EUROPEAN SYMPOSIUM OF PORCINE HEALTH MANAGEMENT

Proceedings

of the Joint Meeting of the

5th European Symposium of Porcine Health Management

and the

50th Anniversary Meeting of the Pig Veterinary Society of Great Britain

22nd-24th May 2013

Edinburgh, United Kingdom

PRODUCTION TEAM FOR PROCEEDINGS

D. Berkshire
B. Strugnell
S. Done
J. Walker

THE PIG VETERINARY SOCIETY (PVS)

The Pig Veterinary Society (PVS) is based in the United Kingdom and was founded in Cambridge in 1963, making it the World's oldest dedicated pig veterinary society. It currently has over 250 full and associate members drawn from all walks of the pig industry worldwide, with full membership being open to qualified veterinary surgeons.

PVS is a specialist division of the British Veterinary Association and is consulted on many aspects of pig related subjects by the Government, the industry and the public. PVS exists to allow its members to exchange knowledge on all aspects of pig health, welfare and management, and promote the study of these subjects. It does this by providing a forum for discussion and the exchange of these ideas.

THE EUROPEAN COLLEGE OF PORCINE HEALTH MANAGEMENT (ECPHM)

The European College of Porcine Health Management (ECPHM) was given provisional recognition by the European Board of Veterinary Specialisation (EBVS) in 2004 and is currently working towards full recognition. It is the governing body for postgraduate veterinary specialisation in Europe within the field of porcine health and its associated management.

ECPHM is the awarding body for the European Diploma (DipECPHM) that is granted on completing the correct training phase and passing the relevant examinations. There are currently 148 diplomates of the ECPHM, who are also recognised as European Veterinary Specialists in Porcine Health Management.

THE EUROPEAN ASSOCIATION OF PORCINE HEALTH MANAGEMENT (EAPHM)

The European Associaton of Porcine Health Management (EAPHM) was founded in 2010 at the 2nd ESPHM held in Hannover, Germany. It was set up to represent the interests and to serve the needs of all veterinarians specialised in pig and pork production throughout Europe.

The objectives of the EAPHM are primarily educational in order to increase contact and interaction across an increasingly borderless Europe. It also aims to represent pig veterinary interests and views on increasingly important aspects of welfare, health and production as they come to the forefront in the future.

INTERNATIONAL REVIEWERS

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WELCOME FROM THE PRESIDENT

Dear Colleagues

On behalf of the local organising committee, it gives me the greatest pleasure to welcome all delegates, partners, supporters and guests to the 5th European Symposium of Porcine Health Management (ESPHM) here in Scotland's capital city Edinburgh.

This symposium follows the tremendous success of the previous one held in Bruges, Belgium in 2012 and is on target to attract a similar number of delegates – more than 800 have already registered – and over 250 submitted abstracts.

The previous symposium was a joint venture between the European College of Porcine Health Management (ECPHM) and the European Association of Porcine Health Management (EAPHM) aimed at bringing together the knowledge and experience of research and clinical veterinary medicine.

The 2013 builds upon that basis but with an added significance. The reason that this symposium has come to the UK is that 2013 represents the 50th anniversary of the Pig Veterinary Society – the oldest institution of its kind in the world. The local organising committee, which has worked tirelessly, has been drawn from PVS and is charged with delivering a symposium to mark that anniversary and link with the two European bodies in their common aims. The PVS was established in 1963 to share and distribute knowledge between all veterinary surgeons that had an interest in pig health, welfare, medicine, production and management. Over the years its membership has widened to include animal scientists in the pig field and it has become far more active politically such that it has a strong voice within the British Veterinary Association and plays a key role in influencing policy at government executive level.

As part of the event, the gala dinner will bring together as many as possible of the 25 surviving past presidents of PVS (sadly 13 are no longer with us) to mark the anniversary.

The scientific programme of the symposium will spread over three days and will mix keynote speakers with presenters of submitted short papers including contributions from ECPHM residents, in the early stages of their pig veterinary career, and our industrial partners who will present cutting edge scientific information from the commercial sector. The keynote lectures will cover a number of themes including emerging threats, swine influenza, a look at the future for vaccinology and environmental control, and dietary provision linked to immunology. We are very grateful to the army of volunteer scrutinisers who assessed the submitted papers dividing those accepted into oral presentations and a large poster section. The symposium takes place in the dedicated conference facilities of the Edinburgh International Conference Centre – purpose built in the 1990's in the heart of the city. It offers first class conference facilities with a unique layout that enables us to switch between full plenary session and subgroups for parallel sessions. Please enjoy the symposium, the City, the facilities and the highest quality of science on offer and leave enriched.

Mark E C White
Mark White, President of 5th ESPHM Meeting,
Chairman of Organising Committee

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SYMPOSIUM PARTNER INFORMATION

BAYER PLC ANIMAL HEALTH

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Bayer Animal Health is a leading global animal health company committed to research and development in order to provide innovative medicines for livestock and companion animals.

Bayer offer solutions to help manage the well being and productivity of farm animals as well as ensure a healthy relationship between companion animals and pet owners.

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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.

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Since it was founded in 1885, the family-owned company has been committed to researching, developing, manufacturing and marketing novel medications of high therapeutic value for human and veterinary medicine.

As a central element of its culture, Boehringer Ingelheim pledges to act socially responsible. Involvement in social projects, caring for employees and their families, and providing equal opportunities for all employees form the foundation of the global operations. Mutual cooperation and respect, as well as environmental protection and sustainability are intrinsic factors in all of Boehringer Ingelheim's endeavours.

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We are specialists in developing innovative preventive solutions that make it possible to identify existing threats on any poultry or livestock farm before they occur, in such a way that we can act to prevent them or minimise their effects. We have a broad range of highly innovative Biological products, an advanced diagnostic service and our own line of Diagnostic kits.

We are located in more than 20 countries with our own commercial subsidiaries and production plants strategically situated in Europe and America. Likewise, our large global distribution network enables our products to reach customers in more than 100 countries on all five continents. At HIPRA we maintain a commitment to excellence, to service to livestock farms, to our people and to social, economic and environmental improvement.

HUVEPHARMA NV

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Huvepharma® is a rapidly expanding innovative **pharmaceutical company.** The highlight is put on animal health pharmaceuticals, anticoccidials, feed additives, veterinary medicated premixes, veterinary products, enzymes and enzyme complexes, APIs.

Our key factor is fermentation, which Huvepharma® has been an expert in for more than half a century, currently operating the biggest European veterinary fermentation facilities, totalling 6,000m^3 fermentation capacity.

We distribute more than 80 products in more than 70 countries worldwide. A few of our well-known brands are **Pharmasin®** (tylosin), **Tilmovet®** (tilmicosin), **Vetmulin®** (tiamulin) and **HydroDoxx®** (doxycycline) – veterinary range and **Lianol®** product range. Our on-going investment program and R&D initiatives guarantee that the company has a filled "pipeline" with new formulations and products to be launched on the key markets in the coming years.

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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 our website.

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The Group currently distributes its products in one hundred countries throughout Europe, Americas and Asia, with subsidiaries in 23 different countries and a network of 140 distributor partners. The Company has more than 1,750 employees worldwide and sold products to the value of €284.1 million in 2011.

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Our name, Zoetis (zō-EH-tis), has its root in zo, familiar in words such as zoo and zoology and derived from zoetic, meaning "pertaining to life". It signals our company's dedication to supporting veterinary surgeons and livestock farmers everywhere who raise and care for the animals on which we all depend.

As a leading Animal Health company in the world, Zoetis is dedicated to transforming the care of animals for a healthier world.

Zoetis strives to provide full animal health solutions to veterinarians, livestock producers, and companion animal owners. We work to assure a safe, sustainable worldwide food supply from healthy beef and dairy cattle, swine, poultry and fish and to help dogs, cats and horses live healthier longer lives.

Zoetis is a world leader in the discovery, development and manufacture of innovative animal vaccines, medicines and veterinary diagnostic products. We have an extensive research and development network with major research centres on four continents. Zoetis professionals offer a broad array of animal health services and solutions. We aspire to be the trusted partner of choice for veterinarians around the world – that trust earned by consistently anticipating and meeting needs with reliability and integrity.

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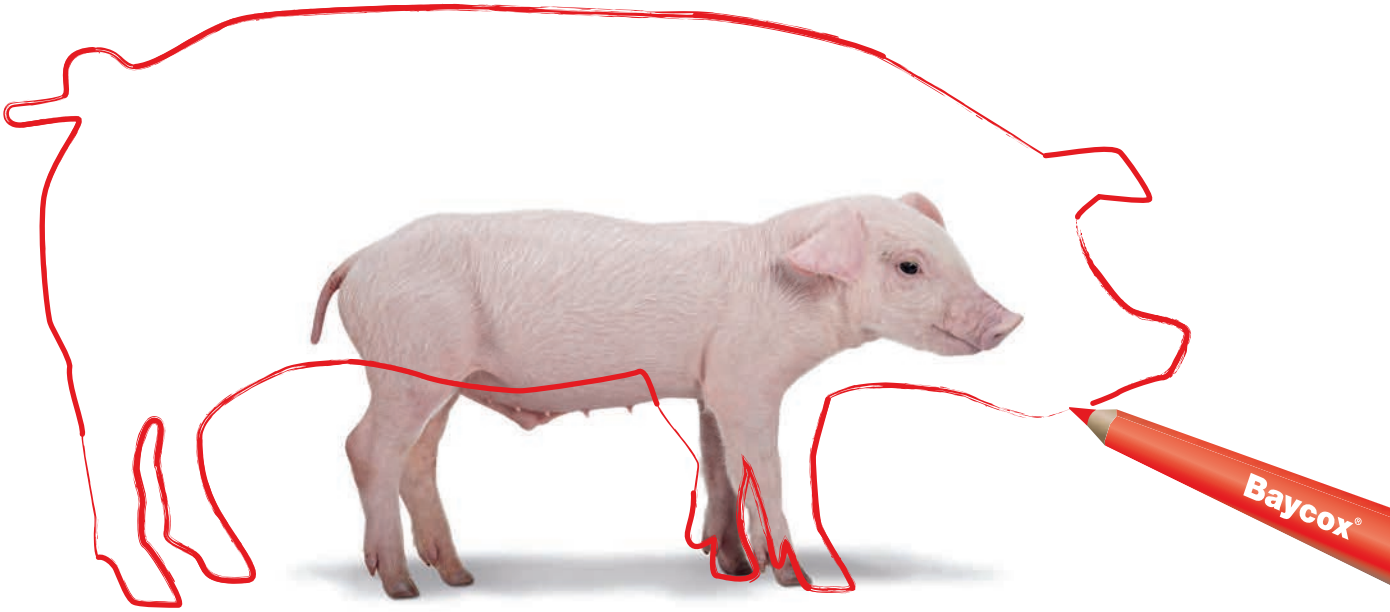

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References: [1]Rypula K. and Porowski M., IPVS (June 2004) Hamburg. Efficacy and economic benefit of Baycox 5% (toltrazuril) for the treatment of diarrhoea in pigs. [2]Mavromatis I. *et al* Efficacy and cost benefit study on the use of toltrazuril for the control of neonatal coccidiosis in pigs due to *Isospora suis* under field conditions. IPVS (June 2004), Hamburg. [3]Viel L (2005). Troup Sovvent aubliée. Pensez a la coccidiose... Porc magazine Nr. 391. **Baycox® 50 mg/ml** contains 50 mg/ml toltrazuril. ® Registered Trademark of Bayer AG. Please refer to appropriate data sheet, further information available on request. Bayer plc, Animal Health Division, Bayer House, Strawberry Hill, Newbury, Berkshire RG14 1JA. Tel: 01635 563000. POM-V

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1. Stipkovits L, et al (2001). Treatment of pigs experimentally infected with Mycoplasma hyopneumoniae, Pasteurella multocida and Actinobacillus pleuropneumoniae with various antibiotics. Canadian Journal of Veterinary Research 2001;65:213-222. 2. Talummuk S, & others (2011): Efficacy of Denagard 20 Injection for treatment of polyarthritis in nursery. Proceedings 21st IPVS Congress, Vancouver, Canada 2010. 3. McOrist & Bennett (2006) Proceedings 19th IPVS Congress, Copenhagen, Denmark, vol 1, p 319 4. S.Wattanaphansak, R.S.Singer, C.J.Gebhart (2009): In vitro antimicrobial activity against 10 North American and European L.intracellularis isolates. Veterinary Microbiology, 134, 305-310. 5. Burch, D.G.S, et al (2006). Comparative efficacy of Tiamutin and Linco-Spectin in the drinking water for the treatment of mixed enteric and respiratory infections in finishing pigs. Proceedings19th IPVS Congress, Copenhagen, Denmark.

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MEET ZOETIS

OUR NAME

Zoetis is the friendly name of our company. It's how we introduce ourselves and tell our story. Zoetis (zō-EH-tis) has its root in *zo-*, familiar in words such as *zoo* and *zoology*. It is derived from *zoetic*, meaning "pertaining to life," and concludes with *–is*, a common suffix for scientific names. It signals our dedication to supporting veterinary surgeons and livestock farmers everywhere who raise and care for the animals on which we all depend.

zoetis

SYMPOSIUM SUPPORTERS

Many thanks to the following companies who have supported the Symposium for 2013

SYMPOSIUM MEDIA SUPPORTERS

Many thanks to the following companies who have supported the Symposium for 2013

SOCIAL PROGRAMME

All social activities must have been pre-booked during the registration for the Symposium

WELCOME RECEPTION

Wednesday May 22nd 19:00hrs

(This is included in the registration fee for the delegates)

Join us in the Symposium's Social Space over a drink or two to catch up with colleagues from across the World. Introduce yourself to our Commercial Partners and have a look through the posters that have been accepted for presentation. A perfect way to start the evening before heading out into Edinburgh to sample the delights the City has to offer.

PVS PAST PRESIDENTS RECEPTION

Thursday May 23rd 19:00hrs

(This event is by invitation only)

To celebrate the 50th year of the UK Pig Veterinary Society, all past Presidents have been invited to a pre-dinner Reception, hosted in the Music Hall Bar at the Assembly Rooms. Please note this event is by invitation only.

GALA DINNER

Thursday May 23rd 20:00hrs

(Pre-booking required)

The superbly renovated Assembly Rooms, having reopened less than 12 months previously, is to host the main dinner event of the Symposium. Built in the 18th Century, the Assembly Rooms have played host to many major events, from Royal banquets to ceilidhs, readings from major literary giants to Edinburgh Festival Fringe shows. It has always been the place in Edinburgh for people to meet, talk and be entertained.

Symposium guests will be treated to a full 3 course Scottish themed dinner within the beautiful surroundings of the Music Hall and Ballroom, both restored to their former glory and providing an elegant backdrop to our main social event.

Assembly Rooms, 54 George Street, Edinburgh EH2 2LR
Tel: 0131 220 4348
Number 28 on the Edinburgh Map – page 26

ACCOMPANYING PERSONS PROGRAMME

Wednesday, May 22nd

09:30 – 11:30	Royal Mile Walking Tour
11:00 – 15:00	Half Day Whisky Tour
19:00 – 20:30	Welcome Reception
21:00 – 22:00	Evening Walking Tour

Thursday, May 23rd

10:00 – 16:30	Full day City of Edinburgh Tour
20:00 – 22:30	Symposium Gala Dinner

Friday, May 24th

All Day – Golfing opportunities

The members of the local organising and scientific committees of the 5th ESPHM, The European College of Porcine Health Management, and The European Association of Porcine Health Management gratefully acknowledge the support of the sponsors, both partners and supporters.

LOCAL ORGANISING COMMITTEE

Mark White
Duncan Berkshire
Stan Done
David Strachan
Ben Strugnell
Paul Thompson
Jill Thomson
Mike Wijnberg
Nigel Woolfenden

BOARD OF THE EUROPEAN COLLEGE OF PORCINE HEALTH MANAGEMENT

President:	Dominiek Maes, Belgium
Vice-President:	Joaquim Segales, Spain
Past President:	Thomas Blaha, Germany
Treasurer:	Elisabeth grosse Beilage, Germany
Secretary:	Tomasz Stadejek, Poland
Member:	Dan Tucker, UK
Member:	Catherine Belloc, France

BOARD OF THE EUROPEAN ASSOCIATION OF PORCINE HEALTH MANAGEMENT

President:	Peter Hoegedal, Denmark
Vice President:	Enric Marco, Spain
Past President:	John Mackinnon, UK
Treasurer:	Jean-Luc Sevin, France
Secretary:	Heiko Nathues, UK
Member:	Rick Jenssen, The Netherlands
Member:	Oliver Duran, Germany

GENERAL AND PRACTICAL INFORMATION

The 5th meeting of the ESPHM and the 50th Anniversary of The Pig Veterinary Society will be held at Edinburgh ICC, Morrison Street, Edinburgh, EH3 8EE, Telephone 0131 3003000.

HOUSE RULES

NO SMOKING – The EICC operates a strict no smoking policy. Smoking is allowed in dedicated areas outside the EICC. Smoking is also prohibited in hotels, restaurants, bars and virtually all enclosed spaces in the UK.

MOBILE PHONES AND VIDEO RECORDING – The use of mobile phones and video recording devices is strictly forbidden during all sessions.

NO DRINKING/EATING IN THE LECTURE ROOMS

USE OF THE INTERNET

WIFI is free and available throughout the EICC.

To log in enter the following:

Username: **ESPHM2013**
Password: **edinburgh**

REGISTRATION AND INFORMATION DESK OPENING HOURS

Wednesday, 23rd May	08:00 to 18:00
Thursday, 24th May	08.00 to 18:00
Friday, 25th May	08.00 to 13:30

LOST AND FOUND

Contact the Queries and Information desk in the Strathblane foyer.

CONTACT INFORMATION DESK

Contact the Queries and Information desk in the Strathblane foyer or call +44 (0)20 78085624

FIRST AID

Contact the Conference team at the Queries and Information desk or any EICC stewards should you require assistance.

CLOAKROOM

A cloakroom is located in the Strathblane foyer and is free of charge.

BUSINESS CENTRE

The business centre located in the Strathblane foyer can assist with printing, copying and other secretarial services. Charges apply.

NAME BADGE

Your personal name badge is your entrance ticket to all sessions and the exhibition. Please remember to wear your badge at the congress centre and the social events. Exhibition passes do not allow access to the scientific sessions.

COFFEE BREAKS AND MEALS

Coffee/tea breaks are included in the registration fee and will be served from Wednesday-Friday. Lunch is included on **Thursday only.** Pre-ordered lunch boxes on Friday can be collected from the Strathblane foyer (ticket required).

OTHER FACILITIES

BANKS – most open from 09.30-15.30 – The closest ATM to the EICC is on Morrison Street near Sainsbury supermarket.

POST OFFICES – most open 09.00-17.00

EXCHANGE FACILITIES – Bureau de change facilities are available in most banks, post offices and major hotels, as well as at Edinburgh Airport and Waverley train station.

CLIMATE AND DRESS

Usually mild but chilly at night. Dress is informal.

ELECTRICAL SUPPLY

This is 220 Volts.

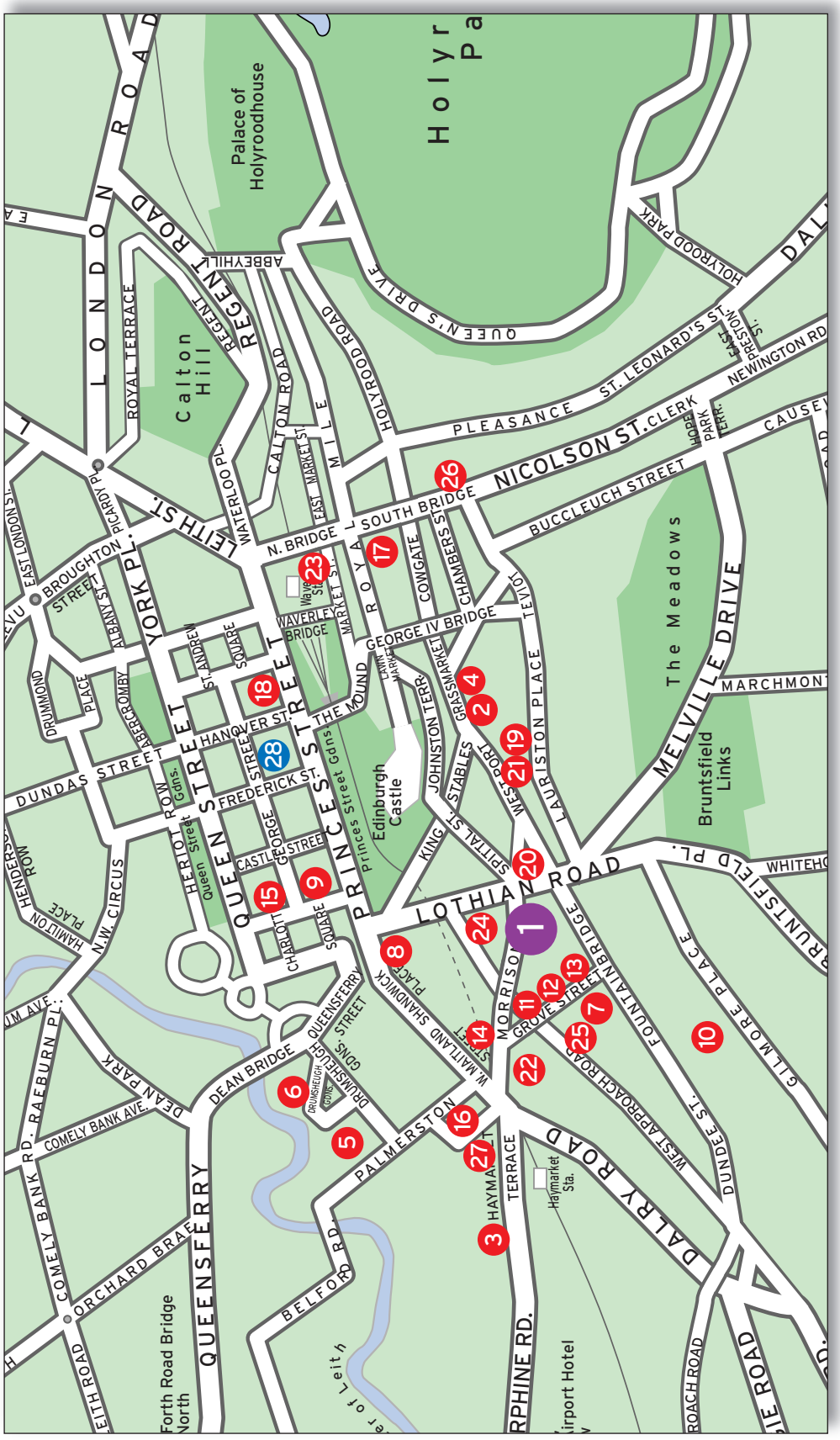
INSURANCE LIABILITY

The 5th ESPHM does not accept liability for personal medical expenses/travel expenses/losses of any nature.

EMERGENCY SERVICES

For Police, Fire and Ambulance dial 999.

MAP OF EDINBURGH



Conference Venue

1 **EICC** – The Exchange, Morrison Street, EH3 8EE

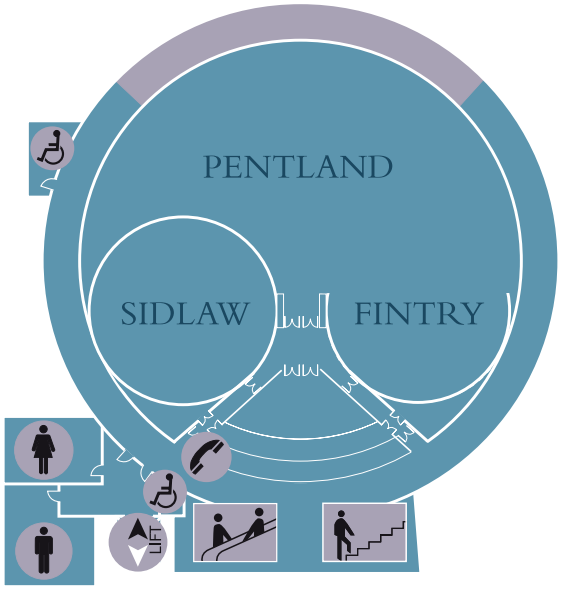
Hotels/Apartments

2 **Apex City Hotel**
3 **Apex European Hotel**
4 **Apex International Hotel**
5 **B&B Edinburgh**
6 **The Bonham**
7 **Brooks Hotel Edinburgh**
8 **The Caledonian, A Waldorf Astoria Hotel**
9 **Crowne Plaza Edinburgh – The Roxburghe**
10 **Fountain Court Apartments – EQ2**
11 **Fountain Court Apartments – Grove**
12 **Fountain Court Apartments – Grove Executive**
13 **Fountain Court Apartments – Harris**
14 **Fountain Court Apartments – Morrison Street**
15 **Fountain Court Apartments – Stewart**
16 **Hilton Edinburgh Grosvenor**
17 **Ibis Hotel Edinburgh**
18 **Mercure Edinburgh Princes Street**
19 **Novotel Edinburgh Centre**
20 **Point Hotel Edinburgh**
21 **Premier Inn Edinburgh Central**
22 **Premier Inn Edinburgh City Centre**
23 **The Scotsman Hotel**
24 **Sheraton Grand Hotel and Spa**
25 **Staycity Apartments Edinburgh**
26 **Ten Hill Place Hotel**
27 **Tune Hotel Haymarket**

Social Programme Venues

28 **Assembly Rooms**
54 George Street, EH2 2LR

EICC ROOM LAYOUTS



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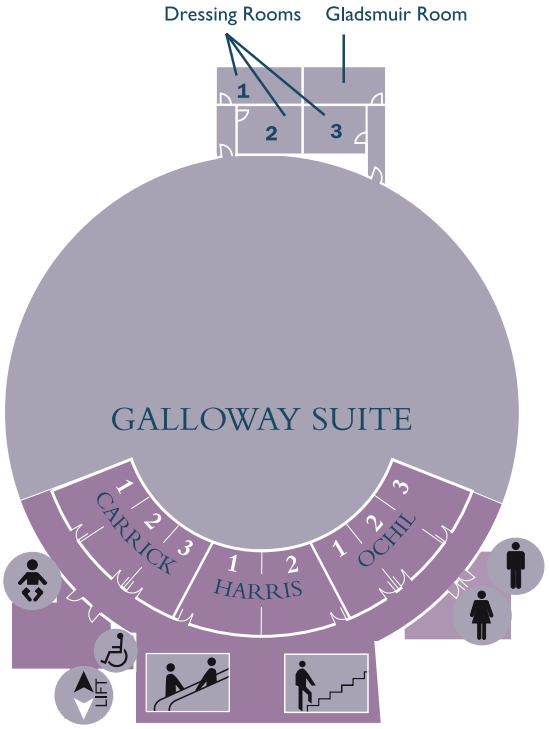

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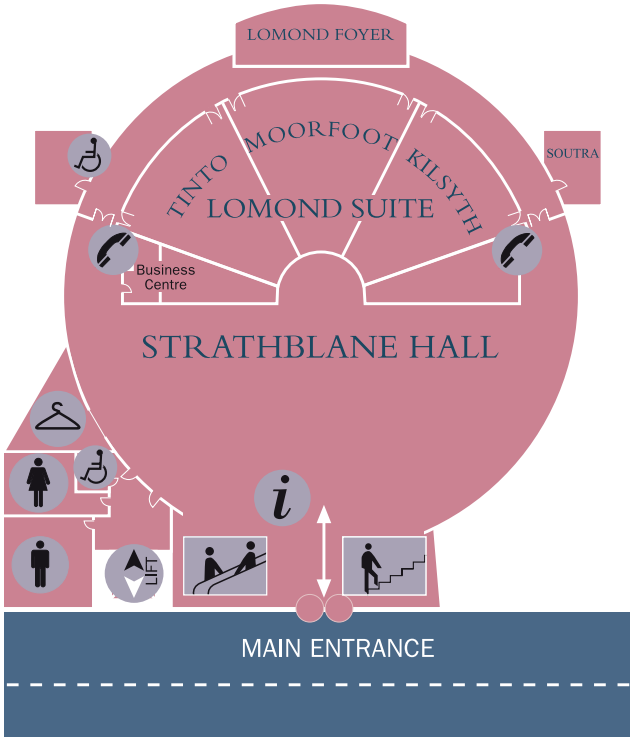

