility.
Material and methods - In a prospective study, 1246 gilt piglets were assigned to nurse in litters of 9 or of 13 piglets. Litter size was adjusted by transferring male piglets to or from the litter. The same piglets were used in a retrospective study, if litter size was affected by whether the gilt piglets were born to and nursed by a 1st or greater than 1st parity sow. Piglets were followed through sale to 18 herds, and litter size in first litter was obtained.
Results - 89 and 87 percent of born gilt piglets were weaned from litters of 9 and 13 piglets, respectively. The first litter size (total born) of the gilt offspring was registered for 621 farrowings. 14.7 total borm piglets were found both in gilts that were nursed in litters of 9 and of13 piglets. At birth gilt piglets born to 1st parity sows weighed 1.28 kg while gilt piglets born to a 2nd to 9th parity sow weighed 1.48 kg. Despite of this weight difference, both groups of gilt piglets gave birth to 14.7 total born piglets in their own first litter.
Conclusions - Female piglets nursing in a large litter will still achieve a good fertility. Even though 1st parity sows farrow lighter piglets, and feed these piglets less than older sows, this does not affect future fertility in the gilts from these litters.
1. Christenson, R. K.; Ford, J. J. and Redmer, D. A. 1985. Maturation of ovarian follicles in the prepubertal gilt. J. Reprod. Fert. Suppl. 33, 21-36.

023 Field evaluation of pig's heterogeneity: key points to understand our ability to evaluate pigs and consequences for herd management

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Objectives - As clinical perception of the evolution of the natural heterogeneity during rearing seems to vary between veterinarians, the aim of this survey was to evaluate how French veterinarians consider this evolution and what influences their perception of pig's heterogeneity.
Materials and Methods - During trainings in 2010, 64 experimented pig French veterinarians were asked how they perceive the evolution of heterogeneity from weaning to slaughter in a standard farm free of disease or management issues.
Results -

- Answer A, heterogeneity increases from weaning to slaughter:19 veterinarians
- Answer B, heterogeneity is the same along rearing:21 veterinarians
- Answer C, heterogeneity decreases from weaning to slaughter: 24 veterinarians

During rearing, the body weight standard deviation increases. Thus, the weight gap between light and heavy pigs increases as supported by many surveys. This gets people confused as human vision is unable to detect the standard deviation but rather detects the variance (standard deviation/average weight). As variance decreases from weaning to slaughter, the right perception of heterogeneity during rearing is actually answer C.
Conclusion - This survey demonstrates that perception of heterogeneity is a confusing clinical sign. It implies very practical consequences for practitioners. What ever a veterinarian has done on a farm, it's normal to get the feeling that heterogeneity decreases when piglets become older while this does not prove the efficiency of the applied strategy. Conversely, should an increasing heterogeneity be detected, it's clearly a strong clinical sign that something is getting wrong on the farm (disease or feeding or management issue).

024 Investigation of the relationship between biosecurity measures and production, health- and treatment-characteristics in pig herds

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Introduction - It is generally believed that biosecurity measures in pig production improve performance and health status of the pigs, and may thus decrease the need for antimicrobial treatments. However, limited quantitative data is available to support this hypothesis.
Materials and Methods - In the present study, 95 randomly selected closed pig herds were visited to quantify the biosecurity status of the herd by means of a risk-based weighted biosecurity scoring system. This score ranges from 0 (= total absence of biosecurity measures) to 100 (= perfect biosecurity). During the same visit, data concerning the herd, farmer and production characteristics and the use of antimicrobials (quantified as treatment incidences) were collected.
Results and Conclusions - The external biosecurity score (measures preventing pathogens from entering the herd) was on average 65/100 (min 45; max 89), whereas the internal biosecurity score (measures reducing within herd spread of pathogens) was on average 52/100 (min 18; max 87). The herd size was positively associated with the external biosecurity score and a negative association was observed between the internal biosecurity score and the age of the buildings as well as the experience of the farmer. These results indicate that biosecurity is generally better implemented in larger herds, in more modern facilities and by younger farmers.
A higher overall, external and internal biosecurity score had a significantly positive influence on daily weight gain of fattening pigs ($p<0.01$). Whereas the internal biosecurity was negatively associated with treatment incidence ($p<0.05$), indicating an improved biosecurity is associated with a reduction of antimicrobial drug use.
This study demonstrated clear associations between the biosecurity and both production and treatment characteristics in pig production.

025 Fear on the farm: management of an electronic feeding system in group housed gilts

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Introduction - In Europe, group housing of gestating sows will be obligatory from 2013 onwards. When using an electronic sow feeding system, technical knowledge is essential to prevent failure.
Case - A farmer with 530 sows experienced severe feeding problems for 8 years with his group housed gilts as soon as they were moved from training pens to the group. 50 % was afraid of the feeding station (FS); about 50 sows were housed in crates permanently because they refused entering the FS during multiple gestations. Maintenance was performed by an official company. We performed 24 h video analysis on the FS.
Observations at the FS - waiting rows, multiple gilts entering at the same time, gilts expelled shortly after entering, tail and nose biting, aggressive behavior towards FS, 95 % occupation time.
What went wrong? Presence sensors at the wrong place: gilts were too small to be noticed by the rear end sensor (near entrance door) and were not detected when the head was not in the trough (sensor 2), resulting in open doors. Feeding time was too short for gilts: before the meal was finished, doors opened already. Anxious sows were separated and a fence would prevent other sows using the FS so these gilts could enter.
As a result, time left for the other gilts to visit the feeder was reduced sometimes by 6 hours: the FS was over capacity. Mechanical blocking of the doors did not function properly, allowing tail and nose biting of gilts inside. Presence of a vertical feed dosator, rewarding aggressive behavior toward the FS with feed.
Take home message - FS need mechanical maintenance but software settings and management skills are also of major importance. Problems can be solved by good observation and understanding of behavior of group housed sows and management routines of a farmer.

026 Unusual peripheral hypomyelinating neuritis in growing pigs causing incoordination - A novel disease?

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Introduction: - An important function of livestock disease surveillance is early detection of new and emerging conditions. In this investigation, pigs presented with unusual clinical signs and neuropathology of unknown aetiology and pathogenesis meriting further investigation.
Description of cases (to include video footage) - In mid-2011, three pig units in England reported wide hind-limb stance with hind legs splaying outwards, straight hocks and a mild body tremor in 4-11 week old pigs. Limb movements were poorly coordinated and sometimes exaggerated with occasional fetlock knuckling. Pigs remained alert. Neuropathology identified a combination of ganglionitis and diffuse hypomyelinating radiculitis and peripheral neuritis, leading to both proprioceptive and motor deficits. Morbidity is low (maximum 2%) and mortality is due to culling of pigs too incoordinate to feed and drink. No virus was detected by microarray or electron microscopy. The pathology has been characterised in detail to help determine possible causes. An immune-mediated aetiology remains possible, as in humans with similar pathology (Guillain-Barre).
Discussion - This is a novel peripheral neuropathy in pigs, as yet of uncertain aetiology. Pig veterinarians in GB have been made aware and, as the clinical signs are unusual, the fact that no further cases have been submitted and no other affected units have been reported suggests the condition is not widespread and, at this stage, is of low impact. Prompt communication and investigation of unusual presentations that could represent the first cases of an emerging syndrome is desirable, although such investigations are demanding of limited resources emphasising the importance of collaborative efforts where disease is identified on multiple units.

Poster Session Abstracts

Welfare

P001 The number of treatments for lameness in growing pigs

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Lameness of pigs is a problem, which causes economical losses in pig industry in several ways: unplanned culling of animals, slaughter condemnations, treatment costs and extra labor. It is also a serious ethical issue.
The objective of this study was to examine the proportion of slaughter pigs treated because of lameness during their life. We wanted to find out also if the need for treatment recurs and if the risk for partial carcass condemnation due to arthritis is higher for pigs, which have been treated for lameness, than for non-treated pigs.
Materials and Methods - This prospective cohort study was conducted in privately owned integrated pig farms in Southern Finland. On each farm two litters were chosen on their birthday and they were individually ear marked. The pigs were managed normally on the farm. The farmers recorded all medical treatments and other interventions for each study pig from birth to slaughter. Meat inspection data were collected at the slaughterhouse.
Results: Altogether 25 pigs (14 %) were treated during their life, 20 of them because of lameness and 5 (3%) for other reasons. Four pigs were treated more than once. The study pigs were slaughtered on average at the age of 176 days (standard deviation +9 days, n=125). The average slaughter age differed by 9 days between treated (184 + 17 days) and non-treated pigs (175 + 9 days). Only 1 study pig was marked to have arthritis at the slaughterhouse. Altogether 29 pigs had some type of condemnation, mainly pleuritis. None of the condemned pigs had been medicated during their life.
Seven (28 %) of the medicated pigs either died or were euthanized at the farm. Among non-medicated pigs the number of deaths and euthanized was 11 (7 %).
Conclusions - Results indicate that many slaughter pigs are treated for lameness during their life. Preliminary results also demonstrate that lame pigs have high risk to die or to be euthanized.

P003 Design principles and practical evaluation of the PigSAFE free farrowing pen

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Concerns about sow welfare in farrowing crate systems are currently balanced by concerns about piglet survival in free pens. The PigSAFE (Piglet and Sow Alternative Farrowing Environment) system was designed as a higher welfare alternative for housing during farrowing and lactation, incorporating features to meet the biological needs of the animals and the practical needs of farm staff. It comprises a nest area with straw and piglet protection features, a heated creep, a slatted dunging area and lockable sow feeder. The system was evaluated over a one year period at 2 sites, allowing performance from a total of 140 PigSAFE (PS) farrowings to be compared with that of 164 contemporary sows farrowing in crates (C) under the same commercial management. At site A (minimal straw, liquid manure handling, staff with previous experience of non-crate farrowing), mortality of liveborn piglets until weaning (adjusted for net fostering, which was similar between treatments and with litter size as covariate) did not differ between systems (PS=6.6%, C=7.4%, sem 0.83). At site B (straw based, solid manure handling, staff with only crate experience), pen performance was initially poorer but improved over time to match that in crates, giving a batch x system interaction (P=0.02) and no significant difference between systems over the full period (PS=12.7%, C=10.6%, sem 2.28). Despite a trend towards higher litter weight at weaning at both sites, it failed to reach significance in either case (Site A: 80.5 v 77.9 sem 1.55 kg; Site B: 91.4 v 87.8 sem 2.35 kg). The PigSAFE system is therefore a promising commercial alternative to crates, but requires wider commercial testing. Staff training and experience will be important for successful implementation.

P004 Effect of housing system during pregnancy on welfare of gilts kept in farrowing crates and on offspring thermoregulation and performance

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While pregnancy stalls will be banned in the EU, farrowing crates will still be used. We aimed to study the effect of transition from loose housing during gestation to farrowing crates on gilt welfare and piglet performance. Ten stall-housed gilts (STALL) and 10 loose-housed gilts kept in groups of 10 (PEN) and their litters were monitored during farrowing and lactation in conventional farrowing pens. Cortisol saliva samples were obtained before farrowing from gilts. T4 hormone serum levels were collected from 2 piglets/litter at birth. Piglet rectal temperature was recorded 60 min (RT1) and 24 h (RT2) after birth. Piglet performance was monitored until weaning. PEN gilts tended to have higher cortisol levels 24 h after being moved to the farrowing pens (10.2±1.05 vs. 8.17±0.67 nM/l; P=0.070) tha STALL gilts. PEN piglets tended to have lower levels of T4 (6.75±0.393 vs. 7.91±0.479 µg/dl; P=0.078) and lower RT1 (37.0±0.29 vs. 38.1±0.25 ºC; P=0.007) and RT2 (38.3±0.08 vs. 38.6±0.08 ºC; P=0.026) than STALL piglets. PEN piglets had lower BW after 48h of life (1.39±0.021 vs. 1.47±0.031 Kg; P=0.008), lower BW at day 17 of life (3.74±0.340 vs. 4.37±0.286 Kg; P=0.028), and higher mortality from 48h post-partum until weaning (15.3±4.68 vs. 3.49±1.38 %; P=0.034) than STALL piglets. Transition from loose housing during gestation to farrowing crates may impair sow welfare and lead to stress, which may in turn compromise the piglet thermoregulatory capacity early in life. Lower thermoregulatory capacity may affect colostrum and milk intake during the first 2 days of life, with negative effects on weaning performance.

P005 Assessment of mechanical nociceptive thresholds in lame versus non-lame sows with two methods

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The aim of this study was to measure the mechanical nociceptive thresholds (MT) of lame and non-lame sows with two methods. Two groups of sows at the same gestation stage (G1, n=12, G2, n=8) from one pig herd were used. Gait was scored on a 150-mm tagged visual analogue scale (VAS); sows scoring > 30mm on the VAS were classified as “lame”. MT (defined as the force in Newtons driving a 1 mm pin that elicited a withdrawal response) was measured on the dorsal aspect of the metatarsus/metacarpus of each limb. A digital algometer driving a pneumatic actuator fixed to the leg (ProdPlus MT1, TopCat Metrology Ltd; actuator) was used. The measurements were also taken with the hand-held version of the same instrument (ProD-Plus, TopCat Metrology Ltd; probe). The average of 3 consecutive measurements was considered as MT for each limb with each method on each of 3 testing days. In G1, the average MT (N) of the four limbs (lame vs. non-lame sows) was 14.3 (6.1) vs. 13.7 (5.9) with the actuator and 10.5 (6.2) vs. 10.2 (6.2) with the probe. In G2, the average MT (N) was 14.8 (6.5) vs. 17.9 (6.1) with the actuator and 11.6 (5.5) vs. 17.4 (6.7) with the probe. The thresholds tended to be higher in the front than in the hind legs. The actuator yielded consistently higher MT than the probe (average difference = 3.2 N, P<0.001); therefore the methods should not be used interchangeably. There was low repeatability both within the same testing session and on different testing days with both methods (average SD of the difference = 7.9 N). Lame sows in G2 had a significantly lower (P<0.01) average MT than non-lame sows. This is in line with the findings of other studies on farm animals affected by lameness. There was no difference in G1.

P006 Impact of essential oils on ammonia and odour emissions of growing-finishing pigs

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Introduction - Ammonia negatively affects animal health and welfare. Aim of the trial was to determine effects of feed supplementation with essential oils (EO) on emissions and performance in growing-finishing pigs.
Materials and Methods - 32 pigs (♀ German Edelschwein × Landrace; ♂ Piétrain) were housed in 2 identical rooms (16 pigs/room) with controlled climate conditions. Pigs were assigned to 2 groups based on BW and sex (50% males and females): (1) Control vs. (2) EO supplementation (Biomin® P.E.P. MGE, grower: 150 g/t; finisher: 100 g/t). Pigs were fed ad libitum a diet based on corn, barley and soybean meal. Feed was changed from 'grower' to 'finisher' ration at an average BW of 75 kg. Temperature and humidity were recorded continuously by means of a combined sensor. Aerial gas concentrations were measured every 10 min using 2 electronic multi-gas detectors. Measurements of odor concentrations were carried out using an olfactometer on 4 days. All samples were evaluated by 2 teams with 4 test persons each. Results are indicated as OU/m³ (odor units).
Results - Supplementation with EO resulted in a 24.4% reduction in NH3 emissions. The average NH3 concentrations were 23.1 and 17.5 ppm in the Control and EO group, respectively. The highest values (36 ppm) were measured in Control group.
Odor emissions were decreased by EO supplementation by on average 29% (2882 vs. 4083 OU/m3) with differences reaching 38% in single cases. In general, the values determined in the present trial, ranging between 2400 and 5300 OU/m3, are in a range commonly observed in practice.
Average daily gain was 3.4% higher in the EO group (1068 vs. 1033 g) and FCR was 4.3% lower (2.46 vs. 2.57).
Conclusions - EO supplementation has potential to reduce emissions of ammonia and odor and had a positive effect on performance and feed efficiency.

P007 Oral meloxicam (Metacam®) improved sow welfare and piglet performance

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In previous field studies, IM administration of 0.4 mg/Kg bw of Metacam® 20mg/ml (Boehringer Ingelheim Vetmedica GmbH) has proven to be effective in the treatment of MMA. Metacam® increases the activity on the first few days postfarrowing of the sows. During the lactation period, many IM injections are performed on sows increasing the stress and the risk to develop post injection abscesses and cysts.
The aim of this study was to evaluate the convenience of a single oral administration of Metacam® 15 mg/ml oral suspension for pigs (BI Vetmedica GmbH) in sows and the effectiveness of this treatment protocol.
Material and methods - 45 sows from a Spanish herd were randomly allocated to two groups. One group was given Oral Metacam® directly into the mouth on the day of farrowing. Control group was not treated. To evaluate the treatment convenience a satisfaction questionnaire was provided to the farmer. The efficacy of the treatment was evaluated by comparing ADG, body weight (at 21d) and mortality parameters (n= 529 piglets).
Results - 100% of the sows in the Oral Metacam® group ate the product without any problem. High farmer satisfaction level was recorded following the use of Oral Metacam®. Mortality rate up was lower in the Oral Metacam® group (9.7% vs.11.26%). Piglets from treated sows showed a higher ADG (0,223 vs.0, 210 g; $p<0.05$), and weight (6,07 vs. 5,82 kg; $p<0.05$).
Conculsions - Oral Metacam® has been found to be a palatable product for the sow and easy for the farmer to administer. This new presentation will reduce the number of injections during the farrowing period and result in additional benefits for sow welfare. Regarding efficacy, Metacam®treatment in sows significantly increased the pre-weaning piglet ADG and the weight at 21days in the treated group.

P008 Immunological castration decreases aggression in male pigs co-penned with females in the late a fattening period

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Objectives - Compare the incidence of aggressive behaviour in vaccinated (immunologically castrated, IC) pigs compared to entire males (EM) when each is co-penned with females.
Material and Methods - A total of 144 pigs were distributed in 18 pens (each of 4 entire males and 4 females). In half of the pens males were vaccinated against GnRF (Improvac®, 36 animals) at 74 days of age and about 6 weeks before slaughter (152 days of age). Aggression was assessed from 1 wk before the second dose of vaccine by direct observation of aggressive interactions in 4 pens per treatment, 3 days per week for 20 min. Interaction types were classified (in order of severity) as mount, threat, lift, thrust (head knock), bite, chase and chase plus bite (7 categories). Injuries were assessed on individuals twice per week in 4 pens per treatment. Injuries were rated 0 to 3, depending on number of scratches in specific parts of the body (3 parts per side; total score per pig 0 to 18). Total interaction number and mean intensity were analysed by GLMM and injury score was analysed using LMM (SAS 9.2).
Results - Pens with EM showed more frequent ($P=0.013$) aggression with a tendency to higher intensity ($P=0.085$). Additionally, EM were mainly initiators of aggression, while in IC pens aggression was initiated equally by males and females. Furthermore, after the second dose of vaccine, pigs penned with EM had more injuries than pigs in IC pens ($P<0.01$).
Conclusions: Immunological castration decreases aggression in males co-penned with females.

P009 Effects of NSAIDs on pain, stress and discomfort in male piglets during and after surgical castration

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Introduction - Surgical castration of young male piglets is serious distress and impairment of animal welfare. Awareness of this problem has created the moral commitment to seek for practical and more humane alternatives. As one possible alternative, the application of analgesics has been installed in Germany as an interim solution by the QS system. However, effects of NSAIDs on pain, stress and discomfort during castration, and on the post-castration period are conflicting.
Materials and Methods - Piglets of 30 litters, each providing exactly one piglet for each of five treatments (sham castration: SC, castration without NSAID [Ca], or with an injection of Meloxicam [M] or Flunixin [F] at the time of castration or 30 minutes before castration [F-30]) were randomly allotted to the blinded treatments. Effects were compared based on cortisol levels, behavioural indices, vocalisation, and wound healing.
Results - There was no difference in vocalisation during castration in analgesic treated and untreated piglets. Both analgesics led to a significant impairment of behavioural indices and wound healing.
Conclusion: Analgesics can improve the welfare of piglets during the first part of the post-castration period. However, the benefits may be considered small and may not meet the requirements of the EU. Hence it is of high importance to prevent the interim practice of surgical castration of male piglets under analgesics from becoming implemented as a permanent condition in pig production.

Reproduction

P010 Partus induction and birth assistance as important factors in piglet production

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Introduction - During the last decades, pig breeding has focused mainly on the increase in piglet numbers, but has not considered birth characteristics appropriately. In this study, the possible association of partus induction and birth assistance with key figures of piglet production was investigated.
Material and Methods - Production data of 992 parturitions from 755 sows from three genetic lines, including birth assistance, partus induction and numbers of piglets born alive, stillborn and weaned piglets were analysed statistically.
Results and Conclusions - For 991 parturitions, the state of partus induction (yes/no), and for 984 parturitions the state of birth assistance was assessed. In 42% of cases, hormonal partus induction was applied. Litter size was lower in litters with partus induction (12.5 vs. 13.3, $p<0.0001$) than in litters without. Litters with partus induction showed minor numbers of piglets born alive (11.5 vs. 11.9, $p=0.03$) and less stillborn piglets (1.0 vs. 1.4, $p<0.0001$). The number of weaned piglets was not influenced by previous partus induction (10.5 vs. 10.5, $p>0.05$). Obstetric assistance was necessary in 28% of all parturitions. In total, litter size was not significantly associated with birth assistance (12.8 vs. 13.0, $p>0.05$). However, sows with birth assistance had less piglets born alive (11.2 vs. 12.2, $p<0.0001$), whereas the number of stillborn piglets was higher (1.5 vs. 0.9, $p<0.0001$). Consequently, the number of weaned piglets from litters with birth assistance was lower than from non-assisted litters (10.4 vs. 10.6, $p=0.01$).
Because of these results, partus induction, and birth assistance respectively should be considered more carefully and recorded in piglet production continuously. The possible use of birth assistance as a selection criterion in pig breeding will be evaluated in a further study.

P011 Piglet uniformity and survival in organic sows: effects of pre-mating nutrition

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Objectives - Organic sows have larger litters, but lower pre-weaning piglet survival than conventional sows. Two important factors in piglet survival are piglet birth weight and piglet uniformity, which are both negatively related with litter size. In conventional sows, with a strong catabolic state until weaning (at 24-28d), insulin-stimulating sow diets before mating can improve subsequent piglet birth weight and uniformity, probably by improving follicle development. We questioned whether this could also be the case in organic sows, with longer lactations.
Materials and methods - Organic sows (137 cycles; Raalte, The Netherlands) were fed a control diet during lactation and weaning-to-insemination interval (CON), or an insulin-stimulating diet (sucrose plus lactose, both 150g/d) during only the weaning-to-insemination interval (WII) or during the last two weeks of a 41±4d lactation and the weaning-to-insemination interval (LAC+WII). Piglets (live and stillborn) were weighed individually within 24h after birth.
Results - For CON, WII and LAC+WII, litter size was 17.0, 17.2 and 17.8 total born ($P=0.53$), piglet birth weight was 1.28, 1.29 and 1.23kg ($P=0.48$), CV of birth weights was 23.4, 22.6 and 23.3% ($P=0.79$) and pre-weaning piglet survival was 72.8, 72.8 and 76.9% ($P=0.33$), respectively.
Conclusions - Pre-mating insulin stimulating diets did not improve piglet uniformity in organic sows. These sows have longer lactations and may switch to an anabolic state during the last weeks of lactation, and thus probably have a better follicle development at weaning (as reflected by larger litters) compared with conventional sows. Thus, pre-mating insulin-stimulating diets only seem beneficial in sows with a compromised follicle development at weaning, related with catabolic state.

P012 Characterization of "second parity syndrome" profiles and associated risk factors in French sow herds

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Reproductive disorders in sows often occur at high frequency after the first weaning, with subsequent detrimental effects. "2nd parity syndrome" (P2S) includes various signs: delayed estrus, infertility and small litters. The aim of this study was to evaluate the occurrence of these different components, and to identify associated factors at herd and individual level. Analysis was performed on 2008 data (National Pig Management database) for 842 herds and 42,000 primiparous sows. Fertility problems, delayed estrus (> 7 days) and small litters (<11 total born piglets) occurred respectively in 16, 13 and 19% of primiparous sows, with 21% exhibiting a severe reduction in 2nd litter size (>20% fewer total born piglets). At herd level, profiles were characterized using threshold values for average 2nd parity results: fertility to 1st service <85%, reduction in total born piglets ≥0.2, and weaning to insemination interval >7 days. At least one of these problems occurred on 80% of the farms, but one or two signs together (fertility and/or estrus) was a more frequent occurrence (40% herds) than the full syndrome (<10% herds). Logistic analysis identified factors associated with P2S components, at sow level: delay between arrival and1st insemination, 1st parity litter size and fertility, 2nd litter conceived to 1st service, season to 1st weaning; and at herd level: herd size, batch management, 1st parity performance, fostering. This study confirms that P2S is still a frequent problem, but with various manifestations. Because risk factors may not be the same for all these components, prevention may benefit from the identification of P2S profiles.

P013 Supplementing new born piglets with 50 ml sow colostrum failed to influence piglet survival

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Objective - To investigate the effect of supplementing newborn piglet sow colostrum. After birth piglets face the challenge of ensuring colostrum to cover their needs for energy and immunoglobulin's. With continuing increase in litter size, the risk that the sow does not produce enough colostrum increases. Thus a supplement of sow colostrum may increase piglet survival.
Material and methods - In one herd, 431 piglets in 27 litters were weighed and earmarked. Time of birth and birth order was registered. Every second piglet in the litter was given 25ml sow colostrum six hours and again nine hours after birth, by tube feeding. At 8am/pm a blood sample was taken of every piglet more than 18 hours old. Day 7, 14 and 21 the piglets were weighed. Piglet dying the 21 days were post mortem examinated.
Results - Supplement of sow colostrum did positively affect the IgG concentration in piglets serum from 32 to 34 mg/ml. Piglets with a birth weight below 1.1 kg had a increase of from 28 to 34 mg/ml and piglet born in a litter of 18 piglets an above increased IgG in serum from 31.5 to 34 mg/ml. The supplement with sow colostrum thus reduced the number of piglets with a low IgG concentration in serum, however it did not significantly effect piglet mortality.
Conclusions - Supplementing piglets with sow colostrum did increase IgG level in piglet blood significantly, but did not increase piglet survival.

P015 Weaning management practices associated with sow reproductive performance in commercial pig herds

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To achieve optimal performance, sows need to become pregnant as soon as possible after weaning. The aim of this study was to investigate management practices at weaning and to identify factors associated with reproductive performance. A questionnaire, pertaining the management and sow reproduction records, was administered to 76 randomly selected pig herds in Belgium. The associations between the herd factors (independent variables) and reproduction parameters (outcome variables: weaning-to-estrus interval (WEI), repeat breeders (RB), conception rate (CR) and farrowing rate (FR)), were evaluated by means of general linear models. The results of the multivariable models showed that separated breeding and feeding of the gilts and the finishing pigs from 60kg onwards was associated with a shorter WEI (p=0.03), than when they were housed together until 110kg. The highest CR was related to AI practised 0h or 12h after detection of estrus (p=0.01) and applied twice with a 24h-interval (p=0.02). Separated housing of newly weaned sows from pregnant sows had a beneficial effect on CR and RB (p<0.01). Providing light (>200 lux) in a 16-18h schedule improved CR (p=0.03), compared to housing weaned sows in daylight or 24h-light-schedules. Using semen for >4d after collection, instead of fresh semen (p=0.01) and practising estrus stimulation with the boar only 1x/day instead of ≥2, increased RB (p=0.03). Performing pregnancy diagnosis >1x/gestation was associated with a higher FR (p=0.01). FR was also higher in larger herds (p=0.04) and in herds spending more time for estrus detection (p=0.01). In conclusion, the results demonstrated that different management practices that can be implemented rather easily by the pig producer, may improve sow reproductive performance.

P016 Effect of a GNrh analogue (Maprelin®) on estrus and reproductive performance in gilts and sows

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GnRH is a key regulator for growth, maturation and ovulation of follicles in sows. The present study investigated the effect of l-GnRH-III (Maprelin®) in gilts after altrenogest treatment and in sows post weaning on stimulation of estrus, weaning-to-estrus interval (WEI) and estrus duration (ED). Three pig herds with more than 500 sows and an average WEI of more than 5 days were enrolled. Within each age group, animals were randomly allocated to three treatments: 1 ml of physiological saline solution (control=C-group); 1.000 IU PMSG (Folligon®=F-group) and Peforelin (150 µg in gilts and pluriparous sows, 37.5 µg in primiparous sows; Maprelin®=M-group). Animals were injected IM 24h after weaning (sows) or 48h after last altrenogest treatment (gilts). The WEI (sows), last altrenogest (20 mg/d for 18d, Regumate®) treatment-to-estrus interval (gilts; AEI) and ED were assessed. Statistical analysis was done using the analysis of variance. The mean WEI and ED of all sows (n=1647) were 125.8 and 42.9 hours, 139.6 and 41.2 hours, and 122.4 and 41.6 hours for the C, F and M-group, respectively (P=0.01). Parity significantly influenced WEI (P=0.01) but not ED (P>0.05). In gilts (n=233), mean AEI and ED were 143.5 and 37.2 hours, 145.9 and 36.5 hours, and 148.8 and 38.2 hours for the C, F and M-group, respectively (P>0.05). In primiparous sows (n = 317), it was 133.3 and 38.4, 164.8 and 37.1, and 155.7 and 38.6 hours for the C, F and M-group, respectively (P>0.05), while it was 124.4 and 43.9, 133.5 and 42.2, and 113.5 and 42.3 hours, respectively, in pluriparous sows (n=1330) (P<0.01). In conclusion, the results show that the WEI was shorter in pluriparous sows that were treated with Maprelin®. No differences in ED were found.

P017 Factors associated with piglet uniformity

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Objectives - Piglet uniformity is an important factor affecting pre-weaning piglet mortality. Piglet uniformity is negatively related with litter size, but other factors affecting piglet uniformity are poorly described. Piglet uniformity is affected by parity (Quesnel et al. 2008, Animal 2, 1842), but this may be related with litter size differences among parities. We studied effects of parity, genetic line, season of insemination and repeat breeders on piglet uniformity at birth.
Materials and methods - At the IPG research farm, uniformity of piglets (birth weight CV of total born) of 2,129 litters (>4 total born, weaning-to-insemination interval ≤7d, non-repeat breeders) was measured, and analyzed with a mixed model including parity, genetic line, season of insemination, total number of piglets born and sow (random). In a separate dataset, piglet uniformity of repeat breeders (n=177) was compared with non-repeat breeders, using the same model.
Results - Birth weight CV was affected by litter size (β=0.8% /piglet, P<0.01) and by parity (19.8, 20.9, 21.5 and 23.1% for parity 1, 2, 3+4 and ≥5, P<0.01), genetic line (20.8 and 21.8% for Topigs20 and Topigs40, P<0.01) and season of insemination (21.3, 22.0, 21.6 and 20.4% for spring, summer, autumn and winter, P<0.01). Birth weight CV was lower in repeat breeders (19.7%) compared with non-repeat breeders (21.3%, p<0.01). Conclusions - Piglet uniformity differs among parities and genetic lines, in addition to litter size differences. The finding that piglet uniformity is improved in repeat breeders suggests that the pre-mating period can influence piglet uniformity. Therefore we are now studying whether and how previous lactation characteristics (such as lactation length, lactational body weight loss) affect piglet uniformity.

P018 The use of trans-abdominal B-mode ultrasonography to assess uterine involution in sows: validation of the technique

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The present study was performed on 20 culled Belgian Landrace sows bred in the same herd. The objective was to validate ultrasonography as a technique to assess uterine involution by comparing post-mortem measures and live animal ultrasonography measures recorded on-farm. The day before slaughter, a trans-abdominal B-mode ultrasonography (5 MHz micro-convex probe) was performed to measure three uterine parameters: maximum uterine height, diameter of uterine horns and presence of intra-luminal uterine fluid. After slaughtering, the uteri were cut off 1 cm before the bifurcation. Uterine volume and weight and length and width of horns were measured. The maximum uterine height (8.2 ± 1.3 cm) was positively correlated with uterine weight (1467 ± 696 g), uterine volume (1467 ± 688 ml), and width of horns (3.8 ± 1.1 cm) (p<0.05). The diameter of the uterine horns (1.5 ± 0.7 cm) was positively correlated with uterine weight and uterine volume (p<0.01) and with width of horns (p<0.001). These results, though performed on a small number of animals, suggest that ultrasonography may be a useful technique in assessing uterine involution in sows. To detect any retarded uterine involution could allow the detection of uterine infection. Early treatment or culling decision could then be taken in a way to reduce nonproductive days.

P019 Ghrelin in the perinatal development of runt and normal weight piglets

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Objectives - Intrauterine growth retardation (IUGR) results in increased perinatal mortality and increased incidence of the metabolic syndrome in adulthood. A possible relationship between IUGR and ghrelin, an orexigenic peptide that stimulates growth hormone and gastric acid secretion as well as gastrointestinal (GI) motility is suggested by its presence in foetal blood especially in IUGR human fetuses. So, we compared the density of gastric ghrelin cells (GC) and serum ghrelin levels in IUGR pigs with their normal weight (NW) littermates.
Material and methods - Fetal- (PF; d90-105 of gestation) and postnatal pigs (d0, d3, d10, d28) were assigned IUGR or NW according to body weight. Each age group contained 5 pairs of pigs (gender-matched). Gastric fundi were processed for IHC. Stereological volume densities (Vv) of GC were analyzed by GLM. Serum ghrelin levels were measured by RIA.
Results - The perinatal GC density is similar in IUGR and NW pigs, except at d0, where NW have higher Vv. The GC Vv in postnatal NW and IUGR groups showed an age-dependent increase. Preliminary data of postnatal serum ghrelin levels confirms data from literature.
Conclusion - The similar GC densities in IUGR and NW pigs correspond to similar ghrelin levels in IUGR and appropriate for gestational age (AGA) infants reported earlier. The age-dependent increase of the GC Vv in postnatal NW and IUGR pigs suggests an extra-uterine metabolic role for ghrelin. The significant postnatal increase of GC in NW can be explained by the increasing number of tasks postnatally i.c. regulating gastric acid secretion and food intake. This increase is not observed in IUGR pigs, probably because the newborn stomach is still immature. However, at d3 this temporary difference between IUGR and NW pigs disappeared.

P020 Analysis of selected biochemical components in boar seminal plasma and their relation to semen quality

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Selected boar seminal plasma (SP) components and their relation to semen quality were investigated. Thirty nine boars from 3 artificial insemination (AI) centers were divided ingroup A (GA: >80% normal sperm and >70% motility) and group B (GB: <80% normal sperm and <70%motility). One ejaculate/boar was collected and semen volume, concentration, sperm motility (CASA), morphology and vitality (eosin nigrosin staining) were investigated. The SP was separated and analyzed for activities of aspartate-amino-transferase (AST), g-glutamyl-transferase(GGT), alkaline phosphatase (ALP) and for concentrations of sodium (Na), potassium (K), chloride (Cl), calcium (Ca), phosphate (P), magnesium (Mg), selenium (Se) and zinc (Zn). The activity of GGT (r=-0.482) and ALP (r=-0.459) ($p<0.05$) was moderately associated with ejaculate volume and strongly associated with concentration (r=0.580 and r=0.618 respectively; p=0.000). Moderate associations ($p<0.05$) were found between ALP (r=0.439), GGT (r=0.387), Na (r=-0.428), K (r=0.354) and Se (r=0.354) with progressive motility. The SP concentration of Na (r=-0.401), Cl (r=-0.521) and K (r=0.350) was associated ($p<0.05$) with normal morphology. Only Mg was associated ($p<0.05$) with membrane damage (r=-0.335). In addition, a moderate association ($p<0.05$) was found between AST (r=0.481), ALT (r=0.353), K (r=0.421), Cl (r=-0.500) and Zn (r=-0.398) and strong between Se (r= 0.628; p= 0.000) with days to previous collection. Concentration of Na, Cl and Zn (1681.0 vs. 1701.0 µg/dL) was different between groups ($p<0.05$). In conclusion, several biochemical components of SP were related to semen quality and days to previous collection. The analysis of biochemical parameters could therefore provide extra information about reproductive health of AI boars.

P021 Urinary acidifiers to reduce urine pH and leucocytes

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Urinary tract infections (UTI) can be found in individual sow herds in high numbers. UTIs are caused by *E. coli* and especially in the case of asymptomatic bacteriuria as one form of UTI bacterial growth takes place in the urine. Therefore, urine is an important factor in the prevention of UTI and it might be hypothesised, that reducing urinary pH creating unfavourable conditions for the growth of pathogens will lead to a reduction in UTIs. A trial was conducted at the Instituto Internacional de Investigación Animal in Mexico using two groups of 69 sows each. The trial lasted for 32 days, starting at day 108 of gestation up to insemination. Sows were fed common commercial diets and sows assigned to the experimental group were fed a mixture of phosphoric acid, anionic substances and cranberry extract (Biomin pHD, BIOMIN Holding GmbH, Austria) as top dressing at 20g per sow and day. Urine pH and leukocytes were measured at the beginning of the experiment, at farrowing, weaning and insemination. Urine pH as well as leucocytes were significantly decreased ($P<0.05$) in the experimental group at farrowing, weaning and insemination. The presence of leukocytes in urine indicates inflammation of the kidney and the urinary tract. Their significant reduction in the current experiment indicates a reduction of inflammation of kidney and urinary tract usually caused by pathogenic bacteria such as *E. coli*. This reduction was most likely caused by the reduction in urine pH below 6. Therefore, it can be assumed that the occurrence of UTI is less likely resulting in improved reproductive performance of the sows such as shorter weaning to oestrus intervals and reduced repeated breeder, which was also seen in the performance data collected on a regular basis on the farm.

Veterinary Public Health

P022 An innovative long acting florfenicol formulation for the treatment of swine respiratory disease

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Introduction - The efficacy of single-dose therapy with a long-acting Florfenicol 300mg/ml suspension for injection (Florgane®) in the treatment of acute Swine Respiratory Disease was evaluated in a blinded, multi-centre field study in Germany and Italy.
Materials and methods - Three groups of diseased pigs (weaner, fattening) were treated on D0 either by one single I.M. injection of the suspension at 22.5 mg/kg (n=103) or 30 mg/kg (n=104), or by conventional therapy with a Florfenicol solution for injection given twice I.M. at 15 mg/kg 48 h apart (Control; n=103). Respiratory parameters scored prior to treatment for inclusion (D0), from D1 to D7 to determine treatment success and from relapses between D8 and D21±1 were: depression, respiratory symptoms (respiratory pattern, coughing, nasal discharge) and rectal temperature. Groups were statistically compared by the Wilcoxon-Mann-Whitney-U Test.
Results - Respiratory pathogens identified by bacteriol. examination were *A. pleuropneumoniae*, *P. multocida*, *H. parasuis*, *B. bronchiseptica*, *Streptococcus spp.* and *A. pyogenes*. Treatment failures (D7) and relapses occurred in 20.39% and 8.54% of animals treated with the suspension at 22.5 mg/kg, in 26.92% and 6.58% of animals treated with 30 mg/kg and in 21.36% and 2.47% of control animals. Single I.M. doses of Florgane® of 22.5 and 30 mg/kg were equally efficacious with respect to treatment success and relapse rate and both single-dose regimens were non-inferior to conventional two-dose therapy with the solution.
Conclusions - Applying the principle of the lowest 'efficacious dose', the optimum dose for the suspension is 22.5 mg/kg once I.M.. Benefits of single-dose over repeat-dose therapy result from reduction of workload and animal stress and easing of correct administration.

P023 The yellow card initiative in Denmark - Its effect on the consumption and choice of antimicrobials

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Introduction - In 2010 the Yellow Card initiative was developed by the Danish Veterinary and Food Administration, target-ing pig farms with the highest consumption of antibiotics. Farms exceeding the regulatory limits are subject to injunctions to reduce their use, increased monitoring by government officials and to various fees.
In July 2010 first warnings were sent to farmers with an antimicrobial use close to the regulatory limits. Unless actions were taken they would receive a Yellow Card in December 2010. In December 2010 the first Yellow Cards were issued, ordering a reduction in antibiotic consumption below the maximum limits within 9 months.
The objective of the study was to evaluate the effect of the Yellow Card Initiative on the consumption and choice of antimicrobials.
Materials and Methods - Descriptive analysis of data from the monitoring system for antibiotics in livestock (VETSTAT) was per-formed.
Results - The warning resulted in a decrease in the national use in pigs of 12.5 % during the last half-year of 2010 com-pared to the same half-year in 2009. Between January and June 2011 the consumption was 25 % lower than for January to June 2010. Flock medication became significantly less common, and the use of injectables surpassed the use of water medication. Further results will be presented.
Conclusions - The Yellow Card initiative led to a decrease in antibiotic use in the Danish swine production to a very low level, and significantly less flock medication. However, it still needs to be evaluated if the decreased con-sumption had an impact on animal health and welfare as well as on the level of antimicrobial resistance.

P024 Boar taint: Ability of official veterinarians and auxiliaries to perceive androstenone and/or skatole

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In December 2010, EU pig producers and stakeholders signed a European Declaration on alternatives to surgical castration of pigs. With this voluntary initiative, the European pork industry pledged to end pig castration by 2018. For starters, the declaration announces the end of surgical castration without anaesthesia of piglets in the EU from January 1, 2012 onwards. Currently, boar taint in non-castrated male pigs can only be avoided by slaughtering pigs at a younger age, which is economically unviable, or through vaccination using Improvac® (Pfizer Animal Health). Improvac® is composed of a synthetic GnRH-analogon conjugated to a carrier protein. Schmoll et al. (2009) demonstrated that vaccination of boars against GnRH reliably controls boar taint. Nevertheless, off-flavours in pigs may still occur, especially if the timing of the vaccination deviates from the prescribed vaccination scheme. For that reason, the development of a harmonised method to detect boar taint at the slaughter line under commercial conditions and effective training methods as they are required to enable official veterinaries and auxiliaries to identify unpleasant off-flavours are the two key factors for a successful introduction of meat from non-castrated animals on the market.
92 official veterinarians and auxiliaries (55 females, 37 males) underwent a specially designed triangle test which examines a probands ability to smell androstenone and skatole. The analysis of the results showed that only approximately one third of the probands was able to smell both components, with women making up the majority of this group.

P025 Efficacy of Pracetam® 20% oral solution in swine in the treatment of an episode of acute respiratory disease in comparison with an antibiotic and placebo

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Introduction - A GLP-complying field trial has been performed on a French farrow-to-finish farm, with the aim of assessing the interest of the use of paracetamol in the context of an acute influenza-like episode.
Materials and Methods - Among 103 fatteners presenting with an influenza-like syndrome (rectal temperature >40°C, depression and respiratory signs), 68 were included in the trial. They were randomly allocated to one of the three groups: one group was orally treated with doxycyclin for 5 days (10 mg/kg/day), the second with paracetamol for 5 days (60 mg/kg/day) and the third with a placebo. The animals were monitored twice a day. Several criteria were followed: clinical signs, body temperature, number of new cases of ill pigs, number of individual complementary treatments.
Results - The group treated with paracetamol presented a significantly faster drop in rectal temperature at the start of the treatment and the placebo group remained at a higher rectal temperature average on the 5th day of treatment. Thus, the global course of the rectal temperature decrease was significantly different between the three groups ($p = 0.033$). As soon as D0 pm, a significant decrease temperature was observed in the paracetamol group in comparison to the other groups ($p = 0.018$).
Conclusion - The results give evidence that the administration of an antibiotic treatment for influenza-like syndrome in a conventional herd does not provide a higher clinical benefit as compared to paracetamol. This is not a surprise since antibiotics are proven ineffective against viruses but this is relevant in the present context where every antibiotic prescription to farm animal should be questioned, and where alternative treatments should be promoted.

P026 Internet based checklist for the risk assessment of Salmonella control in finishing pig herds, abattoirs and cutting plants

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Introduction - An internet based risk assessment and advisory tool for the control of *Salmonella* was developed. The objective is to assist in the risk management of *Salmonella* in finishing farms, abattoirs and cutting plants. The intended users are veterinarians, persons responsible for quality control, and advisors.
Materials and Methods - Existing SOPs and expert opinions were used to compile three different checklists that are dynamically programmed in a MySQL database. Basic requirements and specific control measured are checked, resulting in over 100 multiple choice questions per questionnaire. A panel of international experts contributed to a scoring system that weighs the given answers relative to their impact on *Salmonella* control.
Results and discussion - The German, Dutch and English checklists can be found at http://sg.ytally.com. A pass word and login are required to guarantee privacy and data protection, and can be freely obtained through a simple registration procedure. New data entry can be made by entering a name, a herd or premises number and a date. After finishing the checklist, the total weighed score is given under results. For each answer that is not optimal, advice for improvement is given. A pdf can be made for correspondence with the owner of the location. Multiple checklists can be filled out in connection to the same location by using a different date. In this way progress in implementing *Salmonella* interventions and hygiene measures can be monitored within a timeframe. Since the workshop at the SafePork 2011 conference, advice of the international expert group on the scoring system was implemented, and real live herd, abattoir and cutting plant data were entered to validate the checklists and scoring system. The progress and validation results will be presented.

P027 Trends in sales of antimicrobials for pigs in Sweden

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Introduction and Objectives - Antimicrobial resistance has emerged as a crucial issue in animal and human health. Disease prevention is paramount in reducing the need for antimicrobials. However, when antimicrobial treatments are required, it is of outmost importance that antimicrobials are used judiciously. The aim of this study was to identify the trends of sales of antimicrobials for use in pigs in Sweden.
Materials and Methods - In Sweden, veterinary medicinal products must be dispensed by pharmacies. All pharmacies deliver data on sales of veterinary medicinal products, including target animal species as given on the prescription, to a government owned company (Apotekens Service AB). For the present study sales of antimicrobial products for systemic and for intestinal use (ATCvet codes QJ01 and QA07AB) for the years 2006-2010 were extracted. The sales figures were calculated to kg active substance and products were categorized as for individual animals or for groups of animals in water or feed. To correct for changes in animal numbers, data were expressed as mg active substance per kg live weight.
Results and Conclusions - The sales of products for use in individual pigs, mainly injectables, increased by 23% during the study period. In particular, use of benzylpenicillin increased and was 61% of all sales of antimicrobials for use individual pigs in 2010. The sales of tetracyclines, macrolides and pleuromutilins for medication of groups of pigs decreased by 37, 50 and 61%, respectively. A shift from medication of groups of animals via feed or water towards medication of individual clinically diseased animals, preferably with narrow spectrum antibiotics such as penicillin, is well in line with the rational and prudent use of antimicrobials.

P028 Cost-effectiveness of Salmonella control strategies along the pork supply chain

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Objective - *Salmonella* is a main concern in public health and pig products can be at risk for human infection. This study aims at developing a tool useful for decision making process regarding *Salmonella* control measures throughout the pig supply chain. The main levels considered are farm, transport-lairage and slaughtering process.
Materials and Methods - A mathematical model has been developed in order to determine the influence of control measures implemented at several steps during the supply chain on the *Salmonella* prevalence on carcasses at the end of the slaughtering process. The model is parameterized using the outcomes of epidemiological models as well as expert knowledge. Using economic parameters, mathematical simulations (Monte Carlo simulations) are then performed to determine which measures implemented at which step(s) are the more cost-effective for *Salmonella* control. The performed cost-effectiveness explicitly includes a *Salmonella* prevalence target to achieve at the end of the slaughtering process.
Results - To illustrate this approach, a numerical application is given. Simulation results enabled us to highlight the incidence of the heterogeneity of *Salmonella* prevalence between batches of slaughter pigs on the choice of an intervention strategy. For each considered strategy, the probability to overcome the prevalence target can also be assessed.
Conclusion - This study enabled us to develop a flexible tool, which can be parameterized to take into account the diversity of field situations (levels of *Salmonella* infection, slaughter processes). Il can also be adapted to specific stakeholders' needs for instance by ex ante assessing incentive systems.

P029 Preliminary results on prophylactic and curative antimicrobial usage on 20 pig herds and advices on improvement

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Introduction - Between January and August 2011 data on antimicrobial usage and herd management characteristics were collected retrospectively on 20 herds. The aim of the research was to promote prudent antimicrobial usage and optimize herd management.
Materials and Methods - Antimicrobial usage was calculated with the ABcheck (www.abcheck.ugent.be), using treatment incidences (TI) as the quantifying value.
Results and Conclusion - Average total TIADDpig for reproduction animals was 63.8 (0.2 - 279.5, 42% prophylactic). For suckling piglets and weaners 237.1 (1.6 - 770.9, 68% prophylactic) and for finisher pigs 118.9 (0 - 648.9, 28% prophylactic). In suckling piglets only three antimicrobial classes were used, all parentally administered; macrolides (tulathromycin 13%, TIADDpig 80.9), aminopenicillin (amoxicillin 31%, TIADDpig 173.0) and cephalosporins (ceftiofur 56%, TIADDpig 513.6). In weaners and finishers all used antimicrobials were administered orally, with amoxicillin (31%, TIADDpig 637.1) and colistin (34%, TIADDpig 710.6) for the weaners and doxycycline (67%, TIADDpig 232.5) for finishers as main antimicrobials.
Reliable slaughterhouse findings were available from 11 farms, with on average 6.6% of the lungs affected, 2.8% showed pneumonia/fissures, 2.6% pleuritis and 5.7% of the livers showed white spots lesions.
Most advices were given on "general" biosecurity and management measures such as: washing of sows, cleaning and disinfection and personal hygiene. Also supplemental vaccinations and frequent follow up were advised.
Higher awareness on the necessity of prudent antimicrobial usage was advised. A switch from prophylactic to curative treatments was strived for as well as less use of (WHO) critically important antimicrobials.
In the follow up of this study, the effect of given advise, relations between production parameters and antimicrobial usage will be studied.
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P030 MRSA prevalence and spread between livestock species

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Methicillin-resistant *Staphylococcus aureus* (MRSA) has emerged in productive livestock. In this study, 6 farms were investigated on the presence of MRSA, 2 one-species pig farms and 4 multi-species [2 poultry-pig and 2 dairy-pig] farms. The aim of this study was to evaluate MRSA prevalence in different pig age categories, to study MRSA contamination in barn environment and to determine possible spread to other livestock species.
From 1934 pigs nasal samples were collected. In addition: 75 broilers, 44 dairy cows, 9 farmers and barn environment were sampled. All samples were screened for MRSA. A selection of 358 MRSA isolates were included for further characterization by spa-typing.
Pre-weaning prevalence was low on one-species farms (<20%) compared to multi-species farms (>55%). Post-weaning prevalence ranged between 74% and 100%. In fattening pigs, the prevalence was still high on all farms (51%-86%). In sows MRSA was detected in very low numbers (<3%) on one-species farms in contrast to multi-species farms (>55%). Furthermore, MRSA was found in broilers (19%) and in dairy cows (59%) and 8/9 farmers were MRSA positive. In the environment MRSA was isolated in barns with a high number of MRSA colonized pigs but not in the broiler environment and dairy barns. Different spa-types were found with spa-type t011 (74%) as dominant type in pigs, barn environment, other livestock species and farmers.
These data suggest that prevalence in sows and pre-weaned piglets might be related. Overall MRSA prevalence was highest in post-weaned piglets (4-10 weeks) and slightly decreased to slaughter age. The presence of MRSA with same spa-type in different animal species suggests transfer and could indicate that pigs constitute as main source for other livestock contamination in mixed farms.

P031 Effect of two non-antibiotic growth promoters on weight gains of weaned pigs

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Objectives - The aim of the work was to evaluate the efficacy of two non-antibiotic growth promoters on weight gains of weaned pigs.
Material and Methods - The feeding trial in weaned pigs was carried out in the agricultural farm. It started after weaning and lasted 42 days. There were 1200 weaned pigs included into the experiment. Pigs were divided into three groups, every group consisted of 400 pigs. The first group, which served as a control group, was fed with diet not containing any feed additives. The second group received the growth promoter based on medium chain fatty acids, at the dose 2000g per ton of feed. The third group received diet supplemented with probiotic preparation, which contained *Bacillus licheniformis* and *Bacillus subtilis* in equal amount. The dose of probiotics was 1.28 x 10(6) CFU per gram of feed. In the trial the following parameters were evaluated: average daily gains, feed conversion and number of treated and dead pigs.
Results - Average daily gains were the highest in the group, which received probiotic preparation. They were approximately 3.6% higher compared with control group and 2.15% higher in comparison with the second group. Feed conversion was the best also in group, which was fed with probiotics. Feed conversion of that group was by 3.1% better than in control group. Although the numbers of dead pigs were approximately the same in all groups, the number of treated pigs was lower in the third group than in other groups. The pigs receiving probiotics suffered from diseases and diarrhea less than others.
Conclusion - Both non-antibiotic growth promoters increased weight gains of pigs, however, probiotic preparation had slight better effect.

P032 The effect of probiotics on sows' metabolism and the benefits in suckling piglets

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Objectives - The goal of the work was to evaluate the effect of probiotic administration to sows on their metabolism and for the benefits in suckling piglets.
Material and Methods - There were 2 x 16 hybrid sows included into the trial. The trial started 2 weeks before farrowing and lasted until weaning, i.e. 28 days after farrowing. Control group (n=16) was fed with standard feed. Experimental group (n=16) was fed with the same feed, supplemented with probiotics at the dose 1.28x10(6) CFU/g feed. Probiotic preparation contained equal amount *Bacillus licheniformis* and *B. subtilis*.
Blood samples were collected on day 1 and 15 of lactation. Following indices were measured from blood serum: urea, total proteins, albumin, cholesterol, total lipids.
Some parameters concerning piglets were investigated: number born alive, number stillborn, number weaned, individual weight at birth, 14th day, at weaning.
Results - The increase of total serum proteins was higher in experimental group, though no significantly. The albumin level was relatively uniform during the experiment in both groups. Though serum urea level increased in both groups on day 15, no significant differences were observed between groups. Serum cholesterol and total serum lipids in experimental group were significantly higher compared with control group on day 15. No significant differences were revealed in number of piglets born alive, stillborn and weaned pigs between groups of sows. Suckling piglets in experimental group reached better weight already on day 14 of their lives, the differences in weight were significant at the end of the trial (P=0.002).
Conclusion - Probiotic administration to sows increased serum cholesterol and lipids in sows and enabled to reach significantly higher piglets' weight at weaning.

P033 Occurrence of antibodies against selected infectious agents with zoonotic potential (Salmonella and Trichinella spp.) in wild boars in some regions in Southern Germany

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Objective - Wild boars are reckoned to be a reservoir for infectious agents relevant in domestic pigs. But they can be carrier of diseases with zoonotic potential, too. This plays an important role because of the increasing popularity of wild boar meat. Though there are legal requirements for the inspection of wild animal meat, the public awareness of high-risk food is low. The aim of the study was to give a clue about the occurrence of some diseases with zoonotic potential in wild boars in some parts of Southern Germany.
Material and Methods - We examined 84 hunted wild boars from different hunting regions in Southern Germany. Antibodies against *Salmonella* spp. (Salmotype® Pig Screen, LDL) and *Trichinella* spp. (PIGTYPE® Trichinella Ab, LDL) were measured in blood serum. Meat inspection for *Trichinella larvae* was done by local authorities according to legal requirements.
Results - We found 12 wild boars (14%) positive of antibodies against *Salmonella* spp., other 9 animals (11%) were questionable. In 18 wild boars (21%) we detected antibodies against *Trichinella* spp. All wild boars in this study were found *Trichinella larvae* negative.
Conclusions - Seroprevalence of *Salmonella* antibodies was relatively low in this study compared to the literature, but detectable in a considerable amount. *Trichinella* antigen can scarcely be detected. Information about seroprevalences of antibodies against *Trichinella* spp. in wild boars is rare in the literature, but a high prevalence was found in this study. The occurrence of positive Trichinella antibody results in wild boars indicates that the meat inspection for Trichinella larvae in this species is important to prevent infections in humans. Raw or undercooked meat from wild boar that did not go through meat inspection is a high risk food.

P034 Possible association between meat inspection lesions in finisher pigs and the yellow card antimicrobial scheme in Denmark

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Objectives - The yellow card scheme initiated by the Danish Veterinary and Food Administration has resulted in a reduction in consumption of antimicrobials and an increased use of vaccines in Danish pigs. We studied the potential association between lesions found at meat inspection and the change in antimicrobial con-sumption and vaccine use
Materials - Data originated from Vetstat. Moreover, data from meat inspection of finisher pigs from before and after introduction of the scheme were compared, including 1.7 million finisher pigs. Ten lesions of chronic and bacterial origin were selected. Logistic regression models with year and week as explanatory variables were used to identify whether the prevalence changed from 2010 to 2011. A repeated statement was used to identify animals originating from the same herd and to account for overdispersion.
Results - The decrease in antimicrobial consumption was pronounced for weaners and finisher pigs treated for gastro-intestinal or respiratory disease. For sows/piglets a decrease was found for treatment of respira-tory disease. Use of vaccines increased in general
The most common lesion found was chronic pleuritis (~23%) while the other lesions occurred less-commonly (<1%). For osteomyelitis, pleuritis, chronic arthritis and condemnation, no differences were observed between the 2 years. Chronic enteritis, umbilical hernia and chronic peritonitis were statistically more frequent in 2011 compared to 2010 ($p<0.01$), whereas tail infection, chronic pneumonia and chronic pericarditis occurred less frequent ($p<0.01$).
Conclusions - Marked reduction in use of antimicrobials might have resulted in a higher prevalence of specific lesions found at meat inspection and higher vaccine coverage might have reduced the prevalence of chronic pneumonia.

P035 Incidence of mycobacterial infections in wild boars (Sus scrofa) in Germany

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Introduction - Bacteria of the genus *Mycobacterium* (M.) represent a major challenge for the protection of human and domestic animal health. Members of the *M. tuberculosis* complex (MTC), classified as a list B disease by the Office International des Epizooties (OIE), are strictly distinguished from nontuberculosis mycobacterial species *(M. avium*-intracellulare complex (MAC), including *M. avium* ssp. paratuberculosis [MAP]). There is conflicting evidence as to the role of wild boars as a reservoir, which should be addressed by the present study.
Materials and Methods - Members of MTC and MAC were detected in tissues from Lymphonoduli ileocolici of 428 wild boars from 33 hunting grounds throughout Germany by conventional and qPCR.
Results - None of the wild boars was tested positive for MAC; only one wild boar was positive with MAP. In contrast, in 77 wild boars (18%) mycobacteria of the MTC were detected. From these, 12 (2.8%) could be assigned to *M. tuberculosis/M. canettii*, and each five (1.2%) to *M. bovis/M. bovis* BCG and *M. africanum/M*. *microti/M. pinnipedii/M. caprae*, respectively. None of the hunted wild boars showed gross pathological symptoms of disease. However, in 13% (n = 10) of the MTC-positive wild boars lymph nodes were found to contain calcified granulomas.
Conclusion - Based on the less laborious and less time-consuming PCR, the overall outcome of the study shows unexpected high prevalence of *M. tuberculosis/M. canettii*. However, significantly differing prevalence between hunting grounds argues against a systematic role of wild boars as a reservoir.

P036 Testing and validating a monitoring system based on "meat juice multi-serology" for optimizing food safety in pork and animal health in pigs

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Introduction - The objective of this study was to analyse meat juice samples from different pig herds for antibodies of several food safety (zoonosis) and animal health (production diseases) parameters for the development of serological herd profiles.
Material and methods - 1. Selection of 49 herds from two areas in the north of Germany based on the slaughter results of the last 6 months of two slaughterhouses with special regard to pleurisy, pneumonia, pericarditis, lymph node enlargement, systemic diseases
2. Sampling of at least 60 slaughter pigs per herd from different slaughter batches over a period of three months by taking meat from the diaphragm pillar during slaughter process
3. Serological testing (ELISA) of these meat juice samples for zoonosis: *Salmonella* spp., *Toxoplasma gondii*, *Trichinella spiralis, Yersinia enterocolitica, Mycobacterium avium* ssp. paratuberculosis and production diseases: Influenza-A Virus (H1N1, H3N2), *Mycoplasma hyopneumoniae*, PRRSV
Results - Apart from the *Trichinella* seroprevalence, which was zero in all herds, serological herd profiles showed differences in the chosen parameters although the herds are in the same area. Especially for *Yersinia enterocolitica, Toxoplasma gondii* and *Mycoplasma hyopneumonia* the measured intraherd-seroprevalences vary between 0 and 100%.
Conclusion - Multi-serological herd profiling using meat juice is a non-invasive and powerful diagnostic tool for improving animal health and food safety. The logistics of meat-juice based salmonella monitoring systems can be utilised, which makes the monitoring feasible and traceable. Simultaneously testing by miniaturized tests would make the system cost-efficient.

P037 Impact of administering organic acids, salts of sodium and bioflavonoids on Salmonella excretion in sows

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Introduction - The aim of this study was to evaluate, in pig farms with a high *Salmonella* prevalence, the impact of administering a mixture of organic acids, salts of sodium and bioflavonoids on *Salmonella* excretion in sows.
Materials and methods - Two farrow-to-finish farms with a high prevalence of *Salmonella* were selected. In each farm, 100 pregnant sows were individually monitored with a bacteriological search for *Salmonella* on fecal matter, before treatment, and after 4 and 8 weeks of treatment. Also 10 pooled samples of fecal matter from 10 sows were analysed in each farm at these three moments. Bicidal® was distributed to sows via drinking water at a rate of 1 liter per 1000 liters of water.
Results and conclusion - Before starting treatment, the level of salmonella contamination in farm A (41% of positives sows) was significantly higher than that of farm B (12%). For both farms, the excretion of *Salmonella* decreased significantly after the first 4 weeks of treatment, 14% (farm A) and 6% (farm B) of positive sows. During the remaining 4 weeks of treatment, the level of excretion remained the same: slight decrease for farm A, non-significant, slight increase in farm B also non-significant.
For pools of feces, treatment was not effective after the first 4 weeks of treatment. However, after 8 weeks of treatment, the number of positive *Salmonella* pools decreased significantly for both farms. One could hypothesize that in addition to reducing the number of positive individuals, a decrease in the quantity of excreted Salmonella would be seen after 8 weeks of treatment.
The incorporation of Bicidal in drinking water at 1 liter per 1000 liters of water allows a significant reduction in the number of positive sows after 4 weeks of treatment in farms with a high prevalence of *Salmonella*.

P038 Evolution of medication costs over a 10 years period from national technical-economic database on French pig farms

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Introduction - The evolution of medication costs over the last 10 years in French Pig farms was analysed.
Materials and Methods - Medication costs were analysed from results collected in the National technical-economic database (GTE.) in two types of herds: farrow-to-finish herds (n> 1400 farms) and fattening herds (n> 330 farms). The total medication costs and 4 sub-categories were considered: vaccines, orally-administered medication, antibiotic and anti-inflammatory injections and livestock management products.
Results and Conclusions - In farrow-to-finish herds, the total medication costs decreased significantly by 0.70 €/100kg per carcass between 1999 and 2009, in relation to the decrease in orally-administered medication (- 0.24 €/100kg per carcass) and antibiotic and anti-inflammatory injections (- 0.41 €/100kg per carcass). During the same period vaccination costs increased (+ 0.23 €/100kg per carcass), while livestock management products remained stable. Over 10 years, the level of preventive medication was higher than that of curative (3.38 €/100kg per carcass vs. 2.35 in 2009).
Medication costs for fattening herds, also decreased significantly by 0.44 €/100kg per carcass between 1999 and 2009, following the decrease of antibiotic and anti-inflammatory injections (- 0.14 €/100kg per carcass), however, vaccines did not increase for this category of farms.
The decrease in medication costs associated with a decrease in the use of curative treatments, and an increased use of vaccines, meets the expectations of society. This is due to improvements in the health status of farms in connection with the development of vaccinations and the awareness of the need to reduce antibiotic use.

P039 Classical swine fever in wild boars as a permanent threat for pig herd health: success of official control measures

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Introduction - Classical Swine Fever Virus (CSFV) in Rhineland-Palatinate (RP) represents a permanent threat for domestic pig production during the last years. Official control measures are now based on three pillars: Intensive hunting (especially young boars) to reduce the wild boar population; oral immunisation to minimize the number of endangered animals; sampling and analysis for monitoring.
Materials and Methods - More than 105.000 samples from wild boars collected between 2005 and 2011, were screened serologically (Antibody-ELISA) and virologically (real-time PCR). Effects of spatiotemporal distance to vaccinations and outbreaks, as well as the wild boars´ age, gender and cause of death were considered.
Results - The numbers of killed wild boars have increased during the last years, with a preference for young boars (< 1 year). Our virological data confirm that young boars represent the most affected group; most positive wild boars were free from clinical symptoms - underlining the inapparent character of the disease. Oral immunisation yielded in satisfactory antibody prevalence, if practiced.
Conclusions - Our results state the success of the official control measures for CSFV in wild boars in RP. Decreasing antibody titres in wild boars are among the most serious factors proceeding new CSFV outbreaks, the applied measures have led to a lasting elimination of CSFV since June 2009. An end for oral immunization is prospective.

P041 Long term European epidemiologic survey of sensitivity to antimicrobials of bacteria isolated from reproductive, respiratory or digestive disease in pigs (1998-2009)

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Pathogenic bacteria from pigs in several European countries were isolated and subjected to standard antibiogram testing to follow antibiotic susceptibility over time.
Since 1998, the strain collection has been expanded with 70 to 800 strains a year (5115 strains tested in total). Samples originated from cases prior to antimicrobial treatment, and were systematically identified and tested by standard antibiogram for susceptibility to a wide range of antibiotics.
From respiratory cases (53% of tested strains) *P. multocida*, *A. pleuropneumoniae* and *S. suis* were most frequently isolated, with rarer instances of *B. bronchiseptica* or *H. parasuis*. *S. suis* was also isolated from cases of meningitis (8% of tested strains). Susceptibility of respiratory pathogens was representative of the natural susceptibility of the bacteria, with a tendency for antibiotics with a high percentage of susceptibility to be stable through the years whereas there was a decreasing trend of susceptibility for certain antibiotics with medium susceptibility.
From digestive cases (24% of tested strains), *E. coli* and *Salmonella spp* were isolated, with a large number of the K88 serotype among *E. coli*. From mastitis or metritis cases (8% of tested strains), *E. coli*, *Streptococcus sp* and Stapylo*coccus sp* were isolated. *E. coli* was also isolated from cases of urinary infection (6% of tested strains). Susceptibility levels of *E. coli* from various aetiologies were similar, with a tendency for reduced susceptibility to certain antibiotic classes.
This epidemiologic survey provides with a description of antibiotic susceptibility patterns in bacteria of interest for the pig veterinarians. There is no dramatic evolution of antibiotic susceptibility on the period, with several antibiotics maintaining high susceptibility.

P042 Seroprevalence for Toxoplasma gondii infection in wild boar and finishing swine in Northern Italy

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Objectives - The EFSA has recently recommended that *Toxoplasma* monitoring programmes should be initiated in the preharvest sector on sheep, goats, pigs and game. The aim of the present study is to determine the seroprevalence of *T. gondii* in wild boar and in confined swine in Northern Italy, an area accounting for over 80% of the Italian swine production.
Materials and Methods - The study involved a total of 400 fattening pigs, randomly sampled in a main abattoir and 427 wild boars collected during 2010-2011 hunting season. Samples of meat juice were examined for specific antibodies by a commercial ELISA test (IDvet *T. gondii* serum screening). Muscolar tissue of seropositive animals (diaphragm and hearth) were further examined for directly detecting the parasite contemporary by PCR and bioassay in mice.
Results - Seroprevalence against *Toxoplasma gondii* was 17.3% (CI 95%: 13.9-21.3%) in wildboar and 5.25% (CI 95%: 3.28%-7.91%) in slaughtered fattening pigs. Amongst the 95 seropositive samples, 3 muscolar tissues were positive by PCR, instead all bioassayed samples were negative.
Conclusions - Data from different studies are not directly comparable due to the variability in the sampling strategy and in the type of method applied for the testing. However, our data demonstrate a high difference in seroprevalence ($\chi 2=29.62$; $p<0.05$) between the wildboar sampled population and the farmed pigs even in the same study area. This survey confirms the low infection rates in animals reared indoors and suggests that the maintenance and the implementation of biosecurity measures can prevent the exposition to contaminated environment. The level of this agreement between indirect and direct tests indicates that presence of antibodies is not a good indicator for the presence of viable *T. gondii* muscolar cystis.

P043 The prevalence and genetic basis of antimicrobial resistance among isolates of Haemophilus parasuis in the UK

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Haemophilus parasuis is the etiological agent of Glässer's disease in swine, characterized by fibrinous polyserositis, polyarthritis and meningitis.
Objectives - The aim of this study is to determine the antimicrobial susceptibility of *H. parasuis* in the United Kingdom, and to investigate the molecular basis of resistance, i.e., the structure and organisation of the resistance genes as well as mutations in resistance-determining regions.
Methods - A total of 103 clinical isolates and 28 non-clinical isolates were tested by agar disc diffusion method for their susceptibility to 10 antimicrobials currently used in swine production in UK. Genomic DNA of all isolates was subjected to Illumina sequencing, and the draft whole genome sequences were annotated according to the complete genome of *H. parasuis* SH0165.
Results - Data will be presented to describe the prevalence of antimicrobial resistance among UK isolates of *H. parasuis*. We show that resistance is conferred by small plasmids as well as resistance genes integrated into the chromosome.
Conclusion - Our observations underline the prevalence and clinical significance of antimicrobial resistance amongst *H. parasuis* isolates. These findings also emphasise the risk of resistance gene acquisition by *H. parasuis* via vertical/horizontal plasmid transmission as well as by horizontal gene transfer.

P044 Evaluation of a DIVA vaccine and feed with coated butyrate to reduce the transmission of Salmonella Typhimurium in pigs

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Introduction - Despite current control measures, *Salmonella Typhimurium* in pigs remains a major public health concern. This study investigated the effect of 2 interventions on *Salmonella* transmission in pigs.
Materials and Methods - Forty-eight *Salmonella*-negative piglets were randomly assigned to 3 groups: A) vaccination with a *Salmonella Typhimurium* DIVA-strain 'Δrfaj'; B) this vaccination + feed with coated butyrate; C) positive control group. At age 9 weeks, 4 pigs of each group were orally challenged with 1.107 CFU of *Salmonella Typhimurium* strain 112910a. From 3-15 weeks of age, blood from all pigs was analyzed once/week with a commercial LPS- and in-house whole cell-ELISA; respectively detecting only infection-induced or both infection-vaccine-induced antibodies.
Rectal feces (taken twice/week after challenge) and different tissue samples (collected at necropsy) from all pigs were bacteriologically examined for *Salmonella* presence. With these isolation results a transmission ratio Ra was calculated to quantify the average number of secondary cases caused by 1 infectious animal during the observation period.
Results - In serum, the vaccination did not cause a detectable seroconversion in the LPS-ELISA, while an earlier rise in antibodies was observed in A and B when compared to C using the whole cell-ELISA. In the feces, more pigs were excreting *Salmonella* in C (22.7%) than in A (19.7%) and B (7.4%) ($P>0.05$); in the organs, a similar trend was present ($P>0.05$). The Ra values indicated significantly that transmission occurred least in A (1.76[1.02;9.01]), more in B (2.52[1.02;9.01]) and most in C (+∞[1.88; +∞]).
Conclusions - The present study demonstrated that the DIVA-vaccine solely limited the transmission of *Salmonella Typhimurium* between pigs the best and confirmed its capacity to Differentiate between Infected and Vaccinated Animals.

P045 Implementing PCV2 vaccination results in reduction of antibiotic use and improved technical results on a Dutch farrow-to-finish farm

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The antibiotic use in the food producing animals is of a growing concern for consumers, human health care, politicians and retail. Also the food producing sector itself is looking for (economical) alternatives. One of the tools of reducing antibiotics are vaccinations. Production data of a 800 sow farm with 5900 fattening places was retrospectively reviewed for the period March 2009 till November 2010. The fattening pigs on the farm (PRRS and APP positive, *Mycoplasma hyopneumoniae* negative) showed clinical signs of increased number of PMWS cases in the second half of 2009. Diagnosis was made based on clinical signs, necropsies of several affected pigs and high virus load of PCV2 in affected lungs and lymphenodes. In September 2009 the farm started with vaccinating Ingelvac CircoFLEX® (1 ml) at 3 weeks of age. Continuous flow data of the fatteners was used for evaluation. Eight months before vaccination (total of 12220 pigs) were compared to eight months in which only vaccinated pigs were present on the farm (12090 pigs). The transition period lasted from November 2009 to February 2010 (5879 pigs) with vaccinated and non-vaccinated being present in the finishing unit at the same time.
Comparing non-vaccinated versus vaccinated pigs, the mortality was reduced by 38 % (3.09 vs 1.94%), also the ADWG (+31 gram) and the feedconverison improved (-0,18) in favour of the vaccinated pigs. At the same time a reduction in antibiotic use by 60 % was observed in the vaccinated pigs (20.60 vs 8.25 DDD per animal year). Based on an average feedprice of 0.25 €/kg and a (slaughtered) carcass price of €1,40 an improved gross margin of > 5€ per vaccinated pig was established (ex vaccine). These results suggest that there are situations where PCV2 vaccination decreases the use of antibiotics and improve the production and economical performance.

P046 The effect of the application of mono-lauric acid with glycerol mono-laurate in weaned piglets, on the use of antimicrobials in sow herds

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The use of antimicrobials in pigs in The Netherlands is relatively high in comparison with the use in some other European countries. This caused a public debate which caused the Minister of Agriculture to demand from the pig sector that the use of antimicrobials should be reduced by 50% by 2013. This triggered use of alternative substances to improve pig health. Mono-lauric acid (MLA) is a medium chain fatty acid (MCFA) with antimicrobial properties which can be used as an additive through the feed of weaned piglets, to improve their health and as a result reduce the use of antimicrobials. MLA was continuously used in the feed of weaned piglets for periods of 4 – 6 months.
Data on the use of antimicrobials per herd was extracted from the sales records of VP “Lintjeshof” for 33 sow herds that used MLA and 30 herds that did not. Used amounts of antimicrobials were transformed to Animal Daily Dose (ADD) according to the nationally accepted rules established by the chemistry of the Faculty of Veterinary Medicine in Utrecht. Data were used from an equal period before the application of the MLA and for the period during which MLA was used. Data for the control herds was extracted for comparable periods. The change in ADD (delta-DDA) was calculated by ADDbefore – ADDduring. Statistical analysis was done at the AHS using the Two-Sample Wilcoxon rank-sum (Mann-Whitney) test in STATA/SE 11.0 for Windows. P-values of < 0.05 were considered significant.
Mean, median and SD of the ADD for the control and test group were -1.7, 1.8, 18.2 and -9.8, -8.2, 10.6 respectively. The difference in delta-ADD between test and control group was significant.
From these data we conclude that the addition of MLA to the feed of weaned piglets significantly reduced the ADD in the treated herds.

P047 Antibacterial and antioxidant activity of oregano essential oil

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The livestock industry is investigating phytonutrients like oregano essential oil (OEO) because of its potent antimicrobial and antioxidant activity. These activities are attributed to OEO's most abundant polyphenols, carvacrol and thymol. Carvacrol and thymol have been shown to permeabilize and depolarize the bacterial cytoplasmic membrane, resulting in cell death. The objective of this study was to quantify the antimicrobial and antioxidant activity of OEO. Antibacterial activity was determined by testing for the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of OEO for common livestock pathogens. A standardized microtiter protocol was used. Several bacteria were tested including *Salmonella enteritidis, S. typhimurium, S. choleraesuis*, *Escherichia coli*, *Klebsiella pnemoniae*, *Streptococcus suis*, and *Staphylococcus aureus*. Results showed that MICs for both gram-positive and gram-negative bacteria ranged from 1.25 to 10.0 µg/ml. MBCs were identical to the MIC showing bactericidal activity. Antioxidant activity of OEO and vitamin E (positive control) was determined by the oxygen radical absorption capacity (ORAC) value against five oxygen radicals: peroxyl radical, hydroxyl radical, peroxynitrite, superoxide anion, and singlet oxygen. Antioxidant testing showed that OEO had much higher level of total antioxidant activity (2,520,600 trolox equivalents/100g) than natural vitamin E (48,200). These results demonstrate that OEO has high antimicrobial activity for pathogens that cause swine disease. The very high level of antioxidant activity of OEO may protect enterocytes against inflammatory damage caused by reactive oxygen molecules that are released during immune system activation. OEO has several benefits for the swine industry: it is a safe and accepted feed ingredient, it has potent activity against gram-negative and gram-positive bacteria, and it does not leave residues in the environment. Synergistic activity has been demonstrated between OEO and common antibiotics. OEO when used alone or in combination with antibiotics will allow the producer to reduce antibiotic use.

P048 European surveillance network for influenza in pigs 3 (ESNIP 3)

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Objectives - The "European surveillance network for influenza in pigs (ESNIP) 3" continues a surveillance network previously established during concerted actions ESNIP 1 and ESNIP 2. Running from 2010-2013, ESNIP 3 represents the only organised surveillance network for influenza in pigs in Europe and seeks to strengthen formal interactions with human and avian surveillance networks.
Materials and Methods - The project consortium comprises 24 participants, contributing a variety of specialism's and skills ensuring multi-disciplinary cutting-edge outputs. Most partners are actively working with swine influenza virus (SIV) experimentally and in the field. Three work packages aim to increase knowledge of the epidemiology and evolution of SIV in European pigs to inform changes in disease trends and variation in contemporary viruses through organised field surveillance programmes.
Results - An inventory of the programmes that are currently active in fifteen of the partners showed that passive surveillance was primarily used. Detected virus strains will be characterised by antigenic cartography (informing better evidence-based approaches for selection of vaccine strains) and genetically through full genome sequencing using the latest technology. The virus bank and electronic database will be expanded and formally curated with relevant SIV isolates together with information for global dissemination within and out with the consortium to the wider scientific and veterinary community.
Conclusions - All data will improve SI diagnosis by updating reagents employed in the recommended techniques to define minimum datasets for standardised epidemiological analyses. These approaches will aid pandemic preparedness and planning for human influenza whilst providing an evidence base for decisions relating to veterinary health.

P049 Veterinary advisory tool to reduce antibiotic use in pig production

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Objective - In Danish pig production, antibiotic (AB) consumption has close attention of the public. A threshold level for an acceptable number of daily doses (ADD) per pig is set by the authorities, and herds with ADD/pig above the threshold are obliged to imply action plans for reduction.
Farm Facts is an advisory tool developed for veterinarians for creation of action plans for reducing AB consumption in pig herds. It consists of 3 parts: Identification of a focus area for reduction, development of an action plan and follow-up on results.
Materials and methods - In part 1, Farm Facts calculate ADD/pig for all herds in a veterinary practice. Each pig herd can compare their ADD/pig to other herds, and they can overview their diagnoses and treatments. The vet can identify diagnoses and treatments responsible for the main of the AB consumption.
With main consumption identified, the action plan can be prepared. Farm Facts has built-in suggestions for ways to prevent disease, including management changes, feeding strategies and vaccinations. The action plan includes success criteria based on selected parameters.
Part 3 gives a graphical presentation of the development of selected parameters before and after implementation of the action plan, and the graph shows whether success criteria are met. The follow-up can also be used to monitor AB use over time.
Results - Until now, Farm Facts has mainly been used for introduction of vaccination programmes. Here, it has proved helpful to implement vaccines as a preventive measure, and in some herds, ADD/pig has been reduced by over 50%.
Conclusion - Farm Facts is a useful tool for veterinarians to systematise action plans for reduction of AB use in pig herds, and it guides pig producers towards prevention of disease instead of treatment with AB.

Miscellaneous

P050 Chronic hyperproliferative process with major involvement of mast cells at ear tag sites of sows

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Introduction - Ear tags are commonly used world-wide for the appropriate identification of laboratory and farm animals. The application of ear tags may induce local inflammatory or neoplastic reactions, which are observed mostly in combination with metallic tags. This report for the first time describes the occurrence of massive inflammatory reactions with involvement of mast cells and eosinophils as well as fibroplasia at ear tag sites of sows after the application of commercially available and routinely used ear tags made of polyurethane.
Case report - Eight Landrace gilts or sows, all housed on one farm with approximately 300 sows, developed a severe inflammation as well as fibroplasia shortly after application of commercially available ear tags made of polyurethane. The farmer decided to remove the tags, but the reactive sites continued to increase in size. Histologically, a huge amount of collagenous tissue as well as a perivascular inflammation dominated by lymphocytes, plasma cells, mast cells, and eosinophils was evident. The epidermis was not altered. Dexamethasone treatment of two affected animals led to a 20 % dimension's reduction, but could not prevent re-start of growth after cessation of therapy.
Conclusion - It is not clear whether the ear tags triggered some allergic reaction, which converted into a chronic inflammatory and preneoplastic process or whether the auricles developed a chronic inflammation first, which then led to the increased recruitment of mast cell precursors.

P051 Physiological ranges of rectal temperature values, respiratory rate, and pulse rate in growing and adult Pietrain boars

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Introduction - Available reference values on basic physiologic data relevant for physical examination of pigs derive from the 80ies of the past century. Meanwhile, housing and genetics of pigs have changed, which demands an update of this topic.
Materials and Methods - Rectal body temperature, respiratory rate, and pulse rate were determined by one person in 51 growing and 56 adult boars belonging to the Pietrain breed in an AI center in Lower Austria. All animals were routinely used for semen collection and thus well accustomed to close contact to humans. Room temperature in the facility was constantly 22°C. Before entering the individual crates, respiratory rate was counted. Afterwards, rectal body temperature was determined by use of a digital thermometer and pulse rate was examined at the coccygeal artery.
Results and Conclusion - Mean rectal body temperature was 38.0°C in young boars and 37.6°C in adult ones. Mean respiratory rate was 37/min and 36/min and mean pulse rate 104/min and 96/min in young and adult boars, respectively. Our data show that boars in general have a lower rectal body temperature but higher respiratory and pulse rates than the ones given in literature (Diseases of Swine, Straw et al., 9th ed., p 9), i.e., a rectal body temperature of 38.1–38.7°C, a respiratory rate of 13–18/min and a pulse rate of 70–80/min. This age-dependent peculiarities have to be accounted for when interpreting physical examination data.

P052 Physiological ranges of rectal temperature values of piglets and fattening pigs at different ages

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Introduction - Rectal temperature (RT) is a valuable indicator of health status of an individual pig and when measured in select animals of a herd it can also give an impression as to whether an infectious agent is probably involved in depressed behaviour of respective animals. As published reference values of RT have not been updated since the 1980ies irrespective of dramatically modified housing conditions and genetics, aim of this study was to generate actual data on this topic.
Materials and Methods - RT of 67 suckling piglets (Large White x Pietrain) was measured by one person at 1, 12, and 24 hrs as well as at 3, 7, 14, and 21 days post natum. RT was again measured in the flatdeck (week 8) and during the fattening period (weeks 15 and 25).
Results - Corresponding mean RT values given in the same order as the consecutive time points of measurement were 38.3, 38.6, 39.1, 39.3, 39.5, 39.4, 39.3, 39.5, 39.6, and 39.2°C. Mean air temperature was 25.3°C in the farrowing crates, 29.7°C in the flatdeck, and 31.0°C at the start and 24.5°C at the end of the fattening period, which was in summer. Only data of clinically healthy animals were accounted for.
Conclusion - In general, all RT data were higher as those given in literature, which has to considered when interpreting physical examination data. Additionally, the actual season has to be kept in mind as different air temperatures during winter and summer will also influence RT values.

P053 Acute rear limb paresis induced by fibrocartilaginous embolism in sows

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Introduction - Ischemic myelomalacia due to fibrocartilaginous embolism (FCE) is a rare cause of neurological dysfunction that has been described in humans and different animal species, including swine (1, 2).
Description of the actual case - In a herd with 900 sows, 5% of gestating sows developed acute rear limb paresis during group housing. Two sows were presented to the clinic. They were alert and responsive, stayed in a dog-sitting posture with absent interdigital claw reflexes of the hind legs and were unable to rise.
Laboratory diagnostics revealed increased CK levels, whereas blood count, AST, Ca, P, Se levels and the cerebrospinal fluid cell count were normal. In one sow, survey radiographs of the vertebral column showed a diskospondylitis at L3/L4 and L4/L5 verified by necropsy.
Histological examination of the lumbar spinal cord of both sows revealed extensive leukomyelomalacia characterized by astrogliosis, microgliosis, macrophage infiltration, myelinophagie and axonal swelling. In one case lesions were additionally extending into the grey matter. Multifocally, alcian blue positive emboli occluded leptomeningeal and intraparenchymal blood vessels in both cases, consistent with FCE.
Infection with porcine teschovirus was excluded by PCR.
Discussion of the novelty and importance of the specific case - Paresis due to FCE has been associated with vigorous activity followed by traumatic insults to intervertebral disks. The origin of the emboli is generally accepted to be the nucleus pulposus (1). FCE should be considered in cases of limb paresis, particularly if gross lesions are absent. Prevalence of FCE in sow herds may increase due to frequent group housing and poor grouping management (restlessness, prolonged rang order fights).
References:
1. Benson et al.1998, J Vet Diagn Invest. 10:274-7.; 2. Gandini et al. 2003, J Small Anim Pract. 44:76-80.