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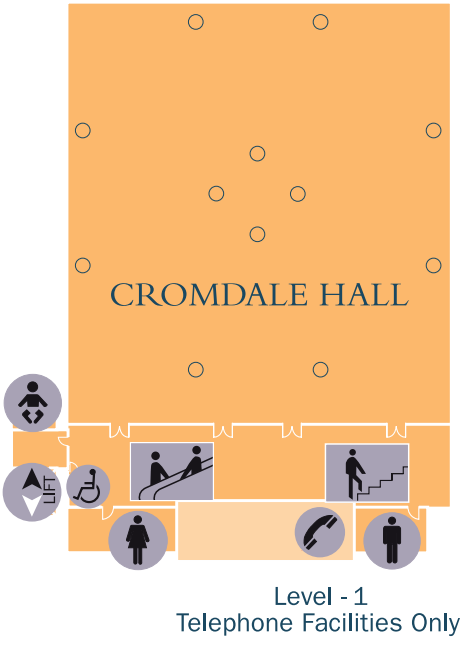


LEVEL -2

PROGRAMME

WEDNESDAY, MAY 22ND 2013 – REGISTRATION 08:00 TO 18:00

13:00-14:20	**Opening & Keynote Addresses – Pentland Suite**		
13:00-13:10	**Welcome Address** Mark White – ESPHM 2013 President		
13:10-13:45	**The UK Pig Industry** Stewart Houston CBE		
13:45-14:20	**Emerging Clinical Threats** Joaquim Ségales		
14:20-15:20	**Clinical Club – Part 1 – Pentland Suite**		
14:20-14:35	**Diagnosis of recent leptospirosis outbreaks in pigs in England** ***Susanna Williamson***, *Alex Barlow, Catriona Gaudie, Ben Strugnell, Charlotte Featherstone, Paul Duff & Lee Smith*		
14:35-14:50	**Importance of microbial culture to identify (novel) highly beta-hemolytic Brachyspira species** ***E. de Jong***, *M. Mahu, V. Vandenbroucke, T. Vandersmissen, F. Boyen & C. Miry*		
14:50-15:05	**Control of Glässer's disease when introduced into a naïve SPF herd** ***Axel Sannö***, *Lena Eliasson-Selling & Per Wallgren*		
15:05-15:20	**Description of a *Streptococcus suis* serotype 7 infection in an Austrian piglet producing farm** ***C. Unterweger***, *M. Höcher, L.Fischer, A. Weiss & I. Hennig-Pauka*		
15:20-15:50	**Coffee Break – Cromdale Hall**		
15:50-16:50	**Clinical Club – Part 2 – Pentland Suite**		
15:50-16:05	***Klebsiella pneumoniae* subsp. *pneumoniae* sequence type 25: re-emergence as a cause of septicaemia in piglets in 2012** ***Cornelia Bidewell***, *Susanna Williamson, Jon Rogers, Therese Carson, Cath Clark, Richard Ellis & Manal AbuOun*		
16:05-16:20	**Successful PRRSV elimination in a gilt rearing farm** ***Katja Brase***, *Helmut Wilke, Pieter Mesu, Gabriele Schagemann & Sabine Schrauth*		
16:20-16:35	**The effect of all-in all-out management by site on infection with *Mycoplasma hyopneumoniae* and *Actinobacillus pleuropneumoniae* in finishers** ***Marie Erika Busch***, *Henriette Steinmetz & Torben Jensen*		
16:35-16:50	**Pigs with undocked tails in a conventional nursery and fattening unit – a report** ***Michael Alt***, *Heiko Janssen & Hartwig Fehrendt*		
16:50-17:30	**Scientific Quiz – Pentland Suite**		
17:30-18:30	**Pentland Suite**	**ECPHM AGM**	**Poster Session – Cromdale Hall**
18:30-19:00		**EAPHM AGM**	
19:00-20:30	**Welcome Reception – Cromdale Hall**		

THURSDAY, MAY 23RD 2013 AM – REGISTRATION 08:00 TO 18:00

08:00-08:30	Nominated Poster Presentations – Cromdale Hall			
08:30-10:00	Keynote Addresses – Influenza – Pentland Suite			
08:30-09:05	**Pigs And Pandemic Influenza: Getting Closer To The Truth** Kristien van Reeth			
09:05-09:40	**Practical On-Farm Solutions To Tackle Swine Influenza** Giampetro Sandri			
09:40-10:00	Round Table Discussion			
10:00-10:20	Coffee Break – Cromdale Hall			
10:20-12:00	Parallel Session		Residents' Session	
10:20-10:40	Pentland Suite	**Molecular epidemiology of porcine reproductive and respiratory syndrome infections in England** ***Jean-Pierre Frossard***, *Ben Strugnell, Catherine Fearnley & Susanna Williamson*	Sidlaw Room	***Actinobacillus pleuropneumoniae* colonisation before weaning in offspring from sows on two endemically infected farms** ***T.J. Tobias***, *D. Klinkenberg, A. Bouma, J. van den Broek, A.J.J.M. Daemen, J.A. Stegeman &J.A. Wagenaar*
10:40-11:00		**Risk assessment of the introduction of Porcine Reproductive and Respiratory Syndrome into Switzerland via boar semen** *Christina Nathues, Urs Zimmerli, Ruth Hauser, Heiko Nathues, Elisabeth grosse Beilage & Gertraud Schüpbach-Regula*		**Efficacy of vaccination against *Actinobacillus pleuropneumoniae* on pleuritis lesions in slaughter pigs and their technical and economic performance in Belgium** *Rubén Del Pozo Sacristán, Annelies Michiels, Marc Martens, Freddy Haesebrouck & Dominiek Maes*
11:00-11:20		**Evidence of recurrent Influenza infections in pig farms and associated epidemiological characteristics** ***N. Rose***, *S. Herve, E. Eveno, N. Barbier, F. Eono, V. Dorenlor, C. Camsusou, F. Madec & G. Simon*		**Case report: Peracute outbreak of *Haemophilus parasuis* infection in suckling piglets in a self-recruiting, specific pathogen free herd** ***Odd Magne Karlsen***, *Tone Bjordal Johansen, Hans Gamlem & Tore Framstad*
11:20-11:40		**Efficient protection of a swine pandemic H1N1 influenza virus vaccine against the newly emerged H1N2 pandemic virus reassortant** *Ralf Dürrwald &* ***Michael Schlegel***		**Slaughterhouse examination of culled sows in commercial pig herds** ***E. de Jong***, *R. Appeltant, J. Beek, F. Boyen, K. Chiers, A. Van Soom & D. Maes*
11:40-12:00		**Investigation of anomalous H1N2 serology results on swine influenza-infected pig farms** *Catriona Gaudie, Susanna Williamson, Cornelia Bidewell, Ben Strugnell, Chris Russell &* ***Ian Brown***		**Action-related repetitive myoclonus (congenital tremor) in piglets – a case report** ***J. Beek***, *T. Vraeghe, I. Cornelis, F. Van Looveren & D. Maes*
12:00-13:00	Lunch – Cromdale Hall			

THURSDAY, MAY 23RD 2013 PM – REGISTRATION 08:00 TO 18:00

13:00-15:15	**Partners' Session – Pentland Suite**
13:00-13:15	**Mutant Prevention Concentration: a tool to support the responsible use of antimicrobials in swine production – *Bayer PLC Animal Health*** ***Raúl Vázquez***
13:15-13:30	**Worldwide occurrence of fumonisins and their effective counteraction *in vivo* – *Biomin*** ***Diego Padoan***, *Karin Naehrer, Dieter Moll & Carlos Mallman*
13:30-13:45	**Different PCV2 vaccine protocols reduce PCV2 viraemia by the same magnitude – *Boehringer Ingelheim Animal Health*** *Brian Payne, Amanda Sponheim & Keith Bretey*
13:45-14:00	**An optimised swine management approach and its value to the industry – *Elanco*** ***Alvaro Hidalgo***
14:00-14:15	**HIPRA PRRS approach under field conditions – *Hipra*** ***Isaac Rodríguez***
14:15-14:30	**Effect of Tilmovet® and KetoProPig® on post-weaning diarrhoea and *Streptococcus suis* in piglets – *Huvepharma NV*** ***Wouter Depondt***, *Stefaan Demarez, Mike Overend, Henk Lecuyse & Alain Kanora*
14:30-14:45	**Development of a subunit vaccine containing recombinant Stx2e against Oedema Disease of pigs and its impact in the field – *IDT Biologika GmbH*** ***Olaf Bastert***, *Regine Fricke, Olaf Lüder, Volker Florian, Rolf Bauerfeind & Hans-Joachim Selbitz*
14:45-15:00	**Efficacy and tolerance of Pracetam in the reduction of post-operative pain following the castration of piglets – a comparison of two dosages versus a placebo – *Laboratoire Sogeval*** *Anne Trotel, Valérie Courboulay, Anne Hémonic, Florian Voisin, Eric Pagot, Nathalie Capdevielle, Arnaud Anty, Claudine Zemirline*
15:00-15:15	**Efficacy of GRIPOVAC®3/RESPIPORC® FLU3 against challenge with a recent H1N2 Swine Influenza Virus in pigs – *Merial – A Sanofi Company*** *K. van der Meulen, P. Elskens, M. Schlegel, R. Dürrwald, H.-J. Selbitz,* ***T. Vila****, M. Bublot, F. Joisel & K. Van Reeth*
15:15-15:45	**Coffee Break – Cromdale Hall**
15:45-16:30	**Partners' Session continued – Pentland Suite**
15:45-16:00	**Efficacy of a new combination vaccine against *E.coli* & Clostridium spp. on a Dutch farm undergoing a *Clostridium perfringens* type A infection – *MSD Animal Health*** *M.R.T.M. Martens, M.J.S. Reijnders, K. Redhead, M.H. Witvliet & A.S. Eggen*
16:00-16:15	**Detection of PRRSV antibody in oral fluid specimens from individual boars using a commercial PRRSV serum antibody ELISA – *PIC*** *A. Kittawornrat, M. Engle, J. Johnson, J. Prickett, C. Olsen, T. Schwartz, D. Whitney, K. Schwartz, A. Rice, A. Ballagi, S. Lizano, C. Wang, J. Zimmerman &* ***G. Shepherd***
16:15-16:30	**Using electronic clinical score in swine herds to set management decisions: one year of experience of IPC in Europe – *Zoetis*** *O. Azlor, A. Dereu, P. Doncecchi, A.C. Piñeiro & J. Morales*
16:30-18:00	**Keynote Addresses – Disease Management Horizons – Pentland Suite**
16:30-17:05	**Immunological Innovations In The Future Of Pig Health Management** Dan Tucker
17:05-17:40	**Future Environmental Control For Pig Production** Hugh Crabtree
17:40-18:00	**Round Table Discussion**
19:00-20:00	**PVS Past Presidents' Reception – Assembly Rooms**
20:00-23:00	**Symposium Gala Dinner – Assembly Rooms**

FRIDAY, MAY 24TH 2013 – REGISTRATION 08:00 TO 13:30

08:00-08:45	PVS AGM – Pentland Suite			
08:45-10:15	Keynote Addresses – Young Pig Gut – Pentland Suite			
08:45-09:20	**Microbiota, Metabolism and Immunity** Mick Bailey			
09:20-09:55	**Feed intake in young pigs and its importance for the 'post-antibiotic era'** Paul Toplis			
09:55-10:15	Round Table Discussion			
10:15-10:35	Coffee Break – Cromdale Hall			
10:35-12:35	Parallel Sessions			
10:35-10:55	Pentland Suite	**Results of a field trial for vaccine against oedema disease** *X. Sidler, S. Mattei, R. Fricke, W. Schmid, O. Bastert, O. Lüder & A. Becker*	Sidlaw Room	**An integrated system for pig health and welfare monitoring – fact or fiction?** ***Sue.C.Tongue**, Richard P. Smith, Carla Gomes, Toby Floyd, Elizabeth Marier, Guanghui Wu & Susanna Williamson*
10:55-11:15		**Observations on the latest epidemic strain of Salmonella in pigs: monophasic *S. Typhimurium*** ***G. Crayford** & R. Davies*		**Occurrence and severity of lung lesions in slaughter pigs vaccinated against *M. hyopneumoniae* with different strategies** ***Sonja Hillen**, Hermann Willems, Stephan v. Berg & Gerald Reiner*
11:15-11:35		**Severe acute gastritis in grower pigs associated with acute monophasic *S. Typhimurium* infection after withdrawal of acidified water** ***B.W. Strugnell** & R.J. Evans*		**Variability of ovulation in gilts; associated factors and consequences on reproductive performances in 4 pig farms** E. Sallé, M. Le Jeune, Y. Huang & ***S. Boulot***
11:35-11:55		**Development and validation of a *Streptococcus suis* serotype 2 meningitis challenge model in pigs** ***David Reddick** & Cliff Ramage*		**An ultrasonographical, histological and immunohistochemical investigation of the growing mammary gland in the pig** *David Sporn, Axel Wehrend, Johannes Seeger & Johannes Kauffold*
11:55-12:15		**Septicaemic pasteurellosis in free-range pigs in Spain: an emerging disease?** *F. Cardoso-Toset, **J. Gómez-Laguna**, M. Callejo, A.I. Vela, L. Carrasco, J.F. Fernández-Garayzábal, A. Maldonado & I. Luque*		**Bone formation and resorption throughout the reproductive cycle of primiparous and multiparous sows** ***M.M.J. Van Riet**, S. Millet, A. Liesegang, E. Nalon, F.A.M. Tuyttens, D. Maes & G.P.J. Janssens*
12:15-12:35		**Association between blood haemoglobin concentration in sows and neonatal piglets** *Anna Kathrine Jensen & Jens Peter Nielsen*		**Longevity of gestating sows statistically related to lameness, leg and claw problems** ***Elisabeth Okholm Nielsen**,* *Lisbeth Ulrich Hansen, Hanne Midtgaard Rasmussen, Flemming Thorup & Mai Britt Friis Nielsen*
12:35-12:50	6th ESPHM Presentation – Pentland Suite			
12:50-13:00	Closing Address & Handover of PVS Presidency – Pentland Suite			

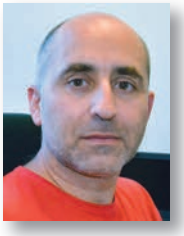
KEYNOTE SPEAKERS

STEWART HOUSTON

The UK Pig Industry

Stewart is a director in a family business focused on pig production. He is Chair of the British Pig Executive (BPEX) and was the most recent past Chair of the National Pig Association. He is a David Black Award winner and a Fellow of the Royal Agricultural Society. Stewart was awarded a CBE in the 2007 Queen's Birthday Honours for services to agriculture.

JOAQUIM SEGALES



Emerging Clinical Threats

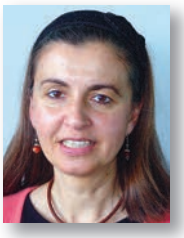
Professor Joaquim Segalés is a world-renowned figure in the world of pig diagnostic pathology and applied research into important pig diseases. He qualified as DVM in 1991, achieved his PhD in 1996, became a diplomate of the European College of Veterinary Pathologists in 2000 and a diplomate and founding member of the European College of Porcine Health Management in 2004.

His current position is the director of the *Centre de Recerca en Sanitat Animal* (CReSA) and Associate Professor at the Veterinary School of the Universitat Autònoma de Barcelona, where his everyday work is focussed on pathology and swine clinics.

Prof. Segalés has also been a diagnostician at the Pathology Department of the Veterinary School of Barcelona since 1996, where he has responsibility for the pathological diagnostic activity in swine.

As a leading world researcher in pig matters, Prof. Segalés has been involved in research of swine diseases since 1993, mainly infectious diseases (including infections by porcine reproductive and respiratory syndrome virus (PRRSV), Aujeszky's disease virus, porcine circovirus type 2 (PCV2), swine hepatitis E virus, swine Torque teno sus viruses (TTSuV), *Haemophilus parasuis* and *Mycoplasma hyopneumoniae*). He has co-authored more than 200 articles in international peer-reviewed journals.

KRISTIEN VAN REETH



Pigs And Pandemic Influenza: Getting Closer To The Truth

EDUCATION AND TRAINING

2000	Visiting post-doctoral fellowship Dept. Of Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin-Madison, USA.
1998	PhD in Veterinary Sciences, Laboratory of Virology, Faculty of Veterinary Medicine, Ghent University, Belgium.
1985-1991	Veterinary Medicine at the Faculty of Veterinary Medicine, Ghent University, Belgium.

WORK EXPERIENCE

Associate Professor, Laboratory of Virology, Faculty of Veterinary Medicine, Ghent University, Belgium.

Main research fields: Pathogenesis and immune response to swine influenza virus, public health aspects of swine influenza virus, pathobiology of the porcine respiratory disease complex.

Member of the executive committee of OFFLU (OIE/FAO network of expertise on animal influenza); co-chair of the OFFLU swine influenza virus group.

Member and expert Chamber of Veterinary Medicines, Belgium.

Member of the Royal Academy for Medicine of Belgium.

Member of professional societies for virology, microbiology and swine health: European Society for Veterinary Virology (ESVV), American Society for Microbiology (ASM), American Association for the Advancement of Science (AAAS), Belgian Society for Microbiology (BSM), International Pig Veterinary Society (IPVS) Belgian Branch.

GIAMPIETRO SANDRI

Practical On-Farm Solutions To Tackle Swine Influenza

Giampietro Sandri achieved his DVM from the University of Parma in 1981, having written his thesis on porcine stress syndrome. He has worked for Gruppo Veronesi, the largest integrated swine producer in Italy, since 1983 and is currently Health Director of the swine business, leading a team of nine vets. Dr. Sandri is a well known and regular speaker at national and international scientific meetings and congresses and well as courses for swine veterinarians and producers.

Dr. Sandri was a board member of SPIAS (the Italian Society of Swine Pathology and production) between 1989 and 1994 and between 1999 and 2006, serving as Vice president during this second term. He was Secretary of the organising committee of the XLV IPVS Congress in Bologna and a board member of the IPVS. He was awarded the 'Porco Bravo' industry award in 2007.

DAN TUCKER

Immunological Innovations In The Future Of Pig Health Management

A.W. (Dan) Tucker is Senior Lecturer in Veterinary Public Health at the University of Cambridge's Department of Veterinary Medicine (www.vet.cam.ac.uk) where he is responsible for teaching pig medicine and veterinary public health. He is a Fellow of Pembroke College, Cambridge (www.pem.cam.ac.uk). His research interests are focused on respiratory infections of pigs and more generally the interface between emerging technologies and pig health. He maintains clinical activity and has long term links with the pig breeding and animal health industries. He is a Diplomate of the European Colleges of Porcine Health Management and the European College of Veterinary Public Health. He is member of the UK Animal Health and Veterinary Laboratories Agency (AHVLA) Pig Expert Group, and served for a number of years on the Executive of the UK's Pig Veterinary Society and also on the UK Pig Levy Board's (BPEX Ltd) Pig Technical Committee.

HUGH CRABTREE

Future Environmental Control For Pig Production

Hugh Crabtree gained a first class honours degree at Reading University and continued with post graduate research into thermal performance in pig buildings. A founder member of Farmex Ltd in 1980 the company has gone on to become the market leader in ventilation systems for pig production in the UK. Three times winner of the New Equipment Award at the British Pig & Poultry Fair Farmex is now at the forefront of real-time production monitoring both in the UK and the States.

Hugh is a Fellow of the Institution of Agricultural Engineers and a past Vice Chairman of the National Pig Association. He is a current member of the Allied Industries Group of the NPA. Outside business, Hugh is a past Chairman of Reading RFC, runs a touring band – Feast of Fiddles, collects wine and is restoring a 1955 Sunbeam Mk III. Hugh is married with three children.

MICK BAILEY

Microbiota, Metabolism And Immunity

Mick graduated from Bristol Veterinary School in 1979 and immediately started a PhD at Cambridge on immune responses to parasite infections. After the PhD, he spent a year in practice, then took up a postdoc at Bristol working on immune responses to food antigens around weaning. Over the last 25 years, he has been studying the factors determining development of immunological competence in young piglets, gradually focusing on the role of early microbial colonisation. Because of the similarities between this process and the role of early-life microbiota in human infant allergies, his group have developed the use of young piglets as immunological models for human infants in addition to their economic importance as agricultural species. This, in turn, has resulted in an interest in comparative evolution of immune systems. As a sideline, his group has been involved with several other groups interested in large animal models of transplantation including laryngeal, vascular, intestinal and corneal allografts. One of the main approaches they have used has been quantitative imaging, and they also collaborate on non-immunological projects using this technology, including identifying meiotic stages of the animal pathogen *Trypanosoma brucei brucei* in tsetse flies. Mick was appointed to a chair in Comparative Immunology in 2006.

PAUL TOPLIS

Feed intake in young pigs and its importance for the 'post-antibiotic era'

After graduating, Paul joined RHM Agriculture as an assistant nutritionist working on ruminant, pig and poultry nutrition. Paul was appointed National Pig Nutritionist in 1976 and after four years became RHM's Chief Nutritionist. In 1982 Paul was appointed manager of the company's centralised diet formulation department with responsibility for 15 feed mills manufacturing over 1 million tonnes of compound feed. In 1985 Paul moved into the premix industry where he increasingly specialised in commercial pig formulations and began regular export work.

In 1989 Paul joined SCA Nutrition with a remit to begin export activity. In 1994 SCA Nutrition were awarded the Queen's award for Export Achievement (and remain the only livestock feed manufacturer to ever win this award). Paul left SCA in 1996 with three fellow directors to form Primary Diets where he still serves as Technical Director.

Paul has and continues to serve of numerous industry committees and boards including; over twenty years on the Agricultural Industries Federation Legal Affairs and Scientific Committee, current member of both the Responsible Use of Medicines in Agriculture Board and NPA Allied Industry Committee and two recent terms on the Pig Veterinary Society Executive. In 2011 Paul received the David Black award for outstanding and sustained contribution to the UK pig industry.

Paul has maintained an on farm advisory role throughout his career, both in the UK and overseas, and normally visits one or more pig units each week to help with problem solving or to give feeding recommendations.

STRUCTURE OF THE UK PIG INDUSTRY

Stewart Houston

The total number of pigs recorded in the UK June Agricultural Census rose slightly in 2012, for the first time since 2006. The total was up by 0.9 per cent, to stand at 4.48 million head. The female breeding herd on the other hand fell by 1.5 per cent to 425,000 head. The total breeding pig herd was virtually unchanged between 2011 and 2012 and stood at 523,000 head. On the back of improved sow productivity, the number of fattening pigs rose by one per cent to 3.96 million head. The number of in-pig sows increased by nearly five per cent but the number of suckling or dry sows fell sharply. This may reflect increased replacement levels since maiden gilt numbers were up by nine per cent. The increase in the UK pig herd was also reflected in the English, Welsh and Northern Irish herds, all of which were slightly larger than in 2012. In contrast, the Scottish herd suffered a further decline, falling by seven per cent to just 363,000 head. The Scottish breeding herd fell even more sharply. Since the June census was undertaken, feed prices have increased sharply. This is thought to have led to a fall in the size of the breeding herd of perhaps as much as five per cent. This will be clarified when results from the December census are published in March 2013. There were 10,900 commercial agricultural holdings with pigs in the UK in 2011 (figures for 2012 are not yet available), 6,000 of which had female breeding pigs and 9,000 of which had fattening pigs. This implies that just over 4,000 holdings had both breeding and fattening pigs. The average number of female breeding pigs on each commercial holding was 72. However, excluding those holdings with five or fewer breeding pigs, the average number was 153. The average size of breeding herds has fallen steadily over the last decade from a peak of 92 in 2002. The average number of fattening pigs on each holding was 437. Excluding holdings with fewer than ten pigs, the average was 768. This average has also fallen over the last decade. The figures above include many holdings which keep pigs but which are also engaged in other agricultural activities. When holdings were classified based on their predominant activity, there were 5,600 specialist pig holdings in the UK in 2010 (the latest year for which figures are available). Of the specialist pig holdings, only 1,600 were in England. These holdings accounted for 71 per cent of pigs on commercial holdings in England. The 1,100 specialist pig holdings with breeding pigs had an average of 300 breeding pigs. Pig holdings with other pigs had an average of 1,500. Pig producers are highly geographically concentrated. Of the 4.5 million pigs in the UK, around 81 per cent are in England, with 10 per cent in Northern Ireland, nine per cent in Scotland and less than one per cent in Wales. In 2010, well over half of England's pigs were concentrated in just four counties: Norfolk, Suffolk and North and East Yorkshire. There are also significant concentrations in Northern Ireland, to the South & East of Lough Neagh. The decline in abattoir numbers has led to a high degree of concentration. The 16 specialist pig abattoirs accounted for around 70 per cent of all pigs slaughtered during 2010. In fact, the seven largest plants (including one non-specialist) killed around two-thirds of all pigs. The four largest companies, with nine sites between them, killed around three-quarters of English pigs. The majority of holdings with pigs are not specialist pig farms. This is particularly true of those involved in finishing pigs, but many pig breeders are also not specialists. It is therefore, impossible to accurately determine the contribution of these farms to the workforce involved in pig production. In England, around 40 per cent of the commercial pig breeding herd are kept outdoors. This percentage varies little between different stages in the breeding cycle and has risen from under 30 per cent five years ago. The remaining 60 per cent of sows and gilts are kept in indoor systems but here there are differences across the breeding cycle. During farrowing and whilst sows are suckling piglets, most are kept on fully or partly slatted floors, although a significant minority are kept on straw. However, for the remainder of the breeding cycle, most indoor sows are kept on straw-based systems. Almost all indoor maiden gilts are kept on straw. Outdoor breeding pigs are typically housed at a density of around 15 sows/gilts per hectare. In around 80 per cent of cases, outdoor pigs are used as part of a rotation system, with pigs spending an average of 17 months in a paddock before they are rotated. Most outdoor producers provide pig arcs for shelter, with some using cabins or tents as well as or instead of arcs. Once piglets have been weaned, they are less likely to be kept outdoors. Only around one in five weaners (between 7 and 30kg) are housed outdoors, with stocking densities much higher than for breeding pigs, typically close to 400 per hectare. Where weaners are housed indoors, over half are on straw with the remainder mainly on fully-slatted floors. At later stages in the feeding process, pigs are much less likely to be housed outdoors. Only three per cent of commercial growers (between 30 and 65kg) and finishers (over 65kg) are kept outdoors, although these figures are likely to be higher for smaller producers, for whom equivalent figures are not available. The majority of pigs which are housed indoors are on straw, a proportion which has increased in recent years. Finishers are more likely to be on slatted floors than growers.

NOTES

THE THREAT OF EMERGING AND RE-EMERGING DISEASES IN PIGS

Joaquim Segalés

Centre de Recerca en Sanitat Animal (CReSA), UAB-IRTA, Campus de la Universitat Autònoma de Barcelona, and Departament de Sanitat i Anatomia Animals, Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Spain.

The World Health Organisation (WHO) defines an emerging disease as one that has appeared in a population for the first time, or that may have existed previously but is rapidly increasing in incidence or geographic range. These have increased over the last 20-30 years. Most of them are infectious diseases; their transmissibility and maintenance in a population is favoured by a number of phenomena, including intensive rearing practices and globalised/international trading. The last 10 years have shown a significant increase in the knowledge of newly discovered infectious agents particularly viruses of unknown pathogenicity. This presentation discusses the general and particular causes of the appearance of new diseases or novel presentations of known diseases and the recently recognised infections of as yet unknown impact. Mechanisms of emergence and re-emergence of diseases and the duality of "disease and infection" are discussed in general.

The infectious component is usually a significant element which guarantees, that transmission and infection would occur in a relatively large number of individuals. Of course, once a new or a re-emerging disease spreads into a population of naïve animals reared under intensive conditions, human action plays a major role in its evolution. Firstly, measures are established to limit the transmission of the pathogen. Over time, the infection may be endemically maintained causing minimal (sub-clinical) or sporadic disease. Eventually, the infection can be eradicated, recreating a population of susceptible animals.

The differentiation between infection and disease is relevant. In fact, a pathogen-exposed animal may eventually develop illness subjected to a number of factors. Factors influencing host susceptibility or resistance to disease include age, immuno-competency, vaccination status, genetic predisposition, concomitant disease problems, stress, environment, management, and nutritional status. Another factor is the intrinsic virulence of the infectious agent which is variable within types, serotypes or genotypes of a given pathogen.

Traditionally, veterinarians have dealt with overt diseases, with the main task of counteracting them and getting profitability of the production system represented by a farm or a group of farms. Moreover, several decades ago, the most important diseases affecting pigs(such as ASF) were considered mostly "uni-factorial" and these have been controlled or are under control. The control of these diseases increased the awareness of less devastating but economically important infections such as *Mycoplasma hyopneumoniae, Brachyspira hyodysenteriae, Actinobacillus pleuropneumoniae*, porcine reproductive and respiratory syndrome (PRRS) virus, and porcine circovirus type 2. All of them are considered "multi-factorial" since the mere presence of the agent is not sufficient to trigger the disease. There are some exceptions such as certain serotypes of *A. pleuropneumoniae* in naïve herds or the reproductive form of PRRS in sero-negative farms which may be considered as "uni-factorial". Other diseases have probably been there all the time, but their relevance has increased over 20 years, such as colibacillosis, Glässer's disease, proliferative enteropathies, and swine influenza. Finally, there is a third category of infectious agents of unknown clinical significance. Most of these latter infections are ubiquitous in the swine population but have a poorly understood epidemiology and pathogenicity.

The risk of emerging and re-emerging diseases with significant economic losses and infections with unknown impact on production is high. Pig production is a good example of a globalised industry, and swine veterinarians and researchers in conjunction with producers, consumers, and stakeholders should join efforts for more global, collaborative, and action-oriented approaches towards logical and practical solutions. Definitively, the concept of "one world, one health" and its related disciplines are corner-stones to keep swine production as a high quality, friendly, safe, consumer-acceptable, and profitable activity.

NOTES

PIGS AND PANDEMIC INFLUENZA: GETTING CLOSER TO THE TRUTH

Kristien Van Reeth
Laboratory of Virology, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium.

Pigs have been assigned a role in the generation of pandemic influenza viruses for humans for decades. In theory, such pandemic viruses could emerge following a) adaptation of a strain of avian origin to humans by mutations and/or genetic re-assortment with a human influenza virus or b) adaptation of an established swine strain to humans. The classic viewpoint is that pigs are more susceptible to avian influenza viruses than humans, and that they are essential intermediate hosts for the introduction of avian viruses or avian virus genes in the human population. This central dogma apparently needs to be revised, as shown by recent zoonotic flu infections and experimental studies. Some 700 human cases of infection with the highly pathogenic H5N1 bird flu virus have occurred since 2003. These cases were invariably due to direct contact with infected poultry, not with pigs. The H5N1 virus so far fails to spread efficiently between humans and thus could not cause a human pandemic. Avian influenza viruses including H5N1 have been able to infect pigs under experimental conditions and in nature. However, there is clearly a strong barrier to infection of pigs and the avian viruses lack the capacity to spread between pigs. In fact there is no evidence that pigs are more susceptible to avian viruses than humans or that pigs serve as unique "mixing vessels", since genetic re-assortment between avian and mammalian influenza viruses can also occur in several bird species.

On the other hand, the same influenza virus subtypes that infect humans – H1N1, H3N2 and H1N2 – are endemic in swine populations worldwide. Many of these viruses are entirely or in part of human origin, but they follow a different evolution in swine and in humans. Such swine-adapted H1 and H3 viruses occasionally jump (back) to humans, but as for wholly avian influenza viruses second generation transmission is extremely rare. The 2009 pandemic H1N1 virus is the first virus of presumed swine origin that resulted in efficient transmission between humans. The latter virus is a re-assortant between established swine influenza viruses from North America and Europe, with gene segments of avian, human and swine origin. Still, it remains unknown how, when and where this specific re-assortant emerged. In 2011 and 2012, another swine-origin re-assortant, subtype H3N2, has infected some 300 children at pig fairs in North America. Unlike the 2009 pandemic H1N1 virus, this so-called "H3N2 variant" virus did not spread readily between humans. Unfortunately, we still have a very limited understanding of what is needed for adaptation of avian influenza viruses to pigs, for influenza virus transmission from pigs to humans, and for sustained transmission of such viruses in the human population. On the positive side, the 2009 pandemic has given a boost to swine influenza virus surveillance, as well as to experimental research of the host barriers for influenza viruses in pigs and other animals. In my lecture I will review the major lessons learned from these complicated studies. I will also address the role of the veterinarian in the prevention of zoonotic swine influenza virus infections.

NOTES

PRACTICAL ON-FARM SOLUTIONS TO TACKLE SWINE INFLUENZA

Giampietro Sandri
Agricola tre Valli, Gruppo Veronesi – Verona, Italy.

Swine Influenza Virus (SIV) is known to be a primary respiratory pathogen for swine, inducing typical lung lesions. In Europe and in Italy subtypes H1N1, H3N2 and H1N2 are almost endemic in many pig producing areas although there are different prevalences in different countries at different times. In most of the cases, SIV induces an acute infection of the respiratory tract whose consequences depend on the "intrinsic pathogenicity/virulence" of the specific virus, the pig's immune status and the pig's immune system reactivity. In the field, we may observe basically two different forms of Swine Influenza (SI). The most common is the Epizootic form affecting adult animals of different ages, all at the same time or in a short period of time. It usually has a sudden, acute onset, with pigs showing clinical signs within the first 12 to 48 hours after being infected. Affected animals show prostration, fever, anorexia, hard coughing, dyspnoea and nasal discharge. Secondary bacterial infections may contribute to complicate the course of the viral infection. The Enzootic form mostly affects young animals in the nursery period. The clinical appearance may be similar to the epizootic form but the final outcome is largely dependent on the dynamic of population immunity. This form is frequently seen on farrow-to-finish farms and when or where the mothers are not regularly vaccinated. The gross lesions caused by SIV start to develop as soon as 24 hours after infection and are usually limited to cranial and middle lobes of the lungs. In the most severe cases almost all of the lungs may be affected. Swine Influenza may be suspected every time there is a sudden acute respiratory disease affecting a large proportion of the pigs in a herd, but to confirm the diagnosis, virus isolation or detection using a PCR is required. The best samples to submit are the lung tissue of dead animals or a few nasal swabs taken from sick, high-fever animals. The hemagglutinins and neuraminidases are then determined using specific inhibition tests. I would not suggest using serology to diagnose influenza because of the interference of both maternal antibodies in young animals and vaccine immunity in vaccinated animals. Of course, there is no specific treatment for Swine Influenza. Affected animals only need careful nursing providing a good, warm and nicely ventilated environment. Antipyretics (aspirin or paracetamol) are very useful to treat pigs during the acute phase of the disease. Antibiotic treatment may only be used to treat concurrent or secondary bacterial infections. Biosecurity measures (All In/All Out management of groups, quarantine period of incoming animals, strict management of access to pigs) play a major role in preventing SIV infection. Nevertheless, these measures alone are not enough to efficiently prevent infection in densely pig populated areas where airborne spread may contribute to Influenza epidemics over relatively large geographical areas. Vaccination is therefore the most important tool to reduce the incidence of this infection/disease not only in sow herds but also in growing and finishing pigs. In Italy there are only two licensed inactivated vaccines on the market. Both have the H1N1 and H3N2 strains and only one has the new H1N2. The evaluation of the economic effect of SI vaccination may be contradictory and certainly requires and accurate evaluation of prevalence (hence the need for a monitoring programme) and costs (need to evaluate the cost of every single outbreak) in order to be able to evaluate the supposed benefits. In sow herds, besides protecting the mothers themselves, vaccination is aimed at reducing or possibly stopping transmission from the dam to the offspring, so the supposed economic benefits will also be transferred – if we may say so – to the following production stages. Surveillance and active monitoring of SIVs changes remain a primary requirement. Understanding where SIVs are coming from and how they enter pig farms is also crucial. Despite the degree of protection provided by the available vaccines and the experimental challenges of these appear to be more than satisfactory, there is still the need to gather more scientific and economic evaluation of their real performances in the field. This is before their acceptance becomes more widespread. Nevertheless, when correctly applied, vaccination is today by far the most efficient tool – available for veterinarians and producers – to prevent and control SI.

NOTES

IMMUNOLOGICAL INNOVATIONS IN THE FUTURE OF PIG HEALTH MANAGEMENT

A.W. (Dan) Tucker
Department of Veterinary Medicine, University of Cambridge, UK.

The work outlined above emphasises the dependence of a herd's health on the inter-relationships between individual pig susceptibility, the environment and the local pathogen profile. The industry needs to focus on applying these approaches to ensure long term sustainability of a food source that is vital for the human population. Drivers will include the need for cost effective production through better feed efficiency, reduced disease losses, reduced dependence on antimicrobials, and preparedness for new emerging diseases and zoonoses. History emphasises that pigs are an important source of emerging infectious diseases, with significance for both pig and human health, and a number of factors make pigs a suitable platform for disease emergence and transmission to humans. To maximise the herd health benefit from our understanding of pig immunity and vaccinology we should combine this with better approaches to understand the ever-changing threat posed by pig pathogens – whether they are endemic, everyday, infections such as *Mycoplasma hyopneumoniae* or epizootic pathogens such as African Swine Fever virus.

The term 'dynamics of infectious disease' describes changes in prevalence and biology of specific pathogens within and between given populations over time. This information is important in better targeting existing management or vaccine-based controls. Typically, highly specific diagnostic tools are required in order to track pathogen strains within populations and the new, high throughput sequencing technologies could make these tests affordable and practical at herd level in the coming years. For example, better understanding of *Streptococcus suis* infection dynamics could simplify and strengthen eradication programmes, maybe without the need for repopulation. However, a given pig population may be colonised with multiple strains of *S. suis* and molecular tests are needed that can discriminate those strains that actually have potential significance for disease. These tools could allow better understanding of the prevalence, transmission and duration of carriage by relevant strains, and could lead to new approaches for control. Similar, sequence based, approaches that account for the whole genome (rather than the snapshot permitted by existing PCR-based testing), could support our understanding of PRRSV infection. Parallel infection of herds with multiple PRRSV strains is possible and understanding the dynamics of these combined infections in field populations using existing PCR approaches is not feasible. Whole genome approaches, which are becoming cheaper and increasingly applicable at field level, could shed light on host immunological factors and virus determinants that are associated with natural control, or the appearance of mutants able to escape immunity.

New advances in immunology and vaccine design promise real benefits to pig health, leading to downstream production efficiency, better food safety and pig welfare. Veterinarians have an important role in facilitating the acceptance and uptake of new technologies by producers. In the reverse direction, veterinarians should make use of their position at the interface of science and animal production to keep abreast of emerging technologies so that further applications, that may not be apparent to the fundamental scientists who drive them, can be identified.

NOTES

FUTURE ENVIRONMENTAL CONTROL FOR PIG PRODUCTION – MORE OF THE SAME OR RADICAL CHANGE?

Nick Bird & Hugh Crabtree
Directors, Farmex Ltd.

The basic physics involved in environmental control in pig production do not change. Practitioners may need regularly reminding of the basis on which ventilation systems are designed for example, but the starting point is always the same: a heat balance and contaminant removal. There has been a significant change in the number of animals each stockperson is expected to look after. More and more pigs are being looked after by fewer and fewer people. This means there will need to be an increasing investment in information technologies. If producers are going to achieve increased output at less environmental cost at the same time as satisfying consumer demands for high standards of animal health and welfare; then they will need to have the information and communication technology (ICT) tools available to them.

The trend is going to be for automatic data analysis with readily usable notifications delivered to operators using mobile devices. New buildings are likely to incorporate new ICT tools but if the type of performance changes that are required are going to be achieved existing buildings will also have to take on board real time monitoring.

There is a wide range of performance across the UK pig industry. The challenge is to get most producers to achieve top 10% performance. That would be a radical change indeed but it could be achievable with the routine use of new ICT tools that allow producers to get more right more of the time. Monitoring has been shown to modify behaviour in production management – if significant energy waste is exposed for example it quickly gets rectified.

Measuring water use by growing pigs is crucial as it provides important insights across all aspects of environmental control. This is already clearly understood in poultry production but is only just gaining credence in pig production. Understanding of growth, feed intake, and metabolism is improved through water use monitoring. Water data also has practical benefits such as leakage detection, batch on batch growth comparisons, monitoring labour and early illness detection for example.

If monitoring and ICT tools are to help producers achieve radically improved efficiency then they must focus on extracting maximum value from low cost, robust and available devices that use cloud-based technologies to deliver decision support where it's wanted, how it's wanted and to whom it's wanted. A shared knowledge resource will emerge and it could be exploited by the whole industry through professional technical support dedicated to gaining commercial advantage. Process monitoring in pig production is the ***radical change*** that is taking place across Europe now and is set to deliver significant efficiency gains to those that invest in it.

NOTES

MICROBIOTA, METABOLISM AND IMMUNITY: THE ROLE OF EARLY-LIFE EVENTS IN DETERMINING PIGLET PERFORMANCE

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ABSTRACT

Increasing evidence over the last decade has suggested that the complex process by which the intestinal tract is colonised with bacteria after birth has profound effects on development both of the immune system and of metabolism in human infants. Importantly, it is now apparent that very early-life events may have prolonged, sustained effects on both of these systems. The link between early-life microbial colonisation and later allergic or autoimmune disease (the 'hygiene hypothesis') was proposed two decades ago. Initially, early-life exposure to pathogens was hypothesised to be the major protective factor. However, the development of high-throughput sequencing approaches to characterise the entire gut microbial ecosystem have demonstrated marked differences between individual humans in the initial establishment and subsequent development of normal commensal microbiota. In rodent models, specific components of the gut microbiota have dramatic effects on the function of the mucosal immune system. More recently, it has become apparent that changes in this pattern of microbial colonisation are also linked to a range of juvenile and adult metabolic diseases in humans, including diabetes, obesity, atherosclerosis. Thus, the evidence now indicates that very early events which affect microbial colonisation of human infants (maternal microbiota, weaning age, diet, environmental 'hygiene') have long-term effects on health and disease.

In contrast, the idea that very early-life events can have long-term effects on pig health and performance has not achieved wide publicity. The suckling period is frequently regarded simply as a way of delivering a sufficient number of weaned piglets of an acceptable weight into the growing stage. However, the immune and metabolic systems are key determinants of later pig performance, governing resistance to infectious disease and conversion of feed to body mass. Early life events which have persistent, long term effects on these systems are likely to be key targets for improving pig health, welfare and performance in future.

Our recent studies have used experimental systems ranging from highly reductionist, defined colonisation of gnotobiotic piglets through specific intervention in isolator-reared piglets to comparisons of piglets under different rearing conditions. Under highly controlled conditions, colonisation with defined, three-component microbiota results in expansion and development of the B-cell, T-cell and antigen-presenting-cell compartments of the mucosal immune system of neonatal piglets. By comparing piglets from different farm sources, either reared on the sow or moved to SPF isolators, we have further demonstrated that rearing environment during the first 24 hours, and from 1 day until weaning, have independent and interacting effects on development of function of antigen-presenting cells and T-cells in the intestinal mucosa. Finally, we have shown that specific intervention with pre- or probiotic from weaning or from the first day of life can have significant effects on development of the mucosal immune system and on metabolism.

Our results clearly demonstrate that treatments which influence the intestinal microbiota in young piglets have surprisingly persistent effects on intestinal microbiota in later life, and that these differences are linked to long-term alterations in the structure and function of the immune and metabolic systems. We have not examined the impact of these manipulations on pig performance in commercial situations. However, on-farm studies have demonstrated significant differences between farms in development of the immune system in young piglets. It seems likely that these differences reflect differences in the type of antigenic and microbial challenge between farms. While there is considerable potential for intervention at birth and at weaning aimed at improving pig health and performance throughout the growing and finishing periods, such interventions may need to be targeted at specific conditions on specific farms – the equivalent of the 'stratified medicine' approaches proposed for human populations.

NOTES

FEED INTAKE IN YOUNG PIGS AND ITS IMPORTANCE FOR THE 'POST-ANTIBIOTIC ERA'

P. Toplis[1], I.J. Wellock[1], K. Almond[1], P. Wilcock[2], C.L. Walk[2]

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The importance of promoting feed intake following weaning is often underestimated as a contributory factor towards reducing antimicrobial use. The focus of this paper is to discuss nutritional factors that influence feed intake and the potential consequences for a post-antibiotic era. Other important factors outside this area of research, most notably health status and management, are beyond the scope of this paper.

Pig production remains an economic activity, not an academic one and pig producers must deliver many of the changes necessary to reduce antimicrobial usage. It is incumbent on all involved in the pig industry to find cost effective ways to reduce antibiotic use which work not only at the test facility but repeatedly at farm level. Antibiotic reduction is more achievable and sustainable with highly digestible diets (usually higher cost), but current levels of profitability prevent widespread adoption of this route. Profitability is as much a reflection on consumer demands and pork retail price as producer efficiencies and cost control.

Weaned piglets would be expected to become hungry and seek food sources, yet they are often poorly motivated to ingest solid feed. Poor growth performance is commonly accompanied by an increased susceptibility to enteric disorders which has led to prophylactic use of antibiotics around the world. Having taken account of a variety of measures (villus height, crypt depth, intestinal permeability and inflammation and brush border enzyme activity) as indicators of small intestine integrity the authors propose the order of importance for enhancing gut health and subsequent growth performance, are firstly feed intake followed by feed ingredient choice and lastly nutrient level. Feed intake is the clear priority.

As feed intake appears to be the top priority, The Feed Industry continues to fund research to identify dietary measures which will facilitate a reduction in antimicrobial use while maintaining feed intake. For example, novel avenues of research are focusing on the impact of phytase superdosing (>1250FTU/kg) and the efficacy of pharmaceutical levels of zinc oxide on performance.

Feed intake should be promoted pre- and post-weaning utilising the full armoury of dietary, ingredient, management, and health measures at the disposal of the pig industry.

NOTES

THE FOLLOWING ABSTRACTS FOR BOTH THE ORAL AND POSTER PRESENTATIONS ARE PRINTED AS SUBMITTED BY THE CORRESPONDING AUTHORS – THEY HAVE NOT BEEN SUBJECT TO EDITORIAL REVISION

CLINICAL CLUB PRESENTATIONS – WEDNESDAY, MAY 22ND

PENTLAND SUITE

O1 **Diagnosis of recent leptospirosis outbreaks in pigs in England**
Susanna Williamson, Alex Barlow, Catriona Gaudie, Ben Strugnell, Charlotte Featherstone, Paul Duff & Lee Smith

O2 **Importance of microbial culture to identify (novel) highly beta-hemolytic Brachyspira species**
E. de Jong, M. Mahu, V. Vandenbroucke, T. Vandersmissen, F. Boyen & C. Miry

O3 **Control of Glässer's disease when introduced into a naïve SPF herd**
Axel Sannö, Lena Eliasson-Selling & Per Wallgren

O4 **Description of a *Streptococcus suis* serotype 7 infection in an Austrian piglet producing farm**
C. Unterweger, M. Höcher, L.Fischer, A. Weiss & I. Hennig-Pauka

O5 ***Klebsiella pneumoniae* subsp. *pneumoniae* sequence type 25: re-emergence as a cause of septicaemia in piglets in 2012**
Cornelia Bidewell, Susanna Williamson, Jon Rogers, Therese Carson, Cath Clark, Richard Ellis & Manal AbuOun

O6 **Successful PRRSV elimination in a gilt rearing farm**
Katja Brase, Helmut Wilke, Pieter Mesu, Gabriele Schagemann & Sabine Schrauth

O7 **The effect of all-in all-out management by site on infection with *Mycoplasma hyopneumoniae* and *Actinobacillus pleuropneumoniae* in finishers**
Marie Erika Busch, Henriette Steinmetz & Torben Jensen

O8 **Pigs with undocked tails in a conventional nursery and fattening unit – a report**
Michael Alt, Heiko Janssen & Hartwig Fehrendt

O1

Susanna Williamson[1], Alex Barlow[2], Catriona Gaudie[3], Ben Strugnell[3], Charlotte Featherstone[3], Paul Duff[4] and Lee Smith[5]

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DIAGNOSIS OF RECENT LEPTOSPIROSIS OUTBREAKS IN PIGS IN ENGLAND

Leptospirosis in pigs can occur due to infection with a range of Leptospira serovars, in particular those which are pig-adapted (for example, Bratislava and Pomona) but also those adapted to other hosts. Confirmation of disease due to leptospire infection depends on detection of the organism, seroconversion and/or histopathology. Polymerase chain reaction (PCR) tests have tended to replace other methods of detecting leptospires, allowing more rapid diagnosis and implementation of interventions such as vaccination, treatment and rodent control. An improved diagnostic PCR was introduced in 2011 to detect pathogenic leptospires in diagnostic submissions to Animal Health and Veterinary Laboratories Agency laboratories. Since its introduction, five outbreaks were diagnosed in 2011-2012 compared to just two from 2005 to 2010. The outbreaks involved systemic disease in growing pigs or reproductive disease in breeding pigs. In growing pigs, jaundice prompted suspicion of, and testing for, leptospires. Porcine circovirus-2 associated hepatitis, septicaemias, phenol toxicity and Mycoplasma suis were differentials considered for jaundiced pigs. The PCR detects pathogenic leptospires but does not identify the infecting serovar for which serology is vital. This was undertaken on four recent cases and mainly implicated infection with Leptospira Icterohaemorrhagiae and L. Bratislava. Outbreaks mostly occurred in late autumn probably associated with increased contact with wild rodents as temperatures fall and food sources become scarcer; significant rodent populations featured on affected farms. As leptospire infections are zoonotic, advice was given to limit the risk of human infection, especially to avoid contamination of people's mouths, noses, eyes or open wounds by pig urine, afterbirth, aborted and stillborn piglets. Effective rodent control is also important as urine from infected rodents represents a transmission risk to humans as well as pigs.

NOTES

O2

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IMPORTANCE OF MICROBIAL CULTURE TO IDENTIFY (NOVEL) HIGHLY BETA-HEMOLYTIC BRACHYSPIRA SPECIES

Brachyspira hyodysenteriae is considered the primary etiological agent of swine dysentery, causing severe mucohemorrhagic diarrhoea. Up till now, the presence of strong beta-hemolysis and positive ring-phenomenon differentiates the highly pathogenic B. hyodysenteriae from weak hemolytic – less pathogenic – species (B. innocens, B. murdochii and B. intermedia). However, recent data suggest that also other strongly beta-hemolytic Brachyspira species, identified as B. intermedia, can induce a dysentery-like disease in pigs (1). In a routine monitoring protocol, two gilts were presented for necropsy. Soft, watery colonic content was found. Microbial culture of fecal content revealed strongly beta-hemolytic, ring phenomenon-positive spirochetes, indicative for B. hyodysenteriae. In additional samples taken at the farm, strongly beta-hemolytic Brachyspira isolates, with ring phenomenon were again found on microbial culture, whereas PCR analysis (ADIAVET BRACHY) did not confirm the presence of B. hyodysenteriae. In order to elucidate this discrepancy, additional PCRs were performed targeting the 16S rRNA, 23S rRNA, nox, hlyA and tlyA genes of different swine-related Brachyspira spp (2,4). PCRs targeting nox and 23s rRNA specific for B. intermedia were positive. However, all isolates were also positive for tlyA and hlyA gene, hemolysins considered being virulence factors of B. hyodysenteriae. The hlyA gene was properly located between fabG en fabF genes encoding an ACP-reductase and – synthetase(4). A sequencing protocol, targeting a highly variable region of the Brachyspira nox gene(3), was performed, identifying the isolates as B. intermedia. Additionally, the obtained sequence showed high (>99%) similarity with sequences of previously published strongly hemolytic B. intermedia isolates(1). This case report highlights the fact that strongly hemolytic isolates, belonging to "less pathogenic" Brachyspira species can be isolated from field cases in Europe. While the presence of strong beta-hemolysis and ring phenomenon might indicate the pathogenicity (1), intense genotypic testing is required to correctly identify these isolates to the species level.

NOTES

O3

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CONTROL OF GLÄSSER'S DISEASE WHEN INTRODUCED INTO A NAÏVE SPF HERD

In July 2012, apathy and locomotor disorders were recorded in a pregnant gilt in an integrated SPF herd with 160 sows. Two weeks later, similar signs were recorded in a recently inseminated group of sows/gilts. Blood analysis indicated acute infections. Two sows/gilts died, and necropsy of one revealed an acute purulent encephalomeningitis, a fibrous pleuritis and pericarditis. Affected sows responded to Trim-sulpha and NSAIDs.

One week later, the first demonstration of Hemophilus parasuis in the herd was made in a dead piglet. At this stage, no clinical signs of disease were recorded in the four fattening units located only two corridors away, and the hygiene barriers within the herd were trimmed. Further, all sows were vaccinated against Glässer's disease, as well as all piglets before transfer to the fattening units.

No further signs of disease were recorded and vaccinations of growers were terminated two months later. However, signs of Glässer's disease were recorded in the first unvaccinated group in the fattening unit, followed by disease in the oldest group that not had been vaccinated. About 5% of the unvaccinated pigs developed disease and 1-2% died. All unaffected market weight pigs were sent for slaughter. All younger pigs were vaccinated and all pigs with disease were treated with Trim-sulpha and NSAIDs. The vaccinated groups remained unaffected and no more signs of disease have been recorded since. The low number of diseased animals and the slow spread of disease contradict other reports on severe consequences when naïve herds are exposed to Hemophilus parasuis. Subtyping of Hemophilus parasuis is therefore ongoing. However, since the microbe obviously was pathogenic, the high standard of the biosecurity might have contributed to the low morbidity. The onset of disease among sows/piglets was also unexpected and curious, and the way of introduction remains obscure.

NOTES

O4

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DESCRIPTION OF A *STREPTOCOCCUS SUIS* SEROTYPE 7 INFECTION IN AN AUSTRIAN PIGLET PRODUCING FARM

A Streptococcus suis (S. suis) serotype 7 infection in an Austrian piglet producing farm with 1000 sows is described. Two weeks after weaning piglets at five to eight weeks of age developed symptoms of meningitis (2%) and arthritis (2,5%). Mortality rate was approximately 2% in spite of antibiotic treatment. Cleaning and disinfection protocols were at high standard and a clear separation between all age groups was guaranteed. Routinely, newborn piglets were treated parenterally with ceftiofur on the 3rd day of live and with amoxicilline for ten days in medicated food after weaning. When symptoms occurred, amoxicilline treatment was continued later. Brain and joint samples of euthanised piglets (n=18) with symptoms of meningitis and/or arthritis were examined bacteriologically. Twenty-five S.suis isolates (medium to high-grade bacterial growth) were recovered, 15 of them were serotyped by coagglutination technique resulting in serotype 7 in all samples. All isolates were tested by multiplex-PCR using primer pairs specific for virulence-associated genes mrp (muraminidase-released protein), ef (extracellular factor), ofs (serum opacity factor) and sly (suilysin). All isolates were positive for mrp, but negative for epf, ofs and sly. No other pathogens typical for causing meningitis or arthritis could be isolated from clinical samples. Additional symptoms typical for S. suis infection as endocarditis, wasting, pneumonia or polyserositis were not seen on the farm. Four serotype 7 isolates were chosen for farm-specific vaccine production, which was applicated to suckling piglets in the first and third week of life, but without a protective effect. This case shows that not only S. suis serotype 2 (most common serotype in Austria), but also serotype 7 can cause clinical disease in Austrian pig farms. A vaccination program must be adjusted to specific farm conditions taking a potential interference with maternal antibodies and the time-point of outbreak of clinical disease into account.