P055 Skin disease in fattening pigs macroscopically resembling fat necrosis

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Introduction - Sporadically skin alterations of unknown aetiology in swine occur. In the fifties the picture of the so called "fat necrosis" was supposed to be due to a resorption of necrotic subcutaneous adipous tissue.
Description of the case report - In a closed system with 25 sows and 70 fattening pigs ten five months-old pigs presumably belonging to one litter showed irregular large-scale elevations and adjacent indentations of the skin being most prominent at the back, flanks and shoulders. All pigs were in good general condition with no pathological blood parameters. A gas chromatic analysis of the fatty acid composition of feed and of samples of subcutaneous fatty tissue of two pigs was not indicative of fat oxidation or necrosis. By histological examination of tissue samples of two pigs a multifocal, perivascular inflammation of the superficial corium layers, characterized by lymphocytes and plasma cells as well as eosinophils and mast cells was diagnosed.
Discussion - In the past a hereditary origin, external injuries or a nutritional and climatic impact on the consistency of fat were assumed as possible causes for cases of porcine "fat necrosis", but the occurrence of necrosis had never been proven. In the present cases, histological no changes of subcutaneous fat were detected in a skin condition macroscopically resembling "fat necrosis". A perivascular dermatitis with eosinophils and mast cells suggests an allergic or hypersensitive reaction, e.g. due to a parasitical infection. In the cases of this study a hereditary disposition for an inflammatory skin condition can not be excluded.
Take home massage - No signs of necrosis but inflammatory cell infiltrations suggesting an allergic reaction were found in a skin disease macroscopically resembling "fat necrosis".

P056 Bacterial pathogens associated with lung lesions in slaughter pigs: a cross-sectional study in 125 herds

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Objectives - The aim was to investigate the relationships between macroscopic lesions and Polymerase Chain Reaction (PCR) detection of *Mycoplasma hyopneumoniae* (Mhp), *Pasteurella multocida* (Pm), *Actinobacillus pleuropneumoniae* (App), *Haemophilus parasuis* (Hps) and *Streptococcus suis* (Ssuis) from the lungs of 3731 slaughter pigs.
Materials and Methods - A cross-sectional study, involving 125 herds, was carried out from November 2006 to February 2008 in western France. In each herd, the lungs of a random sample of 30 pigs were scored for pneumonia-like lesions, pleuritis, healing of pneumonia, abscesses and nodules. Tissue samples were obtained from the site with lesions or from the right middle lobe when no macroscopic lesions were detected. All samples were tested by PCR for DNA detection of Mhp, App, Pm, Ssuis and Hps. Relationships between lung lesions and PCR-statuses were assessed at the pig level (generalized linear models) and at the herd level (principal component analysis).
Results - All five bacteria increased the risk of pneumonia-like lesions occurence at the pig level. High percentages of pigs infected by Mhp, Pm and Hps were associated with high pneumonia scores and a high frequency of recovering lesions at the herd level. Although abscesses, nodules and pleuritis were not significantly associated with detection of respiratory pathogens at the pig level, a high percentage of pigs infected by Ssuis and App was found in herds with high rates of occurence of abscesses, nodules and pleuritis.
Conclusions - The results strengthen the hypothesis that Mhp and Pm are primarily associated with pneumonia and App with pleuritis. Measures focusing on the control of Mhp, Pm and App should significantly reduce the occurrence of both pneumonia and pleuritis.

P057 Coal tar poisoning in grower pigs exposed to road surfacing used as a straw yard base

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Introduction - Disease in growing pigs is often but not always caused by infectious diseases. Toxic agents to which pigs may be exposed must be considered; a thorough history is essential.
Description of case report (to include photographs) - 3 pigs were submitted to the AHVLA laboratory, Thirsk, UK, to investigate clinical signs of malaise and recumbency in15% of 400 pigs in a straw yard on a large nursery unit. Mortality was 10%. Necropsy revealed icterus, serofibrinous peritonitis, mesocolon oedema and hepatomegaly with multifocal black/ purple/ tan stippling of hepatic lobules, histologically characterised as extensive haemorrhagic and coagulative hepatocyte necrosis predominantly involving centrilobular and mid zones. Liver immunohistochemistry for PVC2 was negative. Liver vitamin E was 1.0 & 1.5 □mol/l (ref. range 1.5-14.3). A farm visit revealed that these pigs were on straw over road surface material which had been obtained from a local road which had been drilled and resurfaced. Pigs had rooted holes in the straw. Coal tar toxicity was diagnosed. Marginal liver vitamin E levels were probably secondary to hepatopathy. Pigs were moved and no further cases occurred. The incident was reported to the UK Food Standards Agency, which stipulated that surviving pigs did not enter the human food chain for 28 days after removal from the yard. The yard was concreted to a depth of 6 inches over an impermeable liner at a cost of £7000 in advance of arrival of the subsequent batch.
Conclusion/ Recommendations - Toxic components of coal tar are aliphatic hydrocarbons, mononuclear aromatics and polycyclic aromatic hydrocarbons, and cause severe hepatotoxicity in pigs. The use of road surfacing as a base for pig accommodation should be avoided.

P058 Back-test is not predictive for mortality rate in underweight piglets

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The behavioral response of piglets in a back-test early in life seems indicative of their coping strategy, immune responses and production performances at a later age. Aim of the present work was to investigate the possible predictive capacity of the back-test on the mortality rate in underweight piglets during the first week of life, considering that the incidence of underweight newborn is increasing due to the increase of litter size. In a commercial pig farm, 59 underweight piglets (27 females and 32 males; mean body weight: 742.8 ± 36.9 g/head) from 7 sows was tested with back-test at 2 days of age and mortality was recorded at 8 days of age. Number of squeals, grunts and escape attempts carried out during the back-test were processed using a linear model which considered the mortality (died vs. survived) and gender (males vs. females). Neither behavioral parameters considered in the study and gender were related to the mortality at 8 days (30%). This result suggest that the different reactivity showed during the back-test is not predictive of the probability of mortality of underweight piglets during the first week of life. Coping characteristics represent individual adaptation mechanisms to try to avoid a stressor but are not correlated with a useful parameter for this type of survival rate.

P059 Post mortem inspection criteria for pleuritis in swine differs between slaughterhouses

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Substantially different swine pleuritis prevalences (from 5% to 20%, mean 10%) are reported by Finnish slaughterhouses. The aim of the study was to compare post mortem inspection criteria for pleuritis.
Altogether, 547 swine carcasses were evaluated in five different slaughterhouses. Approximately 100 carcasses per slaughterhouse were randomly selected from pigs slaughtered during one working day. Meat inspectors checked the carcasses as usual and recorded their pleuritis findings (yes/no). Same carcasses underwent detailed examination by researchers, who recorded their pleuritis findings (diameter of pleuritis finding/no pleuritis). The prevalence for pleuritis was calculated based on 1) regular slaughterhouse post mortem inspection 2) detailed examination (all findings greater than 1 cm in diameter counted). Correlation between the two different inspection results was computed. Finally, the specific pleuritis diameter cut point was used to categorize pleuritis in detailed examination as yes/no variable. The cut point was set to equalize the pleuritis prevalence in two different inspections.
The pleuritis prevalence for five different slaughterhouses in post mortem and detailed inspection, respectively, were 1,8% and 53.2%; 6.8% and 25.0%; 4% and 42.4%; 32.0% and 40.8%, and 16.7% and 24.5%. The correspondent correlations were 0.13, 0.47, 0.24, 0.62, and 0.60. The pleuritis diameter cut points settled to be 3 cm, 3 cm, 10 cm, 10 cm and 5 cm, respectively in these five slaughterhouses.
In conclusion, there were major differences in post mortem inspection criteria for pleuritis in swine in Finland. That makes pleuritis prevalence figures incomparable between different slaughterhouses.

P061 Real-time PCR testing for Porcine Circovirus Type 2 and Lawsonia intracellularis to assess diarrhoea status

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Introduction - Real-time PCR tests have been developed to detect and quantify Porcine Circovirus type 2 (PCV2) and *Lawsonia intracellularis* in pigs' faeces. Pooling of individual faecal samples is often used to reduce the costs of diagnostic testing. The objective of this study was to determine the association between quantities of PCV2 and *L. intracellularis* in pooled faecal samples and diarrhoea in pigs.
Materials and Methods - Forty individual faecal samples were collected from grower (>10weeks) pigs on five farms in Denmark. Each pig was described as having diarrhoea +/-. Eighteen individual "diarrhoea" and 18 "non-diarrhoea" samples were randomly selected from each farm. Six "diarrhoea" and six "non-diarrhoea" pooled samples were made by combining three individual "diarrhoea/non-diarrhoea" samples. Individual and pooled samples were tested using real-time PCR specific for PCV2 and *L. intracellularis*. The associations between diarrhoea (+/-) and pooled faecal PCV2 and *L. intracellularis* quantity were analysed using logistic regression (Stata/IC 11.1).
Results - Low quantities of *L. intracellularis* were detected in six non-diarrhoeic pigs. There was no association between PCV2 or *L. intracellularis* quantity in pooled faecal samples and diarrhoea ($p>0.05$). However, when moderate/massive categories for *L. intracellularis* were combined, there was a tendency toward significance (OR=4.9; 95%CI 0.9 26.0).
Conclusions - PCV2 was not associated with diarrhoea in pigs on the five farms studied. Our results suggest that the quantity of *L. intracellularis* in pooled faecal samples may reflect diarrhoea status, however further research in this area is required. Subclinically-affected pigs shed low quantities of *L. intracellularis*.

P062 You can pool faecal samples from individual pigs to test for Porcine Circovirus Type 2 and Lawsonia intracellularis using real-time PCRs

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Introduction - Real-time PCR tests have been developed to detect and quantify Porcine Circovirus type 2 (PCV2) and *Lawsonia intracellularis* in pigs' faeces. Pooling of individual faecal samples is often used to reduce the costs of diagnostic testing. The objective of this study was to evaluate any change in the test sensitivity of PCV2 and *L. intracellularis* real-time PCR when individual faecal samples were pooled.
Materials and Methods - Forty eight faecal samples were collected from the rectum of individual pigs (>10 weeks) from four farms. Faecal samples were classified as diarrhoea +/- based on subjective assessment of consistency. Three individual samples were combined to make 16 pooled samples (8 diarrhoea; 8 non-diarrhoea). Individual and pooled samples were tested using real-time PCR tests specific for PCV2 and *L. intracellularis*. A positive result in any of the three individual samples was deemed "group positive". Changes in test sensitivity after combining the three individual samples were evaluated.
Results - The sensitivity and specificity of the pooled faecal samples for *L. intracellularis* were 86.4% and 100%, respectively. The sensitivity and specificity of the pooled faecal samples for PCV2 were 97% and 100%, respectively.
Conclusions - These preliminary results suggest that three individual faecal samples may be pooled for PCV2 or *L. intracellularis* testing using real-time PCR with minimal loss of sensitivity. Under the conditions of this study, the sensitivity of pooling was reduced when quantities of *L. intracellularis* or PCV2 in individual samples were low.

P063 Immunocastration - Control at slaughter

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Immunocastration, or vaccination against boar taint, is an alternative to surgical castration of male piglets. Vaccination suppresses testicular function by stimulating the production of antibodies against GnRH. The procedure includes two injections, at least 4 weeks apart, with the last injection 4-10 weeks before slaughter.
Objectives - To investigate possible control measures at the slaughter house to identify animals not vaccinated according to the recommendations. Overall objective is to prevent pork from boar tainted carcasses to reach the market.
Materials and methods - A two step practical study was performed in 2010. Initially, 160 male pigs from one herd were vaccinated with Improvac® (Pfizer ltd). For all animals recordings of behaviour, testis size (live animals and carcasses), testis weight and length, length of bulbourethral glands, colour of testis tissue and analyses for skatole (S) and androstenone (A) in fat were performed. In the main study, 2415 vaccinated pigs from 19 herds were included. Testis weight >300g was used as an indicator of boar taint, confirmed/disproved by analyses for A and S in fat.
Results - In the main study 365 animals (15.2%) had testis size >300g. A >=1ppm was detected in 11 pigs and S>=0.2ppm in 2 pigs. Per herd, the percentage of animals with testis size >300g varied from 3-67. The association between testis size and levels of A and S was not sufficiently strong to recommend testis size as indicator of boar taint. For 8.6 % of the animals, the second vaccination was performed outside the recommended interval (4-10 weeks) before slaughter. Four of these animals had high levels of androstenone.
Conclusions - Testis size in animals vaccinated with Improvac showed too large variation to be used as indicator of inadequate vaccination.

P064 MUC4 expression is not related to susceptibility of piglets to enterotoxigenic Escherichia coli-F4

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Introduction - Diarrhoea in neonatal and early-weaned piglets due to enterotoxigenic *Escherichia coli*-F4 (ETEC-F4) is an important problem in the pig farming industry. However, some piglets do not suffer from ETEC-F4 diarrhoea because they lack a receptor for the F4 fimbriae of *E. coli*. A region on the 13th porcine chromosome has been found to be in close linkage to the susceptibility of piglets for ETEC-F4ab,ac. MUC4 is a positional candidate gene but, despite efforts of several research groups and SNP's found in complete linkage disequilibrium with the phenotype, a causative mutation could not be identified yet. In this study another approach was followed and gene expression of MUC4 was compared between susceptible and non-susceptible piglets.
Materials and Methods - During an on farm outbreak with ETEC-F4, piglets with and without diarrhoeal symptoms were sacrificed. F4ab,ac receptor status was determined upon autopsy using the brush border adhesion test. Microarray analyses with the Affymetric GeneChip Porcine Genome Array on mid-jejunum samples were performed by the VIB MicroArray Facility. Differential expression was assessed via the moderated t-statistic. Validation was performed using qRT-PCR.
Results - MUC4 expression measured through microarray was not different between both groups. It also was very low, in contrast to the jejunal expression of other membrane-bound mucins, such as MUC13 and MUC20. This was confirmed by qRT-PCR.
Conclusion - Although MUC4 is an interesting positional candidate gene in relation to ETEC-F4 diarrhoea in piglets, its expression is very low in mid-jejunum samples and not different between susceptible and non-susceptible piglets, thereby rejecting major MUC4 expression influences in relation to ETEC-F4 diarrhoea.

P065 Integrative analysis based on expressed QTL and interaction networks identifies candidate genes for resistance/susceptibility to Actinobacillus pleuropneumoniae in swine

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Introduction - *Actinobacillus pleuropneumoniae* (APP) is responsible for extensive losses in worldwide pig production. Since therapeutics cannot be used in a sustainable manner, and efficacy of vaccination strategies is often hampered by limited cross-serovar protection, natural resistance of pigs to APP infection and/or disease should be considered a potential chance for less susceptible herds and for an improved understanding of host defence and disease mechanisms.
Materials and Methods - Experimental pigs were produced from an F2 Hampshire-Landrace-family, with 170 healthy pigs challenged with an APP serotype 7 aerosol. Phenotypes were characterized by detailed clinical, pathological and microbiological examinations, complemented by whole genome expression analysis. Roles of differentially expressed genes were verified by genomewide eQTL-analysis. Subsets of candidate genes were included in pathway- and regulatom-analyses.
Results - Starting with 1600 differentially expressed genes, 4 hotspots of gene regulation were identified to be linked with APP disease and resistance. Severity of clinical, pathological and microbiological findings and all cases of death could be explained by the synergistic action of two marker regions on chromosomes 2 and 12.
Conclusion - Two marker regions show significant association with clinical, pathological and microbiological outcome of APP infection in pigs. They make a solid start point for the development of gene markers to select herds resistant to APP in the future. The combination of functional (Gene-expression), positional (QTL-analysis) and clinical (including pathological and microbiological) methods led to the establishment of a regulatory network that provides completely new insight into APP disease and defence mechanisms.

P066 Worldwide occurrence of mycotoxins in components intended for animal feed in the years 2010 and 2011

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Mycotoxin contamination often begins in the field and continues throughout harvest, transportation and storage, depending on the activity and colonization levels of different fungi species. In order to deliver insights into the occurrence of mycotoxins in different components intended or animal feed a survey was initiated and backed by BIOMIN. This work focus on the results between January 2010 and October 2011 in which 6,483 samples were collected worldwide and analyzed for aflatoxins (Afla), zearalenone (ZON), deoxynivalenol (DON), fumonisins (FUM) and ochratoxin A (OTA). Analyses were performed either by high performance liquid chromatography (75 %), enzyme-linked immunosorbent assay (25 %) or thin layer chromatography (less than 1%) according to standard procedures. For the purpose of data analysis, non-detection levels were based on the quantification limits of the test method for each mycotoxin.
From all samples analyzed worldwide, 27 %, 42 %, 58 %, 55 % and 26 % tested positive for contamination with Afla, ZON, DON, FUM and OTA, respectively. The presence of the so called field mycotoxins produced by Fusarium sp. which cannot be avoided totally is very frequent and the contamination levels can be considered as moderate to high (average ZON level of all samples analyzed: 111 µg/kg, average DON level of all samples analyzed: 702 µg/kg and average FUM level: 1028 µg/kg). The results of this mycotoxin survey highlighted once again ubiquitous presence of mycotoxins in agricultural commodities, thus stressed the necessity of applying a proper mycotoxin risk management.

Nutrition

P067 Inhibitory action of analytical grade zinc oxide and of a new potentiated ZnO on the ex vivo growth of porcine small intestine bacteria

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Previous *in vitro* studies showed a significantly higher growth repressing effect of a new and potentiated feed grade zinc oxide product (HiZox, Animine), compared to analytical grade zinc oxide, on two pathogenic bacterial *E. coli* strains.
Objectives - The inhibitory action of the two zinc oxide sources (zinc oxide p.a.; HiZox) on the *ex vivo* growth of small intestinal bacteria from weaned piglets is studied in liquid media.
Materials and Methods - Piglets weaned at 28 days of age and fed a standard European diet were sacrificed at 42d. Chyme from the stomach and from jejunum was taken and diluted in Zn-containing media adjusted to different ZnO concentrations. Intestinal samples were inoculated in 96 well microtiter plates, and bacterial growth was recorded every 5 minutes for 22 hours. Growth curves from the two ZnO sources and from the non-supplemented medium were statistically analyzed with a non linear regression analysis and growth data with t-test ($p<0,05$).
Results - Lag time was higher in HiZox supplemented media in the stomach samples; no difference was measured in jejunum samples and in maximum growth data vs ZnO p.a. Bacterial growth depression was more drastic and more rapid in HiZox supplemented media when optical density was compared to the negative control.
Conclusions - This new potentiated zinc oxide showed a higher inhibitory effect on bacterial growth in stomach and jejunum samples of piglets in comparison to analytical grade zinc oxide.

P069 Effect of a fibrous diet for fattening pigs on growth performance, carcass characteristics and gut health

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Performance, carcass characteristics and gut health were studied on 2 groups of 12 fattening Piétrain x Belgian Landrace pigs ad libitum fed either a standard diet (STD) based on 33% wheat and containing 18.0% non-starch polysaccharides (NSP) or a high fiber diet (HFD) based on 23% sugar beet pulp and containing 30% NSP. Diets were isoenergetic (2225 kcal/kg Net Energy) and isoproteic (16% crude protein). From 34 to 120 kg body weight (BW), the average daily feed intakes were 2.69 and 2.38 kg/pig in STD and HFD groups, respectively. The average daily gain and the dressing percentage were 962 vs. 837 g/day ($P<0.001$) and 78.4 vs. 75.6% ($P<0.001$) respectively in STD and HFD. The muscle (M2) and fat (G2) depths were respectively 68.3 vs. 61.9 mm ($P<0.05$) and 14.7 vs. 10.9 mm ($P<0.01$) in STD and HFD. The lean meat contents were similar (61.3%). The weights (expressed as % of BW) of the emptied stomach, small and large intestines of 4 pigs/group were compared. The stomach weight was higher for HFD pigs (0.62 vs. 0.43%; $P<0.01$); the small (1.72%) and large intestines (1.51%) weights were not statistically different. In fecal samples collected from the rectum of all pigs the day before slaughter, the dry matter content and pH were respectively 25.1 vs. 19.5% ($P<0.001$) and 7.15 vs. 6.46 ($P<0.001$) in STD and HFD. Higher *Lactobacillus* (10.07 vs. 9.77 log10 of cfu/gram of feces dry matter; $P<0.01$) and *Bifidobacteria* counts (9.50 vs. 9.02; $P<0.01$) but lower *Enterobacter* counts (5.32 vs. 5.86; $P<0.01$) were associated with HFD. While growth performance and carcass characteristics were impaired with HFD, gut health was improved by the promotion of a beneficial microflora. The source and amount of fiber should be further explored to combine favorable effects on health and performance.

P070 The effect of Actigen™ on post-wean pig performance compared with an antibiotic growth promoter

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Introduction - Actigen™ is derived from *Saccharomyces cerevisiae* and designed to help animals of all species thrive and reach their genetic potential by supporting gut health and modulation immunity. The objective was to compare the performance of post-wean pigs fed Actigen™ versus that of those fed the common AGP strategy, colistin + amoxicillin.
Materials and Methods - Hundred and twenty newly weaned pigswere attributed to 2 treatments (4 pens/tr.) in a 34 day trial. Two treatments were imposed: control diet with 4 kg/ton colistin-amoxicillin feed premix (amoxicillin 10%+ colistin 10M IU/kg) and a treatment diet with 0.4 kg Actigen™/ton. Start and final weights, daily feed intake, and mortality were recorded. Scouring percentage was calculated as the total number of pigs exhibiting loose and watery diarrhea within 1 to 7 d post-wean over the total number of pigs per pen. Pigs exhibiting loose and watery diarrhea were injected with 1 cc/d of colistin injectable until the scours stopped. Data were subjected to ANOVA. Treatment effect on scouring and mortality was analyzed using Chi-Square Goodness-of-Fit test.
Results and Conclusion - Final weight, ADG and feed intake did not differ between treatments ($P>0.05$). FCR tended to be better in the Actigen™-fed pigs compared with the colistin-amoxicillin-fed pigs ($P=0.07$). Mortality and scouring percentage did not differ between treatments. Medication cost (injectable) was the same for both treatment groups while in-feed medication cost per pig was 0.68 $/pig lower for the Actigen™ group compared with the colistin-amoxicillin group. It could be concluded that overall, performance of post-wean pigs (up to 64 d of age) was similar between the Actigen™ or colistin-amoxicillin treatments, however Actigen™ was the more economical option.

P071 Models to study the effect of immune system activation on amino acid metabolism in pigs

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The amino acid requirements of pigs can be influenced by health status. The immune system of unhealthy pigs is activated very frequently. To date, however, quantitative knowledge about the effect of health status on amino acid requirements of pigs is limited. In the present study we evaluated two experimental models and study the effect of immune system activation on amino acid requirements of pigs. The first model concerned i.v. infusion with complete Freund's adjuvant (CFA, containing dead *Myc. tuberculosis* cells) and the second one s.c. injections with turpentine oil (substrate from *Pinus* spp). Nine pigs of 30 kg body weight were either challenged with CFA (n=3), with turpentine oil (n=3), or served as a control (intravenous saline infusion and subcutanous saline injection, n=3). Plasma acute phase proteins (C-reactive protein, pigMAP, haptoglobin and albumine), white blood cell counts and N balance were determined. In addition, pig's body temperature, respiratory rate and feed intake was measured. Universally 13C labeled amino acids were infused to study amino acid metabolism. After euthanasia, autopsy was performed and organs and turpentine injection spots were pathologically evaluated. Intravenous infusion of CFA induced a chronic lung inflammation and resulted in an increased blood concentration of C-reactive protein, haptoglobine, and eosinophil granulocytes. Inducing subcutaneous inflammation with turpentine oil resulted in an increased blood concentration of C-reactive protein, pigMAP and haptoglobine. Results on amino acid requirements will be available soon. Both CFA and turpentine oil induced a measurable acute phase response in pigs and could serve as a suitable model for studying the effects of immune system activation on amino acid requirements in pigs.

P072 The effect of echium oil or linseed oil in the diet of gestating sows on the fatty acid composition of piglets' tissues

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Objectives - Polyunsaturated fatty acids (PUFA) and especially docosahexaenoic acid (DHA) are essential for the growth and development of the foetus, and dietary supplementation may be beneficial. DHA can be directly supplied from the diet through the addition of fish oil, or it may result from the conversion of dietary precursors. As fish oil becomes a scarce resource, research for sustainable alternatives is needed. This study aims to evaluate two sources of *n*-3 PUFA: linseed oil as a source of α-linolenic acid (ALA, C18:3*n*-3) and echium oil as a source of stearidonic acid (SDA, C18:4*n*-3). As SDA is one step further than ALA in the conversion to DHA, the hypothesis is that echium oil will yield a higher conversion to DHA than linseed oil.
Materials and Methods - Two groups of sixteen sows each were fed a diet containing 1% linseed oil or 1% echium oil from day 73 of gestation and during lactation. At birth, two piglets per sow were sacrificed and blood, liver and *Longissimus dorsi* (LD) samples were taken for fatty acid analysis. The effect of diet was analysed by GLM using SAS 4.3.
Results - The transfer of the dietary *n*-3 PUFA from sows to piglets differed according to the source. All tissues had a higher content of ALA when linseed oil was fed. However, when echium oil was fed only plasma and LD but not red blood cells and liver showed a higher content of SDA (and C20:4*n*-3). Furthermore no difference was found between linseed oil and echium oil in the amount of DHA.
Conclusions - Echium oil did not result in a higher conversion to DHA than linseed oil. As echium oil contains less SDA than linseed oil contains ALA, feeding higher amounts of echium oil or richer sources of SDA should be investigated.

P073 The effect of Sangrovit®, a natural feed additive, on the performance and health status of weaned piglets

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Objectives - The aim of this study was to assess the efficacy of a natural, plant-derived feed additive (Sangrovit®, Phytobiotics, Germany) on health status and performance of weaned piglets.
Materials and Methods - The trial was conducted in a Greek commercial pig farm (900 sows under production). In total, 888 piglets were equally divided into three groups as follows: (A) negative controls, (B) piglets offered the same feed as negative controls supplemented with 15 g Sangrovit per tonne of feed and (C) piglets offered the same feed as controls supplemented with 50 g Sangrovit per tonne of feed. Piglets were weaned in three consecutive weeks. Each week's weaned piglets were allocated into 12 pens of 24 piglets each (equal number of males and females), i.e. 4 pens per group. In total there were 12 replicates in each treatment. Performance (body weight, average daily gain, feed conversion ratio) and health parameters (morbidity, mortality, diarrhea score, acute phase proteins: serum amuloid A-SAA, haptoglobin-HP) were recorded throughout the weaning period.
Results - The results revealed that piglets of group C had significant increase in body weight and average daily gain, while their feed conversion ratio was significantly ($P<0.05$) reduced in comparison to the other groups. Health parameters' evaluation showed that group C had significantly ($P<0.05$) lower concentration of SAA and HP, while no significant differences ($P>0.05$) were observed in terms of morbidity, mortality and diarrhea score among the three groups.
Conclusions - The results of the present field study indicate that administration of Sangrovit® in the feed at inclusion rate of 50 ppm can have considerable beneficial effects on growth performance of weaned piglets.

P074 The effect of Sangrovit®, a natural feed additive, on the performance and health status of growing / finishing pigs

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Objectives - The purpose of this study was to evaluate the efficacy of a plant (*Macleaya cordata*) feed additive (Sangrovit®, Phytobiotics, Germany) on health and performance of growers/finishers.
Materials and Methods - The trial was performed on a farrow-to-finish pig farm in North Greece. It started from the end of the weaning stage (10 weeks – movement to growing stable) and it was completed at the end of the fattening stage (25 weeks – slaughter age). In total, 576 pigs (equal number of males and females) were introduced in 2 weekly batches (12 pens x 24 pigs/pen=288 pigs / weekly batch) and were equally divided into two groups as follows: (A) Negative Control group – NC: received growers feed from 10th week until 15th week of age and fatteners feed afterwards until slaughter, (B) Treated group – Sang: received NC group feed with the addition of 15 ppm Sangrovit®/tn of feed for the same time period. Performance (BW, ADG, ADFI, FCR) and health parameters (morbidity, mortality, diarrhea score-DS) were recorded throughout the trial period. After slaughter, carcasses were weighted (30 min after slaughter) and the lean content (%) was calculated.
Results - According to the results, Sang group showed significantly better BW at the end of both periods (growing and fattening period) ($P<0.05$). Sang group showed also significantly better ADG and FCR at the end of both periods and for the total trial period, as well as improved carcass quality ($P<0.05$). No significant differences were observed for ADFI and health parameters (morbidity, mortality, DS) among the two groups ($P>0.05$).
Conclusions - The present field study indicates that administration of 15 ppm Sangrovit® in feed can have considerable beneficial effects on performance parameters of growing/finishing pigs.

P075 Clay minerals bind endotoxins in vitro

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Objective - Endotoxins, which are cell wall components of Gram- negative bacteria, are discussed to play a major role in different disease complexes of sows and piglets and cause economic losses. Therefore, the aim of our study was to find a clay mineral with a high endotoxin binding capacity.
Material and Methods - Four bentonite (Bent 1-4) samples were dissolved in pyrogen free water and treated with turbo-ultrasonic. Polymyxin B (PMB) was used as positive control. Dilutions (0.1%, 0.01%, 0.001%) were prepared and endotoxin was added (7.5 EU/ml). Samples were incubated for 1 hour, at 37 °C and shaking. After incubation, the LPS/sample mixtures were centrifuged and the supernatants were analysed with the Limulus-Amebocyte-Lysate (LAL) test.
Results - Bentonite 1 to 4 showed a good binding capacity (92-99%) compared to the positive control PMB (99%) in the highest concentration (0.1%). No statistical difference between the samples was observed ($p = 0.222$). At 0.01%, binding capacity of Bent 1 (48%) was significantly reduced ($p = 0.048$) compared to PMB (99%). All other samples bound less endotoxin (64-77%) compared to PMB but no statistical significance was observed. All products bound significantly worse than positive control at 0.001% ($p = 0.000$). Nevertheless, Bent 2 still bound 45% of the added endotoxin.
Conclusion - Selected clay minerals showed a good concentration dependant binding in the in vitro test. Especially Bent 2 can be considered as a feed additive for pigs to reduce the negative effects of free endotoxins in the organism. Further studies are currently carried out to better understand the endotoxin binding mechanism.

P076 Dietary inclusion of attapulgite improves the performance of pigs in the post-weaning, growing and finishing periods

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Objectives - The aim was to investigate the effects of attapulgite (a magnesium, aluminum-silicate clay, of the group of hormites) on performance characteristics of pigs after its inclusion in their diet during growing and finishing periods.
Materials and Methods - Three different, in terms of size and management, commercial pig farms were selected: Farm 1: 880 sows, Farm 2: 500 sows and Farm 3:220 sows. In each farm weaned pigs were randomly allocated in three treatment groups; Control (C): pigs fed a basal diet, according to stage of growth, Attapulgite (A): pigs fed the basal diet supplemented with 0.7% attapulgite and Attapulgite plus (A+): pigs fed the basal diet supplemented with 0.7% attapulgite and 0.1% of a mixture of minerals, vitamins, enzymes, live yeast and amino acids. In Farms 1 and 2, each group comprised 240 pigs, housed in pens (n=20 pigs/pen, 12 replicates/group). In Farm 3 each group comprised 120 pigs (n=20 pigs/pen, 6 replicates/group). The performance characteristics of all pigs throughout the experiment were recorded. In Farms 1 and 2, one week post-weaning, pigs were scored for diarrhoea and cleanness. Collected data were analysed by ANOVA.
Results - Data analysis showed that pigs in groups A and A+ had significantly lower feed conversion ratio ($P<0.01$) and higher average daily gain ($P<0.01$) than those of group C during growing and finishing periods. In Farm 1, pigs in groups A and A+ had significantly ($P<0.05$) lower incidence of severe diarrhoea indicators post-weaning compared to those of group C.
Conclusion - The results suggest that under field conditions, the inclusion of attapulgite in the diets of pigs can reduce the severity of diarrhoea during the post-weaning period. Moreover, it can improve the performance characteristics of fatteners.

P077 Effect of different sources and doses of zinc on plasma levels of zinc, iron, and copper after weaning in a commercial farm

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In the present study plasma levels of zinc, iron, and copper induced by different dietary sources and doses of Zn were studied in early weaned pigs. A total of 200 piglets were weaned at 28 days of age and allocated to 20 pens (10 animals per pen). Pens were randomly allocated to 10 dietary treatments. Treatments included were, a commercial weaning diet (COM) normally used in the farm including antibiotics and 2500ppm of Zn as ZnO; an experimental diet similar to COM but without antibiotics or any source of zinc other than the ingredients (DEF) considered zinc deficient (33ppm of Zn) compared to NRC recommended levels (100ppm); diet DEF supplemented to NRC levels of Zn with either ZnO (NRCZnO) or ZnSO4 (NRCZnS); diet DEF supplemented to the EU legal limit (150ppm) of Zn with either ZnO (150ZnO) or ZnSO4 (150ZnS); diet DEF supplemented to 250ppm and 700ppm of Zn with ZnSO4 (250ZnS and 700ZnS); and diet DEF supplemented to 2500ppm of Zn with ZnO (2500ZnO). An extra treatment used diet NRCZnO but animals were fasted for the 24h hour immediately after weaning (NRCZnOf) in order to induce temporary deficiency. Two animals per pen were bled on days 1, 2, 3, and 5 post weaning and plasma samples were analyzed for Zn, Fe, and Cu concentration. Most animals showed plasma levels of Zn considered almost deficient (<0.60 mg/L) for the first 2 days after weaning with a slight recovery after day 3 post weaning. Animals on DEF and NRCZnOf diets did not show lower plasma levels compared to animals on NRC diets even when a strong decrease on Zn plasma levels was expected. Zinc sulfate is the Zn source for diarrhea treatment in humans and is supposed to be more soluble and better absorbed by the animal; however none of the treatments including ZnSO4 increased Zn plasma levels compared to NRC levels. Both treatments including therapeutic levels of Zn, COM and 2500ZnO kept plasma levels of Zn in pre-weaning levels (<0.90 mg/L) at all time. No differences were found on iron and copper levels among treatments. Therapeutic levels of ZnO were the only treatments able to avoid plasma levels of Zn to fall close to deficient levels.

P078 A blend of chelated trace minerals improved sow cumulative reproduction performance and farrowing rate

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Most of sows in modern commercial units are unable to reach their lifetime potential to produce weaned piglets. Over 50% of sows culled before reaching their third or fourth parity. Our objectives were to determine if feeding a chelated trace mineral blend (MINTREX®, Novus International, Inc.) from weaning and throughout the reproductive phases in commercial farms would improve farrowing rates and cumulative reproductive performance. Two sister PRRS-stable sow farms (6,400 sows each) with a common grandparent farm were fed either an inorganic control (ITM) or a MINTREX blend (Zn, Mn, and Cu), which replaced 50% of the ITM, with target supplementation levels of Zn 165 ppm, Cu 16 ppm and Mn 38 ppm in the final diet. Replacement gilts were blocked by group on the basis of each monthly supply of weaned gilts. The experiment was conducted from April 2007 to April 2010. To calculate cumulative reproduction performance up to parity 4, only sows within groups that were old enough to produce at least 4 parities were included in the data analyses. This included a total of 8,412 sows for the analyses. Farrowing rate was improved 2.3 percentage units with MINTREX supplementation (86.8% vs. 84.5% for MINTREX and ITM, respectively, $P < 0.001$). The benefit was observed across parities except in parity 2 with farrowing rates of 86.4% vs. 83.6%, 84.9% vs. 83.9%, 87.7% vs. 85.8% and 88.9% vs. 85.4% from parity one to parity 4 for MINTREX vs. ITM, respectively. Sows fed MINTREX had more total born (44.1 vs. 40.8, $P = 0.02$) and born alive (41.6 vs. 38.9, $P = 0.04$), and tended to have more weaned pigs (36.4 vs. 34.6, $P = 0.07$) compared with those fed ITM. In summary, sows fed MINTREX had higher farrowing rates and better cumulative production performance up to parity 4.

P079 Improved retention rate and reduced culling for lameness in sows fed a chelated trace mineral blend

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Our objectives of this study were to improve sow retention rates by feeding a chelated trace mineral blend (MINTREX®, Novus International, Inc.) from weaning and continued through the reproductive phases. Two sister farms (6400 sow each) with a common grandparent farm were used. One farm was fed an inorganic control (ITM) and the other was fed a MINTREX blend (Zn, Mn, and Cu), which replaced 50% of the ITM, with target supplementation levels of Zn, 165 ppm, Cu, 16 ppm and Mn, 38 ppm in the final diet. Replacement gilts were blocked by group on the basis of each monthly supply of weaned gilts. The group of sows was the experimental unit for statistical analyses. Results indicated that gilts fed MINTREX had lower removal rates than gilts fed ITM from first service to farrowing (8.0% vs. 8.8%, $P = 0.04$). Subsequent retention rates were analyzed for sows that were on treatment from weaning to parity 4. Sows fed MINTREX had higher ($P < 0.01$) retention rates than sows fed ITM at both P3 and P4 (72.1% for sows fed MINTREX and 63.5% for those fed ITM, respectively). The involuntary and relative removal rates due to locomotion were significantly reduced with MINTREX. Similar results were observed in gilts and the overall group of sows. The overall removal rates due to locomotion were reduced by 55% with MINTREX supplementation (10.4% vs. 16.1%; $P<0.01$) compared to sows fed ITM. The overall involuntary removal rates were reduced by 45% with MINTREX supplementation (19.4 vs 28.1%; $P < 0.01$) compared to sows fed ITM. Overall mortality was reduced with 8.6% mortality for the MINTREX group and 10.4% for the control. In summary, MINTREX is beneficial for sow skeletal health and welfare assessed by higher survival rates to parity 4 and lower removal rates due to locomotion.

P080 Improved progeny performance from sows fed a chelated trace minerals blend

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Our previous study indicated that sows fed a chelated trace mineral blend (MINTREX® Zn, Cu and Mn) had improved retention rates and produced piglets that were heavier at birth compared to sows fed inorganic minerals (ITM). We hypothesized that piglets with heavier birth weights should perform better until market weight. The treatment design was a 2x3 factorial arrangement with 2 progeny sources from sows fed either MINTREX or ITM, and 3 dietary mineral programs: 1) ITM or 2) MINTREX supplementation at 50% of NRC levels (Zn 50, Mn 2,and Cu 3 mg/kg), and 3) ITM at 2x NRC levels. 2400 weanling pigs (20 d of age) were randomly allotted to 6 treatments with 16 replicates each and 25 pigs/pen. Data was analyzed by PROC GLM for main effect of progeny, dietary mineral source, and 2-way interaction. Pen was the experimental unit. There was no interaction between progeny source and dietary mineral treatment. Overall, no differences were observed among pigs fed the 3 different mineral programs. Weights were similar across the progeny sources for 20 days pigs. However, compared to progeny from sows fed ITM, progeny from MINTREX sows were heavier by d 10 post-weaning ($P<0.01$) and remained heavier until the end of the study on d 161 (118.5 vs. 116.5 kg, $P=0.02$). During the nursery period, MINTREX progeny ate more ($P <0.01$), gained more ($P<0.01$) and were 2.5 kg heavier at the end of nursery ($P<0.01$) compared to pigs from sows fed ITM. Overall (d 0-161), progeny from sows fed MINTREX ate more ($P<0.01$), gained more ($P <0.01$) and tended to have greater loin compared to the control group. In summary, progeny from sows fed MINTREX performed better than piglets from sows fed inorganic trace minerals. This demonstrates that sow mineral source can impact their progeny performance.

P081 The influence of the mannanoligosaccharide Bio-Mos on sow and piglet performance

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A review of 12 studies has been carried out and a summary prepared on the effects of Bio-Mos in sow diets on both sow and piglet performance. Bio-Mos had been included at 1 kg/ton during both gestation and lactation, or 2 kg during late gestation and lactation. The number of sows on the various commercial and university trials in several countries was 2,996 and varied between 24 and 1,028 sows over a range of parities in the different trials. Data were analyzed with Bio-Mos inclusion as the main effect to determine its impact on sow and pre-weaning piglet performance. Including Bio-Mos in the diet of the sow did not influence the number of piglets born alive (11.24 vs 11.14) ($p>0.05$), but the number of piglets weaned was numerically higher in all studies: 10.11 (±1.09) vs 9.67 (±0.74) ($p>0.05$). This increase resulted from a 21.0% decrease in pre-weaning mortality, from 11.56 (±1.85) to 9.13 (±1.60) %, respectively ($p<0.05$). The birth weight of the piglets from sows fed Bio-Mos was similar to that from control fed sows, but weaning weight was increased from 6.87 to 7.17 kg ($p>0.05$). However, the difference was significant ($p<0.05$) in 4 of the studies. Colostrum samples were collected in 5 of the studies and the concentration of Ig's was measured. The concentrations of IgA, IgM and IgG (mg/dl) were considerably increased when Bio-Mos was included in the diet of the sow and in several studies the difference was significant ($p<0.05$). In 2 studies, piglet growth rate was measured during the first 24 hours of life and was increased from 83 to 123 g/day and 138 to 164 g/day, respectively ($p<0.05$), when Bio-Mos was included in the diet. The responses to Bio-Mos in sow diets are therefore consistent, with considerable benefits for both sow and piglet productivity.

P082 Fish oil improves weaning piglet's performances and health status

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Due to its high levels of specific w3 fatty acids, fish oil may positively affect health status, immune response and some productive performances of farm animals. In sows the positive effects of fish oil on reproductive parameters such as gestation length, piglet survival rate and piglet growth before weaning are widely recognised. The present experiment was designed to study the effect of dietary fish oil supplementation in piglets shortly after weaning.
Piglet diets contained 0.0%, 0.5%, 0.75% and 1.0% of a specific EPA and DHA rich fish oil. Each treatment consisted of 60 piglets distributed over 4 pens (Topigs x Piétrain). Growth performance of the animals was followed individually 3 weeks after weaning. At day 21, 10 blood samples per treatment were taken in order to measure plasmatic fatty acid profiles and seral haptoglobin levels.
Body weight at day 21 as well as daily gain increased in de dose-dependent way with increasing dietary fish oil levels. However, differences between treatment groups were not systematically significant.
Fatty acid profiles in blood plasma generally reflected the ingested fish oil contents by the piglets. Plasmatic EPA and DHA contents significantly increased in a dose-dependent way, whereas the level of arachidonic acid was significantly decreased in fish oil consuming animals. These changes in fatty acid profile resulted in a more favourable and decreased plasmatic w6/w3 ratio. Furthermore, animals with seral haptoglobin levels above 0.5 mg/ml decreased from 50% in the control group to 20%, 20% and 10% in the FO0.5, FO0.75 and FO1.0 groups, respectively.
It could be concluded that fish oil ingestion improves piglet's performances shortly after weaning and decreases seral haptoglobin levels, probably due to its effect on animal health.