NOTES

O5

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KLEBSIELLA PNEUMONIAE SUBSP. PNEUMONIAE SEQUENCE TYPE 25: RE-EMERGENCE AS A CAUSE OF SEPTICAEMIA IN PIGLETS IN 2012

Septicaemias due to *Klebsiella* species in pigs occurred sporadically until outbreaks of *Klebsiella pneumoniae* subsp. pneumoniae (Kpp) septicaemia were diagnosed in England on six pig units between July and September in 2011. No further cases were diagnosed until three farms were affected in July and August 2012. 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. Possible predisposing factors were investigated and included characterisation of the bacterial isolates. Epidemiological data collected from affected units has not, so far, explained the emergence of this pathogen. However there is a clear seasonal pattern of disease and all nine outbreaks were diagnosed on outdoor breeding units in Eastern England with disease occurring only in pre-weaned pigs from two weeks old. Isolates from the nine outbreaks were compared with historic isolates from pigs. Multilocus sequence typing (MLST) was performed following methods described at the *Klebsiella pneumoniae* MLST Database (http://pubmlst.org/kpneumoniae/). MLST revealed that all case isolates were in sequence type 25 (ST25 Kpp), while historic isolates were a variety of clades, none being ST25. Analysis of virulence gene content of case isolates showed that all possessed identical profiles, with all having the rmpA gene, which again differed from those of the historical isolates. The plasmid profile of the outbreak isolates also differed with ST25 Kpp having a 4.5kb plasmid which was absent in the historic isolates. Investigation of porcine upper respiratory tract carriage of Kpp in diagnostic carcase submissions and further analysis of the 4.5kb plasmid are being undertaken to progress understanding of the emergence of this pathogen.

NOTES

O6

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SUCCESSFUL PRRSV ELIMINATION IN A GILT REARING FARM

In late December 2011 PRRSV antibodies were detected in blood samples in a so far PRRSV-negative gilt rearing farm in the north of Germany. The farm has about 3000 places in six separate buildings on three sites and is supplied with four weeks-old piglets from a PRRS negative multiplier located in a distance of 100 km. PRRSV-infection with type 2 (US) virus with 99% homology with VR2332 was confirmed by additional blood samples in three buildings on all of the three sites, whereas samples of the multiplier gave no evidence of PRRSV-infection. No clinical signs were observed and virus was probably introduced via trucks used for the delivery of gilts or via aerosols from a neighbouring fattening farm. It was decided to attempt a PRRSV-elimination with the live vaccine Ingelvac® PRRS MLV without perpetuation of vaccine virus. In PRRSV-positive buildings all pigs were vaccinated twice with 2ml Ingelvac® PRRS MLV (February and March 2012). In each of the six buildings 10-17 blood samples were tested in a monthly interval from February to September 2012 for antibodies and PRRSV-genome. Due to the number of separate buildings, PRRSV-positive/vaccinated and PRRSV-negative animals could be reared and managed separately by different personnel. Vaccinated animals were successively sold out and emptied buildings where cleaned, disinfected and restocked with PRRSV negative pigs. Since February 2012 no PRRS positive blood samples have been detected in non-vaccinated animals. Because of different virus vectors the hygiene measures have been tightened at the most extreme. The transport of the negative piglets and vaccinated gilts was carried out with different vehicles and transportation routes did not overlap. Since blood tests until October were negative, it can be concluded that the PRRS virus has been successfully eliminated by vaccination and consistent management measures have prevented the spread and persistence of vaccine virus.

NOTES

O7

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THE EFFECT OF ALL-IN ALL-OUT MANAGEMENT BY SITE ON INFECTION WITH *MYCOPLASMA HYOPNEUMONIAE* AND *ACTINOBACILLUS PLEUROPNEUMONIAE* IN FINISHERS

In all-in all-out (AIAO) production systems, it is possible to produce batches of finishers that do not show signs of infection with the respiratory diseases that exist in the sow herd of origin. However, the success rate is often low. In finishing units managed AIAO by room, one of the possible sources of infection is pigs in other rooms. AIAO management by site eliminates this source of infection. The objective of this study was to compare the occurrence of infection with M. hyopneumoniae (Mh) and *A. pleuropneumoniae* (App) in finishing units managed AIAO by site and finishing units managed AIAO by room. Two production systems were included in the study. Each system consisted of one sow unit (comprising, respectively, 1300 and 2100 sows, infected with Mh and App), one weaner unit, and several finishing sites. Each of the two systems included a finishing site managed AIAO by room (4-6 batches on the site at a time) and a finishing site managed AIAO by site. From each of these four finishing sites, 6-7 batches of pigs were included in the study. At slaughter, pigs from each batch were bled, and lungs were examined macroscopically. Each batch was defined as infected or non-infected with Mh and App on the basis of serological analysis and pathology. On the two sites managed AIAO by room, 11 batches out of 13 were infected with Mh. On the two finishing sites managed AIAO by site, 2 batches out of 13 were infected with Mh (P=0.002). All batches except one were infected with App. On finishing sites managed AIAO by site, significantly fewer batches were infected with Mh than on sites managed AIAO by room. Thus, it seems that transmission between rooms can be a significant source of infection with Mh. No difference was found for App.

NOTES

O8

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PIGS WITH UNDOCKED TAILS IN A CONVENTIONAL NURSERY AND FATTENING UNIT – A REPORT

Despite of European Directives which specify that tail docking in pigs should not be practised routinely, more than 98 %of the piglets in the EU are weaned with docked tails for the purpose to prevent tail biting. In order to reduce the prevalence of tail docking in Lower Saxony a series of investigations has begun. In this trial weaned piglets of 12 litters were divided in four groups: Females and castrated males, one half with docked tails and the other half with entire tails, were introduced in the nursery. Six weeks later 108 of these were brought into the fattening unit, where 50 % of the pens provided additional floor space (1,0 m² per pig). All animals were checked twice a week. The prevalence of tail and ear biting, the necessity of applying control measures as treatment, separation of animals and providing toys were recorded. Temperature, humidity, as well as air and feed quality were controlled permanently. Weight gain, length of tails and carcass examinations were recorded for each pig. Despite of a generally high health standard and only three animal losses the percentage of injured pigs reached up to 30 % in the undocked groups in the nursery unit whereas only very single cases of tail biting occurred in the other pigs. Providing additional floor space had no effect. Treatment of injured animals and in severe cases separation limited the problem as well as providing additional toys. Regular control of air quality and a feeder/animal ration of 1:1 seemed to be useful. In general measures like the Husbandry Advisory Tool (HAT, Taylor *et al.*, 2012) should be applied on a farm before leaving pig tails undocked.

NOTES

ORAL PRESENTATIONS 1 – THURSDAY, MAY 23RD

PENTLAND SUITE

O9 **Molecular epidemiology of porcine reproductive and respiratory syndrome infections in England**
Jean-Pierre Frossard, Ben Strugnell, Catherine Fearnley & Susanna Williamson

O10 **Risk assessment of the introduction of Porcine Reproductive and Respiratory Syndrome into Switzerland via boar semen**
Christina Nathues, Urs Zimmerli, Ruth Hauser, Heiko Nathues, Elisabeth grosse Beilage & Gertraud Schüpbach-Regula

O11 **Evidence of recurrent Influenza infections in pig farms and associated epidemiological characteristics**
N. Rose, S. Herve, E. Eveno, N. Barbier, F. Eono, V. Dorenlor, C. Camsusou, F. Madec & G. Simon

O12 **Efficient protection of a swine pandemic H1N1 influenza virus vaccine against the newly emerged H1N2 pandemic virus reassortant**
Ralf Dürrwald & Michael Schlegel

O13 **Investigation of anomalous H1N2 serology results on swine influenza-infected pig farms**
Catriona Gaudie, Susanna Williamson, Cornelia Bidewell, Ben Strugnell, Chris Russell & Ian Brown

O9

Jean-Pierre Frossard, Ben Strugnell, Catherine Fearnley and Susanna Williamson
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MOLECULAR EPIDEMIOLOGY OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME INFECTIONS IN ENGLAND

Porcine reproductive and respiratory syndrome (PRRS) is a contagious viral disease endemic in Great Britain. PRRS is diagnosed in submissions mainly by the use of PCR and this provides material for further characterisation of the viruses causing disease in GB. Sequencing of a region of the viral RNA genome provides an opportunity to examine the potential relatedness of viruses from different origins through phylogenetic analysis. In this study, the genetic sequence encoding the GP5 protein of genotype 1 (European) PRRS viruses from a number of selected cases in England was determined, and these were compared to probe potential links between viruses. The links detected sometimes supported likely epidemiological connections which had been identified. These included geographic proximity, shared staff, and common piglet supply sources. Additionally, the sequence data analysis identified instances of multiple infection by different PRRS virus strains on a given farm, and over time, on units where infection persisted long-term, progressive evolution of the virus was detected. The percentage of diagnostic submissions in which PRRS was diagnosed from January to March 2012 increased compared to the same quarter in 2011 and the last quarter of 2011 (11.4% compared to 7.7% and 8.6% respectively) and provided an impetus to provision of sequencing as a commercially available test. PRRS virus sequence analysis has been a useful tool in identifying possible sources of infection for PRRS virus, determining if outbreaks are linked, differentiating field virus from vaccine virus, and demonstrating the innate ability of PRRS virus to become more diverse with time. This latter property presents challenges to both diagnostics and control of PRRS virus.

NOTES

O10

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RISK ASSESSMENT OF THE INTRODUCTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME INTO SWITZERLAND VIA BOAR SEMEN

Semen imports from PRRSV infected European countries to Switzerland, which had always been PRRSV free, have increased during the last couple of years. Since the virus can be transmitted via semen and the risk of PRRSV introduction was unknown, a risk assessment was conducted to estimate the annual probability of importing PRRSV positive semen into Switzerland. A quantitative stochastic model was set up with data comprised by import figures of 2010, interviews with importers or corresponding boar studs and expert opinions. It resulted in an annual median number of 0.18 imported ejaculates (= imported semen doses from one collection from one donor) from PRRSV infected boars or the import of one positive ejaculate every 6 years. A median number of 10 sows or one herd would be infected by one positive ejaculate respectively. These results suggested that under the circumstances in 2010 there was a substantial risk of PRRSV introduction into Switzerland via imported boar semen and that measures to enhance safety of imports should be taken. The time from infection of a previously negative boar stud to its detection had the highest impact on the number of imported "positive" ejaculates. Therefore, emphasis should be placed on PRRSV monitoring protocols in studs. Results indicated that a substantial increase in safety could only be achieved with much more intensive sampling protocols than currently performed. These outcomes were supported by a PRRSV outbreak in Switzerland that occurred in November 2012 after an infection of an exporting boar stud followed by the import of PRRSV positive semen.

NOTES

O11

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EVIDENCE OF RECURRENT INFLUENZA INFECTIONS IN PIG FARMS AND ASSOCIATED EPIDEMIOLOGICAL CHARACTERISTICS

Repeated infections by different Influenza A virus subtypes within pig farms increase the risk of emergence of new virus reassortant. The objectives of this study were to characterise the epidemiology of recurrent swine influenza virus (SIV) infections for a better understanding and identification of main determinants. A longitudinal study was carried out in 3 selected farms. Three batches were followed within each farm from piglet birth to slaughter through a representative sample of 40 piglets per batch. Piglets were monitored individually on a monthly basis for serology and daily for clinical and virological investigations when a flu outbreak occurred, during the whole clinical outbreak.

Influenza outbreaks, confirmed by Influenza A virus detection, were observed at least once in each batch followed. These outbreaks occurred at constant age within farms, most often in nursery and were correlated with an increase in the frequency of sneezing and coughing fits. Avian-like swine H1N1 and human-like reassortant swine H1N2 viruses from European enzootic lineages, as well as reassortant viruses generated from these parental enzootic viruses, were identified consecutively and sometimes simultaneously according to studied batches. These concomitant detections suggested co-circulation of different viruses at the farm, batch and sometimes individual levels. A great variability was observed between farms in terms of dynamics of infection (Ro estimation), and humoral immune response. Propagation of the epidemics was slowed down in the presence of maternal derived antibodies but persisted a longer time at the population level. Failings in increasing hemagglutination inhibition titers in sera following SIV infection were also observed in piglets infected before 50 days of age in the presence of maternal derived antibodies. All these results suggest that enzootic persistence of SIVs within pig farms is strongly influenced by rearing conditions, age at infection, and level of passive immunity transmitted by the dam.

NOTES

O12

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Animal welfare legislation. All trial procedures and animal care activities were conducted in accordance with the guidelines and under approval of Good Clinical Practice (VICH GL9, CVMP/VICH/595/98), the Directive 2001/82/EC on the Community code relating to veterinary medicinal products and German Animal Protection Law. The protocol IDT A 3/2004 was approved by the Landesverwaltungsamt Sachsen-Anhalt (Reference Number: AZ 42502-3-401 IDT).

EFFICIENT PROTECTION OF A SWINE PANDEMIC H1N1 INFLUENZA VIRUS VACCINE AGAINST THE NEWLY EMERGED H1N2 PANDEMIC VIRUS REASSORTANT

Since 2009 the pandemic H1N1 virus (panH1N1) was transmitted frequently to pig herds in all over Europe. In most cases farmers were the source of infection. The virus spread between pig herds but infection cycles were limited. In central Europe the virus got a new quality by acquiring the gene coding for neuraminidase 2 of the porcine H3N2 viruses. The first strain of this novel reassortant was isolated in autumn 2010 in Germany. Since 2011 this virus was isolated at regular level indicating that a new line of swine influenza viruses has been established which is capable to spread very efficiently between pigs herds.

Commercially available trivalent vaccines based on porcine viruses H1N1, H1N2, and H3N2 do not cross-react sufficiently with the hemagglutinin of panH1N1. Therefore a monovalent vaccine containing panH1N1 is in development which can be integrated in the vaccination schemes of the trivalent vaccines.

In order to investigate the efficacy of the monovalent panH1N1 vaccine a challenge trial was performed. Thirteen pigs were vaccinated with an inactivated panH1N1 vaccine, 13 pigs were vaccinated with a pandemic H1N2 virus (panH1N2) vaccine, and another 13 pigs remained unvaccinated. Seven days after second administration of the vaccines pigs were infected via aerosol with strain A/sw/Papenburg/IDT12653/2010 (panH1N2). The unvaccinated pigs underwent a long period of severe dyspnea from day 1 after infection (pi) on reflecting the high virulence of this virus. One pig of this group died 5 days pi having 100% lung lesions. All other unvaccinated pigs had lungs with macroscopic lung lesions of about 70%. Vaccinated pigs of both groups had highly significant lower lung lesions and lower viral lung load in comparison to unvaccinated pigs and showed less symptoms.

A new line of virulent influenza A viruses has been emerged in Europe. PanH1N1 vaccines are means of prevention.

NOTES

O13

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INVESTIGATION OF ANOMALOUS H1N2 SEROLOGY RESULTS ON SWINE INFLUENZA-INFECTED PIG FARMS

The haemagglutination inhibition test (HAIT) is the primary serological test for detection of antibodies to swine influenza virus (SIV) and has the advantage of being strain-specific. Low-level serological cross reactions between SIV strains occur and it is important to use a panel of representative SIV strains for serology from the country in which the pigs tested reside. Government-funded SIV surveillance is performed in GB by the Animal Health and Veterinary Laboratories Agency and the four strains detected circulating in GB in the last 20 years are included in the panel; avian-like H1N1, H1N2, pandemic H1N1 2009 and H3N2, although H3N2 virus has not been detected in GB since 1997. Knowledge of the SIV strains circulating is important for pig producers as well as those involved in pig disease and SIV surveillance; it allows appropriate use of SIV vaccine and can assist in epidemiological investigations. Novel strains are only identified through surveillance detecting virus however, serology is still used as a monitoring and diagnostic tool by veterinary practitioners. Since 2005, sera from recovered pigs on occasional farms with confirmed H1N2 infection failed to demonstrate convincing HAIT seropositivity to the H1N2 used in the serological panel. In 2012, this anomaly was noted more frequently. Investigations were initiated including use of a selected recent H1N2 isolate for comparative HAIT on units with anomalous results, wider testing of sera submitted for monitoring and diagnostic purposes and genetic analysis of recent H1N2 virus isolates. These investigations will be described, their aim being to determine the reason for the anomalous results and the nature of any genetic changes found in recent GB H1N2 viruses. The implications for the diagnosis of swine influenza and the importance of maintaining surveillance to know what strains are active and enable appropriate changes to the serological panel will be emphasised.

NOTES

ECPHM RESIDENTS' PRESENTATIONS – THURSDAY, MAY 23RD

SIDLAW ROOM

O14 ***Actinobacillus pleuropneumoniae*** **colonisation before weaning in offspring from sows on two endemically infected farms**
T.J. Tobias, D. Klinkenberg, A. Bouma, J. van den Broek, A.J.J.M. Daemen, J.A. Stegeman &J.A. Wagenaar

O15 **Efficacy of vaccination against** ***Actinobacillus pleuropneumoniae*** **on pleuritis lesions in slaughter pigs and their technical and economic performance in Belgium**
Rubén Del Pozo Sacristán, Annelies Michiels, Marc Martens, Freddy Haesebrouck & Dominiek Maes

O16 **Case report: Peracute outbreak of** ***Haemophilus parasuis*** **infection in suckling piglets in a self-recruiting, specific pathogen free herd**
Odd Magne Karlsen, Tone Bjordal Johansen, Hans Gamlem & Tore Framstad

O17 **Slaughterhouse examination of culled sows in commercial pig herds**
E. de Jong, R. Appeltant, J. Beek, F. Boyen, K. Chiers, A. Van Soom & D. Maes

O18 **Action-related repetitive myoclonus (congenital tremor) in piglets – a case report**
J. Beek, T. Vraeghe, I. Cornelis, F. Van Looveren & D. Maes

O14

T.J. Tobias[1], D. Klinkenberg[1], A. Bouma[1], J. van den Broek[1], A.J.J.M. Daemen[1], J.A. Stegeman[1], J.A. Wagenaar[2,3]

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ACTINOBACILLUS PLEUROPNEUMONIAE COLONISATION BEFORE WEANING IN OFFSPRING FROM SOWS ON TWO ENDEMICALLY INFECTED FARMS

We hypothesise that colonisation with Actinobacillus pleuropneumoniae (App) in young piglets is a risk factor for developing pleuropneumonia as finishers. An improved understanding of the epidemiology of App on farms could help to design control measures that prevent colonisation in piglets. The objective of this study was to determine colonisation of suckling piglets with App before weaning on endemic infected pig farms and its association with sow characteristics such as parity and antibody levels. A cohort study was performed on two farrow-to-finish herds in two cohorts per farm. Farmers had to comply with a strict hygiene and animal management protocol (e.g. limited cross fostering) to obtain independent litter observations. Serum and tonsil brush samples from 76 sows were obtained three weeks before parturition, and tonsil samples from 871 offspring were obtained three days before weaning. The samples were obtained in compliance with the Dutch Act on the Practice of Veterinary Medicine. Serum samples were analysed by serology (apxI, apxII, apxIII ELISA) and tonsil samples by apxIVA qPCR (Tobias, 2012). Colonisation at litter and individual piglet level was assessed and associations with sow's parity and serum and brush sample results were evaluated using logistic regression models. Whereas all sows tested positive in qPCR and three apx antibody assays, in 41% of the litters none of the piglets tested positive for App. Litters status was not associated with the explanatory variables. In positive tested litters however, the probability for piglets to test positive was positively associated with piglets' age at sampling and negatively with sow parity (OR=0.59). There were strong indications for a negative association with apxII titer (OR=0.73) and amount of App DNA from the sow. It is concluded that App colonisation in suckling piglets is clustered within litters and that colonisation is negatively associated with maternal immunity.

NOTES

O15

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EFFICACY OF VACCINATION AGAINST *ACTINOBACILLUS PLEUROPNEUMONIAE* ON PLEURITIS LESIONS IN SLAUGHTER PIGS AND THEIR TECHNICAL AND ECONOMIC PERFORMANCE IN BELGIUM

The efficacy of vaccination against A. pleuropneumoniae on pleuritis lesions, lung lesions, mortality, days of additional treatment (DAT) and weight gain (WG) was investigated in two farrow-to-finish pig herds (A and B) affected by chronic pleuritis. In total, 1161 pigs were included. The pigs were randomly allocated to one the following groups at four weeks of age: A-Non Vaccinated (A-NV; n=280), A-Vaccinated (A-V; n=281), B-NV (n=300) and B-V (n=300). At six and ten weeks of age, pigs of the vaccinated groups were injected with Porcilis-APP®, whereas unvaccinated controls pigs were injected with Diluvac Forte®. At slaughter (26 weeks), pleuritis and pneumonia lesions were assessed. Mortality and DAT were registered from 6 to 26 weeks. All pigs were weighted individually at 6 and 26 weeks and WG and average daily gain (ADG; g/pig/day) calculated. Data were analysed using binary logistic regression or ANOVA for proportions or continuous variables, respectively. The prevalence of pleuritis and pneumonia was [A-NV=19.2, A-V=7.9, B-NV=17.9, B-V=0.7, (P=0.000)] and [A-NV=42.4, A-V=21.2, B-NV=46.7, B-V=19.0, (P=0.000)], respectively. The average SPES was A-NV=3.22, A-V=3.21, B-NV=2.50, B-V=2.00. The mortality during the experiment was: A-NV=5.7, A-V=1.8, B-NV=2.3, B-V=1.0, (P=0.007). The DAT (average±sd) was: A-NV=3.78±2.13, A-V=3.75±2.17, B-NV=4.39±2.42, B-V=3.40±2.94, (P=0.000). The ADG was A-NV=632±157, A-V=647±91, B-NV=660±115, B-V=670±81, (P=0.066). The present field study in two herds affected with pleuritis showed a significant improvement of the prevalence of pleuritis and pneumonia and a numerical improvement of performance for both vaccinated groups in both herds.

NOTES

O16

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CASE REPORT: PERACUTE OUTBREAK OF HAEMOPHILUS PARASUIS INFECTION IN SUCKLING PIGLETS IN A SELF-RECRUITING, SPECIFIC PATHOGEN FREE HERD

In an outbreak of Haemophilus parasuis in a specific pathogen free herd there was a 19 % (n=172) mortality in two to three week old piglets from 82 litters during 2 ½ days. Subsequent outbreaks made mortality reach 30 %.

Diseased piglets were clinically evaluated and dead piglets were autopsied on-farm. Whole piglets and tissue samples, fresh, frozen and formaldehyde fixated, were collected and submitted to the Norwegian Veterinary Institute for pathologic evaluation. Half of the piglets (400) were injected with procain-penicillium to prevent further mortality while awaiting definitive diagnosis. Interviews regarding management routines, biosecurity and environmental factors were performed. Blood samples from ten piglets were analysed for hemoglobin concentration.

The piglets died without any prior signs of disease. The autopsy findings were consistent with septicemia and anaemia. Haemophilus parasuis was detected by bacteriological examination from most tissue samples. The piglets injected with procain-penicillium stopped dying whereas 50 piglets died during the forthcoming night in the untreated group. Immunohistochemistry performed were negative for Porcine Circovirus type 2 and Influenza A virus. Hemoglobin concentration in the blood samples were on average 66.5 g/L. Iron paste given to the piglets within the first 24 hours after farrowing was the only iron supplementation. There were no cleaning and disinfection between batches in the farrowing room and the ventilation was operated manually. The herd was self-recruiting with no evident breach in the biosecurity. Four sows had fever (>40oC), were lame and ataxic.

It was concluded that Haemophilus parasuis caused the 30 % mortality in the piglets. Anaemia is known to impair immunity. Poor iron supplementation routines, a manually operated ventilation system and poor hygiene likely contributed to the outbreak. The causes of the apparent lack of protecting maternal antibodies is unknown. Only eight of the 82 sows were first parity sows.

NOTES

O17

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SLAUGHTERHOUSE EXAMINATION OF CULLED SOWS IN COMMERCIAL PIG HERDS

This study investigated reasons for culling of sows from commercial pig herds and post-mortem lesions of the reproductive tract of these sows. Reproductive organs of 502 females from seven herds were examined. Macroscopic examination focused on uterus (cervix, corpus and corni), ovaries (including bursa ovarica) and oviducts. The phase of the reproduction cycle was determined according to the presence of follicles or corpora lutea/albicantia on the ovaries. In 20% of the uteri bacteriological and histopathological examination was carried out to determine the presence of bacteria respectively inflammation. The mean parity of the culled sows was five (min: 0, max: 13). Sows with parity 6 and 7 were most frequently culled. Insufficient performance was the most common reason for culling (53%), with no pregnancy (18%), poor nursing performance (14%) and no heat (10%) as most frequent causes. Macroscopic examination of the uteri revealed no abnormalities (77%), purulent endometritis (18%) and pregnancy (5%). Ovaries were normal in 54% of the animals, 28% showed inactivity and 18% (para-) ovarian cysts. (Para-) oviductal cysts were found in 10% of the animals. Sixty-two percent of the uteri were bacteriologically positive, with E. coli (18%) and Enterococci (12%) most frequently isolated. Sixty percent of the uteri showed a mild to severe inflammation, mainly in a chronic state (41%). Macroscopical endometritis was associated with bacteriological endometritis (OR=2.4, $p<0.001$) and histopathological endometritis (OR=0.66, $p<0.001$). No association was found between bacteriological and histopathological endometritis (OR=2.1, $p>0.05$). For all parameters, significant differences between herds were present. In conclusion, macroscopic examination of culled sows is a helpful tool to optimise the culling policy of sows in pig herds. As many reproductive organs showed no macroscopical abnormalities, histopathological examination seems to be a more reliable method to diagnose endometritis in sows.

NOTES

O18

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ACTION-RELATED REPETITIVE MYOCLONUS (CONGENITAL TREMOR) IN PIGLETS – A CASE REPORT

Introduction – Sporadically the occurrence of piglets with congenital tremor is reported. Congenital tremors are divided into type A (5 varieties of the disorder with known cause) and type B (of unknown origin). Features like percentage of litters affected and duration of outbreak differ, but the common lesion consists of a hypomyelination or demyelination.

Description of the case – In a closed herd with 440 Belgian Negative (BN) Landrace sows, recurrently litters with congenital tremor were born over the last 5 years. Between March and October 2012, 51 out of 797 litters were affected (6.4%). Piglets with congenital tremor had normal birth weights and showed no symptoms of concurrent disease. Mean parity of sows with affected litters (2.92 ± 0,25) was significantly lower than parity of sows with non-affected litters (4,27 ± 0,10)($P<0.01$). From the 51 affected litters, 49 were crossbred (BN x Piétrain), 1 was purebred (BN x BN) and 1 of unknown breed, resulting in an odds ratio of 10.23 [1.40-74.75] for occurrence of the disorder in crossbred litters. There was no recurrence of the problem within the same sow during successive litters (252 sows with ≥2 litters). Preterm farrowing (D100-D113) was not associated with the disorder ($P=0.30$).

Electromyography of two 3-day-old piglets with typical symptoms revealed spontaneous electrical activity in muscles of the thoracic limb in both piglets, and in muscles of the pelvic limb in one piglet. Necropsy did not reveal gross lesions. Histological examination of tissues samples is ongoing. Samples of brain and brainstem were negative for PCV1 and PCV2 by virus isolation and PCR test.

Conclusion – Several potential causes of congenital tremor type A could be excluded. Pedigree analysis may allow distinguishing between the possible hereditary disposition and congenital tremor type B. Final conclusions will be presented at the conference.

NOTES

PARTNERS' PAPERS – THURSDAY, MAY 23RD A.M.