P083 Sow factors affecting colostrum quantity

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Objectives - The intake of sufficient colostrum by the piglet is essential to obtain energy and maternal immunity. However, factors affecting sow colostrum production are hardly known. The objective of this study was to identify sow factors influencing colostrum quantity (CQ).
Materials and Methods - Thirty seven (37) PIC sows were managed identically at a commercial pig farm and moved to the farrowing unit at day (D) 108 of gestation. CQ, parity, change in back fat (BF), gestation length and number of live born piglets were measured. Statistical analysis was done using multivariable linear regression.
Results - The factors associated with CQ present in the final model are in the following equation:
$CQ\ (g) \approx 3713 - 139a + 170b - 112c$ ($p<0.001$, $R^2=0.38$)
a = parity
b = percentage of BF change (expressed per day) between D109 of gestation and D1 of lactation relative to the BF at D109 of gestation
c = change in BF between D85 and D109 of gestation
CQ decreased with a higher parity. Influence of BF changes depended on when they occurred: CQ was higher when BF decreased between D85 and D109 of gestation and increased between D109 and D1 of lactation.
The number of live born piglets was not associated with CQ ($p>0.05$, $R^2=0.003$).
Conclusion - CQ decreased with the age of the sow. BF changes during the last week of gestation (b in equation) were expressed in percentage so the same increase in BF will have more effect on CQ in a skinny sow than in a fat sow. The different influence of BF changes depending on when they occurred underlines the importance of an optimal feeding strategy during late gestation. The number of live born piglets did not influence CQ which may point to the sow as limiting factor for CQ.

P084 Effect of Improvac vaccine on entire male pig performance and carcass quality

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The objective was to examine the performance parameters of dietary lysine on Improvac vaccinated male pigs when compared to physical castrated male pigs, entire male pigs and female pigs.
The trial consisted of 8 treatment groups with 6 animals per pen. Six replicates per treatment group entered the trial. Animals were fed a grower diet (D0-D35), a transition diet (D35-D70) and a finisher diet (D70-D105). Each of the treatment groups were fed different diets; respectively a standard lysine formulation based on CVB (2008), and a formulation that contained 15% more lysine. Finally, one of the Improvac groups was fed 15% more lysine in the grower and transition diet, but a standard lysine in the finisher diet.
When compared to the standard diets, the groups fed a higher lysine showed increased ADG in the entire males (922 to 949g) and Improvac groups (937 to 952g) but not in the barrows group (962 to 909g). The FCR in entire males decrease from 2.28 to 2.22, in the Improvac group from 2.36 to 2.26 and barrow from 2.53 to 2.48. The Improvac group with higher lysine only in starter and transition diet, had an ADG of 942g and a FCR of 2.31. This last group also showed the overall best performance on muscle thickness (61.0mm), meat% (56.9%) and backfat thickness (16.2mm).
In conclusion, boars and vaccinated animals performed better on a diet with higher lysine contents. The vaccinated group with higher lysine only in starter and transition diet performed very closely to the groups with high lysine throughout the trial. Feeding a diet with a lower lysine content in the final 5 weeks has a big impact on the feeding costs. This will be further investigated. Data will also undergo statistical analysis.

Immunology

P085 Comparison of two different vaccination programmes for controlling M. hyopneumoniae in pigs slaughtered at 9 months of age

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Introduction - The aim of the study was to compare the efficacy of two vaccination programmes to control PCV2 and *M. hyopneumoniae* (M hyo) in pigs slaughtered at 9 months of age.
Materials and Methods - A side-by-side study was performed in a 700 sow multisite farm. Pigs were randomly allocated to two treatment groups at 3 weeks of age. Pigs in the FLEXcombo group received a single dose (2 ml) of the mixture of CircoFLEX® and MycoFLEX® at 3 weeks of age, while pigs in the 2-ds M hyo group 2 received 1 ml of Ingelvac CircoFLEX® at 3 weeks and 2 ml of Suvaxyn® M Hyo at 4 and 7 weeks of age. Serology test for M Hyo, PCV2, PRV, PRRSv and SIV was performed at 5 different times, from nursery to slaughter. Samples were tested by PCR for PRRSv antigen. Losses (mortality + runts), lung lesion score and carcass weights were recorded, and wean-to-finish ADWG was calculated based on the individual carcass weights. The two vaccination programmes were compared economically based on the costs for losses and for vaccination.
Results - M hyo challenge was confirmed by seroconversion in finishing. Performance and slaughter check results were similar for both treatment groups. Costs for losses were 0.56€ lower in the FLEXcombo group. Vaccination costs were 0,10€ higher for FLEXcombo, resulting in an overall economic advantage of 0,46€ per pig sold.
Discussion - No relevant differences in performance or slaughter lesions were observed between the two vaccination schemes. As the same PCV2 vaccine was used in both groups and M hyo challenge in finishing was confirmed by serology, the results indicate that a single dose of Ingelvac MycoFLEX® was as effective to control M hyo as the two-dose *M. hyo* vaccine.

P086 Study on cell mediated immune response induced by concurrent vaccinations to PRRSV and PCV2 in naturally infected pigs

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Objective - This field trial was aimed at assessing the immune efficacy of the concurrent use of PCV2 + PRRS vaccinations in comparison with the effects of both single vaccinations (PRRS and PCV2 alone) and with negative non-vaccinated control pigs by measuring IFN-γ-specific SC.
Materials and Methods - This double-blinded trial was carried out in a farrow to finish 2000-sow-herd affected by PCVD and infected by PRRSV in nursery and growing phase (stable herds). PCV2 and PRRS vaccinations have been never applied prior to this trial. At weaning (22.5±1.3 days of age) 800 piglets individually identified were equally distributed to 4 different groups as follow: A (concurrent vaccination with Porcilis PRRS - right side of the neck, + Porcilis PCV - left side); B (Porcilis PRRS only); C (Porcilis PCV only); D (Placebo -adjuvant/control). Blood samples (20 pigs/group) were taken every 2 weeks for the whole duration of the trial in order to perform immunological exams to evaluate specific immune response to PCV2 and PRRSV. PRRS natural infection occurred from 8 to 18 weeks of age and PCV2 infection from 16 weeks of age onward. Data were statistically evaluated by using ANOVA (analysis of variance) and Dunnett's test.
Results - After PCV2 vaccination both vaccinated groups (A and C) developed an increase of the number of IFN-g SC. Conversely, in non PCV2 vaccinated groups the amount of SC stayed at basal level. After infection all groups showed an increase of IFN-g SC especially in concurrently vaccinated pigs. After PRRS vaccination the number of IFN-g SC in concurrently vaccinated and group B increased promptly reaching higher level than the non-vaccinated groups.
Conclusions - In the condition of this study, the results show that concurrent vaccination to PRRS and PCV2 is safe and does not interfere with the stimulation of the cell mediated immunity to the specific antigen and shows some improvement of cell mediated response to PCV2.

P088 Comparison of health and production efficiency of beta-glucane administration and Enterisol vaccination in swine

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On the Clinic of Swine (UVMPh Košice), specific immune response to vaccine Enterisol against *Lawsonia intracellularis* was studied in weaned piglets from sows long-term fed an immunomodulating food additive based on beta-glucane. The experiment included piglets from experimental (n=2) and control (n=2) groups of sows depending of feeding the immunomodulating food additive (IMUNOL P) based on beta-glucane.
Evaluation within the groups was focused on selected production indices of sows and piglets, selected indices of blood immune profile and blood serum levels of specific antibodies against *L. intracellularis*.
In the experimental group of sows, the results showed higher numbers of piglets in the litter, comparable numbers of dead-born and died piglets, as well as birth body weight. However, average daily weight gain after the weaning were significantly ($p<0.05$) higher in the group of vaccinated piglets, as well as in piglets from sows receiving beta-glucane. The same tendency was recorded for average values of CIg. Immunostimulation effect of the beta-glucane based additive combined with vaccination was significantly ($p<0.01$) manifested by changes in index of leukocyte metabolic activity (IMA) and less markedly in lymphocyte stimulation index (SI), when higher average values were recorded in groups with combination of beta-glucane, as well as in the groups with the vaccination only. The effect of Enterisol oral vaccine was confirmed by estimation of specific antibodies (PI) by ELISA test. At both samplings, the groups of non-vaccinated weanlings showed minimum levels of antibodies compared with both vaccinated groups. In the vaccinated groups, highly positive findings were recorded without significant difference between beta-glucane stimulated and non-stimulated groups.

P089 Protection of piglets against edema disease by maternal immunization with Stx2e toxoid

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Edema disease (ED) is common in newly weaning pig and distribution worldwide. Different approaches for immunoprophylaxis against ED have been attempted. However, to date no commercial vaccine or effective therapy exists to treat ED.
In the present study, we used a genetic mutant toxin Stx2e (Y77S, E167Q), designated as Stx2e toxoid to immunize piglets actively and/or passively. We show that a genetic disarmed Stx2e toxoid is a safe antigen that generates antiserum protecting piglets against the Stx2e toxin. Immunization of suckling piglets with the Stx2e toxoid was safe, had no adverse effects on growth of the piglets and resulted in effective prevention of edema disease clinical symptoms after challenge with the Stx2e toxin. Our data showed that maternal immunity against the Stx2e toxoid can be transmitted from the vaccinated sows to the piglets via the colostrum. Very high levels of Stx2e-specific serum antibodies persisted in these piglets until 1 month post-weaning bridging the critical period in which the weaned piglets are most susceptible to edema infection. Challenge with Stx2e toxin resulted in clinical signs of edema disease and death of all control piglets from non-immunized sows, whereas none of the piglets from immunized sows developed clinical signs of ED.
For the first time, it was possible to demonstrate that active immunization with the Stx2e toxoid induced strong immune responses in piglets and sows, as well as provides high levels of passive antibodies in piglets. The latter was confirmed by complete protection of the piglets from lethal dose of Stx2e toxin. The finding of our study looks promising to combat ED in the pig.

P090 How adjuvant formulation can control vaccines stability

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Introduction - Vaccine adjuvants are a key parameter in modern vaccine formulation. Most formulations are composed of synthetic components with immunomodulator properties combined to create a specific galenic antigen presentation. This vehicle effect can be influenced by the evolution of the organised system or by chemical degradations. Multivalent vaccines antigens have new properties which destabilise vaccine formulations. We have been working on innovative formulations able to resist to very crude and concentrated destabilising antigenic media while keeping safety parameters and efficacy at requested levels.

Material and Methods - Vaccine emulsions were prepared by using MontanideTM adjuvants for swine vaccines (O/W emulsions and microemulsions) with multivalent bacterial and whole cell viral antigens. Traditional formulations were compared with optimised formulation for emulsion stability over time. Injectable properties were tested in mice on ovalbumine model antigen before testing on target animals with effective antigens.

Results and Conclusions - Slight adjuvant composition modifications can render stable formulations able to pass severe temperature stress tests. Safety results in model animals allowed the selection of a range of robust formulations based on a modified MontanideTM surfactant. Efficacy trials in swine have shown that aqueous formulations need to be well balanced to find the accurate compromise between formulation stability, short term reaction intensity and long term efficacy. No problems were detected regarding injection sites reactions at the slaughter house and a good onset of immunity was measured. Swine vaccines presented in this work with modified optimized formulation are currently tested in the field for large scale evaluation.

P092 Vaccination of piglets against PCV2 and M. hyopneumoniae infections under field conditions using two vaccines (Porcilis PCV and Porcilis M Hyo) either in separate simultaneous injections or in a single injection of the mixed vaccines

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Introduction - In the field, PCV2 and Mhyo vaccines are frequently mixed for practical reasons. The object of this study was to investigate the effect of this on the safety and efficacy of each vaccine.

Material and Methods - On a French farrow-to-finish farm, piglets were randomly allocated to one of two different treatment group. All the piglets were first vaccinated with 2 ml Porcilis MHyo at 7 days of age. Later piglets were injected at 21 days of age. Group1 (712 piglets) received 2ml doses of both Porcilis PCV and MHyo simultaneously at separate sites; Group2 (685 piglets) received a single 4ml dose of a mixture of the two vaccines.

Piglets were observed for the occurrence of adverse reactions following treatment, and they were each weighed at weaning and at slaughter. Protection against PCV2 was assessed by ELISA serology at 21, 50, 75, 100 and 160 days, and against Mhyo by scoring the lungs at slaughter. Carcass quality was assessed by average percentage of lean (TMP).

Results and Conclusion - Adverse reactions rates were similar in both groups. They had comparable (high) PCV2 titers at 21, 75, 100 and 160 days of age. There were also high titers at 50 days old, but the groups differed slightly ($p=0.02$). The average rate of pneumonia lesions in all the animals was low, Group2 having a slightly higher average than Group1 (1.4 and 1.1 respectively; $p=0.01$). The occurrence of serious pneumonia lesions (score>6) was equivalent for both lots. Group 1 had three times as many lesions of pleurisy as Group 2 ($p=0.03$). ADG between weaning and slaughter was 754 and 743 g/day in Group1 and 2 respectively ($p=0.04$). Group 2 had a slightly better TMP ($p=0.05$).

It was concluded that, though there were some minor statistical differences, mixing Porcilis PCV and Porcilis MHyo in a single dose did not affect the safety or efficacy of eithers.

P093 Interest of serological diagnostic use for understanding of enzootic pneumonia in swine farms

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Introduction - This study aimed to understand the epidemiology of enzootic pneumonia in 8 farms, where serologic analysis were done from suckling piglets and after weaning, for at least 2000 serologies.
Material and Methods - Breeding and fattening farms in which contemporary trials of various vaccine protocols have been organised. We vaccinated all the animals. Individual tagging of 20 piglets (20 piglets vaccinated differently/litter within 10 litters/band and repetition of 3 to 4 bands/farm). Follow-up of animals up to slaughter. Method of antibody detection chosen: OXOÏD (DAKO) test which is a competitive-inhibition Elisa. All the analyses were performed in the same laboratory (LDA 22 in Ploufragan, France).
Results - On suckling piglets, the level of antibody decrease between 7 days and the weaning (R2=0.35) but there are big differences between herds. There was no correlation between the % of positive suckling piglets and the parity of the mother. Post-vaccine seroconversion different depending on the vaccination protocols and fleeting with time followed by fairly stable seroconversion profile from one band to another (serocoversion occurred around 17 weeks of age) depending on the natural contamination of the farm.
Conclusions - These results confirm that the serological tool may help understand the circulation of *Mycoplasma hyopneumoniae*. The serological marking by the single dose vaccines usually used in France is of short duration (study being published) and does not interfere with natural seroconversion in an infected farm.

P094 Serological marking of various commercial vaccines against enzootic pneumonia in a mycoplasma-free farm

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Introduction - The objective of this study is to understand the serological marking of different vaccination protocols performed in a mycoplasma-free farm.
Material and Methods - At the age of 5 days, 7 piglets were identified individually within each litter (piglets were left with their biological mother). 6 different vaccination protocols were performed on 6 piglets and 1 piglet did not receive any vaccine injection (negative control). Blood samples were taken from the 98 piglets at 6/22/37/54/69/90/110/131/156 days of age.
An antibody test was performed at the end of the trial in the same veterinary immunology laboratory using the OXOID (DAKO) method.
Results - It appears clearly that the vaccine marking is very different depending on whether a single dose or double dose injection is administered, irrespective of the vaccine used (among those tested and according to the MA recommendations).
For example, at 68 days of age, there was 7.1% and 8.3% of negative piglets among the 2 shots vaccinated piglets whereas % of negative piglets range from 53.8% to 85.7% for the 4 one shot vaccines protocol tested. 100% of control piglets were negative.
Conclusions - This trial will allow to better interpret serological profiles performed in farms. This confirms the interest of the serological tool to understand the dynamics of Mycoplasma hyopneumoniae infection in farms using 1 shot vaccines. Serology might be useful to assess the quality of the vaccine uptake in farm using 2 shots vaccines.

Parasitology

P096 Species identification of Trichinella larvae isolated from swine in Poland

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Trichinellosis is the disease caused by the parasitic worm *Trichinella*. The important step in his life cycle is obligatory transmission by ingestion of meat. The nematode *Trichinella* occurs in more than 150 animal species in areas with different geographical and ecological characteristics. There are 8 known species of *Trichinella* and four genotypes. The transmission of the parasite takes place through carnivorism, therefore a sylvatic life cycle has to be considered as reservoir of the parasite. The major source of *Trichinella* for humans in Poland is wild boars meat, meat from pigs also is a threat but from year to year less.
In Poland every year are slaughtered about 20 milions of pigs. Each of them was investigated by artifical digestion method for presence *Trichinella* by Commission Regulation (EC) No 2075/2005 of 5 December 2005 laying down specific rules on official controls for *Trichinella* in meat. Since 2005 to 2010 obtained 122 561 546 pigs which was investigated by artifical digestion method in meny laboratories. *Trichinella* larvas was detected in 161 pigs. This is 0,00013 % of slaughtered carcasses. In those time to the National Veterinary Research Institute in Puławy received 87 samples from pigs. Every samples was investigated by artifical digestion method and obtained larvas was archived in 96% ethyl alcohol. Larvas from 2005 – 2008 were destroyed by wrong storage conditions and does'nt obtained good results in DNA isolation. From 15 samples, obtained in 2009, 2010 and 2011, DNA was isolated by QIAGEN - DNeasy Blood & Tissue Kit. DNA form every samples was investigated by multiplex pcr. Species identification showed that every investigated larva was *Trichinella spiralis*.
From 2000 only wild boars meat was source of trichinellosis in Poland. Meat from pigs thanks for surveillanace pigs breeders and good vets practice in investigation isn't a high risk of contracting trichinellosis in human.

P098 Dose determination and confirmation studies of a new fenbendazole drinking water formulation against Ascaris suum in swine

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Objectives - To determine and confirm the dosage regimen of Panacur® AquaSol against larval and adult stages of *Ascaris suum*. This is a unique drinking water Fenbendazole (FBZ) formulation based on an innovative wet milling process which results in a physically stable suspension requiring no stirring during administration.
Materials and Methods - In two dose determination studies artificially Ascaris-infected pigs were randomly assigned to an untreated and three treated groups (5, 2.5 or 1.7 mg FBZ/kg BW/day over 1, 2 or 3 consecutive days respectively). In three dose confirmation studies, artificially or naturally infected pigs were randomly assigned to an untreated and treated groups (5 or 2.5 FBZ/kg BW/day over 1 or 2 days respectively). Animals were necropsied and *A. suum* stages enumerated in small intestines. Reduction of larvae or worm counts was compared statistically between the groups.
Results - A total of 117 pigs completed the dose determination studies, of which 88 were treated with a 94.8% to 100% efficacy. In the dose confirmation studies, 119 animals completed the studies, of which 74 were treated with a 93.8% to 100% efficacy. These studies indicated that the two day dosage was more efficacious than the single day dosage but comparable to the three day dosage.
Conclusions - A dosage of 2.5 mg/kg BW of Panacur® AquaSol given for 2 days via the drinking water was considered the optimal dosage regimen to treat larval and adult stages of *A. suum*.

P099 The simultaneous infection with Toxoplasma gondii strains affects the parasitic load in tissues of experimentally infected pigs

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Objectives - *Toxoplasma gondii* is an intracellulair parasite of humans and domestic and wild animals. The infection with this pathogen causes severe disease in humans and has an important economic impact in domestic animals. The important source of infection in humans is the consumption of raw or undercooked meat. Therefore, the infectious capacity of the tissues from infected animals needs to be determined.
Material and Methods - In the present study, we determined the parasitic load in tissues of experimentally infected pigs after a simultaneous infection with two *T. gondii* strains.
Two groups (n=3) of seronegative 6-week-old pigs were infected with 6000 tissue cysts of IPB-Gangji strain and IPB-LR strain (group 1 and 2 respectively) and 2 months later re-infected with 6000 tissue cysts of IPB-Gangji strain and IPB-LR strain (group 2 and 1 respectively). Group 3 was infected 60 days p.i. with 6000 tissue cysts of IPB-Gangji strain. The animals were euthanized 4 months p.i. and the parasitic load was determined by qPCR in the following samples: brain, heart, spleen, skeletal muscles (*m. gastrocnemius, mm. intercostales, m. longissimus dorsi, m. psoas major*) and diaphragm.
Results - The parasitic load was the highest in brain and heart samples in the three groups of animals. In group 1 several skeletal muscles remained infectious while in group 2 only few samples tested positive. Moreover, the amount of DNA found in the muscles in group 2 was remarkably lower than in positive tissues of group 1. Group 3 showed very high and moderate parasitic load in brain and two muscle samples, respectively.
Conclusions: The IPB-Gangji strain induces and fastens the clearance of infected tissues starting from 2 months p.i., even from the cysts due to prior infection with IPB-LR strain.

P100 Efficacy of a new toltrazuril product (Toltranil) in an experimental Isospora suis challenge trial

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Introduction - Porcine coccidiosis caused by *Isospora suis* is one of the leading causes of neonatal diarrhea in suckling piglets. Currently the only registered substance for metaphylaxis is toltrazuril. Studies with the original product showed the high efficacy on oocyst excretion and reduction of diarrhea in challenge infections and field trials. The present study was performed to investigate the efficacy of a new toltrazuril product in the already implemented challenge model.
Material and Methode - For this, two groups of piglets were infected on the 4th day of life with 1500 sporulated oocysts of an Austrian *Isospora suis* field strain. The control group (n = 10) was sham-treated with water while piglets in the ToltranilTM group (n = 9) received 20 mg toltrazuril (= 0.7 ml of ToltranilTM 50 mg/ml/kg) per kg of body weight 2 days post infectionem. The oocyst excretion was monitored daily between the 8th and the 22nd day of life by autofluorescence and quantified in positive samples by McMaster counting (oocysts per gram of feces; OPG). During the same period the piglets were observed clinically and scored for diarrhea (fecal score 1-4 with 3, 4 = diarrhea). The piglets were weighted individually on days 1, 8, 15, 22 of life to assess the benefit for the new toltrazuril formulation by growth performance (= g/d; daily weight gain).
Results and Conclusions - All animals of the control group excreted oocysts with a peak on day 7 post infectionem. The highest excretion rate was 4x105 OPG. By contrast, in the ToltranilTM-treated group no oocyst excretion was observed. Diarrhea was markedly reduced in the treated group (4/9 vs. 8/10 piglets with fecal score 3 or 4 for at least one day; 2.30 vs. 0.56 diarrhea days/piglet; average fecal score 0.6 vs. 2.3 during the observation period). The treated group showed a much higher growth rate compared to the untreated control (138.10 g/d vs. 73.57 g/d).
From the results of this experimental trial in an established challenge model it can be concluded that the new toltrazuril formulation is as effective as the original product and will perform under field conditions in a comparable manner. The results underline once more the benefit of a metaphylactic treatment in infected herds in terms of piglet health and weight gain.

P101 Cevazuril® in the control of coccidiosis as a part of multi-infectious neonatal diarrhea

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Objectives - The aim of the study was to evaluate the efficacy of Cevazuril® in the control of neonatal diarrhea and it's impact on growth rate in piglets on a farm with a multi infection status.
Materials and Methods - Conventional pig farm positive for *E. coli* F4, *C. perfringens* (CP) type A (cpa, cpb2) Rotavirus and *I. suis* was selected. Cevazuril® treatment (5% of toltrazuril) was performed on day 2 of age. Sows were vaccinated before farrowing with Coglamune®, vaccine containing a toxoid of CP type A and b toxoid of CP type C. Piglets were divided into 3 groups. A – piglets not treated with Cevazuril®, born to non vaccinated sows. B – piglets treated with Cevazuril®, born to non vaccinated sows. C – piglets treated with Cevazuril®, from vaccinated sows. The total number of piglets in groups A, B and C was 123, 107 and 139. Individual weight was measured on day 2 and at weaning. Diarrhea was scored daily. Pooled samples of feces collected per litter on day 14 of life were examined by ovoscopy. ANOVA and Fischer's test were used for statistical evaluation.
Results - The vaccination of sows didn't bring any improvement. Therefore both Cevazuril® groups were included into one (B&C).
1) Excretion of oocysts was higher in the group A (40% positivity with 885 oocysts per gram on average) compared to group B&C (10% positivity with 15 oocysts per gram).
2) The weight at weaning and the weight gain, taking into account the weight at D2, was significantly higher in the group B&C compared to group A, respectively: 7.9 ± 1.85kg versus 6.83 ±1.75kg, $p<0.0001$ and 6.22± 1.68kg versus 5.22± 1.64kg, $p<0.0001$.
3) The deterioration of diarrhea related to the baseline of diarrhea score on days 1 and 2 of age was significantly lower in the group B&C in weeks 1,2,3 and 4 (14.3%, 28.6%, 23.8%, and 19.1%) compared to group A (70.0%, 80.0%, 70.0% and 80.0%).
Conclusions - Treatment of piglets with Cevazuril® reduced the incidence of coccidiosis and proved to be effective in the control of clinical diarrhea, even if newborn piglets were already affected by other concurrent bacterial and viral agents. The reduction of diarrhea was accompanied by the increase in the growth rate for 1 kg on average.

P102 Efficacy and safety of a new fenbendazole drinking water formulation against Ascaris suum in swine under field conditions

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Objectives - To confirm the efficacy and safety of Panacur® AquaSol against *Ascaris suum* under practical conditions. This is a unique drinking water formulation of Fenbendazole (FBZ) based on an innovative wet milling process which results in a physically stable suspension requiring no stirring during administration.
Materials and Methods - The study was conducted at four commercial farms in France, Germany and Spain. Naturally *Ascaris*-infected pigs were randomly assigned to an untreated or a Panacur® AquaSol treated group (2.5 mg FBZ/kg BW/day over 2 consecutive days). Fecal egg count (FEC) was performed for all enrolled pigs on days -2 and -1 before treatment and between 10 to 15 days after last administration. The primary efficacy parameter was the FEC reduction from pre- to post-administration within the treated group. Secondary parameter was the comparison of post-treatment FEC between treated and control groups.
Results - A total of 432 pigs completed the study, of which 332 were treated with Panacur® AquaSol. Both, primary and secondary efficacy parameters were 99.9% overall and ranged from 99.5% to 100% at the study sites. No treatment-related adverse event was seen.
Conclusions - Panacur® AquaSol given orally via the drinking water at a daily dose of 2.5 mg FBZ/kg BW over 2 consecutive days was safe and highly efficacious in the treatment of pigs naturally infected with *A. suum* under different animal husbandry and water qualities conditions.

P103 Impact of larval migration of Ascaris suum on lung pathology and consequently on technical performance

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Introduction - The objective of the study was to evaluate the relation between liver and lung damage and their impact on technical performance.
Materials and Methods - From 91 farms, 313 batches of pigs (n = 22866) were assessed in the slaughter house for the presence of liver milk spots and lung lesions. For liver scoring, three levels were used: score 1: < 3 milk spots, score 2: 3 to 10 milk spots, score 3: > 10 milk spots. The lung lesions were scored using the method from IFIP (score 0 to 24). The average liver and lung scores were calculated per batch. FCR and ADWG (8 to 115 kg life weight) were retrieved from the Gestion Technico-Économique (GTE) of the farms for the relevant period. For the statistical analysis, the GLM procedure in SAS® was used.
Results and conclusion - The average liver scores ranged from 1 to 2.21 and the average lung scores ranged from 0 to 8.68. 24.6% of the livers showed at least 3 milk spots. The ADWG ranged from 588 to 846 g/d and the FCR ranged from 2.10 to 3.25. When categorizing average liver scores in increasing importance, the average lung scores followed exactly the same pattern. But when categorizing average lung scores in increasing importance, the average liver scores did not follow the same pattern. There was a significant negative impact of liver and lung damage on ADWG ($p = 0.0017$ and $p = 0.0015$, respectively) and on FCR ($p = 0.0005$ and $p = 0.0060$, respectively). Migration of Ascaris suum larvae causes liver milk spots and the severity of the infection is related to the severity of lung pathology. The technical performance of the pigs is correlated with the severity of the damage. The control of Ascaris suum infections in pigs is an important step in the successful control of respiratory diseases.

Herd Health Management and Economy

P104 The value of the coughing index in diagnosing enzootic pneumonia in groups of fattening pigs

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Introduction - The accurate and thorough diagnosis of enzootic pneumonia at herd level should be based on a combination of different methods. In this connection, the merit of clinical examination is usually rated as low compared to the direct detection of *Mycoplasma (M.) hyopneumoniae* in lung lesions by PCR.
Material and Methods - The present study compared the value of accurate clinical examination, including the quantitation of coughing, with PCR on bronchoalveolar lavage fluid and serological testing of blood samples for the purpose of diagnosing enzootic pneumonia.
Results and Conclusions - A positive association between the clinical coughing index score and the detection rate of *M. hyopneumoniae* was observed. Fattening pigs with detection rates of *M. hyopneumoniae* ≥50% assessed by ELISA or PCR were characterised by significant higher coughing index scores than herds with detection rates <50%. It was shown that in fattening pigs a quantitative assessment of onsets of coughing - typically dry and non-productive - improves the diagnosis, when the seroprevalence of *M. hyopneumoniae* in the affected age group is also considered. If the coughing index (average % of pigs coughing per minute of observation period) is ≥2.5% and the seroprevalence ≥ 50%, then enzootic pneumonia is most likely. Vice versa, a diagnosis of enzootic pneumonia in fattening pigs would be doubtful if the coughing index is clearly <2.5% and seroprevalence < 50%.

P105 Effects of tiamulin (Denagard®) treatment in nursery pigs suffering from respiratory disease in a field trial

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Introduction - Diseases of the respiratory tract are mainly of multifactorial origin, including several pathogens and other triggering factors. Treatment is thus aiming for the use of antibiotics effective against a broad range of relevant bacteria. This study investigated the effects of a tiamulin (Denagard®, Novartis Animal Health Inc.) treatment in nursery pigs suffering from a respiratory disease in a field trial.
Materials and Methods - 150 pigs at 9 weeks of age were randomly divided into two groups. Pigs of group TIA received 15 mg/kg/day tiamulin hydrogen fumarate by water over 14 days. All animals of group CONT were left untreated. Groups were housed in different pens within one room. On days 0-3,5,7,9,11,13,14,15,17,19,21 a cough index was calculated for both groups. Bronchoalveolar lavage fluid (BALF) was collected from the 30 sampling animals (SAs) per group on days 0,14,21. BALF was used for bacteriological investigation and for PCR-testing of porcine mycoplasmas.
Results - In group TIA the mean amount of *H. parasuis* (HPS), *M. hyorhinis* and α-haemolytic *Streptococci* isolated from BALF was significantly reduced over the study period ($p<0.05$). In group CONT only the amount of HPS was significantly reduced ($p<0.05$). The amount of *P. multocida* and *B. bronchiseptica* in BALF did not differ significantly between the 3 sampling days. Other pathogens were only isolated in a minor number of SAs. The cough index showed an estimated decrease of 50% after 6.1 days in group TIA, while a decrease of 50% was not achieved in the CONT group by the end of this study.
Conclusions - The trial data verified the effectiveness of tiamulin treatment against several pathogens in the expected range of bacteria. Lowering the pathogen burden improved pigs' health (cough index).

P106 Thermography: a novel way to mesure vitality?

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Introduction - Piglet vitality is a crucial parameter of herd management with hyperprolific sows. It determines piglet's immediate survival and future performances. Baxter et al. (2008) have proposed to score vitality 15 seconds after birth based on respiratory movements using four categories. The method was later refined into five categories by Sacy et al. (2010) to enhance precision. The aim of this study was to evaluate whether thermography could be used as an alternative more repeatable and practical mean to measure piglet vitality, the measure being taken 24 hours after birth.
Materials and Methods - The study took place during 3 weeks in a pig breeder/fattener setting of 2000 sows in the centre of France. Thirty one sows were conveniently chosen and the vitality of each of their piglets evaluated by the two methods to be compared, the measure of thermography being taken on the peri-umbilical region. Descriptive statistics of the studied variables were obtained.
Results - Out of 478 piglets, 80 were excluded because of death before the thermography measure at 24 hours. Over half of the piglets were given a score of 2 (202/398) whereas only 3% (12/398) and 2.5% (10/398) were given a score of 0 and 4 respectively. Abdominal temperature ranged from 34.2°C (score of 0) to 39.4°C (score of 2). Distribution of temperature for each score was not normally distributed and, although the medians showed a significant increasing trend ($P<0.05$), ranges were overlapping.
Conclusions - It was not possible to establish a new scale to measure vitality based on a measure by thermography at 24h after birth. However further research seems necessary before definitely rejecting this method. Moreover this work also shed light on the limits of the usual scoring of vitality.

P107 Concurrent vaccinations to PRRSV and PCV2 induces clinical protection in naturally infected pigs

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Objective - This field trial was aimed at assessing the efficacy of the concurrent use of PCV2 + PRRS vaccinations in comparison with the effects of both single vaccinations (PRRS and PCV2 alone) and with negative non-vaccinated control pigs, by measuring viremia, morbidity and mortality.
Materials and Methods - This double-blinded trial was carried out in a farrow to finish 2000-sow-herd affected by PCVD and infected by PRRSV in nursery and growing phase (stable herds). PCV2 and PRRS vaccinations have been never applied prior to this trial. At weaning (22.5±1.3 days of age) 800 piglets individually identified were equally distributed to 4 different groups as follow: A (concurrent vaccination with Porcilis PRRS - right side of the neck, + Porcilis PCV - left side); B (Porcilis PRRS only); C (Porcilis PCV only); D (Placebo -adjuvant/control). Blood samples (20 pigs/group) were taken every 2 weeks for the whole duration of the trial in order to perform virological exams for PCV2 and PRRS by Q-PCR. On a weekly basis clinical signs (morbidity) were recorded by using a standardized scoring system (Segalés et al, 2009). Mortality was recorded also. Statistical analysis was performed by a GAMM (morbidity), GLMM (viremia) and Cox proportional Hazard Model (survival).
Results - PRRS natural infection occurred from 8 to 18 weeks of age and PCV2 infection from 16 weeks of age onward. In these two periods the course of clinical score in control pigs (group D) and in non-vaccinated animals (group C – Porcilis PCV only and B – Porcilis PRRS only) was characterized by a statistically significant increase. Moreover, in PCV2 vaccinated animals (groups A and C) the viral burden in blood was significantly reduced ($p< 0.01$) as compared to PCV2-non vaccinated pigs (Groups B and D). Overall, morbidity in concurrently vaccinated pigs (group A) was significantly lower ($p<0.01$) than the other groups. Survival rate in all vaccinated groups (A, B and C) was statistically higher than group D. Conclusions. In the condition of this study, the results show that concurrent vaccinations to PRRS and PCV2 is safe and improves the health status of the treated pigs when naturally exposed to both infections.

P108 PCV2 piglet vaccination allows French swine herds to reduce their overall veterinary expenses

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Introduction - An actual important trend is to deliver healthy pigs in order to produce safe meat. In that context the French government targets to reach a reduction of 25% antibiotic use within 2016. This paper describes a longitudinal French survey focusing on the total veterinary expenses following the introduction of a PCV2 vaccine in piglets.
Material and Method(s) - The French data collection system "GTE" (Gestion Technico-Economique) was used to gather before-after data from the field. GTE reports were evaluated from 52 farrow-to-finish herds that, beside performance parameters (average daily gain -ADG-, feed conversion rate -FCR - and mortality rate from weaning to slaughter) recorded veterinary expenses as well. The reports covered the period 2009-2010. Each farm reported data of a 6 month-period without PCV2 piglet vaccination (before) and a 6 month-period using Ingelvac CircoFLEX® on the piglets (after). A 6 month-period between the before and after periods were defined as transition allowing for a clear before-after comparison. The effects of the vaccine were assessed by ANOVA at the 5% level between means.
Result(s) and Conclusion(s) - All performance parameters improved significantly ($p<0,05$): ADG improved by 19g/d, reaching 695g/d, FCR reduced by 0,09 down to 2,56, losses dropped by 1,40% to 4,70%. Total veterinary expenses dropped significantly from an average of €6,76 down to €6,38.
Furthemore Larour3 presented French insights where spending on piglets constitutes 50% of the veterinary expenses, and the piglet vaccine(s) item(s) counting for approx. 50% of that cost. The present survey on 52 herds shows that despite the introduction of a PCV2 piglet vaccine, the overall veterinary expenses in the farm decreased. More than 50% of the overall reduction is due to a reduction in antibiotics costs.
In France the introduction of Ingelvac CircoFLEX® allowed not only significant performance improvement but also a reduction in total veterinary costs.

P109 Effects of Ingelvac CircoFLEX® in 87 French farrow-to-finish herds

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Introduction - With recent economic changes it is of interest to evaluate if the benefits of PVC2 piglet vaccines are still economically sound. The aim of this paper was to describe the technical and economic impact of controlling circovirosis in piglets in France by evaluating before – after data collected from the field.
Material and Method(s) - 87 French farrow-to-finish herds using the data collection system "GTE" (Gestion Technico-Economique) were evaluated. These reports covered the period 2009-2010. Each farm reported data of a 6 month-period without PCV2 piglet vaccination (before) and a 6 month-period using Ingelvac CircoFLEX® on the piglets (after). A 6 months period between the before and after periods were defined as transition allowing for a clear before-after comparison. Average daily gain (ADG), feed conversion rate (FCR) and mortality rate data were collected from weaning to slaughter and used to calculate the return of investment (ROI) provided by vaccination. Additionnal data such as age at 115Kg and live weight at slaughter were reported. The effects of the vaccine were assessed by ANOVA at the 5% level between means.
Result(s) and Conclusion(s) - Overall, pigs after use of Ingelvac CircoFLEX® showed significant improvements: ADG improved by +20g/d (up to 696g/d), FCR reduced by 0.09 (down to 2.55), mortality decreased by 1.21% (down to 4.67%). The economic simulation resulted in a positive economic impact with a ROI of 4:1. Other parameters also improved: age at 115 kg was reduced by 3.9d (down to 181.8d) and live weight improved by 0.71 kg (up to 115.79 kg).
This survey confirms the significant technical improvement due to the introduction of Ingelvac CircoFLEX® in French swine herds, generating a 4:1 return on investment. The ROI is specifically remarkable when taking into account that PCV2 infection pressure on many French farms is low and that a number of farms already had used sow vaccination before implementing piglet vaccination.

P110 Paracetamol and respiratory diseases of pigs

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The work presented was aimed at evaluation of therapeutic using of paracetamol and its effects on haematological profile, as well as on body weight and concentration of total immunoglobulins in blood serum of pigs. From 240 weaned pigs (crossbreed large white x landrace) were chosen 15 animals (average body weight 12.27 kg) with clinically evident respiratory diseases symptoms. These stricken pigs were divided to 3 groups (1st experimental group – 5 animals, 2nd experimental group – 5 animals, and control group – 5 animals). The rations supplied to the 1st experimental groups were mixed with paracetamol in the form of a commercial preparation (Pracetam® 10% premix, Vétoquinol) at a dose of 5 g preparation per 1 kg of the ration. The 2nd experimental group was treated with combination of paracetamol + marbofloxacin. Systemic antibiotic – marbofloxacin (Marbocyl® 10% inj. a.u.v., Vétoquinol) was administered intramuscularly in dosage 0.25 ml/12.5 kg of body weight, daily during 4 days. Control group was without treatment. A four days application of paracetamol resulted in a positive effect on concentration of leukocytes and body weight of treated pigs.

P111 Bacillus subtilis PB6 positively influences performance efficiency in post-weaned piglets

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Bacillus subtilis PB6 (ATCC PTA-6737; trade name CLOSTAT(TM) dry) (PB6) is a natural probiotic strain that favors the establishment and maintenance of balanced microbiota within the gastrointestinal tract. In poultry, studies have shown that PB6 is able to significantly reduce *Clostridium* spp. infections, improving animal health and consequently performance. Piglets are usually affected by diarrhea, increasing the need of antibiotic use in their diets. This negatively affects swine producers' economy. This paper presents data from three trials which were run with the objective to investigate the effects of PB6 on weaned piglets' health as observed through performance data. Each trial (trial 1-CERZOO- Italy, trial 2- ZTC-Belgium, and trial 3- IRTA-Spain) consisted of 144 weaned piglets 21 days old (mixed genders; different breeds/trial) randomly allocated into two experimental groups. For trials 1 and 2, piglets were fed a control diet (T1) and a control diet supplemented with PB6 at 1x107 CFU/kg (T2). In trial 3, piglets were fed a control diet (T1) or a control diet supplemented with PB6 at 5x107 CFU/kg (T2). Performance data were analyzed using SAS GLM (trials 1-2) and MIXED/NPAR1WAY (trial 3) procedures. Results for T2 in trials 1 and 2, showed significantly ($P<0.05$) better FCR (-24%) and ADG (+7%) than T1, respectively. In trial 3, T2 had a significant improvement ($P <0.05$) on ADG (+12%) and BW (+8%), diarrhea incidence was significantly ($P<0.05$) lower (-69%) and FCR was numerically improved (-3%; $P=0.3$). It can be concluded that PB6 can be used as a feeding strategy to protect post-weaned piglets from diarrheas, and improve zootechnical performance as a result of a healthier intestinal tract.

P112 The impact of lameness on (re)production results of sows

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Introduction - Lameness, defined as a deviation in posture and/or gait of an animal, is already well known in horses, cows and even chickens. In pigs, research about lameness remains limited although prevalence was found to be relative high: 1% -19.7%. Besides the welfare concerns, lameness can cause severe economical losses. In finishing pigs, the detrimental impact on daily weight gain and feed conversion was already proven. In sows, lameness is the second most important reason for early culling and the most important cause of euthanasia. Yet research about the economical impact is still subject of discussion. Therefore a study to investigate the impact of lameness on reproduction results of sows was set up.
Material and Methods - A cross-sectional field study was conducted on six randomly chosen herds. A total of 624 sows in group housing were followed up for a period of one production cycle. Every sow was assessed for lameness three times when they were moved: from farrowing to insemination stable, from insemination to gestation stable and from gestation to farrowing stable. In addition, claw lesions were scored twice: one week before weaning and one week after farrowing. Information on the reproduction results of each sow for the investigated cycle and the cycle before were collected e.g. including number of life born and still born piglets, number of weaned piglets.
Results - A mean percentage of lameness of 4.26% was found. The percentage of lame sows was lowest when sows were moved from farrowing crates to insemination crates. Depending on the herd, the highest number of lame sows was found when moving from insemination crate to gestation stable or when moving from gestation stable to farrowing crates. Results on the impact of lameness on reproduction will be presented at the conference.

P113 Comparison of the Idexx HerdChek PRRS X3 to the Civtest Suis PRRS E/S with special respect to false positive outliers

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Objectives - The aim of this study was to evaluate the performance of the IDEXX HerdChek® PRRS X3 in comparison to the Civtest suis PRRS E/S with regard to their information value in monitoring programs.
Materials and Methods - 460 pig sera were analysed by the IDEXX HerdChek® X3 PRRSV Antibody Test Kit =ID and the Civtest suis PRRS E/S =CIV. The evaluated sample sets were: TOTAL data set (460), OUTLiers (59), Data set WithOut OUTL (401), PRRSV CHALLenge data (113), Data set WO CHALL (347) and Data set WO CHALL and OUTL (288). The “outliers” had been defined in earlier investigations by the IDEXX 2XR ELISA.
Results: The seroprevalences of the different data sets determined by the two ELISAs were evaluated: ID: TOTAL: 56.1%, OUTL: 52.5%, WO OUTL: 56.6%, CHALL: 59.3%, WO CHALL: 55.0% and WO CHALL OUTL: 55.6%; CIV: TOTAL: 28.9%, OUTL: 37.3%, WO OUTL: 27.7%, CHALL: 29.2%, WO CHALL: 28.8% and WO CHALL OUTL: 27.1%. The correspondence of results is demonstrated in form of cross-classified tables for TOTAL, OUTL and CHALL. The probability of error (Chi2) was calculated and p-values less than or equal 0.05 were considered significant.