PENTLAND SUITE

O19 **Mutant Prevention Concentration: a tool to support the responsible use of antimicrobials in swine production – *Bayer PLC Animal Health***
Raúl Vázquez

O20 **Worldwide occurrence of fumonisins and their effective counteraction *in vivo* – *Biomin***
Diego Padoan, Karin Naehrer, Dieter Moll & Carlos Mallman

O21 **Different PCV2 vaccine protocols reduce PCV2 viraemia by the same magnitude – *Boehringer Ingelheim Animal Health***
Brian Payne, Amanda Sponheim & Keith Bretey

O22 **Full Value Pig concept and its added value for the swine industry – *Elanco***
Alvaro Hidalgo

O23 **HIPRA PRRS approach under field conditions – *Hipra***
Isaac Rodríguez

O24 **Effect of Tilmovet® and KetoProPig® on post-weaning diarrhoea and *Streptococcus suis* in piglets – *Huvepharma NV***
Wouter Depondt, Stefaan Demarez, Mike Overend, Henk Lecuyse & Alain Kanora

O25 **Development of a subunit vaccine containing recombinant Stx2e against Oedema Disease of pigs and its impact in the field – *IDT Biologika GmbH***
Olaf Bastert, Regine Fricke, Olaf Lüder, Volker Florian, Rolf Bauerfeind & Hans-Joachim Selbitz

O26 **Efficacy and tolerance of Pracetam in the reduction of post-operative pain following the castration of piglets – a comparison of two dosages versus a placebo – *Laboratoire Sogeval***
Anne Trotel, Valérie Courboulay, Anne Hémonic, Florian Voisin, Eric Pagot, Nathalie Capdevielle, Arnaud Anty, Claudine Zemirline

O27 **Efficacy of GRIPOVAC®3/RESPIPORC® FLU3 against challenge with a recent H1N2 Swine Influenza Virus in pigs – *Merial – A Sanofi Company***
K. van der Meulen, P. Elskens, M. Schlegel, R. Dürrwald, H.-J. Selbitz, T. Vila, M. Bublot, F. Joisel & K. Van Reeth

O28 **Efficacy of a new combination vaccine against *E.coli* & Clostridium spp. on a Dutch farm undergoing a *Clostridium perfringens* type A infection – *MSD Animal Health***
M.R.T.M. Martens, M.J.S. Reijnders, K. Redhead, M.H. Witvliet & A.S. Eggen

O29 **Detection of PRRSV antibody in oral fluid specimens from individual boars using a commercial PRRSV serum antibody ELISA – *PIC***
A. Kittawornrat, M. Engle, J. Johnson, J. Prickett, C. Olsen, T. Schwartz, D. Whitney, K. Schwartz, A. Rice, A. Ballagi, S. Lizano, C. Wang, J. Zimmerman & G. Shepherd

O30 **Using electronic clinical score in swine herds to set management decisions: one year of experience of IPC in Europe – *Zoetis***
O. Azlor, A. Dereu, P. Doncecchi, A.C. Piñeiro & J. Morales

O19

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MUTANT PREVENTION CONCENTRATION: A TOOL TO SUPPORT THE RESPONSIBLE USE OF ANTIMICROBIALS IN SWINE PRODUCTION

Antibacterial treatment in swine production is facing challenges due to new disease complexes, antibiotic resistance development and increasing regulatory restrictions. Even though biologicals and other preventative measures are applied, antibacterials are still a need. Responsible use is a must to prolong the efficacy of the existing antibacterials. A tool to support the successful treatment and delay the resistance development is the detection of the ratio between the Mutant Prevention Concentration (MPC) and the Minimal Inhibitory Concentration (MIC) and pharmacokinetic parameters in dose dependant antibiotics. This system has been used in human medicine and is currently applied in some countries in animal health. Fluroquinolones have been under strict scrutiny, but as they are dose dependant, MPC and MIC ratio detection can be helpful for selecting an appropriate treatment in the swine veterinary practice. Results of Enrofloxacin resistance monitoring during the last 18 years show the benefit of a high ratio between MPC and MIC and pharmacological parameters.

NOTES

O20

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WORLDWIDE OCCURRENCE OF FUMONISINS AND THEIR EFFECTIVE COUNTERACTION *IN VIVO*

Fumonisins are a concern in pig nutrition due to the almost ubiquitous occurrence of the fumonisin producing pathogen Fusarium verticillioides in regions of warm climate. Fumonisin toxicosis in swine has been related to porcine pulmonary edema (PPE) since the reported outbreak of swine deaths in 1981. This work focuses on results obtained between 2004 and 2011 in which more than 9,000 samples were collected worldwide and analysed for fumonisins (FUM), a sum of fumonisin B1 and fumonisin B2. Analyses were performed either by high performance liquid chromatography or enzyme-linked immunosorbent assay. For the purpose of data analysis, non-detection levels were based on the quantification limits of the test method. Out of all tested samples, 62% of the samples coming from Southern Europe and 56% of the samples coming from Central Europe were contaminated with FUM. An even higher prevalence of fumonisins was found in South America (80%) and Africa (76%). Contrary to regions which have a typical tropical or subtropical climate, only 27% of samples coming from Eastern Europe tested positive for FUM. About 75% of corn samples were contaminated and the average contamination was 2 299µg/kg while the maximum concentration found in corn was 53 700µg/kg. All other commodities such as soybean, wheat and wheat bran, dried distillers grains with solubles and finished feeds were contaminated with FUM. So far, no single adsorbent has been tested effective against most types of mycotoxins, including fumonisins and an alternative way of detoxification of non-adsorbable mycotoxins is via enzymatic detoxification (biotransformation). FUMzyme® is an enzyme – carboxylesterase that hydrolyses the two tricaballylic acid side chains of fumonisins, changing them into hydrolysed fumonisins. Finally, the biotransformation of fumonisins into non-toxic metabolites might be a promising strategy in the counteraction of these undesirable substances in animal feed.

NOTES

O21

Brian Payne, Amanda Sponheim, Keith Bretey
Boehringer Ingelheim Vetmedica, Inc.

DIFFERENT PCV2 VACCINE PROTOCOLS REDUCE PCV2 VIREMIA BY THE SAME MAGNITUDE

Some farms routinely vaccinating pigs for PCV2 over the past 5 years have recently reported a lack of PCV2 detection using common sampling schemes (30hd/farm) and qPCR tests (cut-off=104). The objectives of the two studies described here were to evaluate viremia and the reduction of viremia in vaccinated pigs compared to non-vaccinated pigs, and to compare the impact of different vaccination schedules on viremia, utilising a new, sensitive PCV2 qPCR test (detection limit <102). Both trial A and B included non-vaccinated controls (NVx). In addition, trial A included pigs vaccinated either with a single dose of Ingelvac CircoFLEX®-MycoFLEX® (FLEXcombo) or 2 doses of another PCV2-M hyo combination product (PCVM). Trial B included pigs vaccinated with either a single dose of Ingelvac CircoFLEX® (CF) or a single dose of an inactivated chimeric PCV1/PCV2 vaccine (chimera). In trial A, pigs were serially sampled at 3,10,13,16,19 and 22 weeks of age; in trial B at 3,7,10,14,19 and 23 weeks of age. Serum was evaluated by qPCR for PCV2 levels. Average log level of viremia was calculated at each time point. In trial A, viremia was significantly reduced in Vx compared to NVx on weeks 10, 13, 19, and 22 ($P=0.01$, $P=0.02$, $P<0.0001$, $P<0.0001$, respectively) and in trial B on week 23 ($P<0.0001$). In trial A, percent PCV2 positive samples peaked at 19 weeks and was 75% (NVx), 41% (FLEXcombo) and 39% (PCVM). In trial B, peak percent PCV2 positive occurred at 23 weeks, and was 71% (NVx), 19% (CF) and 20% (chimera). Viremia between the vaccinated groups was not different ($P>0.10$) at any time points measured in either trial. These studies indicate commercial PCV2 vaccines significantly reduce viremia compared to NVx and reduce viremia by the same magnitude. These viremia studies also confirm that vaccines do not completely eliminate viremia.

NOTES

O22

Alvaro Hidalgo
Elanco UK and Ireland.

AN OPTIMISED SWINE MANAGEMENT APPROACH AND ITS VALUE TO THE INDUSTRY

Full Value Pigs (FVP) is a profitability-focused business model that takes a population of pigs and constraints of facility and market to determine the optimum performance for a swine operation. A Full Value Pig is a pig that achieves at least 90% of the Margin Over Feed Cost (MOFC) of the single optimum pig as determined by feed intake, feed costs and payment grids. While some producers are currently benchmarking their FVPs compared to historical data, many are still using single point production parameters that are solely cost-focused or misleading. Although many areas of swine production influence the number of FVPs, four key areas include Disease Management, Feed Optimisation, Precision Harvest and Assurance & Access.

NOTES

O23

Isaac Rodríguez
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HIPRA PRRS APPROACH UNDER FIELD CONDITIONS

Porcine reproductive and respiratory syndrome (PRRS) is one of the most costly diseases affecting swine worldwide.

Mainly there are 2 solutions to face PRRS, eliminate vs control. The elimination of PRRSV entails a high investment, a high coordination among the different statements, and usually a change of mentality. Therefore nowadays, the reality comes to control PRRSV in European swine farms. There are many tools to start the PRRS control in a swine farm: diagnostic, management, biosecurity, vaccines one of the most important tools controlling whatever disease is the vaccination. The main challenge of PRRSV vaccination nowadays is the heterologous protection. The strategy to manage the heterologous protection in field conditions is mainly based on vaccination and the knowledge to manage the PRRSV infection in farm.

Thus the key points to control PRRS are related with the knowledge about how the wild virus is circulating on the farm, and how high is the infection pressure. There are different steps in order to evaluate the infection pressure on farm:

1. Evaluate the farm production system.
2. Evaluate the management of replacement gilts.
3. Evaluate the dynamic of PRRSV infection in pigs and sows.

There are two steps to start the herd vaccination. First step is the breeder vaccination in order to improve the reproductive parameters and to reduce and stop the birth of viraemic piglets. Secondly, piglet vaccination is advisable in order to improve the fattening pig performance.

Therefore nowadays, we have the right knowledge to control PRRS, through serumprofiles which is a helpful tool to understand the PRRS dynamic of infection, and through the use of life vaccines which are the most effective tool to stabilise faster the farm.

NOTES

O24

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EFFECT OF TILMOVET® AND KETOPROPIG® ON POST-WEANING DIARRHOEA AND *STREPTOCOCCUS SUIS* IN PIGLETS

A 300-sow farm was positive for PRRS and Mycoplasma hyopneumoniae. Every 4 weeks 720 piglets were weaned. Recurrent outbreaks of post-weaning diarrhoea (PWD) and Streptococcus suis compromised animal welfare and zootechnical results, such as mortality (4%) and end weight (22.7kg at 10 weeks of age). On a regular basis between January 2011 and December 2012 affected animals were necropsied at Animal Health Center Flanders where Escherichia coli and *Streptococcus suis* was diagnosed and the isolated pathogens were tested on their susceptibility to several antibiotics. The antibiogram indicated a colistin-resistant Escherichia coli strain but sensitive to aminoglycosides and a *Streptococcus suis* strain sensitive to penicillin. Colistin was replaced by an aminoglycoside and amoxycillin was retained from day 10 to day 20 after weaning. No improvement was observed in the control of PWD and Streptococcus suis. At the end of November 2012, Mycoplasma hyopneumoniae was diagnosed on the farm. This is why an alternative treatment was imposed. Tilmovet® at 16mg/kg in feed for 14 days after weaning and KetoProPig® at 3mg/kg at day 5 and 11 after weaning were chosen as a treatment. In addition to the control of Mycoplasma hyopneumoniae, PWD and *Streptococcus suis* were also controlled with this treatment scheme. As a result mortality rate dropped from 4% to 1.5%, no further curative treatments were needed and the end weight increased by 4.7%. An explanation might be as already described by Jens Laurits Larsen (1986) that macrolides interfere with the colonisation phase of enteropathogenic E. coli. Also *Streptococcus suis* was controlled, despite the low in-vitro susceptibility of the isolated strains to macrolides. The explanation might be that Streptococcus suis was a secondary disease causing pathogen and the combination of Tilmovet® and KetoProPig® controlled the primary provoking factor.

NOTES

O25

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DEVELOPMENT OF A SUBUNIT VACCINE CONTAINING RECOMBINANT STX2E AGAINST OEDEMA DISEASE OF PIGS AND ITS IMPACT IN THE FIELD

Edema Disease (ED) caused by Shigatoxin Stx2e producing strains of E. coli occurs worldwide and is responsible for high mortality during the nursery period and substantial economic losses. Therefore, a new vaccine (ECOPORC SHIGA) was developed containing a genetically modified Stx2e antigen. A one shot injection into piglets from an age of 4 days on induces a humoral immune response against Stx2e and ensures protection from ED during the entire nursery period after weaning.

For antigen production a recombinant *E. coli* strain was constructed containing a plasmid coding for the genetically modified Stx2e antigen being highly reduced in toxicity. Administration into suckling piglets via intramuscular routes induced production of Stx2e-neutralising antibodies in a dose-dependent manner as determined by a Stx2e-specific serum neutralisation assay. In challenge studies weaned piglets with detectable amounts of these antibodies proved to be protected against the impact of Stx2e.

Vaccine safety was assessed in laboratory as well as in field trials showing no adverse reactions regarding local reactions at injection site, body temperature or general condition after vaccination.

Vaccine efficacy was demonstrated in laboratory and field studies by significant reduction of morbidity and mortality of vaccinated pigs compared to control animals and by detection of neutralising antibodies after immunisation. Due to vaccination mortality was lowered from 100 % to 6.7 % among piglets experimentally challenged with Stx2e ($p<0.001$) and from 11.4 % to 0 % ($p<0.0001$) in a field trial. Better growth of vaccinated pigs was partially observed during the nursery period. Furthermore, a significant reduction considering the use of orally administered antibiotics against ED was noticed in the course of longitudinal field studies.

The vaccine ECOPORC SHIGA is a safe and effective tool against ED and has the potential to replace oral antibiotic treatment in herds affected by outbreaks of this life-threatening disease.

NOTES

O26

Anne Trotel, Valérie Courboulay, Anne Hémonic, Florian Voisin, Eric Pagot, Nathalie Capdevielle, Arnaud Anty, Claudine Zemirline

EFFICACY AND TOLERANCE OF PRACETAM IN THE REDUCTION OF POST-OPERATIVE PAIN FOLLOWING THE CASTRATION OF PIGLETS – A COMPARISON OF TWO DOSAGES VERSUS A PLACEBO

The castration of piglets under 7 days old is still the most widely accepted solution that slaughterhouses have found to control the risk of "boar taint" in the finished product. It has been demonstrated that this practice causes pain and acute stress. Alleviation of this pain has become absolutely essential. Paracetamol is an analgesic-antipyretic molecule, which could reduce the level of post-castration pain in piglets. The present study was designed to compare the effect of two doses of paracetamol (Pracetam®20% solution) and a placebo, by measuring hormonal and behavioural response. A total of 289 male piglets were included in this blinded, randomised, controlled trial. The piglets were individually identified and followed from the day before castration to weaning. For each batch, a farrowing room was set up to monitor the hormonal responses and another for behavioural observations, so that the taking of blood samples would not have an effect on the animals' behaviour. In the first room, 4 groups were randomly chosen: two receiving paracetamol before castration (one at a dose of 30 mg/kg and the other at 60 mg/kg), a placebo group "P" and a control group "C", which was not subject to castration but underwent a simulation, which would provide the basal cortisol and ACTH levels. In the second room, only the first 3 groups were used. The effectiveness criteria used were the blood levels of ACTH and cortisol 30 mins after castration, behavioural responses (scored) and the average daily weight gain between castration and weaning (ADG). The obtained data showed a significant effect in terms of post-operative pain response behaviour, which was significantly lower in the group treated with paracetamol at a dose of 60 mg/kg compared to placebo on the day of castration and on the day following the procedure.

NOTES

O27

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EFFICACY OF GRIPOVAC®3/RESPIPORC® FLU3 AGAINST CHALLENGE WITH A RECENT H1N2 SWINE INFLUENZA VIRUS IN PIGS

Introduction

GRIPOVAC®3/RESPIPORC® FLU3 is a trivalent vaccine containing each of the three swine influenza virus (SIV) subtypes that are endemic in pigs in Western Europe. We have examined the efficacy of this vaccine against intratracheal (IT) challenge with a recent H1N2 SIV. Additionally, we compared the IT challenge method with intranasal (IN) challenge, which is closer to the natural route of infection.

Materials and methods

Twenty-four influenza-negative pigs were vaccinated twice, 24 pigs were left unvaccinated. Three weeks after the second vaccination, a vaccinated and a challenge control group of 12 pigs each were challenged by IT or IN route with 7 log10 EID50 of A/sw/Gent/102/07 (H1N2). The pigs were monitored for serum haemagglutination-inhibition antibody titres before challenge and for clinical and virological protection post challenge. Virus titres were determined in nasal swabs and lung samples.

Results

After the second vaccination, all pigs had antibodies against all three vaccine strains and the challenge virus. In most unvaccinated controls IT challenge induced fever, tachypnea and/or dyspnea, whereas IN inoculation produced a largely subclinical infection. In both vaccinated groups, clinical signs were observed in fewer animals and they were milder.

Both inoculation methods resulted in high virus titres in the lungs of unvaccinated control pigs. Both vaccinated groups had reduced mean virus titres in the lungs, but the reduction was only significant at selected time points. Nasal virus excretion was delayed after IT as compared to IN inoculation. With both challenge methods, there was a reduction in nasal swab virus titres in the vaccinated pigs, but it was not significant after IN challenge.

Conclusion

GRIPOVAC®3/RESPIPORC® FLU3 induces a protective response against challenge with a recent European H1N2 strain with 95,5% amino acid homology (HA1) with the H1N2 vaccine strain. The IN challenge method could be used as an alternative for the technically difficult IT method in SIV vaccination-challenge studies.

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O28

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EFFICACY OF A NEW COMBINATION VACCINE AGAINST *E.COLI & CLOSTRIDIUM* SPP. ON A DUTCH FARM UNDERGOING A *CLOSTRIDIUM PERFRINGENS* TYPE A INFECTION

A novel clostridial vaccine ought to be efficacious not only against *C. perfringens* (C perf) type C but also against type A strains. This study was carried out using a new coli-clostridium combination vaccine (Porcilis ColiClos). The farm had a high level of piglet mortality against which a traditional combination vaccine was not proving effective. It was considered that by using Porcilis Porcoli DF as a control, any additional efficacy of the new vaccine against C. perf could be demonstrated.

In this blinded trial, sows were vaccinated with either Porcilis ColiClos or Porcilis Porcoli DF, and both sows and their progeny compared between groups. Over a period of 8 months, pregnant sows and gilts were vaccinated six and two weeks prior to their estimated farrowing date. 75 sows were vaccinated with Porcilis ColiClos, and 40 with Porcilis Porcoli DF. Sows were re-vaccinated, with a single dose of the appropriate vaccine, during their next pregnancy. The safety of Porcilis ColiClos was assessed by observing the general health and appetite of the sows. Efficacy in their litters was assessed on the basis of mortality, clinical signs and fecal consistency and composition scored.

The sows in the Porcilis ColiClos group showed significantly better general health and appetite than the control sows. Piglets in the litters born to Porcilis ColiClos-vaccinated dams scored significantly better in all categories. Furthermore, mortality in the first week decreased from 5.9 % in the Porcilis Porcoli DF group to 2.8 % in the Porcilis ColiClos group ($p<0.009$). In the first 10 weeks a reduction from 3.8% to 9.3% ($p<0.0001$) Of the 14 litters needing oral antibiotic treatment, 2 belonged to the Porcilis ColiClos group, and 12 to the control group.

The study showed that the clostridial component of the novel vaccine added to the efficacy induced by the coli components.

NOTES

O29

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DETECTION OF PRRSV ANTIBODY IN ORAL FLUID SPECIMENS FROM INDIVIDUAL BOARS USING A COMMERCIAL PRRSV SERUM ANTIBODY ELISA

Introduction

Oral fluid specimens are used in human medicine for the detection of a variety of infectious agents, hormones, and drugs. Oral fluid samples are of interest in swine medicine because they are easily collected, yet highly efficacious for the surveillance of PRRSV and other pathogens using PCR-based assays.1, 3 Recent work showed that a commercial PRRS serum antibody ELISA (IDEXX Laboratories, Inc., Westbrook, ME USA) could be adapted to detect PRRSV antibody in oral fluid specimens. 2 In the current study we describe the kinetics of the ELISA-detectable anti-PRRSV IgG response in oral fluids collected from individually-housed boars.

Materials and methods

The study was conducted in 72 boars ranging from 6 months to 3.6 years in age. Boars were under the ownership of PIC North America (Hendersonville, TN USA) and housing, study procedures, and protocols were approved and supervised by the PIC USA Health Assurance and Welfare department.

Boars were assigned to three trials (I, II, III). Boars (n = 24) in Trial I were intramuscularly (IM) inoculated with 2ml of a modified live virus (MLV) vaccine (RespPRRS®, Boehringer Ingelheim Vetmedica, Inc., St. Joseph, MO USA). Boars (n = 22) in Trial II were IM inoculated with 2ml of a Type 1 PRRSV field isolate. Boars (n = 24) in Trial III were IM inoculated with 2ml of a PRRSV Type 2 isolate (MN-184).

Boars were monitored for 21 days post inoculation (DPI). Oral fluid samples were collected daily using 5/8" 3-strand 100% cotton rope. Serum samples were collected from all boars on DPI -7, 0, 7, 14, 21 and from 4 randomly selected boars on DPIs 3, 5, 10, and 17. Thereafter, serum and oral fluid were assayed for PRRSV antibody using the ELISA protocol appropriate for each sample type (serum or oral fluid).

NOTES

O30

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USING ELECTRONIC CLINICAL SCORE IN SWINE HERDS TO SET MANAGEMENT DECISIONS: ONE YEAR OF EXPERIENCE OF IPC IN EUROPE

Individual Pig Care protocol (IPC) is based on a daily individual observation of the pigs, early detection of their health problems and prompt and accurate reaction to those, supported by a fast electronic data collection and management system. IPC is currently implemented in 33 farms in UK, France, Germany, Italy, Spain, Belgium, Lithuania and Poland, and after one year of experience first results are shown. Digestive disorders represent 26% of total diseases, mainly appearing in the immediate post-weaning phase (26 to 32 days of age), while a second peak is observed at 90-95 days of age. Respiratory signs (23% of the total) appear at different moments: at about 40 days of age, end of nursery (about 60 days of age) and in growing period (at about 100 days of age). Unspecific clinical signs, mainly associated with runt pigs, are the most frequently scored and treated (33%) in the fattening period, following a similar pattern than lameness occurrences, the fourth cause of disease in prevalence (15%). Neurological and biting cases are infrequent (1% both). About 80% of sick pigs were treated in early stage, when severity of disease is lower and success probability of treatment is higher. Enrofloxacin is the first AIF used for digestive, respiratory and unspecific disorders. Mortality mainly occur in nursery period and main cause is also unspecific (runt-pigs; 54%), followed by digestive (18%), respiratory (11%) and neurological (10%) cases. In total, 0.57 injectable treatments were applied per pig. In conclusion, early detection of symptoms is the key point of the IPC, allowing a faster reaction and better results based on accurate clinical data information obtained real-time.

NOTES

ORAL PRESENTATIONS 2 – FRIDAY, MAY 24TH A.M.

PENTLAND SUITE

O31 **Results of a field trial for vaccine against oedema disease**
X. Sidler, S. Mattei, R. Fricke, W. Schmid, O. Bastert, O. Lüder & A. Becker

O32 **Observations on the latest epidemic strain of Salmonella in pigs: monophasic *S. Typhimurium***
G. Crayford & R. Davies

O33 **Severe acute gastritis in grower pigs associated with acute monophasic *S. Typhimurium* infection after withdrawal of acidified water**
B.W. Strugnell & R.J. Evans

O34 **Development and validation of a *Streptococcus suis* serotype 2 meningitis challenge model in pigs**
David Reddick & Cliff Ramage

O35 **Septicaemic pasteurellosis in free-range pigs in Spain: an emerging disease?**
F. Cardoso-Toset, J. Gómez-Laguna, M. Callejo, A.I. Vela, L. Carrasco, J.F. Fernández-Garayzábal, A. Maldonado & I. Luque

O36 **Association between blood haemoglobin concentration in sows and neonatal piglets**
Anna Kathrine Jensen & Jens Peter Nielsen

SIDLAW ROOM

O37 **An integrated system for pig health and welfare monitoring – fact or fiction?**
Sue.C.Tongue, Richard P. Smith, Carla Gomes, Toby Floyd, Elizabeth Marier, Guanghui Wu & Susanna Williamson

O38 **Occurrence and severity of lung lesions in slaughter pigs vaccinated against *M. hyopneumoniae* with different strategies**
Sonja Hillen, Hermann Willems, Stephan v. Berg & Gerald Reiner

O39 **Variability of ovulation in gilts; associated factors and consequences on reproductive performances in 4 pig farms**
E. Sallé, M. Le Jeune, Y. Huang & S. Boulot

O40 **An ultrasonographical, histological and immunohistochemical investigation of the growing mammary gland in the pig**
David Sporn, Axel Wehrend, Johannes Seeger & Johannes Kauffold

O41 **Bone formation and resorption throughout the reproductive cycle of primiparous and multiparous sows**
M.M.J. Van Riet, S. Millet, A. Liesegang, E. Nalon, F.A.M. Tuyttens, D. Maes & G.P.J. Janssens

O42 **Longevity of gestating sows statistically related to lameness, leg and claw problems**
Elisabeth Okholm Nielsen, Lisbeth Ulrich Hansen, Hanne Midtgaard Rasmussen, Flemming Thorup & Mai Britt Friis Nielsen

O31

X. Sidler[1], S. Mattei[1], R. Fricke[2], W. Schmid[3], O. Bastert[2], O. Lüder[2], A. Becker[2]

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RESULTS OF A FIELD TRIAL FOR VACCINE AGAINST OEDEMA DISEASE

Shigatoxin producing E. coli (STEC) induce edema disease in pigs, mostly after weaning. After attaching with fimbria adhesins F18 at the intestinal cell wall, toxic Shigatoxin (Stx2e) is produced, that penetrates into the bloodstream and causes major organ damages. Because treatment of stx2e diseased pigs is mostly not effective, prophylaxis is of great importance.

The recombinant subunit vaccine ECOPORC SHIGA (IDT Biologika GmbH, Dessau-Rosslau Germany) was tested for safety and efficacy in a field trial in two runs. In the affected farm the mortality rate due to edema disease temporarily reached 25% despite oral antibiotic medication. 336 randomly selected piglets were either blinded vaccinated with 1ml (i.m.) at the age of 4 days (n=167) or served as placebo treated control animals (n=169). Piglets were weaned at the age of 28 days. Blood samples were taken at weaning to measure protective antibodies against Stx2e.

No adverse reactions to the vaccine were observed. No occurrence of edema disease was observed during the first run. In the second run mortality due to edema disease was 13.5% in the control group and 1.4% in the vaccinated group (p=0.009). The number of pigs with neutralising antibodies against Stx2e was significantly higher in the vaccinated group (81.3% vs. 0% at weaning, 89.7% vs. 3.2% at end of nursery period in the first run). At weaning, in the second run, 100% of the vaccinated pigs and 13.3% of the control pigs and at the end of nursery period 92.6% of the vaccinated and 7.7% of the unvaccinated pigs showed neutralising antibodies against Stx2e (p<0,001 at both times).

Vaccination against edema disease represents a safe and effective tool to reduce mortality due to edema disease and reduces consequently the use of antibiotics on affected farms.

NOTES

O32

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OBSERVATIONS ON THE LATEST EPIDEMIC STRAIN OF SALMONELLA IN PIGS: MONOPHASIC *S. TYPHIMURIUM*

The evolution of Salmonella has been punctuated by the emergence of epidemic and multi-drug resistant (MDR) strains. Examples include Salmonella Enteritidis, associated with laying hens, and Salmonella Typhimurium DT104, mainly associated with cattle. These strains are of concern to public health because of their ability to spread widely and rapidly. Epidemic strains have been responsible for many outbreaks in humans, and their resistance to multiple antimicrobial drugs can make treatment more difficult. In the past two decades, monophasic strains of S. Typhimurium (mST) have demonstrated rapid worldwide emergence and in Europe the main reservoir species appears to be pigs (Hopkins *et al.*, 2010). In Europe, mST strains are now the second most common serotype isolated from pigs, and the fourth most common from humans (European Food Safety Authority, 2012). There are many variants of mST and while some are sensitive to antimicrobial drugs, many are resistant to between 1 and 10 different antimicrobials (Animal Health and Veterinary Laboratories Agency, unpublished data). mST and classical S. Typhimurium strains appear to share almost identical pathogenicity gene repertoires (Hauser *et al.*, 2010). Consequently, there should be greater focus on the control of mST, given the ecological success of S.Typhimurium. Monophasic and biphasic variants of Salmonella Typhimurium phage type DT193 have both been shown to survive longer in pig faeces than other serotypes, which may facilitate transmission and therefore contribute to their increased prevalence (Rajtak *et al.*, 2012). The role of pigs in generating and propagating epidemic strains is an important phenomenon that should be considered when studying the epidemiology of Salmonella. Until effective control measures, such as vaccination, are implemented it is necessary to maintain awareness of the presence of such epidemic strains, improve surveillance and attempt to understand the host-pathogen interaction.