TOTAL: p≤0.001	ID-/CIV-: 193	ID+/CIV-: 134	ID-/CIV+: 9	ID+/CIV+: 124
OUTL: p≤0.001	ID-/CIV-: 27	ID+/CIV-: 10	ID-/CIV+: 1	ID+/CIV+: 21
CHALL: p≤0.001	ID-/CIV-: 44	ID+/CIV-: 36	ID-/CIV+: 2	ID+/CIV+: 31

Conclusions - The analysis of the seroprevalences and the cross-classiefied tables shows that the IDX3 has a higher sensitivity than the CIV. With regard to the outliers only one sample was positive in the CIV and negative in the IDX3. The high specifity of the CIV is helpful for the exclusion of outliers. On the other hand, this product is definitely not suitable for herd screenings in the sense of a PRRS monitoring program due to an increased risk of false-negative results.

P114 Movement restrictions for the control of the porcine reproductive and respiratory syndrome virus in a farms' network

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Introduction - The transmission of the PRRSv (porcine reproductive and respiratory syndrome virus) between farms occurs because of infected neighboring farms or purchase of infected animals. Because it is difficult for a farmer to know the individual status of purchased animals, there is a need for a collective management based restriction of animal movements after assessment of farm status. We propose to assess the effectiveness of this strategy compared to the constraints it imposes.
Materials and Methods - We used recorded data of between-herds animal movements. The resulting network consists in real movements of different types of animals (8 kg and 25 kg piglets, reproductive gilts) between farms. We constructed a stochastic epidemiological model where herds can be susceptible or infected. The risk of infection due to trade in animals depends on the origin, the number and the type of animals purchased. The risk of infection by neighboring farms depends on the prevalence of the disease in the area. We modeled movement restrictions (based upon the farm's last test result) that respect the animals' flows to and from farms.
Results - The effectiveness of the restrictions of movements depends on the time between successive status assessments Halving the interval between tests (6 months to 3 months) induces a 50% decrease in risk of infection by trade. The constraint due to the increase in the number of movements and changes in the network structure depends on the prevalence in the area.
Conclusion - This model, highlighting the trade-off between constraints (increase in the number of movements, cost of the tests) and effectiveness (reduction in prevalence) of movement restrictions, can be a tool for decision makers to implement and monitor collective management of PRRS.

P115 Occurrence of diarrhoea in non.medicated growing pigs in Denmark: a cross-sectional study

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The objective of this study was to estimate the prevalence of diarrhoea in growing pigs where the farmer assumed the pigs to be clinically healthy.
The cross-sectional study was performed in 8 Danish herds in 2011. In each herd 200 pigs between 10 and 70 days post weaning were selected by systematic random sampling. Pigs treated with antibiotics within the last 7 days were excluded from the sampling process. The selected pigs were subjected to a clinical examination and a faecal sample was obtained and assessed using a faecal from 1 to 4. One observer examined all samples.
From each herd faecal samples from 8 pigs with and 8 pigs without diarrhoea were selected for faecal dry matter determination. This was used as a gold standard to estimate the diagnostic sensitivity(SE)/specificity(SP) of the clinical observations and to adjust the clinically observed prevalence of diarrhoea. Faecal dry matter content≤18.0% was considered diarrhoeic.
1430 pigs were examined. The diagnostic SE and SP for the clinical assessment of diarrhoea using dry matter as gold standard was SE= 0.86 with a 95% confidence interval(CI) of [0.76;0.93] and SP= 0.95 with a 95% CI [0.85;0.99], and was not significantly different between herds p(SE)=0,15 and p(SP)=0,14. The apparent prevalence of diarrhoea was 0.32. The true prevalence adjusted for SE and SP of the clinical observation was 0.335 with a 95% CI of [0.305;0.365].
The results of this pilot-study suggest that clinical diarrhoea is very common in pigs, which are considered to be clinically healthy by the farmer. This may be the result of restrictive antibiotic use or absence of other preventive measures in Denmark, and has potentially serious implications for pig welfare and productivity.

P116 Elimination of porcine reproductive and respiratory syndrome (PRRS) on four small farms by herd closure and natural exposure in Slovenia

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Objective - Porcine reproductive and respiratory syndrome (PRRS) is a major problem in the swine industry. Several programs have been developed to control and reduce the impact of the PRRS (Fano et al., 2005). Herd closure is one among the strategies that have been promoted (Torremorell et al., 2002). The herd closure and following the strict biosecurity protocols are very important measures (Torremorell et al., 2002). The objective of this study was to eliminate PRRSV from four small pig farms in Slovenia with herd closure and natural exposure.
Material and Methods - The study was conducted on four one-site pig farms. Farm 1 and 4 have 15 breeding sows, farm 2 20 and farm 3 7 breeding sows. After confirmation of PRRS, we bleed all breeding sows every 3 months two times. All farms accepted strict biosecurity protocols and herd closure for at least 200 days. For detection of antibodies, we used IDEXX X3 ELISA and gel-based RT-PCR for antigen detection.
Results - Three months after herd closure in all four farms decreasing of S/P ratios and improvement of production results were evident. Six months after herd closure, the S/P ratios in all farms were still decreasing and some of the fatteners were already without antibodies. Breeding herds were also without PRRS virus.
Conclusions - Decreasing S/P ratios in consecutive testing of breeding herds and absence of PRRS virus after six months indicate that the herd closure and natural exposure control PRRS and lead to elimination of PRRS virus and even to eradication. Substantial part of PRRS elimination is herd closure, biosecurity measures, all in/all out protocol and one-way flow. This method for elimination does not require removal of breeding animals, but requires a long time to complete.

P117 Prevention of an iron gap in modern pig production

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Iron is a vital nutrient and growth factor for the suckling piglet. It has been demonstrated that the need for iron during lactation can be up to 67 mg/kg weight gain. 1 Anaemia occurs with haemoglobin values under 9 g/ml of blood. 2 In modern production systems, iron administration is important for health and growth.
Materials and Methods - Differences in target weight gain must be considered. 200 mg Fe-dextran as a single injection administered at birth is standard prevention. This will cover approximately 4 kg of growth. Faster growing piglets may fall into a period of iron deficiency, an “iron gap”. Additional administration of iron may therefore be beneficial. A second iron injection before weaning yields higher haemoglobin levels (g/ml) and growth after late weaning.
Results and Conclusion - There is a need to further investigate growth capacity and iron need in late weaned or fast growing piglets. 7 kg of weight gain calculates to 469 mg iron need. If the natural source of iron is 78 mg (initial stores 50 mg and 1 mg/day for 28 days via milk), the requirement for iron administration is 391 mg. With the recommended maximum single dose injection of 200 mg at birth an additional need of 191 mg appears at day 17-18. Similar calculations can be made for different proposed weight gains. For further information MSD Animal Health and Pharmacosmos have developed an online iron/weight gain calculator available at www.uniferon.com.

P118 Birth weight influences gastric emptying and small intestinal functional parameters

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Introduction - Selection for hyper-prolific sows has resulted in an increased number of low birth weight (LBW) piglets. The aim of this study was to investigate differences in gastric emptying and parameters of the small intestine between LBW and normal birth weight (NBW) piglets.
Material and Methods - From 15 litters, pairs of LBW (<1.0 kg at birth) and NBW piglets were selected. They were euthanized at fixed time points: day 0 (n=10), day 3 (n=10) and day 10 (n=10). Small intestinal samples were either immersed in 4% paraformaldehyde solution, paraffin embedded and conventionally stained for morphometric analyses or frozen. The latter samples were homogenized and enzymatic activities were determined. Additional piglets were selected at each time point (n=3 per group) to determine gut motility. Thirty minutes after intragastric administration of Evans blue, piglets were euthanized and migration of the dye was calculated as a percentage of the total length of the small intestine. Following extraction of the dye, gastric emptying and the geometric center of intestinal transit were determined. Statistical analyses were evaluated using GLM, with p values ≤0.05 considered significant.
Results - Low birth weight delays the structural and functional maturation of the small intestine, which was shown by shorter villi ($p<0.001$), reduced crypt depths ($p<0.001$) and lower sucrase activity ($p=0.006$). No differences were observed in intestinal transit between the birth weight groups. However, LBW piglets had faster gastric emptying ($p=0.05$).
Conclusion - We believe that the combined effect of accelerated gastric emptying and a compromised small intestine (reduced absorptive and proliferating capacity, lower sucrase activity) contribute to lower growth rates of LBW piglets during postnatal life.

P119 Idexx app-ApxIV Ab test: reliable screening tool for better health management

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Objective - *Actinobacillus pleuropneumoniae* (APP) infection causes significant economic loss to the swine industry. IDEXX returned to the market with an improved version of the APP-ApxIV Ab Test, the only commercial APP specific test detecting all serotypes of the bacteria. The test has been evaluated internally and externally on the field.
Materials and Methods - The reproducibility of the new APP-ApxIV Ab test was evaluated by sending 20 blind samples to 5 different diagnostic laboratories. Results were compared with internal testing results. Diagnostic sensitivity and specificity was evaluated by testing field samples from different origins. The true status of the samples has been confirmed by Western blot testing. Animals vaccinated using INTERVET and CEVA products were tested to show that the test is able to differentiate vaccinated from infected animals.
Results - The diagnostic sensitivity reached 82.9% (95%CI, 78.7%–86.5%) with this set of defined positive samples. The diagnostic specificity reached 99.6% (95%CI, 98.7%–99.9%) with this set of defined negative samples. The positive predictive value (PV+) reached 99.3% (95%CI, 97.6%–99.8%). The cut off value of the test was determined to target maximal specificity. Sensitivity on the herd level shows higher values. Vaccinated animals yielded negative results in the test.
Conclusions - The IDEXX APP-ApxIV Ab test is an effective tool for comprehensive screening for all APP serotypes. The test can be used for regular monitoring of swine herd to better understand the dynamics of APP infection, optimize treatment options and overall herd health management.

P120 Ascaris suum causing coughing and Brachyspira pilosicoli causing diarrhea in finishers in an organic pig herd - A case report

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Introduction - In an organic sowfarm – 250 sows weaning 350 pigs every 4th week, vaccinating all pigs against *Mycoplasma hyopneumoniae* (MH), *L. intracellularis* (LI) and PCV2 – coughing in weaner-growers and diarrhea in grower-finishers was evident.
Description - One pig aged 12 weeks and coughing was euthanized: Catharal pneumonia, small scars in lung, watery diarrhea and many white spots in liver. PCR was negative for MH, SIV and PCV2. PCR and flotation on intestinal content was negative for LI, *Coli* F4, PCV2 and *Ascaris sum* (AS). *Eimeria* spp. and *Coli* F18 was found in low levels and *Brachyspira pilocicoli* (BP) in massive levels.
Bloodsamples from pigs aged 12, 16, 20 and 24 weeks were negative for PCV2 (PCR), SIV and PRRS. The same samples were positive for MH, *H. parasuis* (HP) and LI.
In faeces from pigs aged 8, 20 and 24 weeks no LI or PCV2 was found (PCR). *Coli* F4 and F18 were found in moderate level in pigs 8 weeks old and BP in moderate to massive level in all samples. AS was found in faeces from pigs 8 and 20 weeks old (moderate-low level) and *Eimeria* spp. in high levels in pigs 8 week and low levels in older pigs.
Conclusion - Autopsying the coughing pig show that it has been infected with AS, with larvae migrating in liver and lung and occurrence of secondary bacterial infection. Seroconversion did occur against MH, but the pathogen was not found, and coughing not heard in older pigs.
Diarrhea was caused by a combination of AS, *Eimeria* (?) and later on a high level of BP infection. No LI was found in faeces, even though all pigs were positive to LI serologically.
Take home message: Coughing and diarrhoea can have other causes than “the obvious” MH and LI. To clarify a case many laboratory samples are needed. Due to the high cost uncommon diseases might be overlooked.

P121 Cutting costs and saving CO2 emissions with energy saving techniques in lactation barns

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Objective - To evaluate the effect of using low cost nesting areas to complement the heat provided by infrared lamps for lactating piglets on electricity consumption and growth performance of animals.
Material and Methods - A total of 96 sows were distributed in 8 lactation rooms. Two different heating systems were evaluated: infrared lamps (Control) and infrared lamps into nests (Nest) made with plastic material. Each treatment was evaluated in four rooms. In every experimental room a sensor transmitting real time data about electric power consumption was installed.
Electric power consumption was daily measured. Piglets were individually weighed at birth and at weaning (28 d of age) to calculate the average daily weight gain (ADWG). Mortality was also daily recorded. Comparison of electricity consumption between treatments was assessed as repeated measures using the Mixed procedure of SAS (v.9.2). Percentage of mortality and ADWG of piglets were analysed by GLM models using glimmix and GLM procedures of SAS.
Results - Rooms with Nest systems showed lower power consumption than the Control group ($P<0.01$). Percentage of mortality and ADWG numerically improved (6 and 20% respectively) with the installation of nests, although differences did not show statistical significance in any case.
Conclusions - Installing low-cost nests in lactation rooms to complement the heat provided by infrared lamps reduces power consumption by more than 30%. In addition this system produces environmental benefits by reducing energy consumption and therefore CO2 emissions. This is an affordable option for existing small familiar farms to cut-off fixed costs. Health and performance is expected to be improved as well but more research is needed.

P122 Cost of post-weaning multi-systemic wasting syndrome and porcine Circovirus type 2 subclinical infection – A stochastic economic model

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The present study aimed to assess the economic impact of post-weaning multi-systemic wasting syndrome (PMWS) and porcine circovirus type 2 (PCV2) subclinical infections (PCV2SI) at farm level and to estimate the resulting cost to the industry.
A disease model was built to simulate that varying proportions of pigs in a batch will get infected with PCV2 and develop either PMWS or be subclinically infected, depending on the farm PMWS severity level. The model had six outcomes: infected pigs with PMWS that die; infected pigs with PMWS that recover; PCV2SI pigs that die; PCV2SI pig that reach slaughter age; healthy pigs; and healthy pigs, infected or non-infected by PCV2, that die due to non-PCV2 related causes. Empirical data from farm and animal level studies were used to fit the model. Enterprise and partial budget analyses were used to assess the deficit/profits and the extra costs/extra benefits of a change in disease status, respectively. These were combined with the disease model's estimates produced at different PMWS severity scores to assess the cost of PMWS/PCV2SI and the overall profit at farm level. Stochastic simulations were carried out to account for variability and uncertainty.
At farm level, the greatest proportion of negative economic impact resulted from subclinical infections (PCV2SI). The economic impact of PMWS and PCV2SI for the English pig industry for the year 2008, prior to the introduction of PCV2 vaccines, was estimated to be £-61.9 million.
The study is the first quantification of the economic importance of PCV2SI and highlights PMWS impact on the English pig industry. The model developed provides a basis for cost-effectiveness analysis of different control measures and hence a decision support tool for farmers and policy makers.

P123 Diagnostic performance of the PRRS oral fluid IgG ELISA

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Introduction - Previous work showed that a commercial PRRS serum antibody ELISA (HerdChek® PRRS X3 ELISA, IDEXX Laboratories, Inc.) could be used to detect anti-PRRSV IgM, IgA, and IgG in oral fluid specimens. The objective of this study was to estimate the diagnostic performance (Se, Sp) of the PRRS oral fluid IgG ELISA.
Materials and Methods - Performance estimates (Se, Sp) were based on pen-based oral fluid samples of known PRRSV infection status. Experimental samples were collected from pigs (n = 1,400) inoculated with a type 2 PRRSV (GenBank® AY545985). Positive field samples were collected from 10 wean-to-finish barns in a longitudinal field study. "Positive" was defined as any field sample from a pen after its first PRRSV qRT-PCR positive result. Negative field samples were collected at the Iowa State University Veterinary Diagnostic Laboratory from herds routinely monitored for freedom from PRRSV.
Thus, total positive oral fluid samples consisted of specimens from experimentally inoculated pigs (n = 251) and field samples (n = 241) from pens following their first PRRSV qRT-PCR positive oral fluid sample. Total negative samples included specimens from experimentally inoculated pigs collected on DPI 0 (n = 84) and negative field samples (n = 283). All samples were randomized prior to testing with the PRRS oral fluid IgG ELISA.

Results and Conclusions - Receiver operator characteristic (ROC) curve analysis were performed using MedCalc® 9.2.1.0 (Mariakerke, Belgium). Defining positive samples as S/P ≥ 0.4, Se was estimated at 95% (95 CI: 92, 97) and Sp at 100% (95 CI: 99, 100). These results indicated that antibody testing based on oral fluid specimens could provide an efficient, cost-effective approach to PRRSV monitoring in commercial herds and surveillance in elimination programs.

P124 Ring test evaluation of the PRRS oral fluid IgG ELISA

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Introduction - Previous work showed that a commercial PRRS serum antibody ELISA (HerdChek® PRRS X3 ELISA, IDEXX Laboratories, Inc.) could detect anti-PRRSV IgG in oral fluid specimens. The objective of the current study was to evaluate the reproducibility of the PRRS X3 oral fluid ELISA in a ring test among 5 labs.
Materials and Methods - The ring test was based on 237 oral fluid field samples sent to the Iowa State University Veterinary Diagnostic Laboratory for testing and 39 oral fluid samples of known PRRSV antibody status. Thus, 276 samples were prepared and completely randomized prior to distribution to the 5 labs. To conduct the study, each laboratory received one set of samples, one HerdChek® PRRS X3 ELISA kit (lot no 40959-W721) with reagents and controls pre-diluted and ready to run, and a copy of the assay Standard Operating Procedure. Assay results were calculated as S/P ratios with ≥ 0.4 considered positive.
Results and Conclusions - Among the 237 field samples tested in 5 labs, 233 (98.3%) were in categorical (pos/neg) agreement across all labs, with discordant results observed in 4 samples with S/P values at the cut off. The aggregate correlation analysis based on all data estimated Pearson's correlation coefficient as r = 0.979. The ring test results showed that the PRRS oral fluid IgG ELISA was highly reproducible across laboratories, suggesting that the assay could be performed routinely in the diagnostic setting. Thus, herd monitoring based on oral fluid sampling could be one part of a PRRSV control and/or elimination program. Further, the successful adaptation of one assay to the oral fluid matrix suggests that this approach could provide the basis for monitoring specific health and welfare indicators in commercial swine herds using a "pig friendly" approach.

P125 Towards the application of Lactococcus lactis as a delivery vehicle of oral vaccines in pigs

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Objectives - *Lactococcus lactis* has been used for the delivery of oral vaccines in mice models of human diseases. However, the sensitivity of the bacteria to gastrointestinal conditions (GIC) has limited their application in porcine health management. To address this issue, we evaluated the survival of *L. lactis* in porcine GIC in vitro, as well as strategies for protection.
Material and Methods - The effect of hepatic bile and trypsin on *L. lactis* viability was tested in mimicked porcine GIC. Since toxicity was observed, the potential of three bile acid binders, (cholestyramine, AlOH and Hydrotalcite), and an oral trypsin inhibitor, (camostate mesylate) to protect *L. lactis* from this toxicity was evaluated.
Results were interpreted by expressing the number of viable cell counts as a percentage of non-treated controls. Means and standard deviations of experimental triplicates were calculated and analysed using paired t-test ($\alpha = 0.05$). Results: Bile at the concentrations prevalent in porcine small intestine (15 - 5 mM), reduced *L. lactis* survival (4± 1.15 - 13± 2.08 %). A porcine trypsin activity of 100 IU resulted also in reduced *L. lactis* viability (20± 2 %). Camostat mesylate and AlOH achieved fully protected L. lactis against trypsin and bile toxicity, respectively (100.3 ± 2.08% and 101 ± 1.53%). All experimental findings are statistically significant as indicated by P values (= <0.05). Conclusion: Trypsin and bile seriously reduced viability of *L. Lactis*. Camostat mesylate and AlOH protected *L. lactis* against trypsin and bile toxicity, respectively. Therefore, it is interesting to evaluate the use of these compounds as a pre-immunization treatment or as a component of enteric coated live bacterial tablets to improve the immunogenicity of *L. lactis*-based vaccines.

P126 Biomarkers for lung soundness and disease in swine - step 1: advanced clinical and pathological findings

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Introduction - Porcine health management needs to guarantee swine production with regard to economy, animal welfare and consumer protection. However, a serious threat for all three aspects comes from respiratory diseases; early diagnostics and intervention are among the most important requirements to cope in a satisfactory and sustainable way. An engrossed understanding of the complex pathogenesis, caused by a multitude of interacting agents and environmental factors, might help to establish biomarkers for lung soundness and early onset of pneumonia. At a first step, the present study describes the capability of combined advanced clinical methods to unravel aetiological factors and temporal state of porcine respiratory disease complex (PRDC) in swine herds.
Materials and Methods - Within an ongoing study, 30 early fatteners from 15 herds with different PRDC status (herd health monitoring) have been examined by standard clinical and microbiological methods, complemented with impulse oscillometry (IOS), broncho-alveolar cytology, pathology and patho-histology and a complete molecular screen of BALF and lung tissue samples.
Results - Lung mechanical parameters resistance, reactance and coherence are significantly correlated with the temporal state of lung disease. Obtained from the living animal, they are highly correlated with the overall outcome of lung pathology. They show distinct variation associated with agents and agent combinations.
Conclusions - Our collection of PRDC field cases yields engrossed insight into the pathogenesis of pneumonia in pigs and the role of specific agents and interactions. Combined with molecular data from the same animals, we hope to detect markers for lung soundness and disease in a future second step, to improve PRDC diagnostics in the field.

P127 Subclinical PVC2 infection can have dramatic consequences in non-vaccinated herds

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Introduction - In Denmark, piglet vaccinaton rate against PCV2 is lower than in most pig producing countries. Danish veterinarians estimate ROI of a vaccination program and do not recommend PCV2 vaccination of piglets in mildly infected herds. The case story presented here shows that saved expenses for PCV2 vaccine can be turned into a great loss of money, when the balance of a pig herd is changed.
Case description - The case herd is a typical Danish herd: 600 sows, part of the SPF system, but cronically infected with *M. hyo*. Piglets are weaned to a nursery with all in all out by room and sold for export at 30 kg. The herd had an above average performance for years, but early in 2011, the sow herd saw increased sow mortality and signs of viral infection, and quality of weaned piglets decreased.
In the nursery, piglet mortality increased from 2-4% to more than 10%. Piglets were uneven, suffering from multiple diseases from ear ulcers to severe pneumonia. Samples from weaners showed presence of *M. hyo* and SIV and a high level of PCV2: The nursery experienced a PMWS outbreak. The action plan included vaccination of piglets at 3 woa against PCV2 and M hyo (FLEXcombo®) and management according to McRebel rules.
During 2nd and 3rd quarter of 2011, production level of the nursery was restored, but an economic calculation showed that the herd lost around 41000 € on increased mortality, reduced weight gain and lowered piglet price.
Discussion - Calculation of ROI of a vaccination is not as simple as it seems. This case herd would have prevented huge losses by keeping the piglets vaccinated against PCV2. The event that took place here could happen in any sow herd. Hence, PCV2 vaccination of piglets should be regarded as insurance, stabilising piglets and making them resistant to new infections.

P128 Study of factors affecting mortality in growing-finishing pigs in Spain

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The present study investigated factors for mortality in grow-finishing pigs of 764 batches from 452 pig herds included in 9 different companies during a period of 2 years. All data from herds was collected by surveys to the companies. Mortality data, defined as the number of dead pigs divided by the number of pigs in the growing unit, was investigated retrospectively. Risk factors obtained included: type of farm and animal used, facilities (ventilation, feeder, drinker, floor…), season and length of fattening period, management practices (vaccination and treatments in farm…), and feeding pattern. A multivariable regression model was used including factors that presented a $P < 0.20$ in a univariate model for mortality. Company was considered as a random factor. Risk factors in the multivariable model were considered to have a significant effect if $P < 0.05$. Average mortality percentage was 4.33%. Season and length of fattening period, number of origins of the piglets, and antibiotic treatments were significantly associated with mortality in the multivariable regression model. Animals in batches from January to March had higher mortalities than batches in other months. Animals with longer growing periods had higher mortalities. Herds that obtained piglets from multiple origins presented higher mortality than those that obtained piglets from a unique origin. The number of antibiotic treatments was a priori considered an independent variable due to the description made by the companies as preventive but it actually seems to be a consequence of higher mortalities. Total variability explained by the model was 20%. The effect of companies in the integration was very important (25% of the variability) and among companies is bigger than that within companies.

P129 An attempt to eradicate PRRS in Wallonia (Belgium), a low density area of swine production

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The South part of Belgium (Wallonia) is a low density area of swine production where PRRS eradication should be possible. For some farmers, its real economical impact is still unknown. In a way to demonstrate the possibility to become PRRS-free or to maintain a free status, continuous education and communication meetings with producers, technicians and veterinarians were organised. Eight independent farmers located in Wallonia were followed between October 2009 and October 2011. These 8 farms were farrowing-to-finish units with on average 210 sows [60 to 450]. Serological tests (Elisa and RT-PCR) were performed every 4-6 months. To reduce costs, PCR-tests and sequencing were realized on pools of 2 to 3 sera. ELISA-tests with s/p ratio < 0.4 were considered negative. The quality of the biosecurity on these farm was assessed through a scientific based questionnaire and accompanying scoring system (Biocheck UGent). When necessary, vaccinations of sows and/or 3 week-old piglets were realized with modified live virus in a way to reduce virus circulation. In 2010 and 2011, Biocheck scores for external and internal biosecurity were respectively 62 and 42% vs. 68 and 55%. Two farms were and stayed PRRSv-free until now. One farm became PRRSv-free on Augustus 2011. Since May 2011, one farm begins to produce negative finished pigs while sows continue to be vaccinated. Until now (November 2011), in four out of eight farms, active viral circulation was demonstrated in sows and/or growing pigs. In these farms, some mistakes (non respect of vaccination protocol and/or biosecurity measures such as introduction of PRRS-positive semen) were identified that could explain the active viral circulation. Otherwise, to become and remain PRRS-free is possible in Wallonia.

P130 Economical evaluation of the impact of PRRS in a Walloon farrow-to-finish farm

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In a way to evaluate the economical effects of PRRS in a farrow-to-finish farm, a software program was used to analyze the production costs of weaned, grower and finisher pigs. Data were collected between 2004 and 2008 in two farms where Belgian Negative Landrace sows were bred with Piétrain boars. While farm B continued to be free from PRRS, farm A became positive in June 2006. To compare the production costs between the two farms considering the effects of PRRS without environmental effects, data obtained in 2006, 2007 and 2008 were corrected with differences already observed in 2004 and 2005. The production costs of weaned piglets (7-8 kg), growers (20 kg) and finishers (114 kg) were respectively 0.64, 6.45 and 20.13 EUR higher in farm A. Additional costs during the post-weaning and the fattening periods were essentially associated to lower performance: lower average daily gain and higher feed conversion ratio.

P131 Factors affecting pre-weaning mortality in pigs

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Objective - Neonatal mortality remains a major problem in pig production. The objective of this observational study was to identify factors affecting preweaning mortality.
Materials and Methods - Five hundred and one (501) live born piglets from 37 PIC sows were managed identically at a commercial farm. Parameters investigated were early parturition (gestation length<114 days), influence of sow body condition at D1 of lactation based on backfat (<14mm=skinny, 14-20mm=good, >20=fat), birth weight (BW) and colostrum intake (CI) by the piglet (<160g/kg BW = low; ≥160g/kg BW = high). Statistical analysis was done by survival analysis (Cox regression) followed by a post-hoc Tukey test for condition.
Results - Early parturition decreased the chance of survival of the piglet (p=0.01). Survival of piglets was lower for skinny sows compared to sows in good (p=0.023) or fat (p=0.022) condition. No difference was observed between sows in good and fat condition (p=0.543). The lower the birth weight, the lower the survivability of the piglet (p<0.001). Low CI (p<0.001) also increased the risk for pre-weaning mortality.
Gestation length and sow back fat at day 1 of lactation were moderately to well correlated (r=0.626, p<0.001, R^2 quadratic=0.432). Other correlations were low or very low (r=-0.1-0.2) but still significant.
Conclusion - Skinny sows at D1 of lactation, early parturition, low BW and low CI increased the risk for preweaning mortality. Condition on day 1 of lactation is identified as a potential management target to increase piglet survivability.

P132 The economics of on-farm Salmonella control

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Objectives - *Salmonella* is an important issue in food security, which calls for effective control measures in the pork supply chain.This paper reports on astudy to investigate the economics (both at farm and society level) of on-farm *Salmonella* control in fattening pigs. First, the risk for *Salmonella* transfer from pigs to humans, through the supply chain, is calculatedwith a risk assessment model. With this model, we simulate the impact of on-farm control measures on risk reduction. Second, we use afarm budgeting model to calculate the impact of changes in technical-economic parameters on the gross marginand the farm-level net costs (or benefits). Finally, the model outcome is compared with literature-based monetary benefits to society, arising from, for instance, lower disease costs.
Materials and Methods - The effectiveness, direct costs and productivity impact of threeinterventions were evaluated: vaccination, drinking water acidified with organic acids, and feed supplemented with coated butyrate. For this, *Salmonella*-negative piglets were randomly assigned to these intervention groups; some piglets were infected with a *S.Typhimurium* strain and all pigs were monitored for 6 weeks through serum examination, individual feces and organs and through individual weighing. These results are then entered into the two previously explained models.
Results - Both vaccination and coated butyrate in the feed limited transmission of *Salmonella* in pigs most, representing a possible tool for decreasing Salmonella-positive pigs entering the slaughter process. Moreover, feed with coated butyrate significantly raised the daily weight gain in this experiment.
Conclusions - On-farm control measures may be more cost-efficient than previously assumed, due to the potential productivity improvement.

P133 Identification of factors at the farm, sow and piglet level associated with the colostrum intake per kg piglet

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Over the last decade, the litter size of sows has substantially increased. This has resulted in a lower birth weight, more variation in birth weight and higher mortality in suckling piglets. As a consequence, sufficient colostrum and milk intake of each single piglet has become a critical issue. This study aimed at identifying factors associated with colostrum intake per kg piglet. Ten randomly selected sows and their offspring from five conveniently selected farms were included in the study. Several farm, sow and piglet factors, potentially associated with colostrum intake per kg piglet were recorded. A linear mixed regression model with farm and sow within a farm as random effects was fit (PROC MIXED, SAS 9.3). Statistical significance was assessed at $P < 0.05$. Additionally, the contribution of the three different levels to the total variance of colostrum intake was determined. The average intake per kg piglet was 324 gram with a range between 0 and 1554 gram. Most variation in colostrum intake per piglet resided at the piglet level (63 %). Almost 16% and 21% of the variation occurred at sow and farm level respectively. Parturition duration, birth weight and birth rank were all negatively associated with colostrum intake per kg piglet with a P-value of less than 0.05, 0.001, 0.01, respectively. The average kg colostrum intake per piglet tended to be higher in small litter sizes than in large ones ($P = 0.06$). The average kg colostrum intake per piglet also strongly depended on the sow breed ($P < 0.001$). Interestingly, all variation in colostrum intake at farm level was explained by the sow breed.

P134 Numerical and functional anatomical characterization of mammary glands of breeding sows in Hungary

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Introduction - The number and the performance of mammary glands in breeding sows are important maternal traits. Traditionally, they have 2.5 more teats on the average than the number of piglets in their average litter. As the number of piglets born are increasing, the number of unused mammary glands are decreasing. Few literature deals with number, functionality and anatomical abnormality of mammary glands of sows.
Material and Method - 1,985 randomly selected sows (approx. 0.9 percent of breeding sows of the country) – mainly but not exclusively in 24 breeding herds working with 50-2,000 sows of different genetics - were included in the study between 2009-2011. They were examined and the results recorded within 48 hours after farrowing.
Results and Conclusion - The total number of mammary glands per sow were as follows: 16: 139 sows (7%); 15: 156 sows (7.9 %); 14: 1470 sows (74%); 13: 87 sows (4.4%); 12: 118 sows (5.9%); 10: 15 sows (0.8%). The average number of mammary glands per sow in the study: 14.03; the average number of properly functioning mammary glands: 13.07.
The number of mammary glands being non functional or not functioning properly per sow was 0.96. Following are the main categories of the latter group expressed in numbers and in percentages of the total number of mammary glands: inverted teat: 183 (0.7%); „blind" teat: 217 (0.8%); short teat: 380 (1.4%); mammary gland aplasia: 124 (0.5%); mammary gland hypoplasia: 354 (1.3%); non functioning mammary gland due to trauma or other reasons: 330 (1.2%).
Other anatomical abnormalities: accessory or supernumerary mammary glands: 60 sows (0.2%); supernumerary teats: 95 sows (0.3%). Positional abnormality, asymmetry: 69 sows (0.3%); not adequate space between the mammary glands: 94 sows (0.3%)
The real effective milk let-down of sows and milk intake of piglets take less than 10 minutes/24 hours, which needs high level of "cooperation" between the sows and their piglets.
It raises ethical, animal welfare, animal health and economical issues if the piglets do not have access to properly functioning mammary glands in sufficient numbers.

P135 Combined vaccination against PCV2 and Mycoplasma hyopneumoniae reduced feed conversion in weaners and finishers

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Objective - Vaccination against PCV2 and *Mycoplasma hyopneumoniae* (M hyo) has the potential of reducing use of antibiotics in pig herds. However, antibiotics tend to be less expensive than vaccines and farmers might need further incentive to decide for vaccination, such as saving money on improved feed conversion rate (FCR).
This paper presents a side-by-side trial designed to measure FCR after vaccination against PCV2 and M hyo. Comparison was done both with and without ileitis vaccination.
Materials and Methods - The trial was carried out in a Danish SPF herd infected with M hyo. Each of 2 batches of 1000 pigs was divided in 2 groups. Pigs in group 1 were vaccinated with PCV2 and M hyo vaccine mixed in one syringe, and pigs in group 2 were not vaccinated against PCV2 or M hyo. In the 2nd batch, pigs in group 1 and 2 had been vaccinated against ileitis.
Pigs were weighed at weaning, 4-5 weeks after weaning and before slaughter. Feed conversion was registered per valve. Comparison of vaccinates and non-vaccinates was done within batches.
Results - FCR was reduced after vaccination against PCV2 and M hyo. In the 1st batch, FCR in vaccinated pigs was reduced by 0.15 FE/kg gain in young pigs and 0.88 FE/kg gain in older pigs compared to non-vaccinates. In the 2nd batch, the reduction in FCR was 0.03 FE/kg gain in young pigs and 0.05 FE/kg gain in older pigs.
Conclusions - Vaccination against PCV2 and M hyo resulted in saved feed expenses, thus giving an additional argument for vaccination besides reduced use of antibiotics. The improvement of FCR after PCV2 and M hyo vaccination was higher in pigs not vaccinated against ileitis, probably because ileitis vaccination itself improved FCR, thus leaving less room for improvement. Hence, the lowest FCR is achieved by using all 3 vaccines.

P136 New feedstuff based on fermented potato protein increases weaning pig performance; comparison with sulfadiazine and trimethoprim

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Objectives - Previous research demonstrated a positive effect of Lianol®, a complementary feed based on fermented potato protein, on plasma insulin-like growth factor-1 (IGF-1) levels (IPVS 2010). Saleri et al. (2001) and Kraetzl et al. (1994) reported a positive interaction between IGF-1 levels and growth performance.
This trial investigates the effect of this new feedstuff on performance for a 3 week period post weaning.
Material and Methods - This trial was performed at Leeds University, UK. There was a farm history of *E.coli* and flu infection. 138 just weaned piglets were divided in 3 treatment (6 replicates per treatment); a negative control group receiving standard feed for the first 3 weeks post weaning; a positive control group in which the feed was supplemented with 3kg Trimediazin (375 g sulfadiazine and 75 trimethoprim)/mT during the first 3 weeks post weaning; a Lianol group in which the feed was supplemented with 1.5kg Lianol® Solapro/mT during the first 2 weeks. The daily gain, feed conversion (FCR) and cost per kg gain was evaluated during the first 3 weeks post weaning. Differences between treatments were determined by general analysis of variance method.
Results - The daily gain in the control group is 284 g/day. In the Lianol® group daily gain increased to 298 g/day and in the positive control group to 316 g/day FCR was significantly lower in the Lianol® (1.10) and positive control group (1.09) compared to the negative control group (1.18). Compared to the negative control, the cost per kg gain was 5 and 6% lower in the positive control and Lianol® group respectively.
Conclusions - The supplementation of the post-weaning feed with Sulfadiazin and Trimetoprim for 3 weeks clearly improved piglet post-weaning performance and cost per kg gain. The inclusion of Lianol® Solapro during the first 2 weeks post weaning resulted in a similar improvement.
References:
Kraetzl W.D., Schams D., Brem G., Secretory patterns of porcine growth hormone and insulinlike growth-factor-I in growing pigs, J. Anim. Physiol. Anim. Nutr. 71 (1994) 1–14.; Saleri, R., Baratta M., Mainardi G.L., Renaville R., Giustina A., Quintavalla F., Tamanini C., IGF-1, IGFBP-2 and -3 but not GH concentrations are different in normal and poor growing piglets, Reprod. Nutr. Dev. 41 (2001) 163-172.

P137 Influence of fermented potato protein on IGF-1 levels and mortality in just born piglets

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Objectives - Previous research demonstrated a positive effect of Lianol®, a complementary feed based on fermented potato protein, on plasma insulin-like growth factor-1 (IGF-1) levels (IPVS 2010). After birth, IGF-1 has a predominant role in regulating growth. If a beneficial effect on IGF-1 could be demonstrated in just born piglets, this new feedstuff could have a beneficial effect on neonatal piglet mortality.
Material and Methods - This trial was performed at Tests and Trials, Lleida, Spain. The pre-weaning mortality was compared between a group of 130 control piglets and a group 261 piglets treated with Lianol® Colostro. The Lianol® group received Lianol® Colostro. From these piglets, IGF-1 plasma levels were determined at day of birth and 7 days later with an ELISA test (Mediagnost, Germany) in 57 and 124 piglets in the control and Lianol® group respectively. Difference between treatments were determined by general analysis of variance method.
Results - The increase in IGF-1 level during the first 7 days of live in piglets receiving Lianol® Colostro was significantly improved. The increase in control and Lianol® treatment was respectively 23.23ng/ml and 33.35ng/ml. The pre-weaning mortality reduced from 15.38% in the control group to 11.49% in the Lianol® group.
Conclusions - This research demonstrated a higher increase in IGF-1 plasma levels in just born piglets supplemented by Lianol®. As hypotised, this higher increase in IGF-1 plasma level could reduce the pre-weaning mortality in piglets by 3.9%.

P138 The effect of a fermented potato protein on the performance and lean meat percentage in fattening pigs

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Objectives - Previous research demonstrated a positive effect of Lianol®, a complementary feed based on fermented potato protein, on plasma insulin-like growth factor-1 (IGF-1) levels (IPVS 2010). There is considerable circumstantial evidence that the actions of growth hormone on protein accretion in skeletal muscle and other lean tissues are mediated by IGF-1 (Florini et al., 1996).
This trial investigates the effect of this new feedstuff on lean meat content and performance in fattening pigs.
Material and Methods - This research is a summary of two consecutive well-controlled field trials performed in Belgium. The first trials started in February and July 2010. The animals originate from Large White x Landrace sows and a Belgian Piétrain boar.
Each trial consisted of 720 animals equally distributed between a control and a Lianol® group. The animals were housed in the same compartment. The diets were equally formulated. The diet of the Lianol® group was supplemented with 300 grams Lianol® Solapro/mT for pigs from 40kg until slaughter.
The daily gain, feed conversion (FCR) and lean meat percentage on the carcass was evaluated.
Results - In the first trial the lean meat percentage increase from 59.36 to 60.56% in the control and Lianol® group respectively. In the second trial, this percentage increased from 59.62 to 60.43% in the control and Lianol® group respectively. As a consequence of the higher lean meat percentage, the FCR improved 5% in the Lianol® group in both trials.
Conclusions - The supplementation of fattening feed with Lianol® Solapro from of 40kg body weight improved lean meat percentage and FCR in fattening pigs. Under Belgium conditions this improved lean meat percentage gains an extra benefit of 2.7 and 2.2€ per carcass. The improved feed conversion resulted in another extra benefit of 2.9 and 4€ per slaughtered pig in respectively the first and second trial.
References:
Florini J.R., Ewton D.Z., Coolican S.A., Growth hormone and the insulin-like growth factor system in myogenesis, Endocr. Rev. 17 (1996) 481-517.

Bacteriology: Respiratory Diseases

P139 Serological testing for Actinobacillus pleuropneumoniae

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Actinobacillus pleuropneumoniae (APP) is still an important swine respiratory pathogen in many countries worldwide. A remarkable feature of this organism is that its virulence greatly varies depending on the isolates. This results in a variety of clinical situations varying from subclinical infections to acute mortalities.
Interestingly, the virulence of a given isolate correlates well with the serotype. Fifteen APP serotypes have been identified so far. Among them, serotypes 1, 5 and 7 in North America and 2, 4 and 9 in Europe are the most virulent, even if other serotypes such 8 and 15 may occasionally cause significant losses.
Very few swine herds in the world are free from all APP serotypes (SPF herds). By contrast most of the herds (including multiplying herds) are infected with one or more low virulent serotypes. Moreover some of them may also be infected with one or more virulent serotypes. Consequently APP control measures are usually focussing on the most important serotypes rather than all serotypes.
APP monitoring of nucleus and multiplying herds is mainly based on regular serological testing of representative groups of animals (usually finishers, sometimes sows). Several assays to detect APP antibodies are available. This paper will review the advantages and limits of the most common serological tests and testing strategies.
References:
1. Broes A., and Gottschalk M. 2007. Why and how to diagnose Actinobacillus pleuropneumoniae sub-clinical infections. Proc. AASV Annual Meeting, 193-198.; 2. Broes A., Martineau G.P., and Gottschalk M. 2007. Dealing with unexpected Actinobacillus pleuropneumoniae serological results. J Swine Health Prod. 15 (5):264-269.

P140 Onset of immunity of an inactivated Mycoplasma hyopneumoniae vaccine when administered to MDA positive or MDA-negative piglets at one week of age

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Objectives - Assess onset of immunity provided by vaccination with Suvaxyn MH One in MDA positive or negative (MDA-) piglets at seven days of age or less.
Materials and Methods - 82 MDA- pigs were enrolled in 1 study and 118 MDA+ pigs in a second, each with three treatment groups, vaccinated with either Suvaxyn MH One at minimum titre, Suvaxyn MH One at twice minimum titre or saline at 1 week old; and challenged with *M. hyopneumoniae* 14 days later. Serum was collected prior to vaccination, challenge and necropsy. Lungs were removed at necropsy (day 42) and scored for lesions typical of *M. hyopneumoniae*. Bronchial swabs and lung tissue samples were collected at necropsy and tested by qPCR for the presence of *M. hyopneumoniae*. Treatment contrasts were assessed at the 5% significance level.
Results - In both studies lung lesions scores for both vaccinate groups were significantly lower than the control group but not significantly different from each other. Pre-challenge, serum antibody levels were not significantly different among the three treatment groups but at necropsy both vaccinate groups had significantly greater antibody levels that the non-vaccinates. The experimental vaccine at both dose levels was effective in reducing the level of *M. hyopneumoniae* isolated from bronchial swabs and lung tissues.
Conclusions - Suvaxyn MH One administered to MDA+ or MDA- piglets at one week of age reduces lung lesion scores caused by, and the amount of *M. hyopneumoniae*, isolated from lungs and bronchial swabs with onset of immunity two weeks after vaccination.

P141 A randomised cross-sectional study on herd specific risk factors for Mycoplasma hyopneumoniae infections in suckling pigs

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Introduction - The aim of the present study was the exploration of the herd prevalence of *Mycoplasma hyopneumoniae* infections in suckling pigs followed by an investigation of various herd specific factors for their potential of influencing the occurrence of this pathogen at the age of weaning.
Material and Methods - Overall, 125 breeding herds were examined by taking nasal swabs from 20 suckling pigs in each herd and by epidemiological characterisation.
Results and Conclusions - In total, 3.9% (98/2500) of all nasal swabs were tested positive for *M. hyopneumoniae* by real-time PCR. Piglets tested positive originated from 46 different herds resulting in an overall herd prevalence of 36.8% (46/125) for *M. hyopneumoniae* infection in suckling pigs at the age of weaning. Herds, where batch farrowing was not adopted in a 1- or 3-week interval, were more often found to be positive (OR 2.7). The risk of a herd being positive in suckling pigs was also significantly increased, when the number of farrowing pens in one compartment was higher than 15 (OR: 3.3) or when the total number of purchased gilts per year was higher than 120 (OR: 5.8). Interestingly, some of these and other factors were overlapping with those also influencing the seroprevalences among sows or the transmission of the pathogen between older age groups. Taking the multifactorial character of enzootic pneumonia into account, the results of this study substantiate that a comprehensive herd specific prevention programme is a prerequisite to reduce transmission of and disease caused by *M. hyopneumoniae.*

P142 The impact of environmental risk factors and management on the occurrence of enzootic pneumonia in fattening pigs

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Introduction - The aim of the present study was to examine potential risk factors for the occurrence of enzootic pneumonia in herds situated in a region of high pig density, where a majority of herds is endemically infected with *M. hyopneumoniae*.
Material and Methods - Between 2006 and 2010 a case-control study in 112 herds was conducted, where epidemiological data were assessed by personal interview with the farmers, clinical examination of pigs and their environments, and finally, serological testing for *M. hyopneumoniae*, swine influenza virus (SIV) and porcine reproductive and respiratory syndrome virus (PRRSV).
Results and Conclusions - In 40 case herds (coughing index ≥2.5%, seroprevalence ≥0.5), the mean coughing index was 4.3% and seroprevalence was 86.6%. In 25 control I herds (coughing index <2.5%, seroprevalence <0.5) values were 0.7% and 11.2% and in 35 herds allocated to control II (coughing index <2.5%, seroprevalence ≥0.5) were characterised by a mean coughing index of 0.9% and a seroprevalence of 86.3%. Models for different subsets of associated factors were evaluated. The number of statistically significant factors in the model 'frequent transmission of *M. hyopneumoniae'* (control II vs. control I) was: 2; 'outbreak of clinical disease' (case vs. control II): 10; 'frequent transmission & outbreak of clinical disease' (case vs. control I): 14. Several risk factors already known could be confirmed. New aspects, namely reproductive performance of the sow herd, the duration of the suckling period and the time when applying *M. hyopneumoniae* vaccines to suckling pigs have been identified to have an impact on the occurrence of enzootic pneumonia in fattening pigs.

P143 Efficacy of florfenicol injection in the treatment of Mycoplasma hyopneumoniae induced respiratory disease in pigs

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This study investigated the efficacy of a single intramuscular injection of florfenicol to treat clinical respiratory disease following experimental Mycoplasma hyopneumoniae infection.
Forty-nine 3-week-old M. hyopneumoniae-free piglets were allocated to three groups: piglets of the treatment group (TG) (n=22) and the untreated positive control group (PCG) (n=22) were inoculated endotracheally with a highly virulent *M. hyopneumoniae* isolate whereas piglets of a negative control group (NCG) (n=5) were inoculated with sterile culture medium. The piglets of TG were treated at onset of disease with a single injection of a florfenicol formulation at a dose of 30 mg/kg bodyweight (Nuflor® Swine Once; MSD Animal Health). All surviving animals were euthanized four weeks after inoculation. The efficacy of treatment was assessed by clinical [respiratory disease score (RDS)], performance [average daily weight gain (ADG), feed conversion ratio (FCR), mortality rate] and post-mortem parameters [lung lesion score (LLS)].
The RDS was 8.69 ± 7.90 (TG) and 17.16 ± 12.35 (PCG) ($P<0.05$). Performance parameters in TG and PCG were: ADG: 220 ± 88 and 212 ± 94 ($P>0.05$); FCR: 1.69 and 2.03; mortality rate: 0.0% and 10.0% ($P>0.05$), respectively. The LLS was 4.5 ± 3.9 (TG) and 5.9 ± 3.5 (PCG) ($P>0.05$). No clinical symptoms or lesions were observed in the NCG.
In conclusion, the present study showed that, following an experimental *M. hyopneumoniae* infection, a single injection of the tested florfenicol formulation significantly decreased clinical symptoms and numerically reduced severity of lung lesions and performance when compared to a non treated control.

P144 Atrophic rhinitis in France in 2010: assessment of the prevalence of lesions observed at the slaughterhouse and its relationship with features of farm characteristics

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Objectives - To record recent prevalence data of atrophic rhinitis on French pig farms. To relate the prevalence to certain farm characteristics
Materials and Methods - Phase 1: 209 batches of pigs (4,037 snouts) were checked at the abattoir from March to April 2010 in 9 different abattoirs in Western France. A 20-point scale was used (IFIP scoring method). The results were compared with those of a similar survey conducted in Brittany (France) in 1987.
Phase 2: Data on farm characteristics and disease prevention programs were investigated. These were available for 109 of the farms which had pigs controlled during phase 1. The relationship with rhinitis scores was explored using bivariate analysis.
Results - Phase 1: 54% of the snouts were affected (i.e. score ≥ 1), and 13% had large lesions (i.e. score ≥ 6). The median batch score was 1.8. The average score (2.3) was better than that in 1987 (4.0). No 'geographic' effect was noted. Phase 2: The larger farms (> 160 sows) scored better. The sows were vaccinated on about half of the farms. Comparison of farming practices and the results of snout scoring supported the hypothesis that unvaccinated herds were either farms where no vaccination was necessary or farms that would have benefited from vaccination. Among the vaccinating farms, several indicators showed better results on farms purchasing sufficient doses for a full vaccination protocol.
Conclusions - Since 1987, the prevalence of atrophic rhinitis lesions in France has decreased but the disease is still present and prevalence seems to be related to farm size and vaccine practices. It would be interesting to compare these results with data from farms in other European areas, to better assess the risk factors for the disease.

P145 Repeatability and reproducibility of the scoring of atrophic rhinitis lesions at the slaughterhouse

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Objectives - Lesion scoring at the slaughterhouse is one of the methods of diagnosis for Atrophic Rhinitis in pigs. The aim of this study was to evaluate three factors influencing its reliability: the sampling method at the abattoir, the cutting method (motorized or hand saw) and its reproducibility and repeatability.
Materials and Methods - Scoring was carried out at abattoirs in Western France. A 20-point scale was used (IFIP scoring method). Three indicators were used to assess rhinitis at batch level: the percentage of affected snouts (i.e. of score > 1), the percentage of large lesions (i.e. score ≥ 6) and the mean score. The influence of the sampling method was evaluated by creating sub-sets of five large samples. The influence of the cutting method was evaluated over four batches. The reproducibility and repeatability were evaluated using a set of photographs of lesions submitted to five veterinarians twice a 4-hour interval.
Results - For a given batch, the estimated percentage of affected snouts varied by 20 to 30 percentage points between sub-sets. Regular sampling throughout the chain should give the best results if the objective is the estimation of the batch prevalence. There were no significant differences between manual and motorized cutting. The repeatability was good (R2 = 0.89). For a given veterinarian, reproducibility was correct in the first instance (R2: 0.68 to 0.84) and good after discussion of the scoring system between the assessors (R2: 0.77 to 0.84).
Conclusions - Motorized cutting allows the sampling of more pigs, reduces operator fatigue, and does not lead to an increase in the number of misleading artefacts. Assessors need regular training. Focused screening can be considered if the objective is to detect the disease in a given herd.

P146 Evidence of Mycoplasma hyopneumoniae following partial eradication at a sow herd in Switzerland

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Introduction - In Switzerland prevalence of *Mycoplasma hyopneumoniae* (M. hyo) on herd level is less than 0.5%. Partial depopulation is used as standard eradication program for breeding farms while all other farms like fattening or finishing farms have to go through total depopulation. It is assumed that pigs older than 12 months are eliminating *M. hyo* after the end of acute infection. The success of partial eradication protocols is based on this elimination.
Case report - A certified *M. hyo* free one-site farrow-to-finish farm housing 300 sows and 3000 finishing pigs suffered an outbreak of *M. hyo* in 2007.
After failure of several eradication trials by medication a partial eradication was conducted. All growers and finishers were slaughtered. The sows were moved to another place and 14 days medicated with chlortetracycline. Every sow was tested for presence of *M. hyo* by PCR of nasal swabs. 4/300 sows tested positive. These four pigs were slaughtered. The negative sows returned to the emptied farm 14 days later.
After this eradication neither clinical signs nor positive test results for *M. hyo* could be observed until today.
Discussion - The positive test result of 4/300 sows during the depopulation period is an unexpected result. A short term colonization of *M. hyo* on rhinal mucosa or detection of dead material cannot be ruled out. False positive PCR results due to contamination of nasal swabs are very rare. If 4/300 sows really did not eliminate *M. hyo* at the end of the young-animal-free period, the success of partial depopulation would possibly be endangered by *M. hyo* shedding sows. This might be a reason for so far unexplainable reinfections in Switzerland.

P147 In vitro activity of florfenicol against porcine respiratory disease pathogens isolated in Europe between 2002 and 2010

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Objectives - Determination of the in vitro activity of florfenicol against *Actinobacillus (A.) pleuropneumoniae*, *Pasteurella (P.) multocida* and *Haemophilus (H.) parasuis* recently isolated from the respiratory tract of infected pigs.
Materials and Methods - All tested bacteria were isolated from the respiratory tract of acute diseased pigs.
A total of 262 *A. pleuropneumoniae* and 326 *P. multocida* isolates were collected from the Vetpath I and II surveillance programs organized by CEESA (Centre Europeen d'Etudes pour la Santé Animale) in 8 different European countries between 2002 and 2006. 143 *H. parasuis* isolated in 6 different European countries between 2005 and 2010 came from the MSD AH culture collection. They were epidemiologically unrelated and most of them came from animals not recently exposed to antibiotics. The Minimum Inhibitory Concentrations (MICs) of florfenicol were determined according to CLSI document M31-A3.
Results - The MIC ranges of florfenicol against *A. pleuropneumoniae* were 0.25-4 mg/mL (2002-2005) and ≤ 0.125-0.5 µg/mL (2005-2006). For *P. multocida* the MICs ranged between 0.25 and 4 mg/mL (2002-2005) and 0.25 and 1 µg/mL (2005-2006). For *H. parasuis* they ranged between 0.125 and 0.5 mg/mL. The highest MIC90 value for all isolates was 0.5 mg/mL.
Conclusions - Florfenicol confirmed high activity against all isolates tested. According to the CLSI breakpoints for florfenicol, all strains were susceptible. Furthermore, the data show that the MICs of florfenicol against porcine respiratory pathogens did not change over the last 10 years.

P148 Actinobacillus pleuropneumoniae seroprevalence is low in farmed wild boars in Finland

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The aim of this study was to estimate the prevalence of serum antibodies to *A. pleuropneumoniae* (APP) in Finnish farmed wild boars in order to evaluate any possible effect of this pathogen to the production of wild boar meat.
Based on a national record of wild boar farmers, a sampling frame was compiled. Every active farm (n = 71) on that list was contacted by mail. Non-responders received a phone call from the research group. All farms that volunteered (n = 26) were included in the study. A serum sample (n=202) was obtained from all animals slaughtered in the study farms during 2005-2008. Antibodies to APP were detected in serum diluted 1/1000 by indirect ELISA-techniques using phenol-water extracts of the serotypes analysed for as antigens. These antigenes wer obtained from serotype 1, 2, 3, 5s, 7, 10 and 12, and together they represented serotypes 1-12 through cross-reactions. In all, 1 414 analyses were completed.
Altogether, antibodies against any serotype were detected in 2.3% of all analyses. The apparent animal prevalence of APP 1,9 and 11 was 4% (95% confidence interval [CI] 1–7%), serotype 2 5% (CI 2-8%), serotypes 3, 6 and 8 3.5% (CI 1-6%), serotype 4 and 7 6.4% (CI 3-10%), serotype 10 5% (CI 2-8%) and serotype 12 1.5% (CI 0-3%). No antibodies were detected against serotype 5s. The apparent farm prevalence of APP serotypes 1,9 and 11 was 15.4% (95% confidence interval [CI] 2–29%), serotype 2 3.8% (CI 0-11%), serotypes 3, 6 and 8 11.5% (CI 0-24%), serotype 4 and 7 30.8% (CI 13-49%), serotype 10 3.8% (CI 0-11%) and serotype 12 7.7% (CI 0-18%).
In conclusion, the prevalence of serum antibodies to different APP serotypes was low in farmed wild boar. Based on such a low seropositivity of common swine pathogen it is unlikely that actinobacillosis has a marked effect on wild boar meat production.

P149 The susceptibility study of porcine Mycoplasmas isolated from pig farms in Thailand

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Objective - To survey the susceptibility and resistance of porcine mycoplasmas, e.g. *M. hyopneumoniae* (MH), *M. hyosynoviae* (MHS) and *M. hyorhinis* (MHR) to six antimicrobials.
Materials and Methods - 26 isolates of MH, 9 isolates of MHS, and 66 isolates of MHR derived from pigs in 2009 were tested. Twelve serial broth dilutions of antimicrobials were used: for doxycycline (Doxy) and enrofloxacin (Enro) 100 to 0.048 µg/ml, and for lincomycin (Linco), tiamulin (Tia), tylosin (Tylo) and valnemulin (Val) 12.5 to 0.006 µg/ml was used. MIC tests were conducted by the microtiter dilution test. Mycoplasmal growth was observed by color change of broth. The lowest antimicrobial concentration inhibiting mycoplasmal growth were recorded as MICs. Susceptible and resistant breakpoint were used for evaluation of MICs.
Results - For MH, 34.6% of the tested isolates were resistant to Enro, but the isolates showed no resistance to other drugs. The susceptibility of MH isolates was 96.2 and 38.5% for Doxy and Enro while for the other drugs 100% of the isolates were susceptible. For MHS, 11.1 and 33.3% of the tested isolates were resistant to Doxy and Enro and none of the isolates showed resistance to Linco, Tia, Tylo and Val. The susceptibility of MHS isolates to Doxy, Linco, Tia, Tylo, Val and Enro were 11.1, 100, 100, 33.3, 100 and 0% respectively. For MHR, 37.9, 6.1, and 80.3% of the tested isolates were resistant to Enro, Linco and Tylo. The susceptibility of MHR isolates to Doxy, Linco, Tia, Val, Enro and Tylo were 86.4, 93.9, 100, 100, 0 and 0% respectively.
Conclusions - MH, MHS and MHR isolates were little susceptible to Enro. MHR isolates were highly resistant to Tylo. MHS isolates were little susceptible to Doxy and Tylo. Tia and Val were the antimicrobials with no resistance to porcine mycoplasmas.

P150 Comparison of the efficacy of Suvaxyn MH One® and Ingelvac MycoFlex® in a 26-week duration of immunity study

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A study was conducted to compare efficacy of Suvaxyn MH One (SMHO) and Ingelvac MycoFlex in a *Mycoplasma hyopneumoniae* experimental infection challenge model when given 26 weeks following vaccination. Three-week old pigs in Iowa were randomly assigned to treatment using a generalized randomized block design based on body weight. Treatments were IM administration of 2 mL Saline (n=20), 2 mL Suvaxyn MH One (n=35), and 1 mL Ingelvac MycoFlex (n=35). Pigs were challenged intratracheally with *M. hyopneumoniae (*M. hyo.) lung homogenate 26 weeks later and were euthanized after 4 weeks. Serum collected prior to challenge and prior to euthanasia was analyzed for *M. hyo* (DAKO). Nasal swabs collected prior to challenge and prior to euthanasia and bronchoalveolar lavage fluid (BAL) collected after euthanesia were analyzed for *M. hyo*. by qPCR. In addition, percent of lung lesioned was scored. Data were analyzed using general linear mixed models, with the animal as the experimental unit. Percent of lungs with lesions, the primary efficacy variable, for Suvaxyn MH One (1.1 ± 0.4) was less ($P < 0.05$) than for Ingelvac MycoFlex (2.8 ± 0.7) and both were less ($P < 0.01$ and $P = 0.03$, respectively) than Saline (6.2 ± 1.4). Thus, vaccination with Suvaxyn MH One was more efficacious than vaccination with Ingelvac MycoFlex based on percentage of lung lesions 4 weeks after a *M. hyo*. challenge given 26 wks after vaccination.

P151 Prevalence of Mycoplasma hyopneumoniae infections at weaning age in Spanish pig herds

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Mycoplasma hyopneumoniae (M.hyo) is the primary pathogen of enzootic pneumonia, a chronic respiratory disease in pigs. Infections with *M.hyo* are highly prevalent in almost all swine-producing areas and the disease causes major economic losses to the pig industry worldwide due to the reduced performance and the increased use of antimicrobials. Moreover, *M.hyo* is also considered to be one of the primary agents involved in the porcine respiratory disease complex (PRDC). It has been demonstrated that infections with *M.hyo* may already occur starting from 3 weeks of age in Spanish herds, as demonstrated by the detection of *M.hyo* in nasal swabs by polymerase chain reaction (PCR) (Sibila et al., 2007; Villarreal et al., 2010; Segalés et al., 2011). Recent studies have shown that tracheo-bronchial swabs may be 3.5 to 4.5 times more sensitive for the detection of *M.hyo* than nasal swabs (Marois et al., 2007; Fablet et al., 2010). The aim of the present study was to estimate the detection rate of *M.hyo* infections in Spanish piglets around weaning age by the use of both nasal and tracheo-bronchial swabs. The study was conducted from January to October 2011 in 40 Spanish pig herds. In each herd, nasal and tracheo-bronchial swabs were collected from 27 to 30 three- to four-weeks-old piglets and tested for the presence of *M.hyo*, using a nested PCR (Calsamiglia et al., 1999). In total, 24 out of the 40 tested herds (60.0%) and 53 out of the 1181 tested piglets (4.5%) tested positive for *M.hyo*. The minimum within-herd detection rate was 0% and the maximum within-herd detection rate was 20.0%. Tracheo-bronchial swabs were shown to be slightly more sensitive than nasal swabs. In conclusion, the present study confirmed that Spanish piglets may already be infected with *M.hyo* at weaning age.

P152 Efficacy of a new florfenicol formulation administered once intramuscularly in the treatment of swine respiratory disease under field conditions

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Objectives - The objective of the study was to evaluate the efficacy of a new 450 mg/ml florfenicol formulation administered as a single intramuscular injection in the treatment of naturally occurring respiratory disease in swine by comparison to a positive control.
Materials and Methods: A total of 239 pigs, from 8 sites in France, Germany and Spain, aged from 11 to 18 weeks, showing severe signs of respiratory disease, were randomly assigned to treatment with either florfenicol (2ml/30kg; Nuflor® Swine Once; MSD Animal Health) administered intramuscularly once or enrofloxacin (1.5ml/30kg; Baytril® 5%; Bayer) administered intramuscularly 3 consecutive days. Animals were clinically observed daily for 11 days following treatment initiation.
Results - The predominant pathogens present in pre-treatment respiratory tract samples were *P. multocida, H. parasuis, A. pleuropneumoniae* and *M. hyopneumoniae*. *B. bronchiseptica*, *S. suis* and *M. hyorhinis* were also present. All isolates were found susceptible in vitro to florfenicol (except 8% B. bronchiseptica that were found intermediate). In both treatment groups, rectal temperature dropped and clinical index (depression and respiratory signs) decreased after treatment. The decrease was faster with florfenicol. Success rates on day 5 were 91.1% in the florfenicol treated animals and 86.5% in the control group. On day 11, success rates in florfenicol treated animals were 79.3% compared to 72.7% in the control group.
Conclusions - It is concluded that a single intramuscular injection of the new 450 mg/ml florfenicol formulation, Nuflor® Swine Once, is efficacious in the treatment of naturally occurring outbreaks of swine respiratory disease.

P153 Prevalence of Mycoplasma hyopneumoniae infections at weaning age in Italian pig herds

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Mycoplasma hyopneumoniae (M.hyo) is the primary pathogen of enzootic pneumonia, a chronic respiratory disease in pigs. Infections with *M.hyo* are highly prevalent in almost all swine-producing areas and the disease causes major economic losses to the pig industry worldwide due to the reduced performance and the increased use of antimicrobials. Moreover, *M.hyo* is also considered to be one of the primary agents involved in the porcine respiratory disease complex (PRDC). It has been demonstrated by several research groups that infections with *M.hyo* may already occur starting from 3 weeks of age, as demonstrated by the detection of *M.hyo* in nasal swabs by polymerase chain reaction (PCR) (Calsamiglia & Pijoan, 2000; Ruiz et al., 2003; Sibila et al., 2007; Fano et al., 2007; Villarreal et al., 2010). Recent studies have shown that tracheo-bronchial swabs may be 3.5 to 4.5 times more sensitive for the detection of *M.hyo* than nasal swabs (Marois et al., 2007; Fablet et al., 2010). The aim of the present study was to estimate the detection rate of *M.hyo* infections in Italian piglets around weaning age by the use of tracheo-bronchial swabs. The study was conducted from January to October 2011 in 36 Italian pig herds. In each herd, 20 to 30 tracheo-bronchial swabs were collected from 3- to 5-weeks-old piglets and tested for the presence of *M.hyo*, using a nested PCR (Calsamiglia et al., 1999). In total, 16 out of the 36 tested herds (44.4%) and 34 out of the 745 tested piglets (4.6%) tested positive for *M.hyo*. The minimum within-herd detection rate was 0% and the maximum within-herd detection rate was 25.0%. In conclusion, the present study confirmed that 3- to 5-weeks-old Italian piglets may already be infected with *M.hyo*, as earlier evidenced by Villarreal et al. (2010).

P154 Efficacy of a new 450 mg/mL florfenicol formulation in the treatment of an experimentally induced Actinobacillus pleuropneumoniae respiratory infection in pigs

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Objectives - To determine the optimal effective dose of a new florfenicol formulation administered intramuscularly as a single dose, to pigs challenged with *A.pleuropneumoniae* (App).
Materials and methods - Sixty pigs were sourced from a commercial farm free of App. At 38 days of age, 59 were challenged intra-nasally with an App Serotype 9 inoculum (7.9 x 109 cfu). Within 12h post-challenge, 32 pigs meeting the inclusion criteria (total clinical score ≥ 3) were randomly allocated to four treatment groups: 15; 30 or 45 mg/kg florfenicol (Nuflor® Swine Once) or saline. Animals were clinically examined daily until necropsy on Day 4 when lung lesions were scored in blind conditions. The clinical and lung scores were compared statistically between groups.
Results - The total clinical score was significantly reduced in the three treated groups (15 mg/kg - p=0.03; 30 mg/kg - p=0.02; 45 mg/kg - p=0.02) compared with saline as well as the lung scores (p=0.03; p=0.005; p=0.0003, respectively). The median lung scores were numerically lower in the 30 and 45 mg/kg groups than in the 15 mg/kg group.
Conclusion - All three Nuflor® Swine Once dosages were effective against an experimental App respiratory infection in pigs. The 30 mg/kg dose was considered optimal and selected for further clinical studies.

P155 Mycoplasma hyopneumoniae prevalence in Belgian pig herds using a tracheo-bronchial swab technique

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Mycoplasma hyopneumoniae (M.hyo) – one of the main pathogens of the Porcine Respiratory Disease Complex (PRDC) – is still important in modern intensive swine farming in Europe. The objective of the present study was to obtain data on the distribution of *M.hyoinfections* throughout closed pig herds in Belgium, using the tracheo-bronchial swab (TBS) technique (Fablet et al., 2010). Therefore, 32 pig herds were randomly selected through regular contacts with local veterinary practices. Following inclusion criteria were implemented: at least 200 sows and no specific clinical problems with *M.hyo*. In each pig herd, 30 piglets were sampled: 20 piglets at 3-5 weeks of age and 10 piglets in the 2nd half of the nursery stage (6-10 weeks). Mucus was collected at the tracheo-bronchial split and suspended into 1 mL of buffered saline solution. Polymerase Chain Reaction (nPCR) analysis was performed according to the laboratory standard operating procedures. Results were reported as negative or positive for the presence of *M.hyo* with a detection limit of 300 DNA copies of *M.hyo* per mL. The prevalence of herds having at least one piglet positive for *M.hyo* at 3-5 weeks of age was 25.0%. Over the entire post-weaning period, this prevalence was 46.9%. The individual animal prevalence at 3-5 weeks of age was 8.6%, increasing to 13.0% at 6-10 weeks of age. The results of the PCR testing of the TBS of the older piglets revealed an increasing prevalence of *M.hyo* during the post-weaning period, which is in accordance with other studies. In conclusion, the present study confirms that under Belgian field conditions piglets may already be infected with *M.hyo* very early in their life (prevalence of 8.6% at 3-5 weeks of age) and prevalence further increases in the post-weaning period.

P156 Mycoplasma hyopneumoniae prevalence in Dutch pig herds using a tracheo-bronchial swab technique

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Mycoplasma hyopneumoniae (M.hyo) – one of the main pathogens of the Porcine Respiratory Disease Complex (PRDC) – is still important in modern intensive swine farming in Europe. The objective of the present study was to obtain data on the distribution *of M.hyo* infections throughout closed pig herds in the Netherlands, using the tracheo-bronchial swab (TBS) technique (Fablet et al., 2010). Therefore, 37 sow herds were randomly selected through regular contacts with local veterinary practices. Following inclusion criteria were implemented: at least 200 sows and no specific clinical problems with *M.hyo*. In each pig herd, 30 piglets were sampled: 20 piglets at 3-5 weeks of age and 10 piglets in the 2nd half of the nursery stage (6-10 weeks). Mucus was collected at the tracheo-bronchial split and suspended into 1 mL of buffered saline solution. Polymerase Chain Reaction (nPCR) analysis was performed according to the laboratory standard operating procedures. Results were reported as negative or positive for the presence of *M.hyo* with a detection limit of 300 DNA copies of *M.hyo* per mL. The prevalence of herds having at least one piglet positive for *M. hyo* at 3-5 weeks of age was 29.7%. Over the entire post-weaning period, this prevalence was 35.1%. The individual animal prevalence at 3-5 weeks of age was 6.7%, increasing to 8.7% at 6-10 weeks of age. The results of the PCR testing of the TBS of the older piglets revealed an increasing prevalence of *M.hyo* during the post-weaning period, which is in accordance with other studies. In conclusion, the present study confirms that under Dutch field conditions piglets may already be infected with *M.hyo* very early in their life (prevalence of 6.7% at 3-5 weeks of age) and prevalence further increases in the post-weaning period.

P157 Bactericidal activity and post-antibiotic effect (pae) of florfenicol against porcine respiratory disease pathogens

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Objectives - Determination of the bactericidal activity, the post-antibiotic effect (PAE) and the post-antibiotic sub-MIC effect (PASME) of florfenicol (FFC) *against Actinobacillus (A.) pleuropneumoniae*, *Pasteurella (P.) multocida* and *Haemophilus (H.) parasuis* isolates from the respiratory tract of infected pigs.
Materials and Methods - Time-kill curves were generated for FFC against 10 *P. multocida*, 10 *A. pleuropneumoniae* and 7 *H. parasuis* isolates. The bactericidal activity was determined by the macrodilution method according to CLSI M26-A. It was defined as a 3 log10 decrease of the bacterial counts within 24h.
The PAE was determined for 3 *A. pleuropneumoniae* and 3 *P. multocida* isolates. The PAE and PASME were determined after incubation at 10-fold the MIC for an hour (PAE) followed by 24 h of incubation at a sub-inhibitory concentration (PASME) as described by Lorian, 1996.
Results - Bactericidal activity of FFC was observed for all isolates of the 3 bacterial species tested using concentrations equal to the MIC or maximum 2-fold the MIC of the respective isolate.
FFC demonstrated a PAE against all *P. multocida* and *A. pleuropneumoniae* tested between 3 and 7 h. The PASME using 0.6-fold the MIC led to an extension up to a bacteriostatic effect (12 to > 24 h).
Conclusions - FFC demonstrated bactericidal activity against the 3 major porcine respiratory pathogens tested. It also exhibited a significant PAE and PASME against *A. pleuropneumoniae* and *P. multocida* isolates.

P158 Determination of the in vitro activity of florfenicol against Mycoplasma hyopneumoniae

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Objectives - Determination of the Minimum Inhibitory Concentrations (MICs) of florfenicol against recent *Mycoplasma (M.) hyopneumoniae* isolates from the respiratory tract of infected pigs in Europe.
Materials and Methods - A total of 95 *M. hyopneumoniae* isolates were collected in 8 different European countries between 2005 and 2010.
All bacteria were isolated from the respiratory tract of pigs suffering from respiratory disease and were epidemiologically unrelated.
The florfenicol MICs were determined by a microdilution method as described by Hannan et al. (2000) and Vicca et al. (2004). The M. hyopneumoniae type strain ATCC 25934 (J strain) was used as control strain. The assays were performed in Friis broth medium, containing phenol red. The strains were incubated until a significant color change occurred for the growth controls. i.e. 3 to 13 days. The MIC was defined as the lowest concentration that inhibited the color change.
Results - The MICs of florfenicol against M. hyopneumoniae ranged from 0.06 g/mL to 1 g/mL with a MIC50 of 0.25 g/mL and a MIC90 of 0.5 g/mL.
Conclusions - Florfenicol demonstrated high in vitro antimicrobial activity against all *M. hyopneumoniae* isolates tested.
Bacteriology: Enteric Diseases

P159 Investigations on a novel vaccine against edema disease in field studies

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Objectives - Field trials were carried out to assess the safety and efficacy of a newly developed Stx2e-subunit-vaccine against Edema Disease (ED) caused by Stx2e forming *E. coli*.
Materials and Methods - The vaccine ECOPORC SHIGA was tested in 2011 on 3 German pig farms. On the 4th day of life (Day 0) 399, 327 and 309 piglets of usual regional breed were randomly divided into two groups and once vaccinated with the masked Investigational Veterinary Product (IVP) or Control Product (CP, isotonic saline). All piglets were examined until 14 days after vaccination to assess safety and daily during the period of occurrence of ED to assess efficacy. The piglets were weighed at vaccination, before and after occurrence of ED and blood samples were taken 21 days after vaccination and at study end.
Results - Regarding general health, local reactions, rectal body temperature and gain in weight until Day 14 equality between the two groups could be statistically proven. The ratio of piglets with detectable antibodies against Stx2e in a serum neutralising test was significantly higher in each IVP group (Day 21: IVP 77 % vs. CP 0 %; 85 % vs. 6 %; 77 % vs. 0 %; study end: 87 % vs. 0 %; 100 % vs. 4 %; 100 % vs. 6 %). In CP groups early antibodies were maternally derived and occurred late due to natural challenge. In the 2nd and 3rd trial, in which edema disease occurred after weaning, morbidity was lower (0 % vs. 15 %*; 1 % vs. 6 %*), mortality was lower (0 % vs. 11 %*; 0 % vs. 3 %) and gain in weight after weaning was higher (6889 g vs. 6197 g*; 5272 g vs. 4716 g*) in the IVP groups.
Conclusion - The vaccine ECOPORC SHIGA is a safe and effective tool to reduce the mortality and clinical signs of ED, especially regarding the aim to lower the use of antibiotics.
* corresponding p-value: $p \leq 0,05$

P161 Occurrence of intestinal infections in non-medicated growing pigs in Denmark: a case control study

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The objective was to investigate selected intestinal infections in pigs with and without diarrhea in batches of pigs where the farmer assumed the pigs to be clinically healthy.
A case control study was conducted in 8 Danish herds in 2011. In each herd 200 pigs between 10 and 70 days post weaning were selected by systematic random sampling and a faecal sample was obtained. Pigs treated with antibiotics within the last 7 days were excluded. Among the 200 pigs, 8 pigs with diarrhoea were randomly selected as cases. Eight control pigs without diarrhoea were randomly selected from the same pens as the cases.
Faecal samples from case and control pigs were tested by qPCR for *E. coli F4* (F4) and F18 (F18), *L. intracellularis* (LI) and *B. pilosicoli* (BP) and subjected to faecal dry matter determination and were reclassified accordingly in the statistical analysis.
A total of 71 cases and 57 control pigs was examined. F4 was detected in 7% of the cases and 7% of the controls OR: 1,00 CI [0,26;3,93]. F18 was detected in 10% of cases and 9% of controls OR: 1,38 CI [0,34;3,79]. LI was detected in 35% of cases and 26% of controls OR: 1,52 CI [0,71;3,26]. BP was detected in 31% of cases and 12% controls OR: 3,21 CI [1,26;8,19]. BP+LI were detected in 15% of cases and 4% controls OR: 5,04 CI [1,07;23,76]. More than one pathogen were detected in 18% of cases and 7% of controls OR: 2,97 CI [0,91;9,67]. In 38% of cases and in 53% controls none of the infections was detected,
The results imply that intestinal infections are insufficiently controlled in Denmark. This may be the result of restrictive antibiotic usage and absence of other preventive measures and has potentially serious implications for pig welfare and productivity.

P162 Antimicrobial susceptibility of Finnish Brachyspira hyodysenteriae isolates in years 2007-2011

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Objectives - Efficient antimicrobial agents are needed in the eradication programs for swine dysentery. Resistance to tylosin and lincomycin was very widespread in Finnish *Brachyspira hyodysenteriae* isolates from years 1996-1998 (1). In recent years isolates with decreased susceptibility to tiamulin have been reported in other countries (2). This study reports the in vitro susceptibility of Finnish isolates of B. *hyodysenteriae* from years 2007-2011.
Materials and Methods - Altogether 30 isolates of *B. hyodysenteriae* from 28 farms were obtained from diagnostic samples (porcine faecal samples or intestinal contents) from years 2007-2011. Minimum inhibitory concentrations (MIC) for tylosin, lincomycin, tiamulin and valnemulin were tested by VetMICBrachy method (3).
Results - Decreased susceptibility to tylosin was detected in 25 isolates, (MIC > 1 µg/ml) and to lincomycin in 4 isolates (MIC > 4 µg/ml). All isolates were sensitive to tiamulin (MIC ≤ 1 µg/ml) and valnemulin (MIC ≤ 1 µg/ml) (4).
Conclusions - In Finland, swine dysentery has been controlled and monitored in the voluntary health classification system of pig herds (5). The *B. hyodysenteriae* isolates from the years 2007-2011 showed no trend of increased antimicrobial resistance.
References:
1) Ministry of Agriculture and Forestry (2000), FINRES 1999, Report.; 2) Karlsson M et al. (2004) J Med Microbiol, 53: 281-285; 3) www.sva.se/en/ 4)Rønne H, Szancer J, Proc 11th IPVS (1990) p. 126 5)Tuovinen V, Kortesniemi P. Proc 18th IPVS (2004), Vol 2, p. 656.

P163 Detection of viable Helicobacter suis bacteria in pork samples

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Helicobacter (H.) pylori is by far the most prevalent *Helicobacter* species in the human stomach. However, in gastric biopsies of some human patients, morphologically distinct, typically long spiral shaped bacteria have been detected. These gastric non-*H. pylori helicobacters* may be referred to as *H. heilmannii* sensu lato, but they actually comprise several *Helicobacter* species, all of them known to colonize the gastric mucosa of animals (Haesebrouck et al., 2011). The most prevalent non-*H. pylori helicobacter* in humans is *H. suis*, a bacterium often colonizing the stomach of pigs (Haesebrouck et al., 2009). It is not known whether, besides direct contact with pigs, other routes of transmission of this microorganism are of importance. One possibility is transmission of *H. suis* by manipulation or consumption of contaminated pork. In vitro isolation and cultivation of this very fastidious micro-organism is extremely difficult and time-consuming. The aim of this study was therefore to develop a non-culture dependent, quantitative species-specific detection method allowing differentiation of viable from dead H. suis bacteria. Using ethidium bromide monoazide (EMA) in combination with RT-PCR, detection and differentiation of viable vs. dead bacteria in mixed bacterial populations was established. This EMA real-time PCR, using *H. suis*-specific primers annealing with the urease gene, was applied to 50 commercial pork samples. In two of them, viable *H. suis* bacteria were detected. Sequence analysis confirmed the presence of the *H. suis* urease gene. This indicates that raw or undercooked pork meat might be a source of infection for humans.
Haesebrouck et al (2009). Clin. Microbiol. Rev. 22, 202-223. Haesebrouck et al (2011). Helicobacter 16, 339-340

P164 Lawsonia intracellularis infection patterns in French pig herds presenting with digestive disorders

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Objectives - This study aimed to determine, by means of three different immunoassays, the patterns of *Lawsonia intracellularis* (LI) infection in several herds of French pigs presenting with digestive disorders.
Material and Methods - Symptoms of ileitis were present in all the study farms. Serological testing was conducted in 33 farms (78 batches), using either immunofluorescence (IFAT, Ileitest, Elanco, n=24), or an antibody ELISA (BioScreen Ileitis Antibody Elisa, n=9). LI was detected in the faeces by means of a diagnostic antigen ELISA in 47 farms (69 batches) (FIRSTtest, Microcoat Biotechnologie GmbH). When serological tests were employed, a batch was considered positive if at least 20% of the animals sampled were positive. With the FIRSTtest, a batch was considered positive if at least 30% of the sampled animals were positive.
Results - Serological tests: The sampled pigs were 8 to 26 weeks old. Seroprevalence was minimal in the 8-10 weeks age range (13% of batches, 5% of animals) and maximal in the 21-26 weeks age range (94% of batches, 79% of animals). The highest levels of seroconversion were observed in the 14-16-weeks and 17-20-weeks age ranges. Antigen ELISA (FIRSTtest) tests: The sampled pigs were 5 to 26 weeks old. Shedding was minimal in the 5-7 weeks age range (25% of batches, 13% of animals) and maximal in the 17-20 weeks age range (69% of batches, 62% of animals).
Conclusions - These results corroborate the major prevalence of *Lawsonia intracellularis* infection in French pig farms. They also confirm that, in order to determine at what age seroconversion and shedding occur in a given farm, samples need to be collected from pigs belonging to several age groups.

P165 Early weaning impairs gut mucosal defenses and exacerbates clinical disease in F18 E. coli infection

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Objective - This study investigated the influence of weaning age on the susceptibility and clinical severity to F18 *E. coli* disease.
Materials and Methods - Crossbred piglets (n=72) were weaned at 16 d(Early weaned, EW), 18 d(Middle weaned, MW), or 20 d(Late weaned, LW) of age and were F18 *E. coli*-susceptible as determined by genotypic analysis. Pigs were individually housed, given ad libitum food and water access, and assigned to treatment groups (n=12 pigs/treatment): EW; EW + *E. coli* challenge; MW; MW *+ E. coli* challenge; LW; LW + *E. coli* challenge. At 28 d of age, pigs were inoculated with 1x109 CFU of F18 E. coli and clinical disease was recorded. On d 4 post-challenge, ileum was harvested to assess intestinal injury and inflammation. Intestinal barrier function was measured as mucosal-to-serosal permeability of FITC-labeled dextran on Ussing chambers. Inflammation was determined by histological analysis of formalin-fixed tissues and analysis of pro-inflammatory cytokine levels.
Results - *E. coli* challenge resulted in clinical diarrhea in all weaning age groups. LW pigs exhibited the lowest fecal scores ($p<0.05$) compared with EW and MW challenged groups. Ileum from LW piglets exhibited the lowest ($p<0.05$) FITC dextran permeability, indicating diminished intestinal barrier injury in response to infection. *E. coli* challenge increased neutrophil infiltration ($p<0.01$) and pro-inflammatory cytokine levels in LW ileum but not in EW and MW pigs.
Discussion - Overall this data demonstrates that increased weaning age can ameliorate disease severity and intestinal injury to subsequent F18 *E. coli* challenge. The differences observed among weaning age groups may be due to the enhanced ability of LW pigs to mount an appropriate immune response against *E. coli* infection.

P166 Medium dependent decrease of viability in a pig specific Escherichia coli exposed to glycine and monoethanolamine under alkaline conditions

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Introduction and Objectives - In a previous study we assessed the antibacterial effect of betaine (N,N,N-trimethylglycine) and its unmethylated analogue glycine on a pig specific enterotoxigenic *Escherichia coli* (ETEC). A clear loss of bacterial viability was established after exposure to glycine (unmethylated) compared to betaine and control, under alkaline conditions. Apart from betaine, choline is also an additive in pig nutrition. Therefore our current objective was to compare not only the effect of betaine and glycine, but also of choline and its unmethylated analogue monoethanolamine (MEA) on a pig specific ETEC, under varying conditions of pH in combination with different incubation media.
Materials and Methods - The hemolytic ETEC strain GIS26 was exposed to glycine, betaine, MEA or choline at a pH ranging from 7.4 to 10.0. Three different incubation media were tested: phosphate buffered saline (PBS), a simulated duodenal fluid (SDF) and brain heart infusion broth (BHI). Bacterial viability was determined by the LIVE/DEAD BacLight kit for flow cytometry, which discriminates subpopulations of live, dead and intermediate ("dying") bacteria. Culturability was assessed by conventional plate counts.
Results - Flow cytometric data show a loss of ETEC viability after exposure to either glycine or MEA compared to betaine, choline or control under alkaline conditions in PBS and SDF. Overall, the rate in viability loss is dependent on the incubation medium, with BHI being more protective than PBS and SDF. Furthermore this loss of viability is correlated with a decrease in culturability.
Conclusion - We assessed viability through determination of membrane integrity. Therefore our results show membrane damage caused by the unmethylated compounds glycine and MEA under alkaline conditions. We hypothesize that the underlying biochemical mechanism is a disturbed metabolic process, which is also modulated by the intestinal environment. This is currently tested by analysis of bacterial ATP content and esterase activity.