NOTES

O33

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SEVERE ACUTE GASTRITIS IN GROWER PIGS ASSOCIATED WITH ACUTE MONOPHASIC S. TYPHIMURIUM INFECTION AFTER WITHDRAWAL OF ACIDIFIED WATER

Salmonella infection in growing pigs is commonly subclinical but under some circumstances can result in severe sometimes fatal enterocolitis and septicaemia. Factors which increase the likelihood of clinical disease include high bacterial dose, lack of host immunity and infection with a virulent organism. Mild gastritis is a common sequel of clinical salmonellosis and severe acute gastritis is sometimes seen. Clinical salmonellosis is the most common systemic disease of growing pigs diagnosed by AHLVA. In recent years, monophasic Salmonella Typhimurium has been increasingly reported in pigs and other species in the European countries.

In November 2011 sudden deaths were noted in 10 week old grower pigs on an indoor fully slatted PRRS positive EP positive wean to finish pig unit receiving 400 weaners per week from a distant breeding unit under the same ownership. Pigs were found dead 5-10 days after a move to a fully slatted building comprising six rooms, operated on an All-in All-out basis by room, with cleaning and disinfection between batches. Prior to this stage, from 4-10 weeks of age, the pigs' water was acidified. On gross post mortem examination, severe acute gastritis with marked mucosal erythema and mucus deposition was seen in almost all acutely dead pigs. Stomachs contained large amounts of brown slightly viscous fluid and little food. Histology revealed acute fibrinonecrotising gastritis. Salmonella 4,12:I: phage type 193 (likely monophasic *Salmonella* Typhimurium) was cultured from stomach contents, colon and liver. A severe mouse infestation was noted on the unit and the same organism was cultured from mouse droppings. We suggest that the inclusion of acid in the first stage pigs may have suppressed salmonella infection while maternal immunity waned, resulting in naive pigs entering the grower house where they met a high-dose Salmonella challenge spread by mice. Results of intervention to be reported.

NOTES

O34

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DEVELOPMENT AND VALIDATION OF A *STREPTOCOCCUS SUIS* SEROTYPE 2 MENINGITIS CHALLENGE MODEL IN PIGS

Streptococcus suis is an -haemolytic streptococcus of major importance to the pig industry due to the economic impact of disease outbreaks, prevention, control and welfare implications for infected herds. Thirty five (35) serotypes have been described with serotype 2 responsible for the majority of the infections in diseased pigs in most countries. The objective of this work is to develop and validate an experimental challenge model for serotype 2 to facilitate the efficacy testing of novel vaccines and therapeutics.

Materials and methods

Animals were challenged by the intranasal route with a recent UK field isolate of *S. suis* while the control group received saline by the same route.

Post challenge, clinical observations were carried out and consisted of assessments of demeanour, behavioural/ CNS abnormalities and rectal temperature (°C). Additional observations relating to behavioural or neurological problems were also recorded.

Any animals showing unacceptable levels of disease following challenge were euthanased on welfare grounds and a necropsy performed. On Day 7 all remaining study animals were necropsied following clinical observation. Brain and tonsil tissues were removed for bacteriological analysis.

Results

The first clinical signs in the S.suis challenged animals were observed between 36 and 48 hours post challenge and characterised by initial pyrexia, quickly followed by nervous signs such as reduced coordination, unsteadiness, and some lameness. Over 12 to 24 hours, the severity of the nervous signs increased until animals were unable to stand. These signs are consistent with a field type infection.

All challenged animals were euthanased within 7 days of challenge and the challenge isolate was recovered from all but one animal.

The study demonstrated that the intranasal challenge is reproducible and consistent with a low level of variability between animals and will be applicable in the testing of veterinary medicinal products to control and prevent S.suis infection in pigs.

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O35

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SEPTICAEMIC PASTEURELLOSIS IN FREE-RANGE PIGS IN SPAIN: AN EMERGING DISEASE?

Pasteurella multocida is associated with a broad disease spectrum in animals, constitutes a frequent cause of porcine pneumonia, and may play a central role in the porcine respiratory disease complex. Systemic infections are rarely reported, although cases of acute septicaemia due to capsular serotypes B and D have been reported in India, Asia and Australia. In this study, an acute outbreak of pasteurellosis with a high morbidity (70%) and lethality (95%) in a free-range pig farm is described. Signs of coughing and severe dyspnoea were observed, as well visible inflammation of the throat, which acquired a cyanotic and necrotic appearance. The predominant necropsy findings were a severe oedema, congestion and haemorrhages in lungs and haemorrhagic foci in mediastinal lymph nodes. Diffuse, haemorrhagic and fibrinous pleuroneumonia and acute, focally extensive and hemorrhagic myositis and panniculitis were observed in the histopathological analysis. Pasteurella multocida subsp. multocida capsular type B, biovar 13, was isolated from different tissues obtained from dead animals. Pulsed field gel electrophoresis (PFGE) revealed that all P. multocida isolates displayed undistinguishable macrorestriction patterns with Bsp120I restriction enzyme, which demonstrated a single strain infection. Multilocus sequence typing (MLST) was also determined, and these isolates were assigned to the new allelic profile ST47. Natural infections are generally by inhalation and ingestion of contaminated material. The extensive breeding systems, where is possible a contact with wild ruminants, could be the entry of the bacteria on the farm, maintained and spread by animals, by horizontal via, through nasal secretions. More studies are necessary to determine if the pigs can be harboured of this pathogen in the crypt of tonsils that could represent a risk of diffusion between swine herds.

NOTES

O36

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ASSOCIATION BETWEEN BLOOD HAEMOGLOBIN CONCENTRATION IN SOWS AND NEONATAL PIGLETS

Background

Haemoglobin (Hb) concentrations in sows tend to decrease during pregnancy. Low Hb levels may result in still-births due to inadequate oxygen transport to foetuses Piglets with a high Hb value at birth have an increased chance of survival until weaning. The purpose of this study was to study the association between Hb-concentrations in sows, stillbirth rate in litters and Hb-concentrations in piglets.

Materials and methods

In a Danish 1700 sow herd, 21 sows and 138 offspring piglets were studied at the time of farrowing. Piglet birth order was recorded and a drop of blood was obtained from sows before farrowing and from new-born piglets before intake of colostrum. Hb-concentrations were measured with a HemoCue 201+ photometer. Statistical analysis was performed using a linear mixed model: Hb_ piglet = Hb_sow + piglet_no + parity*total born.

Results

The anaemia prevalence defined as Hb concentration ≤100 g/L, was 0.38 [0.19; 0.61] in sows and 0.08 [0.04; 0.14] in piglets. Piglet Hb-concentration was found positively correlated to sow Hb-concentration (parameter estimate + 0.54; P<0.001) and negatively correlated to the piglet s number in the birth order (parameter estimate -0.08; P = 0.04) and to the combined effect of parity and the number of total born piglets in the litter (parameter estimate -0.01; P = 0.02).

The percentage of stillborn piglets in litters was not significantly correlated to sow Hb-concentration (= -1.16; P = 0.24) and sows with Hb-concentrations ≤100g/L did not have increased rate of stillbirths (P = 0.55).

Conclusion

Piglets from sows with high Hb level had higher Hb levels at birth which will increase their chances of survival until weaning. Apparently, piglets from older sows which are born in the last part of large litters have the highest risk of low Hb values.

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O37

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AN INTEGRATED SYSTEM FOR PIG HEALTH AND WELFARE MONITORING – FACT OR FICTION?

The improvement of pig health and welfare is fundamental to securing the sustainability of the English pig industry. Disease causes significant cost to pig farmers, limits productivity, and is inextricably linked to welfare. Key areas for the development of health and welfare targets for 2020 are outlined in the BPEX (British Pig Executive) 20:20 Pig Health and Welfare Strategy. To measure the effectiveness of any initiatives, allow assessments of change over time and recognise emerging challenges or threats, the pig industry needs to know what the current status is and to monitor changes that may occur.

BPEX required a critical evaluation of the wide range of existing data sources collected by the industry, researchers and from government-led surveillance systems, in order to establish their potential, identify the current gaps and recommend the next steps to be taken.

We have identified and collated information about current available data sources on health, disease and welfare measurements from the English pig industry. Thirteen data sources, including abattoir lesion reports, disease surveillance, quality assurance schemes, welfare assessments and data collected by private vets, were fully evaluated using a standardised framework for the evaluation of animal health surveillance systems – SERVAL http://www.rvc.ac.uk/VEPH/SERVAL.cfm. The key findings of the evaluations, in terms of the strengths, weaknesses, opportunities and threats of each of the selected data sources, were summarised. Existing baseline estimates and currently effective and/or potential monitoring mechanisms were extracted. Methods for analysing, interpreting and disseminating information on health and welfare were sourced and reviewed.

We identified deficiencies in data collection that hamper the potential integration of data sources and their use for epidemiological analysis and monitoring purposes, plus we found some gaps.

We propose a framework for an integrated system for pig health and welfare monitoring and highlight the potential benefits and limitations.

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O38

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OCCURRENCE AND SEVERITY OF LUNG LESIONS IN SLAUGHTER PIGS VACCINATED AGAINST *M. HYOPNEUMONIAE* WITH DIFFERENT STRATEGIES

Objectives

Mycoplasma hyopneumoniae (Mhp) is a major concern for worldwide swine production. The aetiological agent of Porcine Enzootic Pneumonia causes significant losses, particularly in combination with secondary pathogens. Major economic impact results from reduced daily weight gain, feed efficacy and carcass quality.

Vaccination against Mhp is routinely conducted in Germany. Distinct vaccination schemes are based on one – or single dose strategies. There has been some evidence from the field, showing differences in vaccination efficacy. The aim of the present study was to evaluate such differences based on mycoplasma-associated alterations and Mhp loads in lungs of slaughter pigs, provided with different vaccination strategies.

Material and methods

We investigated lungs from slaughter pigs of 20 randomly selected herds with different vaccination strategies, in a blinded study. Groups 1 (8 herds) and 2 (6 herds) had a history of vaccination with one of two different Mhp single dose vaccines. Group 3 (6 herds) had been vaccinated with a two dose vaccine. A minimum of 30 lungs per herd was scored using the method described by Madec and Kobisch (1982, J.Res.Porc.France 14, 405-412). Six lungs were randomly chosen for sampling from each herd for further investigations: histological lesions typical for Mhp infection were scored and Mhp was quantified by real time PCR. Additionally, each sample was screened for other respiratory agents.

Results and discussion

All tested parameters – gross lesions, histological lesions and PCR-results – were significantly correlated. Lowest gross lesions, histological lesions and Mhp numbers were found in herds after two dose vaccination (group 3). One of the one dose vaccinated groups tended to more pronounced alterations (group 2). The second one dose group (group 1) differed significantly from group 2 and 3 in each of the tested parameters.

The present work substantiates significant differences in vaccination efficiency of different Mhp vaccination strategies.

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O39

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VARIABILITY OF OVULATION IN GILTS: ASSOCIATED FACTORS AND CONSEQUENCES ON REPRODUCTIVE PERFORMANCES IN 4 PIG FARMS

Introduction

Adequate timing of insemination close to ovulation is a key determinant of reproduction performances. The objective of this work was to investigate factors associated with variability of ovulation in different herds and possible impacts on reproduction of young gilts.

Material and methods

The study was performed in 4 conventional farms on 68 gilts. Measurements included daily recordings of estrus and ovarian status using transcutaneous ultrasound technique (3.5-5Mhz probe, Exago®, ECM). We collected information about number and timing of inseminations (AI), backfat (BF) at AI, last altrenogest-to-estrus intervals, health status, treatments, and subsequent performances.

Results

67 gilts exhibited estrus and ovulated within 8 days after weaning and 1 ovulated silently. Onset and duration of estrus and timing of ovulation exhibited large variations according to gilts with significant farms differences. Last altrenogest-to estrus intervals ranged between 100 to 162 h (132.8 ± 15 h). Estrus duration (51.6 ± 13.7h) varied between 36 to 96 h according to gilts. Ovulation occurred at 68.6 ± 32.8 % of estrus duration, 33.9 ± 13.9 h after the onset of estrus, with large gilt variations (-3 h to +58 h). Last altrenogest-to-estrus interval was the best predictor of ovulation and estrus duration ($p<0.01$) in 3 of 4 farms. BF (10 to 20.5mm) was related to last altrenogest-to-ovulation interval ($p<0.05$). Gilt were inseminated 2 to 4 times and fertility was high (86 to 100% according to farms). Low BF (≤13mm) and late ovulations (>35h after estrus) were associated with lower fertility ($p<0.01$).

Conclusions

Results confirmed variability of ovulation and the importance of good estrus detection procedures to adapt AI protocols. Impact of BF and management of young gilts should deserve further attention, specially in farms with lower fertility.

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O40

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A ULTRASONOGRAPHICAL, HISTOLOGICAL AND IMMUNOHISTOCHEMICAL INVESTIGATION OF THE GROWING MAMMARY GLAND IN THE PIG

The amount of colostrum/milk that is available per piglet largely depends on litter size and the ability of the sow to produce colostrum/milk. As average litter size has increased over the last decade sows are required to also produce more amounts of milk to sufficiently nurse their litters. However, research into the porcine mammary gland is still patchy. A study was therefore conducted with the aim of investigating the mammary gland of pigs at the age of 60 (n=10), 120 (n=10) and 180 days (n=10) of two different breeds (conventional versus hyperprolific; 5 pigs each for the age groups, respectively) by ultrasonography (US; parameters: echotexture, echogeneity, homogeneity, shape and size), histology and immunohistochemistry (estrogene receptor alpha (ESR-alpha) and molecular immunology borstel-1 (MIB-1) as a marker for cell proliferation). As measured by US the thickness of the mammary gland increased with increasing age. All other US parameters were not different either between and among breeds of the same or of different ages. Histologically, the number lactocytes increased with increasing age. Only lactocytes were positive for ESR-alpha. Intensity of ESR-alpha staining was not related to age or breed. In contrast, intensity of MIB-1 staining was higher in 60 days old than in older pigs. In conclusion, with the methodology used in this study it seems that breeds do not differ with respect to mammary gland architecture and functionality. Results suggest that the age of 60 days is crucial for mammary gland development in the pig.

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O41

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BONE FORMATION AND RESORPTION THROUGHOUT THE REPRODUCTIVE CYCLE OF PRIMIPAROUS AND MULTIPAROUS SOWS

Bone mineralisation is important for an optimal sow health and may differ between parities. The aim of this descriptive study was to determine bone mineralisation parameters during the reproductive cycle of the high prolific sow on a herd and to compare primiparous with multiparous sows.

Blood samples were taken before feeding in the morning from 5 primiparous and 10 multiparous sows at fixed time intervals during gestation (day -5, insemination, 21, 42, 63, 84), parturition (day -7, -3, parturition, 3) and lactation (day 7, 14, 28). Sera were analysed for osteocalcin, a bone formation marker, and crosslaps, a bone resorption marker.

The crosslap pattern differed between primiparous and multiparous sows. At the moment of insemination bone resorption was low in primiparous sows (0,5 ng/ml) but declined in multiparous sows that had previously been in lactation from 3,5 to 1 ng/ml. At parturition, the marker declined in both parity groups to 0,7 ng/ml, whereas the concentrations increased during lactation to 2 and 3,2 ng/ml for primiparous and multiparous sows, respectively. The osteocalcin pattern was similar in both primiparous and multiparous sows. The osteocalcin concentration decreased at parturition to 89 and 57 ng/ml and increased at the end of lactation to 139 and 94 ng/ml for primiparous and multiparous sows, respectively.

The present results supports previous findings that bone resorption increases during early lactation as a consequence of calcium mobilisation for milk production. Whereas in most situations bone resorption behaves inversely to bone formation, bone resorption seems uncoupled from bone formation during lactation, independently of the parity number.

NOTES

O42

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LONGEVITY OF GESTATING SOWS STATISTICALLY RELATED TO LAMENESS, LEG AND CLAW PROBLEMS

Sows are often culled or euthanised young due to locomotor problems. The aim of this study was to identify traits in leg conformation, claws or the locomotor function that relate to a shorter longevity of the sow. Sows from eight Danish herds were included in the study. All sows were group-housed, either in free stalls or with an electronic sow feeder system. A total of 3,535 sows were examined visually in the pen for seventeen different parameters. The sows were examined in the first (1,889 sows) or third (1,646 sows) trimester of the pregnancy. The findings on legs and claws were related to whether the sow was selected for mating after weaning. The statistical analysis used was multivariable logistic regression by SAS programming.

Results: Observation of long claws or long dewclaws in the first trimester were significantly associated with shorter longevity (P=0.06 and P=0.04). In the third trimester, findings of ulceration near the claw and/or the dewclaw were significantly associated with shorter longevity (P=0.05) and (P=0.04). These sows had a lower probability of being mated after weaning. In the first trimester, 16% of the sows had long claws and 12% had long dewclaws. In the third trimester, 24% of the sows had lesions on the claw and 11% of the sows had lesions on the dewclaws. The sows were examined for stance and gait, but the findings were not significantly associated with a shorter longevity in the multivariate analysis. In conclusion, it is important to observe lesions to the lower limb and long claws and dewclaws, since these are associated with the longevity of the sows. Further studies into the prevention of leg problems in sows will be needed, particularly in light of the requirement that all sows in EU countries be loose-housed from 2013.

NOTES

POSTER PRESENTATIONS

P001

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SUDDEN DEATH WITH RESPIRATORY INVOLVEMENT IN GROWER PIGS BY *STREPTOCOCCUS SUIS*

Streptococcus suis is a major pathogen of swine, causing meningitis, arthritis, pericarditis, polyserositis, bronchopneumonia, septicemia, and sudden death of weaning piglets as well as growing pigs, there by inflicting severe economic losses in the swine industry. It is an emerging zoonotic disease mainly affecting the people who have close contact with swine or pork by-products. Thirty-five capsular serotypes of S. suis have been described (types 1/2 and 1 through 34). Although serotype 2 is considered to be the most virulent serotype in most countries, strains belonging to other serotypes can also cause disease in pigs. 10 grower pigs with history of sudden death were presented for necropsy at the postmortem facility, Division of Pathology, Indian Veterinary Research Institute. External examination revealed generalised cyanosis of skin and blood tinged frothy discharge from nostrils. Gross examination of visceral organs showed thickened pericardium with clear fluid in pericardial sac, froth and blood clots filled trachea, severely congested non collapsed lungs, enlarged severely congested liver and severely engorged mesenteric blood vessels. Histopathological examination revealed bronchopneumonia with alveolar heamorrhage, alveolar and inter-alveolar edema and severe infiltration of inflammatory cells. Bronchi and bronchioles contained desquamated epithelium and inflammatory cells. Gram staining of smear from Brain Heart infusion (BHI) broth of lung inoculum showed gram positive coccoid, ovoid organisms occurring singly, in pairs or in short chains. DNA isolated from BHI culture was amplified by PCR targeting 16S rRNA. The amplicons were sequenced and their sequence analysis confirmed that the isolates belonged to S. suis serotype 2 and 9.

NOTES

P002

Joana Ceia (DVM, Setúbal, Portugal); Ricardo Mesquita (Aligrupo CRL, Alcochete, Portugal).

CLOSTRIDIUM NOVYI INFECTION AS POSSIBLE CAUSE OF SOW MORTALITY IN A COMMERCIAL PIG HERD IN PORTUGAL

A clostridial infection was the suspected cause of sudden death of thirty one gestating sows in a five hundred sow farrow to finish farm located in Azambuja, Portugal. The most affected ones were the sows in the last trimester of gestation.

Necropsy findings included timpanism, purple discolouration of the skin, generalised subcutaneous edema with foul-smelling bloodstained fluid in the pleural, pericardial, and peritoneal cavities and enteritis. The liver was friable and uniformly infiltrated with gas bubbles, presenting a spongy appearance on the cut surface.

Large numbers of gram-positive rods were observed in smears from the heart, lungs and liver. Histopathological examination revealed non-staining cavities (gas bubbles) and necrotic lesions in these tissues. All samples showed a marked autolytic degradation.

Even though the diagnosis of some Clostridium infections in swine is difficult due to rapid postmortem invasion, and although no microbial isolation or molecular biology assays were performed in this case, the history of sudden death of gestating sows, along with the identification of clostridial organisms and the presence of emphysema and rapid postmortem decomposition of internal organs in the absence of any other detectable cause of death, suggests death due to Clostridium novyi.

Control measures, such as medication in feed coupled with vaccination of sows, were taken with some relative success.

Analysis of the causes of sow mortality has received less attention compared with investigation of mortality in lactating and growing pigs. This clinical case illustrates the importance of an early postmortem examination and collection of samples as soon as possible after death as tools for the correct management of cases of unexpected mortality in sows.

NOTES

P003

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IMPACT OF INFLUENZA A(H1N1)PDM09 VIRUS ON LIVE WEIGHT OF DUROC BOARS DURING THE GROWTH PHASE

Data was collected during an investigation of an outbreak of Influenza A(H1N1)pdm09 at a boar testing station from April to July 2011. There were 1152 boars at full capacity. The station receives young boars (70-85 days old) from closed self-recruiting nucleus herds to monitor the boars' performance including daily feed intake and daily weight. Cohorts of 72 boars are kept in groups of 12 in 6 equal sized pens (14 m2) in one room where they remain for an average 72 days until they reach a bodyweight of 100kg. Serological and virological tests were performed on 375 boars from all 16 rooms on 8 occasions. A synopsis of the results is presented based on results of one room where 8 Durocs were confirmed positive. 23 uninfected Duroc boars were selected for comparison. The growth curves of the group means of live weights of the two groups (infected vs uninfected) were compared. Student t-test was used to test significance in the differences between the two group means at different days of age. If the lower limit of 95%CI (Group mean difference minus 1 tailed t-distribution at 0.05 sig level with 31 degrees of freedom (1.695) x SD of group mean difference) is greater than zero, than the difference was considered significant at the 0.05 level. The growth curves of uninfected and infected Duroc boars appear to diverge just before 85 days of age. This coincided with the detection of the virus on 14 April 11.

However using one-tailed t tests on group means difference, show that the higher live weights in the uninfected boars were not consistently significant at the 0.05 level. Uninfected boars from 132 days till 140 days did appear to have a statistical significant higher weight than infected boars.

NOTES

P004

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INVESTIGATION ON PRACTICALITY AND EFFICACY OF ISOFLURANE NARCOSIS DURING PIGLET CASTRATION ON MEDIUM-SIZED PIG FARMS IN GERMANY

In the context of the discussion about animal welfare during pork production the castration of piglets is of major interest. Therefore this study tested the applicability of isoflurane narcosis for pain alleviation on three medium-sized pig farms. Extent of anaesthesia, wound healing and growth after castration were examined and compared to traditional castration without narcosis. In addition the microbiological status of the anaesthetic device was investigated to assess the risk of carryover of pathogens between different farm divisions. So far 1545 piglets were monitored (771 with narcosis (WN)/774 without (W)). Both groups were of similar average bodyweight and age. As the investigations are not completed yet, the interim results show, that there are no differences in wound healing or growth between the groups 10 days after castration (p.c.) as well as at the time of weaning (wound healing score 10 days p.c.: mean WN = 13.18/mean W = 12.94; mean of bodyweight at weaning: WN= 7.63kg/W= 7.60kg). But only 76% of the anaesthetised piglets had an adequate depth of narcosis. 24% of these piglets still showed obvious reactions to the castration. The bodyweight of the piglets had a significant impact on the stage of anaesthesia. Small piglets (<1.0kg) and piglets with a bodyweight above 3.0kg showed significantly more pain reactions than piglets with an bodyweight between 1.0kg and 3.0kg. The results of the microbiological investigations demonstrated a risk of pathogen spreading within the farm divisions by the anaesthetic device because bacterial as well as viral pathogen accumulated on the breathing mask. As the handling of the anaesthetic device was assessed as good by the farmers the isoflurane narcosis seems to be a practicable method for pain reduction during piglet castration if the piglet's bodyweight and simple hygiene arrangements are observed strictly.

NOTES

P005

Mette Kragh Jensen, Kopenhagen Fur.

FARMERS EXPERIENCES WITH ORAL ADMINISTRATION OF MELOXICAM FOR SOWS TO IMPROVE SOW WELFARE

Throughout the lifetime of a sow the number of injections is huge. First of all, the sows are routinely vaccinated several times, and on top of that the sows receive a number of intramuscular injections of antibiotics, NSAIDs etc. The stress and pain induced by injection is a welfare problem and therefore, a reduced number of injections will improve the sow welfare.

The aim of this study was to evaluate oral meloxicam given to sows shortly after farrowing, compared to treatment by injection. Farmers filled in a questionnaire covering handling of the product, reaction of the sow to oral treatment as well as advantages and disadvantages compared to injection seen from the farmers point of view. Sows were treated twice with 0.4 mg/kg body weight of oral meloxicam (Metacam®, Boehringer Ingelheim) with an interval of 24 hours and the first treatment was given within 6 hours after end of farrowing. Totally, 42 farmers answered the questionnaire, which was prepared with open questions, thus giving the farmers the opportunity to describe their experiences with their own words.

The overall evaluation of the treatment was predominantly positive, with 90.5 % answering that administration of the product was easy and convenient. Only 4 farmers (9.5 %) thought that giving the oral treatment was a bit difficult. Most of the farmers reported that the sows liked the treatment, with many sows being more interested in the second treatment than the first one. Seven farmers reported that 20-30% of their sows were not too happy to eat the drug. Regarding advantages and disadvantages, the most predominant statement was that it was an advantage to avoid injections. In conclusion, the oral formulation of meloxicam can be regarded as a large improvement of sow welfare and as a good alternative to NSAIDs given by injection.

NOTES

P006

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THROMBOCYTOPENIA PURPURA AS THE CAUSE OF DEATHS IN PIGLETS

Thrombocytopenia purpura in piglets due to passively transferred anti-platelet antibody is a bleeding disorder. Over a period of two months, Thrombocytopenia purpura was diagnosed as the cause of post castration deaths among piglets five to six days of age in two different farms.

Herd visits and on-farm autopsies were performed. Farmers were interviewed regarding the history of the dead piglets. Photographs of typical lesions were taken and sent to the Norwegian School of Veterinary Science for examination. Blood samples from remaining littermates were collected and analysed for thrombocyte count.

In the first farm, 13 piglets, from three different litters, died after castration, first males then females. After questioning the farmer, it was evident that all the diseased piglets originated from one, fourth parity sow but some of her piglets had been fostered to other sows after the ingestion of colostrum. In the second farm, one piglet from a third parity sow died. On-farm autopsies revealed pale piglets with heamorrhages in the subcutaneous tissue and internal organs. In the males, most of the heamorrhages were intra-peritoneal, presumably originating from the cut arteria testicularis. Blood samples were collected from two of the remaining piglets and analysis showed thrombocyte count of 107 and 163 109/L. Normal values in 30-50kg pigs are 211-887 109/L.

The diagnosis was not verified by identifying sow-derived iso-antibodies to piglet platelets or the presence of anticoagulant in body tissues. Post mortem findings, blood samples and the fact that only piglets from single, multiparous sows were affected were highly indicative of the diagnosis.

NOTES

P007

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THE 'GRIMACE SCALE': DO PIGLETS IN PAIN CHANGE THEIR FACIAL EXPRESSION?