P167 A new methodology to detect some pathogenic bacteria involved in swine neonatal diarrhoea

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Introduction - An important drawback when facing the diagnosis of bacterial diarrhoea in new-born pigs is proper and timely sample submission. Stools should be sent quickly to the laboratory in order to reduce overgrowth of saprophytic flora. Also, isolated bacteria should be typing at the virulence factor level, using time consuming methodologies. The aim of this study was to standardize a new methodology to preserve stool samples for subsequent testing using PCR.
Materials and Methods - A conventional multiplex PCR was optimized to amplify virulence factors that include the genes for *Escherichia coli* adhesion factors F4, F5 and F6, *E. coli* thermolabile enterotoxin and *Clostridium perfringens* Alfa and Beta toxins. *E. coli* and *C. perfringens* harbouring the above mentioned virulence factors were mixed in equivalent proportions in pig stools, and were used for PCR optimization. FTA® swabs and Elute® cards were used to collect and preserve the aforementioned bacteria + stool mixture. Total DNA was retrieved from the cards using a heating extraction protocol followed by a silica spin column-based DNA purification step. The PCR products were then analysed by gel electrophoresis.
Results and Conclusions - The 6 virulence factors present in the bacterial mixture inoculated in the cards, in the presence of stools, were detected by the multiplex PCR. This result indicates that the proposed system would preserve clinical samples in good conditions for subsequent amplification using the optimized PCR. Furthermore, these results rule out eventual inhibition due to the nature of the sample (stool) or competition in the amplification in the multiplex PCR. This methodology can be used to aid in the prevention of neonatal pig diarrhoea caused by *E. coli* and *C. perfringens*.

P168 Towards identifying porcine F4 ETEC receptors by comparison between F4-binding brush border membrane proteins of different groups

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F4+ enterotoxigenic *Escherichia coli* (ETEC) are an important cause of diarrhoea and mortality in piglets. Currently, there is no reliable genetic test to screen for F4 receptor (F4R) negative pigs. Additionally, only one of the putative F4R(s) has been investigated for its role in the mucosal immunogenicity of F4 fimbriae. Our study aims to identify F4R(s) associated with F4+ ETEC susceptibility and mucosal immunogenicity. Fifty-four piglets were divided into different groups based on their mucin 4 genotypes, in vitro villous adhesion with F4ab, F4ac and F4ad fimbriae, immune response following oral administration of F4ac fimbriae and F4 binding to brush border membrane glycoproteins. Using the 4 properties, 6 groups including 4 subgroups of pigs could be identified. Immunoblotting revealed 17 F4-binding bands varying from ≥250 to 25 kDa. Only in subgroup IA (SS/SR, IMM+, F4ab/ac/adR+) and IB (SR, IMM+, F4ab/acR+), the ≥250 kDa bands were found (22/26 pigs). Subgroup IIA (RR, IMM+, F4ab/ac/adR+) and IIB (RR, IMM+, F4ab/acR+) gave similar patterns as group I but without glycoprotein bands ≥250 and 34 kDa. Group IV, though being F4R+ (SS/SR/RR, IMM-, F4ab/ac/adR+) showed clearly fewer bands than the other groups. F4R- groups (group III (RR, IMM-, F4ab/ac/adR-), group V (RR, IMM+, F4ab/ac/adR-) and group VI (SR/RR, IMM+, F4adR+)) showed most of F4-binding bands but not the glycoprotein bands ≥250, 34 and 32 kDa. In accordance with previous studies, results indicate that several molecules in the intestinal brush border are interesting candidate F4R. However in contrast to other studies, we demonstrated that several bands were absent in IMM- groups indicating that some of these might have a function in the mucosal immune response against F4.

P169 An investigation into the association between C. perfringens type A and diarrhea in neonatal piglets

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Attributing a pathogenic role to *Clostridium perfringens* in neonatal enteritis of piglets is problematic due to the gastrointestinal colonization of neonatal piglets within the first hours of life. Therefore the diagnosis *C. perfringens* Type A-associated porcine neonatal diarrhea requires the isolation of large numbers of bacteria and the exclusion of other causes.
Objective - To investigate the possible role of *C. perfringens* Type A in neonatal diarrheal illness in pigs. Materials and methods - Ten swine farms with history of diarrhea problem in suckling piglets were identified. On each farm, 2-4 piglets with diarrhea and 1-2 matched normal piglets were tested for *C. perfringens*, *Clostridium difficile* toxins, *Salmonell*a, enterotoxigenic *Escherichia coli*, rotavirus, transmissible gastroenteritis (TGE) virus, and coccidia. The Colony Forming Unit (CFU) of *C. perfringens* in the intestinal contents was determined, and the isolates were tested by PCR for presence of cpa, cpb2, and other virulence-associated genes.
Results - The numbers of *C. perfringens* in the intestinal contents were lower in diarrheic piglets (log10 5.4 CFU/g) compared to normal piglets (log10 6.5 CFU/g) ($P < 0.05$). No significant difference in distribution of the cpa and cpb2 was observed between isolates in healthy and diarrheic piglets. However, a lower proportion of isolates recovered from pigs with diarrhea carried atypical cpb2 ($P < 0.05$). The presence of beta2 toxin in the intestinal contents of normal and diarrheic piglets did not differ significantly. *C. difficile* toxins and rotavirus were each detected in 33% diarrheic piglets. Rotavirus, *C. difficile* toxins, *Salmonella*, or enterotoxigenic *E. coli* were concurrently recovered in different combinations in 19% of diarrheic piglets. The cause of diarrhea in 38% piglets remained unknown.
Conclusion - The number of *C. perfringens* Type A in the intestinal contents was not a useful approach for making a diagnosis of *C. perfringens* Type A enteritis in piglets. The diagnosis of etiology of porcine neonatal diarrhea was complex because other pathogens might form a multiple cause of the enteritis.

P170 Comparison of live yeast and zinc supplement on the occurrence of pathogenic E. coli in weaned piglets

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Introduction - Enterotoxigenic *E. coli* (ETEC) causes disorders in postweaning piglets. *Saccharomyces cerevisiae* may improve vitality of weaned piglets. Piglets fed milk replacer supplemented with *S. cerevisiae* Sc 47 (SC) showed reduced TNF-α expression, suggesting SC immunomodulatory role. The aim of this study was to prove reduction of ETEC strains in faeces after SC dietary supplementation, compare to Zn addition and evaluate differences.
Material and methods - Four batches of piglets were included, aged from 25 days to 2 months, 200 piglets each. The first batch (SC group) received the diet supplemented with SC (Actisaf Sc47, LFA, France) at 1000 ppm. The second received ZnO (Zn group) at 3000 ppm, the third received both, SC and ZnO (SZ group) at 1000 ppm and 3000 ppm and the fourth received the unsupplemented diet (Controls).
From each batch, 10 piglets were randomly selected. Piglets were weighed and swabbed weekly starting Day 2 considering ETEC differenciation (4). All piglets were subjected to daily diarrhoea scoring (Score 1 – no diarrhoea; 2 – pasty faeces; 3 – watery faeces, 4 – severe diarrhoea, apathic piglets).
Results - The Control piglets increased diarrhoea from Day 2 unlike to SC and Zn groups. ETEC and verotoxigenic *E. coli* O141:F18, VT2e+ and O149:F4, STa+, LT+ were found in all groups with prevalence at days 4 and 6. Controls reached highest ETEC score (average 40 %, SD 46.4), the second was Zn group (Avg 20%, SD 37.7); followed by SZ group (Avg 10%, SD 17.6) and the lowest was SC group (Avg 1 %, SD 3.16) at Day 6. The SC and Zn batches gained doubled weight in compare to Controls, with significant difference on 2nd and 3rd week.
Discussion - The study confirmed the improvement of piglets' vitality. It may be linked to reduction of ETEC in yeast supplemented animals. Some researchers reported the yeast not affecting the important microbial groups, incl. *E. coli*. However those results were not obtained under the field conditions. The present study demonstrates impact of Saccharomyces cerevisiae Sc 47 (SC) on ETEC induced diarrhoea under the field conditions.

P171 PK/PD of Denagard (tiamulin) in drinking water for the treatment of ileitis

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Objectives - The objective of the work was to compare the PK of the estimated tiamulin ileal contents concentration (ICC) and compare this with the intracellular MICs against *Lawsonia intracellularis* derived from laboratory studies (PD) and evaluate the clinical efficacy of the drug when administered in the drinking water in an artificial infection study.
Materials and Methods - The tiamulin ICC was estimated using a PK model (Burch 2005) based on the tiamulin colonic contents concentration (CCC) recorded by Anderson et al (1994) following the administration of tiamulin (Denagard® – Novartis) via the drinking water at 60ppm for 5 days and compared with the intracellular MICs derived from Wattanaphansak et al (2009) against 10 EU and US isolates *of L. intracellularis*. An artificial infection study was reported by Walter et al (2001) where pigs were infected with a pure culture of *L. intracellularis.* When >60% of the pens were showing clinical signs of ileitis, the pigs were medicated with tiamulin at 60ppm via the drinking water for 5 days. There was a 10day observation period after which the pigs were necropsied.
Results - The CCC was recorded at 2.16µg/g and the estimated ICC was calculated at 29% of the CCC = 0.63µg/g. The MIC 90 of tiamulin against *L. intracellularis* was ≤0.12µg/ml. The AUC/MIC was 126 and the time > MIC 90 was 100%. In the artificial infection study, the clinical signs almost disappeared by day 3 in the treated pigs and at necropsy the gross lesions in the ileum were significantly reduced from 50% in the untreated controls to 8% in the treated pigs and the microscopic lesions from 82% to 7%, respectively.
Conclusions - Using the ICC and the intracellular MIC of tiamulin appears to give a good correlation for the prediction of efficacy for the treatment of ileitis when administered in the drinking water at 60ppm. This anticipated efficacy was confirmed in an artificial challenge study.
References:
Anderson, M. et al (1994) Proc AASP Meeting, pp 115-118.; Burch, D. (2005) Pig Journal, 56, 25-44.; Walter, D. et al (2001) J. Swine Health and Production, 9, 3, 109-115.; Wattanaphansak, S. et al (2009) Vet Microbiology, 134, 305-310

P172 Correlation of clinical diarrhea, histopathological lesions and diagnostic tests for grow-finish enteritis with a focus on Brachyspira hyodysenteriae

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Diarrhea in grow-finish pigs is a significant disease worldwide. The re-emergence of Swine Dysentery in the US has highlighted the need for a more complete diagnosis of diarrhea. The objective of this study was to correlate diarrhea with gross and histological lesions and main enteric pathogens; *Lawsonia intracellularis* (LI), *B hyodysenteriae* (Bh), *B pilosicoli* (Bp), *Salmonella* spp. (Sal), porcine circovirus type 2 (PCV2).

Farms were enrolled on presence of diarrhea using a grading system. At each site, at least one pig per grade represented was necropsied. The intestines were evaluated grossly and samples were collected and submitted to the ISU-VDL for histopathology, routine culture, Brachyspira spp. culture with Bh/Bp differential PCR, Sal enrichment culture, LI PCR and IHC for LI and PCV2. Proportions of lesions and pathogen were analyzed by Fisher's exact test.

Of 105 pigs from 36 sites, 53.3.0% were positive for LI, 48.6% were positive for *Brachyspira* spp. (37.3% Bh, 35.3% Bp, 25.5% Bspp.), 22.9% were positive for *Salmonella* sp., 24.8% were negative for pathogens and one pig was positive for PCV2. Infection with multiple pathogens was commonly seen. Epithelial necrosis was correlated with severe diarrhea. Other histological lesions were poorly associated with severity of diarrhea. There was no significant difference between grade of diarrhea and presence of pathogen.

There was correlation of lymphoplasmacytic typhlocolitis for Bh compared to Bp, but not other pathogens. Goblet cell hyperplasia was correlated to Bh as compared to LI, Bp, B spp., but not *Sal. Mucous* was correlated with Bh compared with all pathogens.

Clinical presentation of diarrhea ("wet cement", "bloody") was not correlated to etiologic agent. Microscopic lesions typical of swine dysentery were not consistently observed in pigs with Bh. Multiple pathogens were often present and interactions (or non-pathogen factors) may influence the severity of clinical signs and lesions. The data presented suggests a poor correlation between severity of diarrhea, gross and microscopic lesions and pathological agent.

Bacteriology: General Diseases

P173 An outbreak of S. Choleraesuis in Belgium

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The host-specific *S. Choleraesuis* causes severe disease in pigs, but has less importance as a zoonotic agent. The current report describes an outbreak of *S. Choleraesuis* in Belgium. *S. Choleraesuis* was isolated from lungs of a deceased pig. A screening of the affected farm was performed and several samples were collected. Autopsy was performed on 12 deceased animals. A slaughterhouse inspection and a serological screening for several known porcine pathogens was performed by commercial ELISA kits. Bacteriological isolation was performed by a standard enrichment method. Serotyping of strains was carried out following the Kauffmann-White scheme. Pulsed-field gel electrophoresis analysis was performed according to the PulseNet Europe protocol. Several animals showed typical signs of a *S. Choleraesuis* infection, such as anorexia, fever, paleness, and redness of extremities, followed by sudden death within 24 hours. Environmental samples from pens were negative for *S. Choleraesuis*, except for one pen with pigs showing clinical symptoms. *S. Choleraesuis* was also isolated from the fecal sample from one pig with clinical symptoms. Two pigs presented for autopsy were positive for S. Choleraesuis in lungs, spleen and nose, but negative in the colon. Remaining animals were positive for several infectious agents, such as haemolytic *E. coli*, *A. pleuropneumoniae*, porcine respiratory and reproductive syndrome virus (PRRSV), *P. multocida* and *S. suis*. Slaughterhouse examination revealed *A. suum* infection and lung lesions. Serological screening demonstrated health problems such as PRRSV and porcine circo virus 2. Upon serotyping, strains were identified as *S. Choleraesuis*. In conclusion, clinical symptoms were typical for *S. Choleraesuis* infection. The poor biosafety management combined with several underlying infectious diseases could have favored the outbreak.

P174 Antimicrobial susceptibility monitoring of respiratory and enteric tract pathogens isolated from diseased swine across Europe between 2004 and 2006

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Background - VetPath is an ongoing pan-European resistance monitoring program, in place since 1998, for veterinary pathogens isolated from diseased antimicrobial-naive cattle, swine and poultry. Antimicrobial susceptibilities of pathogens isolated from swine affected by respiratory, meningitis or enteric infections are presented here.
Methods - Lung/nasal, CNS or rectal/faecal samples were collected from animals with acute clinical signs, not recently treated with antimicrobials, in 8 EU countries. *Actinobacillus pleuropneumoniae* (Ap), *Pasteurella multocida* (Pm), *Streptococcus suis* (Ss) and *Escherichia coli* (Ec) were isolated (one isolate/farm/outbreak). Susceptibility to 17 antibiotics was determined in a central laboratory by broth micro-dilution as per CLSI recommendations. Results were interpreted using CLSI resistance breakpoints (M31-A3, 2008) where available. Results - Overall 526 isolates were recovered. The majority of the 129 Ap isolates were susceptible to antibiotics for which a CLSI resistance breakpoint is available. Resistance of Ap to amoxicillin/clavulanic acid (AMC), ceftiofur, florfenicol, tiamulin and tilmicosin was absent. Highest MIC value observed was 32 mg/L for amoxicillin, spectinomycin, tetracycline and tylosin. 135 Pm isolates showed 100% susceptibility to AMC, ceftiofur, enrofloxacin, florfenicol, and tilmicosin. Trimethoprim-sulfa (TMS) and tetracycline resistance was 3 and 22%. Similar MIC ranges were observed for the fluoroquinolones. 110 tested Ss isolates showed high susceptibility (89-100%) to AMC, ceftiofur, TMS and enrofloxacin. 152 Ec isolates showed high susceptibility (91-95%) to AMC and gentamicin. Enrofloxacin and marbofloxacin MICs were comparable with a MIC90 of 1 mg/L.
Conclusions - The results show an absence or low prevalence of antimicrobial resistance among the major respiratory and enteric tract pathogens isolated from diseased but non-treated swine across the EU.

P175 The role of Escherichia coli in the pathogenesis of coliform mastitis in sows: do virulence gene profiles give any hints?

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Introduction - Coliform mastitis (CM) as one main symptom of puerperal disorders in sows subsumed under the term Postpartum Dysgalactia Syndrome (PDS) affects both the sow and the piglets seriously. Even though it is a multifactorial disease, the causative agents are bacteria, and *Escherichia coli* (E. coli) has often been isolated from diseased animals. However, in previous studies, the isolated strains have not been further investigated for their virulence-associated genes.
Material and Methods - Bacteriological analysis of *E. coli* was performed from milk samples of five farms.1271 *E. coli* isolates from milk samples of 979 healthy sows, and 1132 isolates from 1026 diseased sows were identified. These isolates were further investigated with multiplex PCR for 27 virulence genes. SAS and R were used for statistical analysis and to generate heat maps to illustrate possible correlations.
Results and Conclusions - *E. coli* was found in 70.6% of the milk samples of CM-affected and in 77.9% of the milk samples of non-infected sows. 1132 *E. coli* isolates from CM-positive samples and 1271 isolates from CM-negative samples were further examined. Both in isolates from healthy and diseased animals, the median number of virulence genes was two. Four virulence genes (hra, chuA, iroN, kpsMTII) occurred significantly more frequently in isolates of diseased animals. However, no specific virulence gene profiles for isolates from either diseased or healthy sows were detected. The association between farm and the occurrence of virulence genes was significant, indicating farm specific *E. coli* isolates. Futhermore, seasonal effects were detected. In conclusion, these results support the theory that any given E. coli strain can cause CM in sows, if further adverse factors are present.

P176 Quantification of methicillin-resistant S. aureus ST398 adhesion to porcine intestinal epithelial cells

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Methicillin-resistant *Staphylococcus aureus* (MRSA) clone sequence type (ST) 398 has been found colonizing animals and humans worldwide. Since adhesion is an important first step towards colonization of the host, we aimed at comparing the adhesion capacity of different MRSA ST398 strains to eukaryotic cells in vitro.
The adhesion capacity of MRSA ST398 strains AS3 (spa-type t034, SCCmec-type IVa), C26 (t011, V), both isolated from pigs, chicken strain S92 (t567, non-typable), and two reference strains, ATCC 33592 and ATCC 43300, was tested on porcine intestinal epithelial cells (IPEC-J2). Bacterial adhesion was evaluated by a flow cytometry-based assay (1). Means of the arbitrary fluorescence units measured during the assay were expressed as percentages of values obtained from control ATCC 33592, derived from two independent experiments performed in triplicate.
Our results showed that strain C26, which is predominating in Belgian pig farms, had a higher adhesion capacity compared to all other tested strains. In contrast, the adhesion capacity of strain AS3 was similar to that of the control strain. Finally, strains S92 and ATCC 43300 had a significantly lower adhesion capacity compared to the control strain.
In conclusion, different MRSA ST398 strains differ in their adhesion capacities in vitro. The predominant strain showed an enhanced ability to adhere, indicating that this feature might have contributed to the spread and dominance of this type on Belgian pig farms. Additional adhesion experiments will be performed, including more strains originating from various animal species.
(1)Trouillet et al. (2011). A novel flow cytometric-based assay to determine S. aureus adhesion to and invasion of eukaryotic cells. J. Microbiol. Methods, doi:10.1016/j.mimet.2011.04.012.

P177 Identification of new surface protein vaccine candidates against Streptococcus suis by proteomics

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Streptococcus suis is a major Gram-positive swine pathogen, which has raised in the last years a great public concern. The efforts made to develop vaccines have failed because of lack of common antigens cross-reactive against different serotypes of this species. The cell wall-anchored proteins can be good vaccine candidates due to their high expression and accessibility to antibodies. Recently we have showed that a protein, designed as SAT, could be a potential vaccine candidate against serotype-2 infections. However, this protein was not expressed by other serotypes, such as 9, considered emerging in Europe and Asia. Therefore, the main objective of our research is to discover new vaccine candidates expressed by different serotypes. In the present study a total of 42 isolates obtained from diseased pigs, belonging to the most prevalent serotypes in Europe (1, 1/14, 2, 3, 4, 7, 8 9, 10, 14, 15, 20, 24) were analysed by a previously validated proteomics approach consisting of the protease digestion of live bacteria and the selective recovery of exposed domains followed by LC/MS/MS analysis.
For testing their capacity as vaccine three parameters were evaluated: Presence of the gene encoding this protein in the isolates (PCR), surface location and quantification (flow cytometry), immunogenicity and protective capacity in vitro (opsonophagocytosis). Two proteins have been selected according to the above criteria, designed as SA and OppA. Currently we are developing in vivo assays to show their true efficacy against infection with different virulent strains. The immunoprotective capacities of these two proteins are being tested, both in a murine and a swine model of infection to use as an effective vaccine to the most prevalent serotypes in Europe.

P178 Prevalence of antibodies to Salmonella spp., and Leptospira pathogens in Lithuanian wild boar (Sus scrofa) population

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Introduction - Wild boars harbour many important infectious agents that are transmissible to domestic pigs and other animal species including humans. They also pose a problem when countries are trying to eradicate zoonotic and important livestock infectious diseases. Therefore, the objective of the present study was to investigate prevalence and distribution of antibodies to several zoonotic bacterial pathogens in wild boars.
Material and Methods - From 2008 to 2010, blood sera samples from 659 healthy wild boars, collected during the autumn-winter hunting season, were obtained from 42 locations throughout Lithuania. We investigated seroprevalence of *Salmonella* spp., and *Leptospira* antibodies. The wild boars sera were analyzed via different ELISA test systems and leptospirosis,- via microscopic agliutination (MA) test (Leptospira Enrichment EMJH) according to manufacturer's instructions and ISO/IEC 17025:2005 standard accredited laboratory.
Results and Conclusions - From 659 examined wild boar sera, 30 (4,6 %) were positive to different serovars of *Leptospira* spp. Most frequent were the findings of antibodies to *L. bratislava* (3,1 %), *L. grippotyphosa* (2,1%) and antibodies to *L. pomona*, *L. copenhageni*, *mixed L. copenhageni - L. bratislava* serotypes and *L. sejroe* were also established. On the basis of our study it can be concluded that small rodents and wild boars are natural reservoirs of leptospirosis in particular regions of Lithuania and represent a significant potential source of leptospirosis for other wild and domestic animal as well as human. *Salmonella* spp. antibodies have been found in 228 (72%) blood samples. The present study demonstrates that *Salmonella* spp is widely distributed in Lithuanian wild boars population.

P179 Characterisation of Klebsiella species isolates from outbreaks of Klebsiella species septicaemia: an emerging pathogen?

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Objectives - Septicaemias due to *Klebsiella* species in pigs occurred sporadically until outbreaks of *Klebsiella pneumoniae* subsp. pneumoniae (Kpp) septicaemia were diagnosed in England in 2011. Possible predisposing factors were investigated and included characterisation of the bacterial isolates.
Materials and methods: - Outbreaks were confirmed on six outdoor breeding units causing sudden deaths of pre-weaned pigs units from July to September 2011. The case definition was of pigs found dead with lesions consistent with septicaemia and pure/predominant growths of Kpp isolated from internal sites in multiple pigs. Biochemical reactions of isolates from the six case units were compared with historic isolates from pigs. Multi-locus sequence typing (MLST) was performed following the methods described at the *Klebsiella pneumoniae* MLST Database (http://pubmlst.org/kpneumoniae/).
Results - Fifty biochemical reactions showed no significant differences within or between case and historic isolates. MLST revealed that case isolates were not identical but were all in clade 25, while historic isolates were a variety of clades, none being 25. Virulence factors are being investigated further to determine whether the case isolates are virulent clones not represented amongst historic isolates.
Conclusions - There may be several reasons for recent emergence of Kpp septicaemia outbreaks with spatio-temporal proximity in East England, however the comparison of case and historic isolates has revealed possible emergence of a clade of Kpp. A case definition has been established and awareness heightened. If future isolates are retained, the extent of this clade and associated disease conditions compared to others can be investigated. This will be advantageous if outbreaks persist in the region, or spread beyond.

P180 Longitudinal study for livestock-associated methicillin-resistant Staphylococcus aureus (MRSA) in piglets

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A longitudinal study was performed to determine the colonization age of the piglets and the effect of the sow status at farrowing on the piglet status. Further, molecular typing was performed to detect the origin of the colonization and changes over time. Knowledge of these factors may help to develop or ameliorate intervention measures to reduce the colonization rates of pigs.
On four farrow-to-finish farms (A to D), nasal swabs were collected from 12 sows per farm and their offspring at 10 time points from farrowing till slaughter age. MRSA presence was confirmed with a specific multiplex PCR. Statistical data analysis occurred with SAS®. A selection of isolates was typed using MLVA, spa typing and PFGE with BstZI restriction.
On farms A and B, MRSA was detected only occasionally in sows. The colonization rate in piglets increased remarkably at the end of the stay in the growing unit. On farms C and D, the MRSA colonization rate of sows and piglets was high from the beginning. In both situations, a decrease in colonization was observed towards slaughter age. The overall colonization age of the piglets was 17.8 days [11.5-25.6]. Sows did not always carry the same MLVA types as their offspring. Piglets of farms A and B carried only one MLVA type during their life, whereas piglets of farms C and D alternated between two dominant types.
In conclusion, the colonization age of the piglets differed amongst farms. It appears that on farms with a high prevalence of colonized sows, the infection age of the piglets is at or within days after farrowing, which is in contrast to farms with low sow colonization rates. Molecular typing revealed that there is a certain dominance of MRSA strains within the animals and within a group of animals over time.

P181 Endotoxins and pigs

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Objective - Endotoxins, which are cell wall fragments of Gram-negative bacteria, take part in many disease complexes in sows and piglets. Although much research was done in the last years, there are still many questions about their mode of action and their real incidence on pig farms. Therefore the aim of our project was to investigate the incidence of endotoxins and develop counteracting strategies. Furthermore we wanted to develop an endotoxin challenge model for piglets to gain more knowledge on the disease itself and to be able to investigate the effect of different counteracting strategies.
Materials and Methods - The Limulus-Amebocyte-Lysate test (LAL) was used to assess the endotoxin activity in samples deriving from different environments or supernatants of binding assays. For in-vitro screening of biological constituents a macrophage-activation-test (MAT) with the parameters nitric oxide (NO) production and cytokine expression was used. For an endotoxin survey environmental samples in the barn (air, feed, water) and samples taken from sows (urine, faeces, milk) were investigated. In parallel in-vivo endotoxin challenge trials with weaning piglets were carried out.
Results and Conclusion - The LAL test was adapted for sample testing and the binding assay showed a concentration dependant binding capacity for some specific clay minerals. Plant materials with a positive effect on NO production and cytokine regulation were identified. The incidence of endotoxins in the sow's environment was proved but no conclusion about endotoxin appearance and effect in the animal could be drawn. Although different piglet challenges with endotoxins and Gram-negative bacteria were investigated, no endotoxemia could be induced so far. However, a specific formulation (based on in-vitro data) showed positive weight and feed data in a piglet performance trial compared to a positive control.

Virology: PRRS

P182 Oral fluid testing of feeder pigs for Porcine Reproductive and Respiratory Syndrome virus (PRRSV)

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Introduction - Porcine Reproductive and Respiratory Syndrome virus (PRRSV) is the most important swine pathogen in North America. Establishing the PRRSV status of feeder pigs prior to moving them from nursery to finishing sites is critical to appropriately manage PRRS. At F. Ménard the PRRSV status of the feeder pigs has been traditionally determined by both antibody and virus detections on serum samples. However bleeding feeder pigs is time consuming and risky for both animals and humans. Recently the use of oral fluids (OF) testing was proposed as an alternative to serum testing for PRRSV. The objective of the study was to evaluate the feasibility of replacing serum by OF for PRRSV PCR testing.
Description - We examined 16 nurseries which included 16 to 24 pens/ barn (average of 25 piglets/ pen). In each nursery we collected OF from 4 pens and 5 blood samples in each of the same pens. Pools of 5 serum samples and OF were examined using a qRT-PCR.
Eight nurseries were found to be infected with PRRSV. OF testing missed only one infected nursery in which only one pool of sera tested positive. This pool originated from a hospital pen where the pigs were reluctant to chew the rope. The virus load was significantly lower in the OF than in the corresponding serum pools but in all cases at least one OF sample contained enough viruses to allow virus sequencing.
Discussion - There was a good correlation between PCR testing on OF and pool of 5 serum samples from the same pens. Moreover collection of oral fluids appeared to be easy and is respecting welfare of both pigs and humans.

P183 Circulation of porcine reproductive and respiratory syndrome virus in Polish farrow to finish farms

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Control is of PRRSV must involve careful evaluation of virus' circulation in the herd. The present study was performed in 24 Polish farrow to finish farms of 70-1400 sows. Serum was obtained from pigs between 2 and 23 weeks of age and from sows. The sera were tested for the presence of PRRSV antibodies by in house indirect ELISA and for the presence of viral RNA by Real Time RT-PCR (PRRS NextGen, Tetracore). Serum samples were tested individually by ELISA and pooled by 5 by PCR. Results obtained in 9 farms indicated no virus circulation in sows nor in weaners. In 5 of these farms PRRSV circulation was maintained in fattening units, while in remaining 4 farms were virus free. In the remaining 15 farms PRRSV was detected by PCR in sows and/ or pigs after weaning. The length of viremia was different in different farms and ranged between 2 and 18 weeks. Differences were observed between the farms regarding the level of seroconversion. To assess the impact of the age of infection on the level of antibodies detected by ELISA two groups of farms were selected were infection was detected before 7 weeks of age or earlier (7 farms, 614 pigs) and at 9 weeks of age or later (6 farms, 746 pigs). The seroconversion profiles were normalized in relation to the age of infection estimated by PCR. This analysis showed significantly higher levels of antibodies in case of early infection than late infection. The presented data showed that PRRSV circulation patterns in Polish pig farms are highly diverse. In 15 of 24 farms the virus circulated in sows and/or weaned pigs indicating that the PRRSV control measures apparently were ineffective. On the other hand, in 6 of 9 farms where no virus circulation was detected, Porcilis PRRS (MSD) and/or Progressis (Merial) vaccination was applied in gilts and/or sows. Complete picture of PRRSV circulation in a herd can be obtained only by testing large number of animals by ELISA and PCR which is costly and time consuming. Oral fluid testing can be a cost effective alternative to serum analysis.

P184 Innate and adaptive cytokine mRNA expression profile in lungs and tonsils of experimentally infected pigs with Porcine Respiratory and Reproductive Syndrome Virus (PRRSV)

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Objectives - As PRRSV causes serious economic losses annually to the swine industry, it is essential to know how this virus impairs the immune response (IR) in pigs. Gene expression of various innate and adaptive cytokines (IFN-α, IFN-γ, TNF-α and IL-12) was quantified in lungs and tonsils during an experimental PRRSV infection.
Materials and methods - Thirty-two 5 weeks old PRRSV-free pigs were selected and randomly located in 8 groups of 4 animals. One group was used as control; 7 groups were inoculated intramuscularly with 1 ml of 3th passage of 2982 PRRSV strain at 103.0 TCID50 and euthanized at 3, 7, 10, 14, 17, 21 and 24 days post inoculation (dpi).
After mRNA extraction, cDNA was obtained by means of RT-PCR, and it was used as template for q-PCR by SYBR-green chemistry. Gene expression was calculated by the Pfaffl method (β-actine, cyclophilin and GAPDH were used as endogenous controls). Kruskal-Wallis and U of Mann-Whitney test were used.
Results - Gene expression of IFN-α and TNF-α was not induced after infection. IFN-γ was upregulated ($p< 0.05$) in lungs (21-24 dpi) and tonsil (14 dpi) in infected pigs.
IL-12 p40 mRNA synthesis was higher ($p< 0.05$) in the lungs of infected animals at 7 and 14 dpi.
IL-12 p35 and IL-12 p40 were upregulated ($p< 0.05$) at 21 dpi in the tonsil.
Conclusions - These results indicate that PRRSV prevented the onset of an effective innate IR in tonsils and lungs of infected pigs, due to the inhibition of IFN-α and TNF-α and the delay of the IFN-γ mRNA expression, inhibiting the onset of a rapid and effective cellular and humoral immune response.
This work was founded by the project AGL2009-12438/GAN.

P185 Immunomodulatory cytokine gene expression in lungs and tonsils of pigs experimentally infected with Porcine Reproductive Respiratory Syndrome Virus (PRRSV)

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Objectives - PRRSV has a high prevalence in swine intensive farms and causes reproductive failure and respiratory disease. Therefore it is necessary to know the dynamic of immunomodulatory cytokines (ImCy) during PRRSV infection, to clarify their role in the pathogenesis of the disease.
The ImCy gene expression (Gex) of IL-10 and TGF-β was determinate in lungs and tonsils during an experimental PRRSV infection.
Materials and methods - Thirty-two 5 weeks old PRRSV-free pigs were selected and randomly located in 8 groups of 4 animals. Seven groups were inoculated intramuscularly with 1 ml of the third passage of PRRSV field isolate 2982 at 103.0 TCID50, and euthanized at 3, 7, 10, 14, 17, 21 and 24 days post inoculation (dpi). A last group was used as negative control.
After mRNA extraction, cDNA was obtained by means of RT-PCR, and it was used as template for q-PCR using SYBR-green chemistry. Gex was calculated by Pfaffl method (β-actine, cyclophilin and GAPDH were used as endogenous controls). Kruskal-Wallis and U of Mann-Whitney test were used.
Results - Gex of IL-10 in tonsil showed no significant differences. IL-10 was upregulated ($p< 0.05$) at 10 and 21 dpi in lungs after PRRSV infection.
The TGF-β Gex was not induced in any tissue evaluated during infection.
Conclusions - The IL-10 overexpression in lungs suggested that PRRSV infection can impair the onset of an effective immune response altering proinflammatory cytokines production. TGF- β mRNA was not expressed in pigs infected with European PRRSV strains as previously reported.
This work was supported by AGL2009-12438/GAN project of Spanish Ministry of Science and Innovation.

P186 Does PRRSV use a Caspase-3 independent pathway to induce apoptosis phenomena?

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Introduction - Porcine Reproductive and Respiratory Syndrome (PRRS) is characterized by an impaired host immune response, together with the establishment of an immunosuppression state that may be linked to the apoptosis of lymphocytes and macrophages. Despite the published studies examining PRRSV infection and apoptosis, there is still conflicting evidence and views whether PRRSV induces apoptosis. The main aim of this study was to evaluate the apoptosis phenomena and to correlate it with PRRSV and caspase 3 (CCasp3) immunohistochemistry and TUNEL method in tonsil and mediastinal lymph node of PRRSV-infected pigs

Materials and methods - Twenty eight, PRRSV-negative pigs were inoculated with PRRSV field isolate 2982 and killed in groups of four animals at 3, 7, 10, 14, 17, 21 and 24 days post-inoculation (dpi). Control animals were mock-inoculated and killed at the end of the study. Samples from mediastinal lymph node and tonsil were fixed in Formol and Bouin solution for histopathological and immunohistochemical study.

Results - In our study, a significant increase in the amount of apoptotic bodies and cell pyknosis, as well as enhanced PRRSV expression was observed in inoculated pigs from the begining of the experiment in examined organs, whereas the expression of CCasp3 and TUNEL was increased just at the end of the experiment. PRRSV was expressed mainly by macrophages, while CCasp3 and TUNEL were mainly expressed by lymphocytes.

Discussion - The finding of morphological apoptotic phenomena at the beginning of the study, together with the delayed increase of CCasp3 expression points to an induction of apoptosis by a CCasp3-independent pathway. The study of different apoptosis mediators is encouraged in order to determine the pathway used by PRRSV to induce apoptosis phenomena.

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P187 Downregulation of major histocompatibility complex class II and CD3 T cells by PRRSV in lymphoid organs of experimentally infected-pigs

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Introduction - Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) is able to provoke a failure in the immune response. In this sense, antigen presenting cells (APCs) play a crucial role in the development of an effective T and B cell responses. Thus, the goal of this study was to study the changes in different APC subpopulations and its involvement in T and B cell response in lymphoid organs of pigs experimentally infected with a European PRRSV field isolate.

Materials and Methods - Twenty eight PRRSV-negative pigs were inoculated with PRRSV field isolate 2982 and killed in groups of four animals at 3, 7, 10, 14, 17, 21 and 24 days post-inoculation (dpi). Control animals were mock-inoculated and killed at the end of the study. Samples from tonsil and mediastinal and retropharyngeal lymph nodes were fixed in 10% buffered formaldehyde and Bouin solution for histopathological and immunohistochemical study, respectively.

Results - Our results showed that the expression of S100, SWC3, HLA-DR molecule and CD3 was diminished in the studied organs throughout the study, being observed a significant correlation between viral antigen and HLA-DR expression in both retropharyngeal and mediastinal lymph nodes. Contrarily, λ-light chains showed an increase during the study.

Conclusion - Taking all together, our results suggest that PRRSV can affect the immune function of APCs and consequently, breakdown CD3 positive T-cell activation and avoiding an expansion of this T cell subset.

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P189 Evaluation of a local pilot PRRSv elimination program in Brittany (France)

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Introduction - A local PRRS elimination program, involving 14 farms (11 of them PRRSv positive), was initiated in Brittany in 2007. Biosecurity improvement and mass vaccination with a modified live virus vaccine were implemented. The aim of this pilot project was to assess the feasibility of such an elimination program in a high PRRSv prevalence area. The objective of this study is to ex post evaluate this program.
Material and Methods - A survey was carried out in order to determine the epidemiological effectiveness of the program through successive PRRSv herd status definition for the 14 farms. Compliance to the program was evaluated by assessing the implementation of biosecutity measures. Farmers, veterinarians and other stakeholders were asked to describe their perception of the program as well as their actual participation.
Results - After four years, the epidemiological effectiveness is poor as no contaminated farrow-to-finishing herd has been sanitized using this protocol. Nevertheless, uninfected farms have remained free from PRRS. The evaluation of the compliance highlighted that internal biosecutity was poorly improved, which may contribute to the viral persistence within positive herds. A lack of communication within producer organizations was evidenced as the PRRSv statuses of farms were infrequently taken into account when pig flows were organized.
Conclusion - Our observations illustrate the difficulty of PRRSv elimination and the need for a strategy aiming at obtaining producers' participation, which is crucial for such voluntary regional control programs.

P190 Seroprevalence of antibodies to porcine reproductive and respiratory syndrome virus (PRRSV) in Lithuanian pigs and wild boars

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Introduction - Since domestic pigs and wild boars have the same susceptibility to various infections there was major concern to monitor the epidemiological PRRSV situation in Lithuanian pigs and wild boars. Therefore, the objective of the present study was to investigate prevalence and distribution of PRRSV antibodies in selected Lithuanian pig farms and in wild boars.
Material and Methods - A total of 17819 pig serum samples from 33 districts and total 659 wild boars serum samples from 42 locations throughout Lithuania were collected in 2006-2011. The pig and wild boars sera were analyzed via different producers ELISA test systems (IDEXX, Ingezim) according to manufacturer's instructions and in the ISO/IEC 17025:2005 standard accredited laboratory.
Results and Conclusions - PRRSV antibodies were detected in 894 out of 17819 (5.02 %) pig serum samples. The swine farms with seropositive pigs were widely distributed in the 20 of 33 Lithuanian regions. From 659 examined wild boar sera, 43 (6.5 %) were positive to PRRSV antibody. Investigation of PRRSV antibodies with different ELISA kits did not show difference in detection positive serum samples. Antibodies to PRRSV were detected in all age groups however seroprevalence was significant higher in adults. Wild boars serum samples from 31 locations of 42 investigated were seropositive for PRRSV.
The present study demonstrates that majority pig farms in Lithuania were positive for antibodies to PRRSV, however antibody prevalence was relatively low in comparison with situation in 1997-2001 (42.2 %). Our study has also presented serological evidence of PRRSV infection in the wild boar population in Eastern Europe. Interestingly, in neighboring countries such as Russia or Poland PRRSV antibodies in feral pigs were not detected.

P191 Is tilmicosin useful in reducing viremia and the clinical impact of porcine reproductive and respiratory syndrome (PRRS)?

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PRRS is the most important swine disease in the world today. A common strategy for controlling PRRS in a breeding herd is to inoculate pregnant sows with PRRS virus to create uniform exposure and develop herd immunity rapidly. It has also become common practice to medicate the sow herd with antibiotics during this controlled exposure to the disease with the intention of controlling secondary bacterial infection. There have been anecdotal reports that tilmicosin has become the preferred option and this is based on a belief that the antibiotic has antiviral properties. The objective of this study was to determine if feed medication with tilmicosin reduced viremia in pigs exposed to PRRS. Two hundred pigs were randomly assigned to one of 5 treatment groups. Negative control: receiving feed containing 400ppm of tilmicosin but not infected with PRRS virus, Negative-negative control: receiving non-medicated feed and not infected with PRRS virus, Positive control: infected with PRRS virus but not receiving tilmicosin, infected with PRRS virus while receiving feed containing 200 ppm of tilmicosin, and infected with PRRS virus while receiving feed containing 400 ppm of tilmicosin. Clinical signs and body temperature were also recorded daily. Quantitative PCR was performed on sera to assess viremia. Statistical analysis of the PRRS titers was conducted in SAS 9.1 using PROC MIXED. Preliminary statistical analysis of the PRRS titers suggests that tilmicosin reduced the viremia in the treated groups ($P<0.001$). The results of this research benefit pork producers by highlighting the reduction of PRRS viremia in pigs fed tilmicosin during a controlled disease exposure and support swine veterinarians by providing them with more information to develop PRRS control strategies.

P192 Reliable detection and typing of PRRSV using multiplex real-time RT-PCR

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Infections with PRRS virus in swine are very prevalent and economically most important for the swine industry, causing respiratory disease in piglets and reproductive failure in pregnant sows. PRRS viruses are classified into the European (EU) and the North American (NA) genotype. There are new isolates from Eastern Europe and since 2006 a highly pathogenic NA strain of PRRSV (HP PRRSV) emerged which is characterized by high fever and high mortality in swine of all ages.
Purpose of this collaboration between Friedrich-Loeffler-Institute and Labor Diagnostik Leipzig was to develop a real-time PCR which allows reliable detection and differentiation of PRRSV strains in one test run.
VIROTYPE® PRRSV RT-PCR uses specific combinations of primer with probe, one for RNA of the EU genotype, one for RNA of the NA genotype, one for RNA of the HP strain and one for the control RNA (internal control). The assay internal control is mRNA of ß-actin housekeeping gene. This guarantees the control of extraction as well as amplification. Sample materials are blood, serum, tissue, lung swabs, saliva and semen samples from swine. With this test kit the EU and NA genotypes, the HP strain of PRRS virus and an amplification- and extraction control can be detected simultaneously.
To evaluate sensitivity and specificity of VIROTYPE® PRRSV, titration studies with in-vitro RNA were performed. Sample specimens were tested in comparison to other PCR assays. Due to the high sensitivity of VIROTYPE® PRRSV pools of five samples can be tested. Testing the Epizone PRRSV ring trial panel, all strains could be detected reliably. East European EU strains and the Lena EU3 strain scored positive. More data will be presented.