With the increase in attention to animal welfare, researchers have focused their interest on the assessment of pain in farm animals. In humans who cannot self-report, such as infants and unconscious patients, the observation of facial expression is frequently used for pain assessment (Prkachin, 2009). The possibility to assess pain through changes of facial expression has also been studied in animals, and pain scales developed which include the 'Mouse Grimace Scale' (Langford *et al.,* 2010), the 'Rat Grimace Scale' (Sotocinal *et al.,* 2011) and the 'Rabbit Grimace Scale' (Keating *et al.,* 2012). Although with some species differences, the three scales focus on the eyes, nose, cheeks, ears and whiskers of an animal.

Although pigs have fewer muscles for facial expression, there are subtle changes in appearance (Flecknell & Watermann-Pearson 2000), but there are currently no published pain scales based on facial expression in pigs. The aim of this research was to investigate if it is possible to observe changes in piglets' facial expressions immediately after painful procedures. Thirty-one piglets were subjected to tail docking by cautery, while held by the farmer. Images of faces were taken immediately before and after this procedure. These images were sorted and those in which piglets had closed eyes were excluded. Images were evaluated by two treatment-blind observers, scoring from 0 to 2 (0 was no evident tension and 2 very evident tension). Because of the non normal distribution, data were analysed with the non-parametric Wilcoxon Signed Rank Test, which showed that the cheek tension score significantly increased from before to after the procedure ($P<0.042$). This result shows promise for the adoption facial expression as a tool for acute pain assessment in pigs. Results from a subsequent study on surgical castration of piglets will be presented.

NOTES

P008

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FIELD CASE OF CLASSICAL SWINE FEVER WITH PCV-2 CO-INFECTION IN THREE DAYS OLD PIGLETS

A case of Classical Swine Fever (CSF) occurred in a 6,000 sows farm. Congenital infection was found in young sow offspring at three days old with acute and chronic symptoms and lesions. The acute clinical signs in piglets were purple cyanotic discolouration of skin at abdomen, inner thighs, and ears. The hemorrhagic gross lesions such as petechial heamorrhage of lymph nodes, tonsil, kidney, urinary bladder, stomach, lung, and subcutaneous tissue were detected from piglets died after natural infection. The chronic signs occurred in young sows unit, 1st parity, at the same farrowing batch. Piglets in the first week of age show congenital tremor and posterior paresis. Some piglets showed both signs. Direct immunofluorescence (FA test on cryostat section) detected the viral antigen from tonsil, lymph node, kidney, spleen, and ileum samples derived from acute cases The PCV-2 antigen was detected by PCR while PRRSV antigen was negative. The final diagnosis was acute and congenital infection from young sow with both virulent and less virulent strains while lived vaccine of CSF was routine used in lactating sows. There might be a factor caused immune suppress and PCV-2 was suspected the predisposing cause of CSF in this case. Normally, the congenital infection of CSF was less incident than post-weaning infection, the investigation of infectious status in herds by virus neutralisation test, the neutralising peroxidase-linked assay (NPLA) was conducted for the further interpretation. For controlling, the infected sows and piglets were culled. Lived vaccine might be booster to sows and weaning pigs. Strict biosecurity practice was implemented to avoid horizontal transmission. The serological test might be repeated for monitoring the herd status three months later.

NOTES

P009

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IS MASS VACCINATION A FEASIBLE METHOD TO CONTROL PORCINE RESPIRATORY AND REPRODUCTIVE SYNDROME (PRRS) IN A PIG DENSE REGION – CASE STUDY

A PRRS mass vaccination trial was set up in Shrophram (Norfolk, England), classified as a pig dense region (2.20 pigs/acre over a 6 mile radius). The trial had 2 objectives: (i) to answer the question "can and will pig producers collaborate to control disease" and (ii) to establish whether mass vaccination is a feasible method to control PRRS in a pig dense area. This pilot trial required participating farmers to meet certain criteria: (1) provide blood samples where possible from 10 sentinel (unvaccinated) pigs within the two weeks preceding slaughter to determine PRRS status of the herd and (2) supply performance data including average daily gain (ADG), mortality rates, feed conversion ratio (FCR) and antibiotic usage prior to and during the period of vaccination. Collaboration of the farmers was monitored by: (i) Attendance at the inaugural and review meetings (80% of vets with clients in the focus area attended) and (ii) the percentage of herds willing to PRRS vaccinate (99% of sows and 81% of growing pigs were vaccinated). To achieve the objectives of the project, as many pigs within the area needed to be vaccinated simultaneously; therefore comparative performance could only be assessed against each herd's performance of pig's pre-PRRS vaccination and not as a direct cohort group. Substantial improvement in terms of ADG and reduction in mortality rates was observed in some but not all herds. Virology results concluded that the strains of PRRS virus in the focus area are closely related, but dissimilar to the live vaccine used which may explain results obtained. Thus it can be concluded that the precedent is there that farmers can collaborate which should bring benefits to disease control. However virological testing is required to determine if mass vaccination can be considered feasible to control PRRS.

NOTES

P010

Dr. Andreas Palzer, Veterinary Pig Practice Scheidegg, Dr. Andreas Becker, IDT Biologika.

VACCINATION AGAINST OEDEMA DISEASE IN A COMMERCIAL PIG FARM

Oedema Disease caused by Shigatoxin Stx2e producing *E. coli* (STEC) is responsible for severe illness in pigs resulting in a high mortality during the flatdeck period and substantial economic loss. In a commercial sow farm the vaccine ECOPORC SHIGA was tested to evaluate the safety and efficacy as well as the reduction of oral medication to avoid edema disease.

In 2011, in the affected farm the mortality rate due to edema disease temporarily reached 15% in the flatdeck despite extended oral antibiotic medication. From 2012 on, all farrowed piglets where vaccinated by one shot of 1ml (i.m.) ECOPORC SHIGA (n=5415) within first week of life. Mortality rate caused by edema disease, use of oral medication and growth performance where observed for vaccinated pigs till end of nursery phase and compared to historical data at the farm.

No adverse reactions to the vaccine were observed. In the vaccinated groups, mortality due to edema disease was 0 to 1,2%. Oral medication against edema disease where fade out completely. While in 2011 oral medication where given 3-4 weeks in nursery phase, in 2012 weaned piglets where only treated 1-1,5 weeks against Enterotoxin producing E.coli, causing diarrhoea. With the control of edema disease by vaccination, the farmer increased energy and protein density in nursery feed to archive higher average daily weight gain.

NOTES

P011

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PCV2 ASSOCIATED CLINICAL SIGNS IN FINISHING PIGS AFTER PCV2 PIGLET VACCINATION PROGRAMME WAS CHANGED – A CASE REPORT

The case farm was a finishing farm with 536 fattening pigs. Since 2006 this farm received PCV2 and Lawsonia intracellularis vaccinated piglets from one 140-sow breeding farm, without experiencing any major health issues.

In December 2011 the finishing pigs showed clinical signs, starting in mid-finishing (at about 40 to 50kg of weight): Inappetence with fever (up to 41°C), wasting with cases of sudden death, reduced ADG, aggression (tail biting), and impaired carcass quality. In February 2012 about 20% of the finishing pigs were affected. Most remarkable was the inhomogeneity in growth mid-to-late finishing, wasting and the high mortality. A post-mortem examination was carried out on 5 pigs (3 dead and 2 typically diseased pigs euthanised). Findings included: wasting, icterus, multiple enlarged lymph nodes, yellowish diarrhoea in one pig with bell shaped abdomen, and as secondary finding pericarditis in 2 pigs. Tissue samples were sent to the lab for further investigation. Lymphoid depletion and granulomatous inflammation as well as an interstitial tubulo-nephritis were found in 3 pigs. Microscopic findings were compatible with PCV2-infection, which was confirmed by immunohistochemistry.

An investigation on the breeding farm revealed that the PCV2 piglet vaccination programme had been changed from a 1-ds subunit vaccine (1ml/dose) to a 1-ds whole-cell vaccine (0.5ml/dose) in September 2011. As an immediate action (based on that information) all vaccinated piglets that were still present on the breeding farm were re-vaccinated, and the whole piglet vaccination programme was switched back to the 1-ds subunit vaccine. During the last farm visit in October 2012 an obvious improvement in the health situation was observed, despite the fact that in-feed medication at placement was stopped in August 2012. Feed intake, growth and homogeneity were improved, while mortality was markedly decreased.

NOTES

P012

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SEROLOGICAL AND VIROLOGICAL PCV2 STATUS IN THE FARROWING UNIT ON ONE FRENCH FARROW-TO-FINISH FARM

Experimental studies have shown that PCV2 can be involved in reproductive failure and can be transmitted to foetuses in utero. However no field study in Europe has investigated PCV2 epidemiology in the farrowing unit to evaluate in-utero transmission. The objective of this study was to initiate the evaluation of PCV2 infection in farrowing sows and possible in-utero transmission to foetuses.

We selected a French farm with reproductive failures characterised by a high number of mummified piglets and a pre-weaning mortality above the average. The selected farm was a 240 sow farrow-to-finish farm. Eight (8) sows were selected from one batch, colostrum samples were harvested at the start of farrowing and blood samples at the end. Pre-suckling piglets (n=83) were blood sampled about 1h after birth. PCV2 PCR was run on sow sera and colostra, and on pooled piglet sera. PCV2 Elisa was run individually on sow and on pooled piglet sera. PCV2 DNA was not detected in any of the samples tested. 85% (7/8) of the sows were PCV2 antibody positive, compared to only 2/83 piglets (from the same litter). This study gives a first insight in PCV2 epidemiology and in-utero infection on a French farm with reproductive clinical signs. The high percentage of seropositivity in sows confirms that PCV2 is widespread in the sow herd. Only 2 piglets from the same litter show PCV2 antibodies, but no viremia, indicating that not all foetuses were infected and that PCV2 infection took place after day 70 of gestation.

Future studies are needed to confirm if this is a regular finding on French farms, and to investigate the reasons and implications of the differences compared to other studies.

NOTES

P013

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A FARROW-TO-FINISH HERD FREE FROM SWINE DYSENTERY 13 YEARS AFTER ERADICATION

In 1996, a specialised fattening herd converted into a two-site farrow-to-finish herd with 80 sows. Clinical symptoms of swine dysentery (SD) were seen in the fatteners and SD was most likely introduced in 1995 with the purchase of growers. In 1998, clinical symptoms of SD were also observed in sows and piglets. Brachyspira hyodysenteriae was demonstrated in 13 out of 23 samples (57%). Samples were negative for salmonella and pathogenic E. coli.

In 1999 an eradication program was undertaken where sows were treated with tiamulin by injections and water medication. In brief, sows received an injection (10 mg/kg) 11 days before they were washed, disinfected and transferred to a disinfected unit where they received a second injection. They were also water medicated for 14 days from the time of the first injection until three days after allocation in disinfected units. The stable units were cleaned and disinfected after being emptied and before sanitised pigs entered. Cleaning of units consisted of pressure-wash, drying and disinfection using glutaraldehyde. Slats were removed to allow thorough cleaning and disinfection. Manure pits were emptied and manure was removed from yard surfaces. Rodent control was enforced and cats and dogs were treated with tiamulin in water. All fecal samples collected after the eradication have been negative for B. hyodysenteriae (n=210) but other Brachyspira spp. (n=102) including B. pilosicoli (n=5) have been demonstrated. The most recent sampling was performed in September 2012. Bloody diarrhoea was seen in a number of fatteners and gilts 2½ years after the eradication. Laboratory investigations determined Lawsonia intracellularis to be the cause of the symptoms. In conclusion, the eradication program for SD proved to be successful in the long term. However, eradication of other Brachyspira spp. was not achieved. Neither was L. intracellularis eradicated although tiamulin is effective in treating proliferative enteropathy.

NOTES

P014

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"PROFESSIONAL PIG PRACTICE" – A GAME-BASED E-LEARNING CONCEPT WITH VIRTUAL PIG HERD VISITS

Background: Herd visits are extremely important for practising clinical skills during veterinary education. However, such activities have a high cost and therefore the student confrontation time is limited. This causes major worries among students that face professional contact with clients/patients after graduation. A possible solution could be to provide a safe, virtual environment to practice such skills in an easy-accessible, interactive setting. Hence, the objective of this project was to develop, document and test a game-based E-learning concept where students visit virtual farms, interact with the farmer, examine the animals, perform autopsies and finally identify and diagnose the problem and suggest appropriate action.

Methods: The project combines veterinary research and professional skills, pedagogical disciplines (didactics and learning methods) and computer science. In short, students draw a herd at random (with a well-defined disease or problem). The visit (game) starts at the stable door where certain safety procedures should be applied to avoid contamination (change clothes, wash hands etc.). There will be several lines of dialogue with the farmer, some leading to important clues, others not. By selecting a pen (point and click) a video sequence shows typical clinical signs and behavioural patterns of affected pigs. Certain animals can be selected for closer examination and autopsy where close-ups will be provided and students must notice and identify pathological changes. It will be possible to select material for laboratory examinations and receive the results of i.e. culturing during the visit. The visit is concluded by selecting the correct diagnosis and prescribe appropriate treatment and/or action. The game design resembles adventure – and simulation games and students obtain points by correct actions.

Results: By now a playable demo is produced and will be demonstrated (10-15 minutes) if this abstract is accepted for oral presentation. Otherwise, screen dumps will be presented on poster.

NOTES

P015

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AN ATTEMPT TO ELIMINATE THE PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME (PRRS) ON THREE SMALL FARMS BY VACCINATION

Objective: An understanding of porcine reproductive and respiratory syndrome virus (PRRSV) persistence and transmission within the breeding herd is critical for successful eradication and/or control of the disease. Vaccination is one strategy among the strategies that have been promoted. Vaccination and following the strict biosecurity protocols are very important measures for the success of the program. The objective of this study was elimination of PRRSV from three small pig farms in Slovenia by vaccination.

Material and method: The study was conducted on three one-site pig farms. Farms 1, 2 and 3 have 15, 48 and 35 breeding sows respectively. After confirmation of PRRS infection on a farm, serum samples were collected from the breeding sows every 3 months for the period of 18 months. On the farm 1, 2 and 3 vaccination was provided at least once with modified-live vaccine (MLV). All farms accepted strict biosecurity protocols and herd closure for at least 200 days. For detection of antibodies, IDEXX X3 ELISA was used and PRRSV detection and sequencing was done as previously described (Toplak *et al.*, 2012).

Results: The decreasing of S/P ratios was observed on all farms six months after the vaccination but later S/P ratios increased again in spite of herd closure and biosecurity measures. The nucleotide identity (ORF7) between reference strain Lelystad and PRRS strain detected from the farm 1 was 89,5%, from the farm 2 was 88-89,1% and from the farm 3 was 93,4%.

Conclusions: The detected high heterogeneity between field and vaccine strain is likely to be the main obstacle for the effective elimination of PRRSV. According to the serological results the vaccination did not result in great improvement. On the other hand the regular vaccination approximately every three months improves the clinical signs, reproduction and food conversion.

NOTES

P016

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CLINICAL CASE REPORT OF SWINE H3N2 INFLUENZA IN FRANCE

Introduction: According to the last survey of swine influenza viruses (SIV), H1N1 and H1N2 subtypes are the major subtypes circulating in France. H3N2 subtype has not been isolated for 12 years despite it is circulating in adjacent countries. This case report illustrates the re-emergence of H3N2 subtype in France.

Materials and methods: The farm located in the Northern of France, 10 kilometres far from the Belgian border was a 300-sow farrow-to-finish unit. The herd was serologically positive to PRSSV but no virus circulation was evidenced in post-weaning. Piglets were vaccinated against PCV2 and M hyo at weaning. No flu vaccination plan on going. Respiratory disease complex revealed by coughing and anorexia used to occur in fatteners and sometimes in post-weaners. Mortality rate weaning-to-slaughter was 7.5% and increased during outbreaks. In January 2012, coughing, anorexia and sudden deaths were observed despite normal rectal temperature. Swine flu was suspected. Mass non-steroid anti-inflammatory (NSAI) treatment was implemented. Nasal swabs in two 100-day-old fatteners were taken and sent to the National Reference Laboratory (ANSES, Ploufragan). A-type SIV RT-PCR, virus subtyping by both RT PCR and IHA tests, isolation on MDCK (Madin Darbin Canine Kidney) cells and genome sequencing were performed.

Results and discussion: The isolate (A/Sw/France/59-120031/12) was confirmed to be a type A influenza virus and belonged to the European human-like reassortant swine H3N2 lineage. The herd health status returned back to normal after the NSAI treatment but heterogeneity at slaughter was evidenced in the affected batch. Vaccination of the sows with GRIPOVAC®3 was implemented in the farm resulting in cessation of cough during post-weaning and decrease of suspected "viral episodes" during fattening. New epidemiological survey is ongoing to determine SIV subtypes prevalence including re-emerging H3N2 subtype, in the Northern part of France.

NOTES

P017

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MUSIC CAN IMPROVE OR DETERIORATE WELFARE IN PIGS

Objectives: Music is occasionally used to improve housing, rearing, milking or pre-slaughter conditions in farm animals. However, detailed scientific information on the effects is extremely rare. Because of direct linkage between music and specific action (e.g. milking), most examples are just instance of classical conditioning. In other cases, positive effects of music are assumed, taking for granted, (often positive) effects of music on humans. The goal of the present study was to understand effects of music of different styles, on pigs of different breeds under experimental housing conditions.

Material and methods: Ten Large White, 18 Pietrain and 18 Miniature pigs were used to study effects of music on the "species" pig. Bach Orchestral Suite No 3 (BMV 1068) and Heavy Metal (Indestructible/Disturbed) were used at a volume of just 60db to compare extremely different music styles. No music served as the negative control. The Behaviour of the pigs was recorded with a video camera and analysed later. A total of 27 different behavioural parameters were statistically clustered into activity and stress related behaviour.

Results: Pietrain and Large White pigs showed a similar behavioural pattern. Music of both styles increased activity and stress related behaviour and decreased lying activity. Miniature pigs, however showed a contrary behaviour. With more stress, they showed increased time with lying and reduced activities. Heavy metal led to significantly increased stress related behaviour. Even convulsions were observed in Pietrain pigs. Bach increased activity related behaviour, although some elements were able to induce stress-related behaviour.

Conclusion: Music as an unfamiliar factor for the pigs was able to induce stress related behaviour, even in its Classic style, although with significant quantitative effects between styles. Some Classic pieces of music however, led to a behavioural activation of the pigs, improving their well-being in an inactive environment.

NOTES

P018

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INSIGHTS IN *BRACHYSPIRA HYODYSENTERIAE* DETECTION ON NINE BELGIAN PIG HERDS

Brachyspira hyodysenteriae – the etiological agent of swine dysentery – is an increasing problem on Belgian pig herds and causes important financial losses. The aim of the study was to create insights in the detection of the disease on infected farms.

Nine pig herds were selected based on the presence of diarrhoea and a positive PCR test (Adiavet Brachy). At each farm, thirty-six individual fecal samples were taken in randomly selected pigs. The sampling was done in four different groups: weaners (n=9), at 40kg (n=9), at 80kg (n=9) and in the group where diarrhoea was seen (n=9). Sampling was done before administration of antibiotics. The samples were tested by PCR and the fecal consistency was scored.

Over the nine farms, thirty-one fecal samples were positive for Brachyspira hyodysenteriae. In the groups where diarrhoea was detected 0-7/9 of the collected samples tested positive at PCR. In the other three age groups, 0-5/27 samples tested positive. Thirty-six percent of the positive samples had a normal fecal consistency. The remaining sixty-four percent of the positive samples were scored as fluent or flat. The within herd prevalence fluctuated between six and twenty percent.

As seen in the results, the possibility exists that, even in a group where diarrhoea can be seen, none of the taken samples are positive for B. hyodysenteriae at PCR. This conclusion makes it very difficult to set up a screening protocol for pig herds.

Given the fact that more than one third of the positive samples had a normal consistency, the bacteria can be found in samples of animals without diarrhoea. Sampling asymptomatic gilts during the quarantine period can thus be useful.

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P019

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A CLINICAL CASE OF CONGENITAL TREMORS IN PIGLETS WITHOUT EVIDENCE OF PCV-1 AND PCV-2

Congenital tremor (CT) is a disease of newborn pigs characterised by spontaneous clonic contractions of one or more groups of voluntary muscles. Besides suspected or confirmed etiologies of CT such as classical swine fever virus, pseudorabies virus, Japanese encephalomyelitis virus, hereditary disorders in Landrace or Saddleback pigs, organophosphorus poisoning etc., porcine circovirus (PCV) has been described as a potential cause of CT. The type AII seems to be the most common form of CT. Although a potential association between PCV1 or PCV2 and CT-AII has been observed, about 50% CT cases described up till now are caused by unknown reasons.

In a PCV-seropositive 108-sow, farrow-to-finish Belgian pig farm breeding hyperprolific Landrace, 42 litters with shaking piglet(s) were reported since June 2006. On March 2012, piglets born from four sows of a 27 sow batch demonstrated CT. After exclusion of main etiologies of CT from these CT-affected piglets, it was hypothesised that PCV1 or PCV2 could be the reason. Necropsies (n=8) and histopathology (n=3) were performed and no evidence of macroscopic or microscopic lesions were seen in cerebrum, cerebellum and spinal cord. Pre-suckled and post-suckled (after 3 days of colostrum uptake) serum samples were also collected from 9 piglets to determine PCV1- and PCV2-specific Ab titres by an immuno-peroxidase monolayer assay (IPMA). No PCV-specific Ab titres were observed in pre-suckled serum samples (≤40), whereas IPMA Ab titres of ≥640 were observed in post-suckled serum samples. Both PCV1 and PCV2 could not be isolated (< 101.7 TCID50/g tissue) from 4 tested piglets (in heart, brain and lungs). The present results do not support the hypothesis that PCV1 or PCV2 are linked to CT in newborn piglets.

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P020

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STUDY ON FEASIBILITY OF UDDER CONFORMATION MEASURES IN SOWS

The aim of this study is to develop practical measures of udder conformation, quantify the changes of udder traits during the sows' cycle life and investigate the correlations between these traits and piglets' survival, health and performance. In a preliminary study, udder traits were based on measurements of udder position, teat size and placement. Measures were taken twice daily to assess record repeatability from the time of entry into the farrowing house until parturition. 5 measures are taken when the sow was lying down on side: distance between the two teat rows; distance from the base of the teats in the upper row to the abdominal line; distance from the teat base in the upper row to the ground; distance from the teat base of the lower row to the abdominal line and distance from the teat base of the lower row to the ground. 3 measures are recorded on the standing sow: distance from teat tip to the ground; distance between the tip teats from one row to the other and distance from the fore udder abdominal attached to the ligament of the leg on both side left and right. Teat traits are the number of functional teats, the placement and the size, measured as length and diameter at the base. Six point linear scales were developed to define teat position and five score to define teat shape. Result will be show on the poster.

NOTES

P021

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MULTILOCUS SEQUENCE TYPING (MLST) OF *ESCHERICHIA COLI* ISOLATED FROM MILK OF SOWS WITH MASTITIS AND HEALTHY CONTROL SOWS

Coliform mastitis 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. It is known as a multifactorial disease, and bacteria, especially Escherichia coli (E. coli), have often been isolated from diseased animals. Although multilocus sequence typing (MLST) is a common tool in bacteria typing, due to our knowledge it has so far not been used for further investigations of isolated strains from sows' milk samples. Therefore, this study aimed at the characterisation of E. coli-isolates from sows affected with PDS (PDS+) and from healthy control sows (PDS-). Bacteriological identification of E. coli was performed from milk samples of five farms. A selection of 432 E. coli-isolates, 194 isolates from PDS+ sows, and 238 isolates from PDS- sows, was examined via MLST. For this purpose, the Achtman MLST scheme (http://mlst.ucc.ie/mlst/dbs/Ecoli) was elaborated, sequencing seven housekeeping genes. In total, 82 different sequence types (ST) were detected with ST10 (21.8%), ST877 (7.1%) and ST101 (6.4%) as the most frequent ones. Whereas ST10 and ST877 were detected more often in E. coli from PDS- sows (ST10: 59.0%, ST877: 54.8%), ST101 was more frequently observed in E. coli from PDS+ sows (60.7%). The subsequent MLST-based phylogenetic analysis represents the distribution and relationship between the ST of E. coli taking into account the effects of PDS and farm.

NOTES

P022

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USE OF ALTRENOGEST (MATRIX™) AT WEANING IN PRIMIPAROUS SOWS

Altrenogest is a common reproductive tool widely used in the US pork industry. Commercialised under the brand name Matrix™ in North America, this synthetic analogue of progesterone is approved for estrus synchronisation in gilts that came in estrus at least once. It is well-known that primiparous (P1) sows experience a decrease in their second-litter size and that they are more sensitive to summer infertility than older sows: delayed return to estrus after weaning and reduced conception rates are common in P1 sows. The purpose of this study was to assess if giving Matrix™ (15 mg of altrenogest) for seven days to the sows after their first weaning could maintain farrowing rate and improve the number of piglets born alive at the second pregnancy. This study was conducted on a commercial farm of 4000 primiparous sows. On the day of weaning, sows were randomly assigned to control or treated group. Results obtained from the first 1158 and 1119 sows in the control and treatment groups, respectively, showed that the farrowing rate following the first insemination was not different (81.5% and 80.4%, respectively), whereas the sows treated with Matrix™ gave birth to 0.5 alive piglets more ($p<0.05$) and tended to wean 0.3 piglet more ($p=0.06$) than the control sows. The second parity depression in litter size was demonstrated in this herd (-0.44 piglets born alive at P2 in the control group) but was suppressed by the administration of Matrix™ (0.02 piglet more at P2). Also, the number of sows culled because they did not come back to estrus after parity one was less (33 versus 69; $p<0.05$) in the treated group than in the control group. Postponing the insemination of P1 sows for one week gives sows time to restore their energy reserves used during the first lactation and improves fertility results.

NOTES

P023

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PCV2 EVIDENCING IN OVIDUCTS OF CULLED SOWS: A CASE REPORT

Introduction: Implication of PCV2 in reproductive disorders has been reported by several authors. It has also been demonstrated that all cells of the young embryos are susceptible to PCV2 as soon as they get rid loss of the zona pellucida. Replication of PCV2 in embryos in early pregnancy possibly leads to embryonic death. In farms suffering from reproductive disorders, PCV2 prevalence in the genital tract of culled sows is consequently of particular interest.

Material and methods: Data was collected in a French 84-sow farrow-to-finish operation. The herd was PRRSV-free. Sows were routinely vaccinated against porcine parvovirus. Sows and piglets were not vaccinated against PCV2. In September 2010, abnormal number of returns to oestrus were observed. PCV2 circulation was evidenced serologically in sows.

Five culled sows from parity 1 to 3 were necropsied at slaughterhouse. Ischiatic and uterine lymph nodes were sampled for histology and immunohistochemistry. One oviduct per sow was collected using aseptic techniques, including single use instruments and assayed by PCV2 PCR.

Results and conclusion: A slight hypoplasia of the lymphoid tissues was found in the lymph nodes of two sows. However, no immunohistochemical staining evocative of PCV2 infection was found in any of the organs. PCV2 DNA was found in two sows out of five in accordance with previous findings (Bielanski *et al.*, 2004). The positive sows were primiparous. No correspondence between the slight lesions and the presence of PCV2 DNA was found. Nevertheless, the presence of PCV2 in the oviduct represents an early risk of contamination and further on of infection and death to the embryos. Additional large scale investigations are required to evaluate the prevalence of PCV2 presence in the oviduct of sows in PCV2 positive herds.

NOTES

P024

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EVALUATION OF DIFFERENT FARROWING INDUCTION PROTOCOLS IN SOWS

Dead born piglets mostly die during parturition due to intra-partum asphyxia. Inducing parturition may reduce the variation in onset of parturition between sows and allow supervision to be more convenient, especially when parturitions can be concentrated during working hours (22-32h after first injection, WH). Three protocols for farrowing induction using prostaglandin (PG) and/or oxytocin (OT) are well known: single injection of PG (1xPG), combination of PG + OT 24h later (PG+OT) and two injections of PG with 6 hours interval (split-dose-technique). The latter protocol uses a double dose of PG. We investigated the effects of using two times half of the dose of PG (2x½PG). One-hundred and eleven Topigs-20 sows, stratified for parity (1-7) and backfat levels, were randomly divided into 4 groups: 1xPG, PG+OT, 2x½PG, and control using Gabbrostim®. Induction was performed at day 114 of gestation. Following parameters were measured: time between first injection and onset of parturition (Tip), parturition duration, average birth interval, % dead born piglets, and need for parturition assistance. Continuous variables with normal distribution and homogeneity of variance were compared using ANOVA with LSD post-hoc tests. Ordinal or not-normally distributed variables were analysed using a Kruskal-Wallis non-parametric approach with post-hoc pairwise comparisons using Bonferroni correction.