P193 Development and evaluation of performances of novel oral fluid sampling technologies with the use of real PCR detection kit for the diagnostic of porcine respiratory and reproductive syndrome

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The use of oral fluid as a sample matrix in PRRSV surveillance has increased in the last few years. Advantages of using this matrix are ease of collection, lack of discomfort to the pigs, low cost of collection and minimum labor required. Successful implementation of sample testing through the use of this sample matrix has extended to the evaluation of its testing for other swine diseases, including PCV2, SIV, and *M. hyo*.
Oral fluid is the liquid present in the oral cavity. It is a mixture of saliva and gingival crevicular fluid. Oral fluids are collected by dropping cotton ropes into individual pig pens. Pigs chew on the ropes, depositing oral fluid in the process. The ropes are removed from the pens after 15-20 minutes and oral fluid is mechanically extracted into ziplock bags for storage.
Multiple pigs chew on the same rope, so the oral fluid collected is considered a pooled sample. Therefore, it can be used for surveillance purposes only. If a pool is found to be positive, clinical samples such as serum or blood are then collected to further test the population and find infected individuals. Once samples are collected and processed they are analyzed using either antibody based assays or real-time PCR based assays.
We have demonstrated an efficient, high throughput method to purify and isolate PRRSV, SIV, and PCV2 nucleic acid from oral fluid samples. This procedure incorporates MagMAX™ based magnetic bead extraction and TaqMan® based real-time PCR. The method is semi automated, involving the use of the MagMAX™ Express-96 Magnetic Particle Processor for the isolation and purification of nucleic acid.
The proposed method of sample preparation and nucleic acid purification efficiently processes multiple samples, thereby decreasing screening time. A major advantage of this high throughput method combined with the ease of collection of oral fluid, is that a large number of pigs can be tested without increased cost or labor. This provides a more efficient and cost effective testing environment and the ability to curb incidences of infection.

P194 Prevalence of Genotype 2 PRRSv in The Netherlands and the influence of PRRSv sow vaccination

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Introduction - PRRSv has 2 distinct genotypes: type 1= EU and type 2= US. PCR or virus isol. with sequencing of the genome, are used to distinguish the genotypes. This is also possible via IFA/IPMA tests. Several publications have revealed a US PRRSv prevalence in Germany and Netherlands varying between 7.7 % and 8.9%. MSD-AH NL started diagnostic PRRS support including isolation on problem farms with different PRRS vaccination strategies. This support was formalized as ResPig, a diagnostic/monitoring program also involving cross-sectional serological investigations for PRRSv. The uniform protocols enable to investigate the seroprevalence of PRRSv and the effect of sow vaccinations since the 5-sow samples are also tested via IFA. The datasets are used for analyzing US-PRRSv prevalence and the influence of PRRSv sow vaccination.
Materials and Methods - 1. The IFA profiles of the sow results in 2010 on farms with vaccination records are counted. The US-PRRSv seroprevalence is determined by the number of US profiles in the IFA results of the 5-sow samples. A US profile is defined as ≥60% of the samples having a US titer which is ≥1 log2 step higher than the EU titer, and/or the positive IFA results showing US titers at ≥1 log2 step higher then the EU titers. ; 2. The prevalence of US-PRRSv strains (2010) on farms with and without PRRSv related problems is calculated out of all sequenced isolations done by MSD-AH NL. ; 3. Between 2004 and 2007, PRRSv isolation was carried out on weak/stillborn piglets on 64 affected farms which late abortions/early farrowing with known vaccination scheme's. Results - 1. 445 results: 67 (15%) US-IFA profiles; - 87 no sow vacc.: 18 (21%)* US-IFA profiles - 338 EU-MLV sow vacc. ; 45 (13%)* US-IFA profiles * calculated O.R. 1.7 : P = 0.091; - 18 KV sow vacc.: 4 (22%) US-IFA profiles; - 2 US-MLV sow vacc.:0 (0%) US-IFa profilies; 2. 42 sequenced isolations: 6 (14%) genotype 2 strains; 3. 64 farms: late abortion/early farrowing: PRRSv isolations affected piglets; - 11 no sow vaccination: 6 (55%)** isolations +; - 53 PRRS sow vacc.:11 (21%)** isolations +** O.R. 0.2 : P value 0.0306; - 42 EU-MLV vacc. : 5 (12%) isolations +; - 11 KV vacc. : 6 (55%) isolations + Conclusions and discussion - The mean seroprevalence of US-PRRSv as determined with IFA in the ResPig 2010 dataset was 15%. The prevalence of genotype 2 strains in 2010 on both problem and no-problem farms is similar with 14% indicating that IFA can be used for predicting the prevalence of genotype 2 PRRS strains. The prevalence of genotype 2 in this study was higher compared with previous studies that mainly involved clinical cases. These findings show that genotype 2 strains are circulating in the Netherlands and seem to differ in virulence and calculating prevalence using PCR/isol. from clinical cases might underestimate the true prevalence. PRRSv sow vaccination can influence the prevalence. On farms vaccinating sows with EU-MLV the seroprevalence of genotype 2 was lower (13 %) than on control farms with no vaccinated against PRRS (21 %). Although the difference was not significant, the trend suggests cross-protection of the EU-MLV vaccine against genotype 2, also because the seroprevalence of farms using EU-KV sow vaccination didn't differ to non vaccinating farms which makes frequent serological boostering as explanation less likely. Efficacy of the EU-MLV vaccine was also demonstrated by the data listed in results 3 were PRRS sow vaccination reduced significantly the risk of isolating PRRSv from weak/stillborn piglets.
Virology: PCV2

P195 IL-4 gene expression in PCV2 vaccinated and unvaccinated piglets born from PCV2 vaccinated and unvaccinated sows

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Objectives - Interleukin 4 (IL-4) regulates the TH2 immune response. PCV2 vaccines increase the level of antibodies in the pigs and reduce the severity of the injuries associated to this virus. The aim of the present study was to evaluate the porcine IL-4 mRNA ex vivo immune response of PCV2 vaccinated and unvaccinated piglets born from PCV2 vaccinated sows and unvaccinated sows.
Material and Methods - Three groups of one month old Large White pigs were used. Each group was constituted by 5 piglets. The vaccination protocol for sows was two doses of CIRCOVAC® to gilts and one dose to sows two weeks before the farrow. Piglets were vaccinated with CIRCOVAC at two weeks of age. The groups were formed as follows:
Group 1 (VV): vaccinated sow, vaccinated piglet.
Group 2 (VN): vaccinated sow, unvaccinated piglet.
Group 3 (NN): unvaccinated sow, unvaccinated piglet.
Two million PBMC were cultured per well. Stimulation was performed with PCV2 ORF2 antigenic peptides. Relative gene expression was determined at 12h poststimulation for IL-4 by using quantitative PCR. To study the possible effect of the stimulation with PCV2 ORF2 in the IL-4 mRNA production, Mann-Whitney´s U test was used.
Results - PCV2 stimulated PBMC from piglets of the VV group exhibited a higher IL-4 mRNA synthesis than PBMC of VN and NN groups (10.1 vs 0.9, $p < 0.05$; 10.1 vs 0.5, $p < 0.05$, respectively).
Conclusion - Sow-plus-piglet vaccination increases porcine PBMC IL-4 mRNA synthesis, suggesting that vaccination of sows and piglets produces the higher specific lymphocyte development against PCV2. Moreover, Sow-plus-piglet PCV2 vaccination strategy not only improves active immune response against PCV2 in pigs, but also prevents reproductive disorders in sows and increases passive transfer of maternal colostrum antibodies to newborn piglets.

P196 Benefits of vaccination with Ingelvac CircoFLEX® on weight at slaughter and carcass quality

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Objectives - The aim of this study was to compare the growth performance in vaccinated and unvaccinated pigs in a herd that used PCV2 vaccination for more than a year.
Materials and Methods - The study was conducted in a 2,000 sow head multi-site production system. Site 2 (2000 nursery places) and site 3 (finishing with 3200 fattening places) are on the same site in this trial. Routinely all pigs in the system are vaccinated at 3 weeks of age (one day before weaning) with Ingelvac CircoFLEX®. For the study, a group of 400 vaccinated pigs (V) was compared to 423 pigs that were left unvaccinated as control group (UV). Pigs on trial were located in the same nursery room and transferred at eleven week-old to the same finishing barn (separate pens). Animals were individually weighted at weaning, start of growing-finishing, and 101 days of finishing. In the abattoir, carcasses were weighted immediately after slaughter and after chilling.The bonus payment by quality obtained for each carcass was also recorded.
Results - There was no difference of weight at weaning (5.7±.05 vs.5.7±.05 for V and UV, respectively). However, there was difference at start growing-finishing (22.4±.1 vs. 21.9±.1, p=0.004), and at 101 days of finishing (94.7±.5 vs.92.6±.6, p=.014). At slaughter there were differences for carcass weight (83.01±.3 vs. 82.18±.3, p=0.027) and chilled carcass weight (81.34±.3 vs 80.53±.3, p=0.027). Slaughter age was slightly different between the groups, with 119,47 days into finishing in the vaccinated group, vs 120,1 days for the non-vaccinated ones. The difference in bonus payment was .0015 €/Kg more in the vaccinated group (p=0.021). The frequency of carcasses lower than 75 Kg was also significant different (5.7% vs 12.1%). The weights were more concentrated around the average in the V group.
Conclusions - The vaccinated group showed better growth during nursery and growing-finishing periods, had reduced variability in weights at slaughter and produced better economic performance by improved quality at slaughter.

P197 PCV2 viremia and performance in vaccinated and unvaccinated animals inside a long-term vaccinated herd with Ingelvac CircoFLEX®

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Objectives - The aim of this study was to study the viremic dynamic and the performance in vaccinated and unvaccinated animals in herd that used PCV2 vaccination since more than a year.
Materials and Methods - The study was conducted in a 2,000 sow head multi-site production system. Routinely all pigs in the system are vaccinated at 3 weeks of age (one day before weaning) with Ingelvac CircoFLEX®. For the study, a group of 400 vaccinated pigs (V) was compared to 423 pigs that were left unvaccinated (UV). Pigs on trial were located in the same nursery room and transferred at eleven week-old to the same finishing barn (separate pens). At 3, 11, 15, 19 and 28 weeks of life twenty animals were randomly blood sampled in each group, and PCV2 qPCR was performed. Pigs were individually weighed at start and at 101 days of fattening. Average daily gain (ADG) was calculated and culls (animals < 75kg at 101 days) and mortality recorded.
Results and conclusions - Viremia were significantly higher in UV at 15 and 19 weeks of life ($p<0.001$). No viremia was detected in V during the trial. Starting with the onset of viremia at week 15 the mortality started to rise in the UV group. The UV pigs showed typical clinical signs and pathological lesions of PCVD. There were lower mortality (3.43% vs. 1.8% for UV and V, respectively), lower percentage of culls (4.6% vs 1.8%) and the ADG was higher in V (700g vs 716 g/day).
The vaccination effectively protects pigs and reduces PCV2 viremia, in this case even to levels below the detection limit. Even when only a small group of pigs was left unvaccinated, clinical PCV2 associated disease reappeared, mortality increased and PCV2 viremia rose to detectable and relevant levels. These findings demonstrate that stopping PCV2 vaccination puts a farm at risk.

P198 Field study on the level and variability of PCV2 antibody titers of sows and 3 week old piglets in 5 Belgian farms

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Introduction - It has been repeatedly demonstrated that Ingelvac CircoFLEX® is efficacious in the presence of high levels of maternally derived antibodies (MDA) (2,3). However, for another subunit PCV2 piglet vaccine a possible interaction has been reported (1). In case of high levels of MDA, this vaccine has to be applied twice (4). Martens et al. (5) classified antibody levels > 10 log 2 as 'high'. The objective of this study was to investigate the prevalence of piglets with high levels of MDA under field conditions.
Materials and Methods - In total, 150 blood samples were collected in 5 commercial farms located in West-Flanders, Belgium. In each farm, 5 lactating sows and 5 piglets of each sow were sampled 3 weeks post farrowing. Piglets were unvaccinated against PCV2 at the time of sampling and cross-fostered piglets were excluded. In none of the farms PCV2 sow vaccination was applied. The serum samples were analysed for PCV2 antibodies with the Serelisa® PCV2 Ab Mono Blocking ELISA (Synbiotics Corp). The results are expressed in Log 2 titers.
Results - The median and interquartile range for sow PCV2 antibody titres was 12.54 and 11.37 to 12.97, respectively. The median and interquartile range for piglet PCV2 MDA titres was 11.22 and 8.90 to 12.15, respectively. In total, 63.2% of the piglets showed 'high' MDA levels (>10 log2) and piglets with 'high' MDA levels were present in each of the sampled farms (ranging from 28% in farm 5 to 100% in farm 2).
Conclusions - High MDA levels were commonly observed in 3 week old piglets. Ingelvac CircoFLEX® can be used as a single dose in these situations as it has been shown to break through high levels of MDA (2,3). However, following label recommendations, the other subunit piglet vaccine should be applied twice. The results are in accordance with an earlier publication of Schillebeekx et al. (6).
References:
1. Fort et al. (2009), Vaccine, 4031-4037; 2. Fachinger et al. (2008), Vaccine, 1488-1499 ; 3. Kixmöller et al. (2008), Vaccine, 3443-3451 ; 4.
veterinary/000135/ WC500061523.pdf (accessed October 24th, 2011); 5. Martens M. et al. (2010), Proc. IPVS, Vancouver, 13; 6. Schillebeekx et al. (2011), Proc. Em. and Re-em. Pig Diseases Conf., Barcelona,108

P199 Field study of PCV2 infection using serology and RT-PCR on rectal swabs before and after piglet vaccination

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Objectives - To measure PCV2 faecal shedding in field conditions, using RT-PCR, linked to clinical signs and serological results obtained at 5 different ages and after 5 months of piglet vaccination.
Material and Methods - 10 pig farms in France, 8 of them with PCV2 sow vaccination. First visit for recording clinical signs, sampling blood and rectal swabs on 25 pigs (5 from 5 different ages). Porcilis PCV vaccination at weaning. Second visit 5 months later for 25 rectal swabs. Clinical signs related to PCV2 infection evaluated as PMWS or PDNS, or as sub clinical cases. ELISA quantitative tests on sera: SERELISA®PCV2 Ab Synbiotics, and RT-PCR tests on rectal swabs: Circovirus@ceeramTools®.
Results - PMWS was observed in 5 farms. In 2 of them, early antibodies increases were linked to positive PCR results. After piglet vaccination PCR level was reduced by a factor 100 to 1000. In the 3 other farms, a late increase of antibodies was found; only in 2 farms in combination with a positive PCR. Here no PCR positive result was found after vaccination. The 5 other farms were sub-clinical cases. Clear antibodies increases were observed only in 3 cases, and positive PCR results in 2 farms. After piglet vaccination no positive PCR result was found.
Conclusions - PCV2 faecal shedding was observed in 6 of the 10 farms before vaccination. After vaccination no PCV2 faecal shedding was found for 8 of the farms. In the 2 others, PCV2 shedding was greatly reduced.

P200 Investigation of PCV2-status in a Danish herd – Two year longitudinal study

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Objectives - The objective was to clarify whether continuous PCV2 vaccination will bring the amount of circulating PCV2 below the detection limit (<103 PCV2 copies of PCV2/ml serum).
Materials and Methods - A finishing herd buying 1000 pigs vaccinated with Ingelvac CircoFLEX® every 7th week was studied. Two batches of pigs (May 2010 and September 2011) were non-vaccinated. Only two age groups of pigs were present at the same time at the herd. 10 blood samples were randomly taken from each of the batches of pigs at 45 kg and 100 kg every 7th week during 2010 and 2011. The level of PCV2 was quan-tified in serum samples using quantitative real-time PCR.
Results - All samples taken, except samples from May 2010, June 2011 (only one pig positive), September 2011 and November 2011 were below the detection limit of the assay.
The detection of PCV2 in May 2010 might be due to the missing PCV2 vaccination of this batch of pigs, but an acute PRRSV-US infection at the same time may also have influenced the PCV2 levels. After reinitiation of the PCV2 vaccination, the herd continued to have undetected levels of PCV2 until the next stop in PCV2 vaccination in September 2011, where pigs at 45 kg (non-vaccinated) were positive and in November 2011, where the same pigs at 100 kg were positive. Normally all pigs were ready for slaughter within a few weeks. But among the PCV2 positive and non-vaccinated pigs in November 2011, 13% had still not reached 100 kg at the same time as the other pigs in the batch, but needed 4 weeks extra before they could be sent to slaughter.
Conclusion - PCV2 vaccination of the piglets seemed to bring the PCV2 level below the detection limit, but only if per-formed continuously.
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P201 Improvement of technical results by the use of Ingelvac CircoFLEX® in a Dutch organic breeding and fattening farm: a case report

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Porcine Circovirus type 2 (PCV2) is a ubiquitous infection and a major cause of production loss for the pig industry. The aim of this study was to evaluate the effect of vaccination against PCV2 on technical results of pigs on an organic breeding and fattening farm, focussing on growth of weaned pigs and mortality and growth of fattening pigs.
The farm was an organic farm with 170 sows and on average 1,092 fattening pigs.
The study was carried out retrospectively between January 2009 and May 2011. During the study period three subsequent vaccination strategies were used:
1. Stellamune One shot®, 2. Stellamune One shot®+Ingelvac CircoFLEX®, 3. Ingelvac CircoFLEX®+Ingelvac MycoFLEX®. From these three periods the corresponding management data and slaughterhouse data were analysed by an ANOVA test. Due to few data in group 2 and an outbreak of *Actinobacillus pleuropneumoniae* during study period 2 and 3, these two groups were combined in one group and analysed by a two-sample t-test.
Mortality of weaned piglets decreased with 3.59%±1.31 (P0.023) in comparison to group 1. Average daily weight gain (gram) of weaned piglets (6-12 weeks old) improved by 20.67±6.45 gram (P0.004) in groups 2 and 3. Mortality of fattening pigs was 2.32%±0.53 lower (P0.001) then in group 1. Corrected energy conversion rate of fattening pigs improved 0.27±0.11 (P0.017). There was no significant effect on slaughterhouse parameters.
In conclusion, vaccination against PCV2 improved technical results of weaned and fattening pigs on this particular farm. The advantage of vaccination with CircoFLEX®+MycoFLEX® in comparison with the Stellamune®+CircoFLEX® vaccination is that the two vaccinations can be mixed and administered as a one shot vaccine. This means less work for the farmer and more animal welfare.

P202 The association between the PCVAD outbreak in Ontario and the positivity of porcine reproductive and respiratory syndrome virus (PRRSV) elisa and PCR test results

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Animal disease monitoring and surveillance are crucial activities for ensuring the health of animals. Limited research has focused on how negative test results from veterinary diagnostic laboratory data can be used to improve our knowledge of disease outbreaks e.g. if a diagnostic laboratory was seeing a disproportionate number of negative test results could this information be an indication of a novel disease outbreak? The objective of this study was to determine the association between the porcine circovirus-associated disease (PCVAD) outbreak in Ontario 2004-2006 and the weekly probability of PRRSV enzyme-linked immunosorbent assay (ELISA) positivity and the weekly probability of PRRSV polymerase chain reaction (PCR) test positivity. Retrospective data were collected from the Animal Health Laboratory (AHL) at the University of Guelph, Guelph, Ontario Canada and were comprised of the weekly count of PRRSV ELISA and PRRSV PCR tests ordered by swine practitioners from 2000-2007. The test results were analysed separately in two separate models using logistic regression with the dependent variables: the weekly probability of PRRSV ELISA positivity, and the weekly probability of PRRSV PCR positivity, respectively. The association between PRRSV test positivity and the outbreak of PCVAD was determined after controlling for a PRRS outbreak, season, and year. The weekly probability of PRRSV PCR positivity decreased during the PVCAD outbreak (OR=0.66, P<0.01). The weekly probability of PRRSV ELISA positivity was not associated with the PCVAD outbreak. The results indicate that during the PCVAD outbreak in Ontario from 2004-2006, the probability of PRRSV PCR positivity at the AHL decreased. Tracking the test results of commonly used screening tests has the potential to be a novel data source for the timely identification of disease outbreaks in swine populations.

P203 Additional benefits of Circovac® sow vaccination on top of piglet vaccination under Bulgarian conditions: a case report

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Introduction - The objective of this report was to assess the benefits of CIRCOVAC vaccination on technico-economic parameters in a Bulgarian farrow-to-finish farm.
Material and Methods - Data were collected using the farm's software: Agro Soft in a 2700-sow farrow-to-finish farm with Danbred genetic and free of PRRSV. In 2008, mortality and lightweight fatteners' rates had increased. Some pigs were affected by PDNS. CIRCOVAC piglet vaccination was implemented at weaning from February 2009. In July 2009 sows were mass vaccinated although no noticeable reproductive disorders were observed. Subsequently, from December 2009 onward, sows were vaccinated batch-by-batch, 2 weeks before farrowing. Gilts were vaccinated on twice, 3 weeks apart before mating and boostered 2 weeks before farrowing. Piglets born from vaccinated sows were vaccinated at 7 weeks of age. Computerized parameters were compared before and after PCV2 vaccination with a Dunett test.
Results - Growth parameters were found to significantly improve after CIRCOVAC sow and piglet vaccination both during grower and finisher periods: increases of 41g/d and 77 g/d respectively. Consequently, the age at 100 kg of bodyweight was reduced by 5.3 days. Reproductive parameters were improved over time: the number of total born piglets used to be around 13 piglets per litter up to 2009; it had improved by 3.7 piglets and the number of weaned piglets increased by 0.8 piglets per litter in 2011.
Discussion - This case report confirms the benefits of vaccinating sows and piglets with CIRCOVAC on technico-economic parameters in large pig farms. In particular, sow vaccination on top of piglet vaccination proved additional benefits regarding growth performance up to slaughter and fecundity.

P204 Evolution of the sero-epidemiological pattern of PCV2 after vaccination of the sows with Circovac®

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Introduction - Efficacy of the sow and gilt vaccination with CIRCOVAC® to control PMWS has been shown in field conditions. The aim of the present work was to confirm in a single farm the evolution of the sero-epidemiological pattern of piglets born from vaccinated sows compared with piglets born from non-vaccinated sows.
Material and Methods - This trial was performed in a 300 sows farrow-to-grower Spanish farm starting to vaccinate the reproductive stock with CIRCOVAC during gestation. Ten piglets issued from 10 litters from non-vaccinated sows, and an equal number of piglets born from the first batch of sows vaccinated twice with CIRCOVAC were ear tagged and blood sampled at 4, 7, 9 (nursery) and at 12, 15, 18 and 21 (fattening) weeks of age. Blood samples were assayed for PCV2 antibodies using Biocheck PCV2 ELISA.
Results and Discussion - Not surprisingly, piglets issued from vaccinated sows showed significantly ($p<0.05$, Kruskal-Wallis test) higher antibody titres than control piglets. In both groups, antibodies began to raise from the twelfth week of age. The sero-conversion titre curve showed a much steeper slope in the control group indicating a quicker and stronger exposure of piglets to PCV2 than in the piglets born from vaccinated sows. These data confirm previous findings (Joisel et al., 20th IPVS, OR.01.15) and show that pigs benefitting from maternal immunity were somehow protected from a bursting PCV2 exposure and were able to smoothly build their active PCV2 immunity with limited health and performance issues.

P205 Evaluation of the synergic effects of DeviGuard® feed supplementation and CIRCOVAC® sow vaccination in prevention of PMWS

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Objective - DeviGuard is a unique combination of ingredients containing a synergistic mixture of protected fatty acids that help improve performance in pigs. Previous studies have shown that CIRCOVAC used in sows was able to reduce mortality and growth retardation in PCVD affected farms. The objective was to evaluate the impact of use DeviGuard plus CIRCOVAC in a PMWS positive herd.
Material and Methods - The trial was performed in an 800-sow farrow-to-finish unit experiencing PMWS. The study was an historical comparison between:

- before PMWS (2100 pigs)
- during PMWS (7000 pigs)
- with DeviGuard (8050 pigs)
- with DeviGuard + CIRCOVAC (3150 pigs).

DeviGuard was added to the first two postweaning diets at 1kg per/tonne of finished feed. Pigs were offered these diets from 4 to 8 weeks of age post weaning. Sows were vaccinated, with CIRCOVAC twice, 3 weeks apart before farrowing. Data were recorded from weaning, at the end of the growing period (~40kg) and compared using Analysis of Variance.
Results - Mortality rate significantly rose from 1.39% before PMWS to 5.61% during PMWS ($p<0.005$). Using DeviGuard brought a statistically significant reduction of the mortality rate from 5.61% to 1.88% ($p<0.001$). Sow vaccination with CIRCOVAC brought a significant additional decrease of the mortality rate down to 0.88% ($p<0.05$).
Pig transfer weight dropped from 40.47 to 36.49kg ($p<0.005$) during PMWS compared to before PMWS. It rose back to 42.71kg with DeviGuard ($p<0.001$) and to 45.44kg with DeviGuard + CIRCOVAC ($p<0.005$).
Conclusion - DeviGuard added to the feed was able to restore pre-PMWS mortality and growth rates and sow vaccination with CIRCOVAC added to DeviGuard supplementation lead to an improvement of the two criteria to even significantly better values than before PMWS.

P206 Effect of PCV2 piglet vaccination on FCR in 24 Spanish farms

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Objective - The aim of this study was to evaluate the effect of vaccination with Ingelvac CircoFLEX® on FCR in 24 different farms in Spain affected by PCV2 associated diseases.
Materials and Methods - This field observation includes data from 24 fattening farms situated in different regions of Spain, suffering in almost all cases of moderate forms of PCVD. This study compares vaccinated animals (72424) with non-vaccinated ones (75428). In the vaccinated animals, one dose of 1ml of Ingelvac CircoFLEX® was administrated between 18 and 29 days of age, following label recommendations. Vaccinated and non-vaccinated pigs in each case originated from the same sow farm and nursery and were placed on the same fattening farm within a maximum period of three weeks. Non-vaccinated and vaccinated pigs were kept under very similar conditions with no relevant differences in management or feeding, apart from PCV2 vaccination.
Results - The average FCR in non-vaccinated animals was 2,786 (2,480 – 3,072) while the average FCR in the Ingelvac CircoFLEX® vaccinated groups was 2,609 (2,374 – 2,800). This means 177 grams of improvement.
Conclusions - Data presented in this study confirms the positive effect of Ingelvac CircoFLEX® on FCR, one of the most important economical parameters during the finishing period.
Estimating the economic impact of the average FCR improvement in these farms, 14,5 kg of feed can be saved per pig. Taking into account actual feed prices in Spain, this means that the cost of one fattener could be reduced by 4,1€.

P207 PCV2 antibody status of gilts before entering swine commercial farms: preliminary results of a survey performed in France

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Objective - As PCV2 plays a major role in sow reproductive disorders in particular in gilts, the objective was to assess the PCV2 antibody status of gilts at the end of the rearing phase in different nucleus units in France.
Materials and methods - The survey was conducted in 2010 using sera of 151 gilts (5 gilts per batch, 1 batch tested per farm) coming from 30 nucleus farms located in Brittany. These farms belong to 4 different genetic companies. None of the nucleus farms were vaccinating against PCV2. Sera sampling was performed the day of selection of the future gilts, at around 5 months of age, 3 weeks before leaving the nucleus farms. All sera were tested for PCV2 antibodies by SERELISA technique (Synbiotics).
Results - Globally, PCV2 antibodies were found at heterogeneous and low level within each batch of gilts: 21% of gilts were negative for PCV2 antibodies, only 1 batch was completely negative; the mean value of positive gilts was 3.3 log10 (+/- 0.6), 53% of batches had 100% positive gilts and 43% of batches were heterogeneous with both negative and positive gilts at the same age.
Conclusion and discussion - The results of this survey illustrate the heterogeneous PCV2 antibody status of gilts coming from non-vaccinated nucleus farms. A significant number of gilts were negative or with low level of antibodies against PCV2 before entering quarantine in commercial units. As PCV2 is a ubiquitous pathogen, these naïve gilts might be infected with PCV2 during their first reproductive cycle and consequently might develop significant reproductive disorders such as return to oestrus, abortions, mummies and stillborn piglets. Furthermore, it has been shown in a previous study that sows with low antibody titres had the highest viraemia and number of PCV2-positive foetuses.

Virology: Other

P208 African swine fever eradication in Brazil, 1978: laboratory and surveillance service integrate action

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In 1978, Brazil eradicated African Swine Fever (ASF) outbreaks. The integrated action among the laboratory team to settle the ASF diagnosis in the emergency phase (from June to December, 1978) and surveillance service were reviewed. ASF Diagnostic Laboratory registration data, Official Laboratories, libraries of Federal Universities of Minas Gerais (MG) and Rio de Janeiro (RJ) were investigated. In the emergency phase, 3803 samples of pig tissue, blood and sera were collected, principally from Southeast and South regions. Virus isolation and antibody screening were based on standard methods such as Swine Erythrocytes Haemadsorption (HAD). Pig samples from Teresópolis city in RJ constituted the first isolation of ASFV out of former outbreak in Paracambi city. Around the country, in the first month, 74 (48.36 %) pig samples of 153 were HAD positive: 24 from RJ, 37 from São Paulo, 17 from Paraná and 7 from MG, besides other regions. The integrated action of the laboratory and surveillance service resulted in a 70% decrease in ASF outbreaks from July to August. The antibody detection against ASFV increased from 18% in June, to 47.8 % in August and, until December more than 200 positive sera were found. The high numbers of positive HAD samples, compared with described symptoms and mortality levels and the results of the intense serological screening campaign in pig herds without ASF symptoms pointed to the occurrence of low or moderate virulence strains of ASFV. Pigs suffering from a subclinical ASF infection can enter a country insidiously causing an economic disaster for the entire swine livestock market. Nowadays, ASF spread rapidly to previously uninfected countries, highlighting the importance to establish secure measures to prevent ASF virus entrance in Brazil.

P209 Classical swine fever eradication in progress in Brazil

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The advances of the Classical Swine Fever (CSF) eradication program in Brazil from 2004 to 2011, by serological screening and CSF outbreaks number, were analyzed. The CSF survey data from 2004 until 2011 were obtained from Agriculture Defense Secretary of Ministry of Agriculture, Livestock and Supply. A few new Federal States were recently included In the CSF free zone, where no CSF-vaccination regimen is used, reaching a total of 15 Federal States which together account for almost 50 % of the Brazilian territory and for almost the totality of commercial swine farms. However, 25 and 6 CSF outbreaks occurred in the non CSF-free region of Northeastern and Northern region, respectively. CSF outbreaks were controlled by stamping out measures and, in 2009, Rio Grande do Norte e Amapá States, emergency vaccination was applied. Except for the CSF outbreaks that occurred in 2009 at the Semi-arid Federal University, the majority of CSF outbreaks took place in rural pig farms where it was a common practice to use food left-overs to feed the pigs. In 2010-11, no CSF outbreaks were registered. It should be noted that there have been no cases of CSF virus (CSFV) infection in the Brazilian CSF-free zone since 2001. Nowadays, pigs from the Northern region of Brazil are being screened for CSFV antibodies. The eradication of CSF from the entire Brazilian territory is in progress and relies mainly on surveillance of animal movement and serological screenings.

P210 Serological survey and molecular investigation on pseudorabies virus latency in Italian pigs

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Objectives - In this study the seroprevalence and the presence of latent pseudorabies virus (PrV) in nervous tissues were investigated in pig samples.
Materials and methods - Fifty five blood and nervous (brainstem) samples were collected at the slaughterhouse, from June to July 2011. Pigs had an average weight of 160/170 Kg and belonged to 11 different herds located in northern Italy. Genomic DNA was extracted from the nervous tissue (approximately 100 mg) using the Ultrasense™ kit (Qiagen) as described by the manufacturer instructions. The presence of latent PrV infection in the nervous tissue was determined using real time PCR following the protocol by Yoon et al, 2006. The seroprevalence of PrV in blood samples (gB and gE) was determined by ELISA (IZSLER home made kit).
Results - Forty five out ofthe 55 blood samples (81.8%) resulted serological positive to gB and gE, while the others (18.2%) were negative to gB and gE. Real Time PCR targets the gB gene detected 5 nervous tissues as positive (9.1%), and 1 of these resulted positive also for the gE gene.
Conclusions - The data obtained from this study showed that the seroprevalence of field PrV strains is high in Italian finishing pigs, and at the same time that some herds don't apply correctly the obligatory vaccination protocol. Moreover, the results of this work underline that field PrV strains could establish a latency in apparently clinical healthy animals. Therefore, considering these data, a continuous survey of serological prevalence of PrV at the slaughterhouse could be a critical point for the success of the Italian eradication program.

P211 Reminder on classical swine fever: recent outbreaks in Serbia

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Introduction - In November 2010, in Serbia, we experienced two classical swine fever outbreaks in domestic pigs, on a big commercial farm and a small household. The last occurrence of this disease in Serbia was in 2007.
At the moment of farm visiting, there were 38 dead pigs. Pathomorfological findings clearly had indicated on CSFV infection: haemorrhages on serosal and mucosal surfaces, particularly on the kidney, urinary bladder, larynx, trachea, stomach and spleen, "button" ulcers in the intestinal mucosa, particularly rectum.
Material and Methods - The blood and tissue samples were tested on qRT-PCR, AgELISA and AbELISA.
Results and Conclusions - Results of the both, qRT-PCR and AgELISA tests, were positive, while the results of AbELISA had indicated on very poor vaccination of pigs. Based on E2 gene and 5`NCR sequences, it was determined that the isolate belongs to the 2.3 genotype. During the epidemiological investigation, in the neighbouring village, on a small individual farm, one dead piglet was found. Laboratory results confirmed second case of CSF.
By epidemiological surveying back, it was found out that in the period July – August 2010. in the village where the second outbreak was confirmed, high mortality of pigs was observed. It is presumed that the second outbreak was the primary one and that the CSFV was introduced in the farm by the employees who also have own pigs and live in the village of second outbreak. In 2010 the vaccination coverage had been monitored by testing the animals from the households, farms and slaughterhouses. It is considered that low coverage in those villages, below 10%, could be one of the reasons of reoccurrence of CSF aside role of wild boars.

P212 Outbreak of swine influenza in France: a case report

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Introduction - This report describes the consequences of a SIV outbreak in a French farrow-to-finish farm.
Description - The 320-sow farm was positive for PRRSV, *Mycoplasma hyopneumoniae* and vaccinated with a bivalent swine influenza virus vaccine. Performance from farrowing to slaughter was excellent up to mid 2010. According to clinical signs and serological profiles, both PRRSV and *Mycoplasma* were stabilized. In July 2010 a severe respiratory disease occurred in the farm: coughing in gilts, coughing and depression in fatteners, increase of the average stillborn and mummified piglet rate in one batch of sow. Necropsic and histopathological lesions were typical of swine influenza disease: pronounced interstitial pneumonia, bronchiolitis and secondary bacterial infections. Serological analyses were negative for PRRSV and *Mycoplasma* but positive for swine influenza viruses (SIV). Mass vaccination of sows with GRIPOVACÒ3 was implemented in August. Serological analysis performed on piglets demonstrated a good passive transfer of maternal antibodies against SIV from vaccinated sows. However, a severe syndrome with various clinical signs occurred in November: no more coughing in sows but neonatal diarrhoea, streptococcosis, colibacillosis and coughing in the fatteners born from non-vaccinated sows. Additional lab investigations evidenced a co-circulation of PRRSV and *Mycoplasma* in fatteners. In July 2011, health status and performance of the farm returned to the initial status.
Discussion - This field report illustrates the consequences of an outbreak of SIV in a farrow-to-finish farm: destabilization of the health status of the herd, favouring co-circulation of PRRSV and *Mycoplasma hyopneumoniae* inducing a severe drop of the technico-economic parameters over one full year.

P213 Merial flu kit: first results of a survey performed in France and Benelux

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Objective- The Merial Flu kit is a new tool to help practitioners to test for shedding of Influenza virus in pigs and to send samples to the laboratory for swine influenza virus (SIV) diagnosis and subtyping. The kit includes all necessary materials to perform an on-the-farm test, including Synbiotics Flu DETECT™ SWINE diagnostic kit (to be used on pigs presenting flu-like signs for 3 days or less) and nasal swabs for PCR and viral isolation in a local lab. This report presents the first results of the use of this kit in France and Benelux.
Materials and methods - The kits were provided to practitioners in 2010 and used on 20, 24 and 19 farms in the Netherlands, Belgium and France, respectively. All selected farms were affected by acute respiratory disease or reproductive problems. On-farm diagnosis was performed with Flu Detect on 3 to 5 pigs for each farm and nasal swabs were sent to a local lab: a total of 47 nasal swabs from France were shipped to ANSES, Ploufragan for virus subtyping by RT PCR and isolation on MDCK cells. 181 nasal swabs from the 44 farms in Benelux were sent to the Veterinary Virology lab of Ghent University for virus isolation.
Results - In France, prevalence of SIV at farm level was found to be 80%, further diagnosis revealed H1N1 isolation in 6 farms, H1N2 in 2 farms; in the 3 other farms RT PCR was positive but no viral identification was possible. In Belgium, 25% of tested farms were positive whereas 35% in the Netherlands. In Benelux, H1N2 was evidenced in 2 farms, H3N2 in 3 and H1N1 in 7 farms.
Conclusion - In this survey, SIV prevalence in French farms affected with respiratory disorders is high (80%). All 3 subtypes of swine influenza viruses are co-circulating in Benelux.

P214 First tentative diagnosis of periweaning failure-to-thrive syndrome (PFTS) in Spain

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Objective - To summarize the preliminary investigation of a clinical condition observed in weaned pigs in Spain resembling to the recently described periweaning failure-to-thrive syndrome (PFTS).
Materials and Methods - A total of 19 pigs coming from 3 different farms were selected between 4 to 14 days after weaning based on their clinical signs. These consisted on anorexia, lethargy, sneezing and licking/chewing behavior. This latter clinical sign was not majoritary but evident in few animals. Morbidity of the condition varied among farms, ranging 4 to 20%. All farms were sero-negative against Aujeszky's disease virus, but seropositive to porcine reproductive and respiratory syndrome virus (PRRSV), porcine circovirus type 2 (PCV2) and *Mycoplasma hyopneumoniae* (Mhyo).
Results - All pigs displayed emaciation, soft-to-liquid faeces, thymic atrophy and serous atrophy. Also, all animals showed various degrees of fusion and atrophy of intestinal villi and catarrhal rhinitis. At least one animal of each farm had histological lesions of inclusion body rhinitis. PMWS diagnosis was discarded in all animals (by histopathology and in situ hybridization to detect PCV2). Immunohistochemistry (IHC) to detect PRRSV of all animals was negative, although RT-PCR for this pathogen was positive in a number of animals in each farm.
Conclusions - Clinico-pathological data suggested that these animals may be affected by PFTS. The lack of interstitial pneumonia and lymphoid lesions in most of the animals as well as PRRSV IHC negativity in all of them did not suggest PRRSV as the main cause of observed clinical signs. Since RT-PCR results for this virus were positive in some pigs, it was not possible to rule out a potential contribution of PRRSV in the overall clinical picture.

P215 Cross-reactivity of hemagglutinin from recent porcine Parvovirus to serum from pigs vaccinated or vaccinated and then experimentally infected

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Introduction - The recent description of field isolates of PPV that differ from vaccine strains, raises the question of whether early vaccines can still protect sows against currently circulating viruses. In this study, we tested post-vaccination sera against recent PPV isolates in the HI assay, using sera from gilts either vaccinated, or vaccinated and subsequently infected experimentally.
Materials and Methods - Two groups of sera were tested: Group A with 12 sera from gilts vaccinated twice, 3 weeks apart, with PARVOSUIN MR® (Hipra, Spain), collected at 9 and 51 days after second vaccination (dpv). Group B with 5 sera from gilts vaccinated, and challenged at 51 dpv with PPV NADL 8, collected at 48 days pi. Test antigens (n=5) consisted of 3 recent (2008-2011) PPV Spanish isolates, the challenge virus, and the vaccine seed stock virus (NADL 2). HI titres were positive when ≥ 4. HI geometric mean titers were calculated and compared between groups.
Results and Conclusions - All sera analyzed tested positive for all 5 antigens in the HI assay, with differences in titers depending on the group. For sera in group A titers were lower than those in group B. Moreover, within group A higher titers were obtained when sera matched the homologous antigen (NADL 2) or the related one (NADL 8). Sera in group B exhibited very high HI titers, showing the same trend of highest titers in the homologous reactions. Differences were also observed between sera within the same group. However, these differences were consistent with all antigens for a particular serum, indicating interindividual differences in humoral response, rather than antigenic mismatches. These results demonstrate that subsequent contacts of vaccinated gilts with PPV would be sufficient to confer protection during the breeding period.

P216 Current Classical Swine Fever (CSF) situation in domestic pigs and wild boars and report of the first sequence of CSF solate from Macedonia

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Objectives - Evaluation of successfulness of vaccination campagne against CSF in farm pigs, and CSF situation in wild boars in Macedonia.
Materials and Methods - For evaluation of vaccination, 29 serum samples per farm (around 120 farms) were planed to be taken, and with this number of samples we should be able to detect 1 positive (vaccinated) animal for 10% prevalence with 95% confidence level. As part of the surveillance activities for CSF in wild boars, from 2009 until November 2011, around 200 organ samples were sent to our laboratory for CSF antigen determination by qRT-PCR (5'NTR protocol). From October 2011, laboratory received around 40 blood samples from wild boars and they were tested using ELISA method (CSF Sero Antibody Test Kit, IDEXX). Several samples from domestic pigs, received in the past years for various reasons and kept frozen on -80°C, were included in PCR testing.
Results - Preliminary results from the uncompleted monitoring showed surprisingly unsatisfactory results. Until 10.11.2011, total number of 1.237 serum samples was tested and only 560 gave positive result (45.2%). All 200 organ samples from wild boars were tested and gave negative results for presence of CSF nucleic acid. However, from the 40 blood samples, 4 samples gave positive result for presence of Ab against CSF. From the samples of domestic pigs, included in the PCR testing, 1 gave positive result. Sequencing and phylogenetic analysis were performed and results showed that it is a CSFV strain 2.3, most similar to the isolate with accession number HQ148061.1, from Croatia. (339635331?report=genbank&log$= nucltop&blast_rank=1&RID=DCEM9RZ4012).
Discussion - Poor vaccination results must be analyzed. Presence of seropositive wild boars indicates the presence of the virus among wild boar population. The PCR positive case of domestic pig, represent the first sequence of CSF isolate from Macedonia.

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