All induction protocols had a significantly shorter Tip(min) than the control group (p=0.006) but did not differ mutually (PG:1363, PG+OT:1472, 2x½PG:1530, control:1925). More sows started farrowing during WH for PG+OT (68%, p=0.001) and 2x½PG (52%, p=0.035) compared with the control (23%) while PG (46%) did not differ significantly from the other groups. All other observed variables were comparable between the four groups.

In the present herd with strict supervision of sows during farrowing, applying PG+OT or 2x½PG for farrowing induction led to significantly more sows farrowing during WH without negative effects on other tested variables.

NOTES

P025

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FACTORS AT FARM AND SOW LEVEL ASSOCIATED WITH COLOSTRUM PRODUCTION PER LITTER

The litter size of sows has substantially increased during the last decade. Therefore, it is a major challenge to provide all piglets with sufficient colostrum. Insufficient colostrum intake has been identified as one of the main causes of neonatal mortality. This study aims at estimating colostrum production and identifying factors at farm and sow level associated with colostrum production. For this purpose hundred randomly selected sows and their offspring originating from ten pig herds (10 sows per herd) were included in the study. Sow colostrum production during 24 hours after start parturition was assessed based on the colostrum intake of the litter, which was estimated by the weigh-suckle-weigh method. Linear mixed regression models with farm as random effect were used for the analysis (SPSS 19.0 IBM). The average colostrum production per sow was 4.75kg (min. 0.65 – max. 9.42). There was no significant effect of parity, gestation length or parturition duration. Breed (P=0.03) and litter size (P<0.01) had a significant effect. Litter size was positively associated with colostrum production. From the total variance of colostrum production, most resided at the farm level (61%), less at sow level (39%). At farm level, breed and litter size explained 80% of the total variation. We can conclude that the majority of variance of sow yield between farms can be explained by the breed. As colostrum composition is a very critical issue, further analyses will give the opportunity to identify factors associated with colostrum quality.

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P026

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ANALYSIS OF PHEROMONES AND TESTOSTERONE IN SALIVA OF LANDRACE AND MINIPIG BOARS

There is anecdotal evidence that minipig boars are more potent in stimulating females at estrus than boars commonly used in commercial swine production. This study was conducted to test the hypothesis of differences in salivary pheromones in Göttingen minipig (GMB) and German landrace boars (GLB). A total of 10 GMB and 16 GLB were sampled either in December (GMB) or February (GLB), and saliva (0.5 to 2.0ml) was obtained during semen collection using collection systems designated for use in humans. Salivary 5a-androst-16-en-3-one, 5a-androst-16-en-3a-ol and -3b-ol were determined using GC-MS analyses, and testosterone using an in-house enzyme immunoassay (EIA). Mean concentration of 5alpha-androst-16-en-3 alpha-ol was 0.18 + 0.13 and 9.20 + 8.57µg/ml, respectively, in GLB and GMB. For 5alpha-androst-16-en-3beta-ol it was 0.02 + 0.01 versus 0.42 + 0.37µg/ml and for 5alpha-androst-16-en-3-one 0.04 + 0.03 versus 1.70 + 1.42µg/ml. Salivary testosterone levels were 3.05 + 3.32 ng/ml in GLB versus 223.7 + 266.3 ng/ml in GMB boars. In conclusion data demonstrates that there is a breed difference in salivary 16-androstene and testosterone concentration. This might, at least in part, be in fact part of the observation of a better libido of minipig compared to landrace boars.

NOTES

P027

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EFFECT OF MASS VACCINATION WITH INGELVAC CIRCOFLEX® ON REPRODUCTIVE PERFORMANCE OF SOWS

PCV2 infection can be with reproductive failure. However, nowadays in France, no PCV2 vaccine has a specific indication for reducing PCV2 associated reproductive failure. Based on the successful implementation of sow vaccination reported from other countries, a field observation was initiated on a 170 sow farrow-to-finish, infected with PCV2 and affected by reproductive failure.

Mass vaccination of sows with Ingelvac CircoFLEX® (Boehringer Ingelheim Vetmedica, 1ml per sow, intra-muscular injection) was implemented mid-December 2011. As sows can be affected by PCV2 associated clinical signs in all stages of pregnancy, the full effect of sow vaccination is only expected when sows are vaccinated at least 3 weeks before mating. Therefore 3 distinct observation periods were defined: A) Before sow vx: 5 batches (A1-E1) mated April to July 2011; B) Transition period: 5 batches (A2-E2) mated early August to December 2011; C) After sow vx: 5 batches (A3-E3) mated January to May 2012. Gilts were vaccinated twice before being introduced into the gestation unit.

No adverse reactions have been observed during or following mass vaccination of the sows. Evaluating the reproductive parameters, an increase in the farrowing rate (Before-after: 81.7% vs 88.7%) and the number of piglets born alive was observed (12.2% vs 12.9%), leading to increased number of piglets weaned per sow (10.1 vs 10.9). No difference was observed in pre-weaning mortality (15.6% vs 15.5%). This finding can be explained by the fact that management of sows was not adapted to the higher number of piglets per sow, leading to an increase in the number of pigs crushed.

In conclusion, this field observation on a French farm confirmed results generated in other countries. Mass vaccination of sows with Ingelvac CircoFLEX® was safe and improved reproductive performance. In addition, piglet health and vitality at birth was improved as well.

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P028

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CLIMATE FACTORS ASSOCIATED WITH SOWS RETURNING TO SERVICE DURING SUMMER IN JAPANESE COMMERCIAL BREEDING HERDS

The objective of this study was to quantify the associations between summer risk factors and sows returning to service. The study analysed 76,099 parity records of sows that had first-serviced between June and September each year from 2007 to 2009; the sows were in 103 herds located in humid subtropical areas across Japan. Average daily maximum temperature (HT) and relative humidity (RH) for 15 days post-service of a sow were obtained from 21 weather stations and coordinated with performance data from respective local herds. The returns to service were classified into regular (RR: 18 to 24 days), irregular (IR: 25 to 48 days) and late categories (LR: 49 days or later). Two-level mixed-effects models were applied to the data by using a herd at level 2 and an individual record at level 1.In mated sows, the occurrences of RR, IR and LR were 3.3, 3.4 and 2.6%, respectively. Higher occurrences of returns to service were associated with higher HT, lower parity and a weaning-to-first-mating interval (WMI) of 7 days or later (P<0.05), but not with either RH (P>0.56) or lactation length (P>0.12). For each 5°C increase in HT, sows with any WMI were 1.22 (1.04^5) times more likely to have an occurrence of RR. Such a 5°C increase in HT also increased the occurrence of IR and LR by 1.27 (1.05^5) and 1.33 (1.06^5) times, respectively, in sows with WMI 0 to 6 days. However, there was no effect of higher HT on IR or LR for sows with WMI 7 days or more (P>0.42). Therefore, in order to prevent returns to service it is recommended that producers install cooling systems for sows during the post service periods in summer.

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P029

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INTERSEX PIGS, ALSO IN THE WILD BOAR

Introduction: Intersex piglets is a common malformation in the domesticated pig and in the conventional pig production. A Swedish study (Bäckström & Henricson 1971) showed a prevalence of 0.2 % in over 17,000 piglets examined. The study also found strong evidence for a genetic predisposition for intersex and a tendency to increased numbers of malformations and scrotal hernias in litters with intersex piglets.

To our knowledge, no reports on the presence or prevalence of intersex individuals among wild boars have been published.

Case presentation: Within the national surveillance program of fallen wildlife, material from a wild boar (Sus scrofa) was sent to the Swedish National Veterinary Institute. The wild boar was shot during normal hunting, was in good body condition, and estimated to be older than one year. The body appearance and external genitals resembled that of a gilt but with a considerably prominent clitoris.

The reproductive organs were taken out by the hunters after photographing them in situ. The right testis was located in the scrotum and one rudimentary testis was found in the abdomen close to the left kidney. The tubular genital part consisted of a uterus that connected the two testis and the corpus and the uterine lumen was partly filled with a semi-translucent fluid. A second tubular part without connection to the former protruded from the middle section out to a vagina with labia and vulva. From the site of the clitoris a 3cm long penislike structure protruded. Several histological sections have been done from various parts of the material. No ovaries or structures resembling ovaries were found.

The wild boar was diagnosed to be a pseudohemaphrodite male.

References:

Bäckström L. & Henricson B., 1971 Intersexuality in the pig. Acta vet. scand. 12, p.257-273.

NOTES

P030

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INFLUENCE OF THE AGE AT 2ND VACCINATION WITH IMPROVAC® IN MALE FATTENERS ON TESTES WEIGHT AND PARAMETERS OF BOAR TAINT

Objective: Aim of the study was to examine, if the age of male fatteners at the time of the 2nd vaccination with Improvac® has an influence on testes weight and boar taint and if testes weight in early vaccinated pigs can therefore be used as parameter to decide if a pig is definitely vaccinated twice as is necessary.

Material and methods: A whole of 161 male fattening pigs were included in the study. All pigs received the 1st vaccination at the age of 11 weeks. Pigs of group A (n=82) received the 2nd vaccination at the age of 21 weeks, pigs of group B (n=79) at the age of 18 weeks. All pigs were slaughtered at the age of 26 (55 pigs of each group) or 27 weeks (remaining pigs), respectively. Testes weight was evaluated in all pigs. Androstenon, skatole and indol concentrations in back fat were examined in 40 pigs of each group.

Results: Testes weight was significantly lower in the earlier vaccinated pigs of group B (median 40.0 g, minimum 22.8 g, maximum 371 g) as in group A (93.3 g, 57.8 g, 400 g). There was, however a wide deviation. In seven pigs of group A and 10 pigs of group B, androstenon concentration was slightly above detection limit of 75 ng/g. Skatol and indol concentrations were at 57 ng/g and 25 ng/g in group A and 55 ng/g and 26 ng/g in group B. No differences between the groups could be observed.

Conclusion: Although testes weight in pigs earlier receiving 2nd vaccination with Improvac® is significantly lower than in pigs with later vaccination, testes weight is no absolute save criterion to decide if one pig is vaccinated twice or not, because pigs with high testes weight were observed in both groups. Parameters of boar taint, however, were not elevated in those pigs.

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P031

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POST-PARTUM DYSGALACTIA SYNDROME FOR PRACTITIONERS

Early postpartum disorders seem more frequent and to occur in very good herds where productivity is very high and management skills are developed. In fact postpartum dysgalactia syndrome (PDS) is a common problem for practitioners in field faced with more subtle symptoms that by the past with Mastitis, metritis and agalactia syndrome (MMA). Some risk factors for PDS have been elucidated mainly related to nutrition, housing, and management practices. A central role of endotoxins and cytokines in the development of the problem has also been suggested. However, the pathophysiology of PDS remains unclear. The objective of this paper was to propose a plausible model for it on which to draw a systematic method to investigate clinical cases in field. A total of 94 papers were selected by a snowball method from an initial search in classical textbooks, conference proceedings and PubMed. The concept of homeorhesis appeared to be an interesting perspective in the explanation of this multifactorial disease and its handling in practice. It encompasses dynamic systems that return to a trajectory, referring to orchestrated changes in metabolism of body tissues to prioritise a physiological state (such as gestation or lactation). We hypothesised that an unsuccessful change in homeorhesis when shifting from gestation to lactation could be at the heart of PDS and that three major components closely related were potentially contributing to it: the body-building syndromes, the endotoxemia component linked to the innate immunity system and stress related mechanisms. If our model does not pretend to be able to solve all the PDS situations encountered in field, it ensures clinicians to have the holistic approach necessary to tackle modifications that often occur before farrowing but remain asymptomatic before revealing animals such as piglets are present, and that affect the optimum expression of the sows' productive capacity.

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P032

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SKIN TUMOUR IN AN AGED GERMAN LANDRACE SOW

Neoplasms are infrequently reported in domestic swine because of the short life span of most farm animals (1). With the increasing popularity of production animals such as swine, sheep, and goats, but also miniature pigs as pets, a geriatric population of farm animals is now developing diseases which are rarely seen in animals raised for meat production (2). Due to the increased incidence of neoplastic diseases in any geriatric population, the increase of tumors in swine species kept as pets has to be expected (1).

A case of the occurrence of a squamous cell carcinoma located in the skin at the center of the udder of a 14-year-old German Landrace sow is presented. The tumor was spherical and 17.0cm in diameter. The tissue of the distal pole had a cauliflowerlike appearance, was black and ulcerated with a malodorous exudation. The sow did not show any signs of reduced general condition caused by the tumor. No evidence of metastasis was noted in regional lymph nodes and in the lung. The tumor, which weighed 2.4kg, was surgically removed. The histopathology revealed infiltratively growing pleomorphic tumor cells and cell aggregations with prominent squamous differentiation. Cells were strongly positive for several cytokeratins by immunhistochemistry. The present findings confirmed the diagnosis of squamous cell carcinoma. After surgery, the sow recovered without complications and remained without recurrence at the follow-up three months later.

References:

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2. Munday and Stedman (2002), Vet. Pathol. 39, 580-583

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P033

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DETECTION OF THE ENZOOTIC FORM OF SWINE INFLUENZA BY ORAL FLUID SAMPLING

Objective: Swine flu outbreaks were detected in Spain as early as 1981 (H1N1) and 1986 (H3N2) following an epidemic pattern. Recent epidemiological studies have shown high seroprevalence of the 3 subtypes common in Europe. However, this disease deserves nowadays scarce attention from the farmers and practitioners, and there is little information about the presence of endemic forms of SIV. The recent availability of oral fluid samples, a sensitive and convenient method, offers new opportunities to detect and characterise the circulation of this and other virus in production farms. Therefore, our objective was to use this new technique to study the co-circulation of PRRSV and SIV in farms experiencing respiratory symptoms in the post-weaning and/or fattening.

Material and methods: Oral fluid samples (1-3) were taken in the post-weaning and/or fattening units of 97 farms with a variable number of animals experiencing respiratory signs, and fever, dullness growth retardation or heterogeneity. Samples were analysed for both PRRSV and SIV by RT-PCR. Fischer exact test was used to analyse prevalence differences within and between production phases. Results were stratified according to the number of samples per farm (1,2 or more).

Results and discussion: For single sampled farms (n=33), none of the virus was detected in 13 of them (39.4%), the PRRS+/FLU- pattern was detected in 3 farms (9%), 11 (33.3%) farms showed a PRRS-/FLU+ result, and the remaining 6(18.2%) yielded positive results for both viruses (p=0.50, NS). However, in farms with 2 or more samples (n=64) the corresponding figures were: 15.6%, 14%, 35.9%, and 34.4% (p=1, NS). Both, single or multiple samples yielded comparable results but these data were not adjusted for production phase or age. This preliminary study is a clear indication of a high prevalence of endemic flu in our conditions as a single infection or associated with PRRSV.

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P034

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EVALUATION OF QUANTITATIVE MULTIPLEX REAL-TIME PCR FOR DIAGNOSIS OF SWINE BACTERIAL ENTEROPATHIES

The aim of this work was the adoption of a Real-time PCR (RT-PCR) assay to detect Brachyspira hyodysenteriae, Brachyspira pilosicoli and Lawsonia intracellularis in swine fecal samples at the same time, overcoming limitations of current tests due to long incubation time of bacterial cultures, low PCR sensitivity from feces and presence of mixed infections. The RT-PCR was compared to culture for Brachyspira spp. and to conventional PCR for L. intracellularis on a set of field fecal samples and kappa coefficient was calculated to estimate level of agreement.

Fecal samples spiked with Brachyspira bacterial cells and a Lawsonia vaccine were tested for the evaluation of Real-time PCR parameters. Sixty Nine (69) field fecal samples, from 24 outbreaks of enteritis in growers and fatteners were analysed using the RT-protocol in parallel with culture and conventional PCR. Bacterial DNA from stool samples was extracted and analysed by a quantitative multiplex RT-PCR, according to Willems H. (2010). Kappa values were evaluated as suggested by Altman.

Analytical sensitivity was 2,7x103 DNA copies/gr feces for B. hyodysenteriae and 1,1x104 DNA copies/gr feces for L. intracellularis. Loss of sensitivity due to matrix effect, compared to initial contamination, was below one order of magnitude. The k-values were 0,32 for B. pilosicoli, 0,63 for B. hyodysenteriae and 0,91 for L. intracellularis, corresponding to a fair, good and very good strength of agreement, respectively. RT-PCR detected more positives than traditional techniques for all the three pathogens considered. For B. hyodysenteriae, 11/12 RT-PCR positive samples and negative by culture were from B.hyodysenteriae-positive herds; moreover, the four B. pilosicoli positive fecal samples detected by RT-PCR and not by culture were characterised by a low DNA copy number.

These results, along with the possibility of quantification of bacterial load, suggest that this test could be a useful tool for rapid diagnosis of pig enteritis.

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P035

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AMBIENT TEMPERATURE STORAGE OF PORCINE ORAL FLUID SAMPLES FOR PRRSV RT-PCR TESTING USING FTA CARDS

The use of oral fluid (OF) as a diagnostic medium is a growing field of research interest across the EU. Reverse transcription polymerase chain reaction (RT-PCR) has been shown to successfully detect RNA pertaining to the Porcine Reproductive and Respiratory Syndrome virus (PRRSv) in swine OF samples. However, inconsistencies have been found in the RT-PCR results of OF samples from known PRRSv positive pig herds in the UK (Strugnell 2010), and the ways in which samples are handled and stored post-collection highlighted as key areas for further investigation. Flinders Technology Associates (FTA) cards are treated with a patented formula to allow the storage and recovery of nucleic acids from biological samples. Storage of swine OF using FTA cards has been shown to significantly reduce the diagnostic sensitivity of RT-PCR for PRRSv (Linhares, Rovira *et al.*, 2012). Here, we demonstrate recovery of PRRSv RNA by RT-PCR from porcine OF dried onto FTA cards with a detection limit of around 4pg/ml RNA. A series of optimisation experiments involving PRRSv RNA and culture supernatant spiking of swine OF lead to the highly sensitive limit of detection reported, and characterised the decrease with storage time at ambient temperature. Successful storage of porcine OF at ambient temperatures using FTA cards will significantly simplify existing chill/freeze protocols for OF sample handling for swine disease diagnostics.

Linhares, D. C. L., *et al.,* (2012). Evaluation of Flinders Technology Associates cards for collection and transport of samples for detection of Porcine reproductive and respiratory syndrome virus by reverse transcription polymerase chain reaction. Journal of Veterinary Diagnostic Investigation 24 328-332.Strugnell B. (2010). Final Report for BPEX Project: Evaluation of a PCR assay for Porcine Reproductive and Respiratory virus in oral fluids from growing pigs and its applications for diagnosis and surveillance in the UK pig industry. Thirsk AHVLA: 26pp.

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P036

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EFFECT OF SALIVA STABILISERS ON THE PRESERVATION OF QRT-PCR DETECTABLE PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS IN ORAL FLUID

In the USA, porcine oral fluids are already used for the monitoring of PRRSV infections. The complex composition of oral fluids however could require important optimisations of preservation methods. Until now it was recommended to store oral fluids at 4°C. Since it can be expected that immediate cooling of samples is not always feasible, alternative options have to be considered. Therefore we analysed the capacity of three commercial saliva stabilisers (Oragene RNA (DNA Genotek), Aware Messenger (Calypte Biomedical Corporation) and the Saliva Gene Collection Method (Stratec)), to preserve PRRSV in oral fluid at room temperature for downstream detection by qRT-PCR. Porcine oral fluid, with or without saliva stabilisers, was spiked with PRRSV, stored at 4°C or room temperature and tested for the presence of PRRSV by qRT-PCR. When oral fluid was spiked with 103.5 TCID50/mL and stored at 4°C, only a non-significant reduction was observed within 7d. When this oral fluid was stored at room temperature, clear degradation of PRRSV RNA occurred resulting in a 10-fold reduction in the number of detectable PRRSV copies within 24h and a 100-fold reduction within one week. Interestingly, addition of the Oragene RNA stabiliser was able to inhibit PRRSV RNA degradation at room temperature for at least 1 week. In contrast, addition of both other stabilisers resulted in faster RNA degradation than when oral fluid was stored without addition of stabilisers. When oral fluid was spiked with the lower concentration (100.5 TCID50/mL), PRRSV could be detected for 7d when kept at 4°C or stabilised with Oragene RNA. In contrast, copy number dropped below the detection limit within four hours when treated with both other stabilisers and within 3d for samples kept at room temperature. Our results demonstrated the importance of correct conservation of oral fluid samples to preserve PRRSV to allow detection by qRT-PCR.

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P037

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IMPACT OF ROPE MATERIAL ON TOTAL AND PRRSV-SPECIFIC ANTIBODY RETRIEVAL FROM ORAL FLUID

Several studies already evaluated the use of oral fluid as an alternative, non-invasive collection method for the diagnosis, monitoring and surveillance of various pathogens. Currently these oral fluid samples are collected through cotton ropes. However, little is known about the influence of rope material on the analytes of interest for subsequent diagnostic tests. Therefore, the aim of the present study was to evaluate the impact of different rope materials on the amount of collected total antibodies and virus-specific antibodies. Three PRRSV-naïve Belgian Landrace pigs were vaccinated IM with a live attenuated PRRSV vaccine and received a booster two weeks later. One pig served as a negative control. Oral fluids were collected at -1, 14 and 28 days post vaccination with four different ropes: cotton, hemp, polyamide and polyester. The total amount of isotype-specific antibodies present in the oral fluid samples were measured by a commercial direct sandwich ELISA and confirmed by means of Western Blotting. As was expected, the amount of total IgA was 3-4 times higher than total IgG and IgM. However, depending on rope type, significant differences on the amount of total isotype-specific antibodies were obtained. Synthetic ropes retrieved 2-3 times more total IgA. Nevertheless, these rope types were less efficient in total IgG retrieval. IgA, IgG and IgM antibodies to PRRSV proteins were detected by immuno peroxidase monolayer assay (IPMA). Preliminary results show that although the total amount of IgA in oral fluid is much higher than IgG, IgG is the dominant PRRSV-specific antibody in oral fluids. Our results show that in order to detect PRRSV antibodies in oral fluid by means of ELISA, ropes of natural material are preferred.

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P038

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INFLUENCE OF EXTRACTION AND AMPLIFICATION METHOD ON THE DETECTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) IN ORAL FLUIDS.

Multiple commercial nucleic acid extraction and PCR amplification kits exist for the detection of viruses in blood, serum and organs. So far, their applicability for virus detection in oral fluid, a complex body fluid containing multiple possible inhibitors and degrading proteases, has not been fully evaluated. Therefore, the aim of the present study was to evaluate the influence of extraction-amplification methods on the detection of PRRSV RNA by qRT-PCR in oral fluid. Four commercial RNA extraction kits (MagMAX Pathogen RNA/DNA kit(Life Technologies), Ultraclean Tissue and Cells RNA isolation Kit (Mobio), QIAamp Viral RNA Mini Kit (Qiagen) and High Pure Viral Nucleic Acid Kit (Roche)) and two real time RT-PCR kits for PRRSV (TaqMan NA and EU PRRSV Reagents (Life Technologies) and Adiavet PRRS EU/NA Realtime (Adiagene)) were examined for their diagnostic performance using a dilution series of PRRSV-spiked oral fluid (1 x 104.7 to 1 x 100 TCID50/mL). All extraction-amplification combinations were able to detect PRRSV RNA in oral fluid, but the limit of detection varied between the combinations ranging from 1 TCID50/mL to 100 TCID50/mL. Based on the limit of detection, r2 value, PCR efficiency, linear range and fluorescence amplification signals, we selected the MagMAX Pathogen RNA/DNA extraction kit combined with the TaqMan NA and EU PRRSV Reagents amplification kit as the most optimal method. The same combination yielded also the best results in a study conducted by Chittick *et al.,* (2011). Nevertheless, all possible extraction-amplification combinations showed rather high PCR efficiency values (115.88% to 139.44%). Since efficiencies can be improved by optimising the buffer and/or polymerase of the PCR reaction, manufacturers of commercial PCR kits should be encouraged to further optimise and improve their kits for PRRSV detection in oral fluid.

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P039

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USE OF AN ENZYME-LINKED IMMUNOSORBENT ASSAY (ELISA) TO DETERMINE THE VACCINE UPTAKE FOLLOWING DIFFERENT VACCINATION SCHEDULES AGAINST *MYCOPLASMA HYOPNEUMONIAE* (M.HYO)

Vaccines against Mycoplasma hyopneumoniae (M.hyo) have been shown to induce serum antibodies, but these antibodies are not suited to evaluate protective immunity. In this study, it was investigated if these antibodies can be used to evaluate and compare the uptake of different one-shot and two-shot vaccines in an M.hyo-negative and M.hyo-positive herd. Fourteen and seventeen sows were selected in an *M.hyo*-negative and *M.hyo*-positive herd, respectively. From each of the fourteen and seventeen litters, six pigs were randomly assigned to six groups, which were subject to different vaccination protocols. Group 1 was vaccinated with Stellamune® *Mycoplasma* at 1 and 3 weeks of life, group 2 was vaccinated with Stellamune® One at 1 week of life, group 3 was vaccinated with Stellamune® One at 3 weeks of life, groups 4 and 5 were vaccinated with other one-shot vaccines at 3 weeks of life, and group 6 was left non-vaccinated. Serum samples collected at 1, 3, 5, 7, 9, 12, 15, 18, and 21 weeks of life were tested for the presence of antibodies against *M.hyo*, using an enzyme-linked immunosorbent assay (ELISA) (DAKO Mh). All five vaccination protocols were followed by a rapid and long-lasting serological response in the M.hyo-negative herd, showing that serology can be used to evaluate the vaccine uptake in the absence of a natural infection. Except for a limited and transient serological response in the two-shot vaccinated pigs, no serological response was observed in the *M.hyo*-positive herd following the vaccinations. However, all vaccinated pigs mounted a clear anamnestic response upon a natural infection, suggesting a priming of the immune system following the vaccinations. The number of doses and the timing of the vaccinations did not have any impact on the magnitude of the anamnestic response. This anamnestic response could be used to evaluate the vaccine uptake in *M.hyo*-positive herds.

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P040

Eric van Esch, BioChek.

A NOVEL *MYCOPLASMA HYOPNEUMONIAE* ELISA, SPECIALLY DESIGNED FOR HIGH SPECIFICITY

Introduction: *Mycoplasma hyopneumoniae (M.hyo)* diagnostics are considered to be a dilemma. For serology there is no true Gold Standard available and until now serological assays lacked specificity. On this basis there is a strong need for a highly specific assay with good sensitivity. This paper describes the first set of results with a high specificity *M.hyo* ELISA.

Materials and methods:

Sera sensitivity panel
This panel contains 108 samples from experimental infected animals.

Sera specificity panel
In total, 1695 samples from SPF herds from five different studies of different geographical regions were tested. Samples were taken from animals of different ages, different breeds and different farm management systems.

ELISA
The BioChek Mycoplasma hyopneumoniae Antibody Test Kits was used.

Statistical analysis: For test evaluation, WinEpiscope 2.0 was used to calculate Sensitivity and Specificity with a 95% confidence level.

Results and discussion: To serologically confirm the *M.hyo* free status of herds, it is imperative that the test has high specificity combined with good sensitivity to be sure that recent outbreaks are not missed. In the different studies described, the overall specificity of the ELISA is high, 99.2%, [95%CI: 98.8; 99.6] while at 21 days post infection the sensitivity is 85.2% [95%CI: 78.5; 91.6]. This is considerably sufficient in monitoring programs and therefore, based on the overall results, the ELISA is suitable for this purpose.

Conclusion: The evaluated ELISA demonstrates high specificity and very good sensitivity which makes this ELISA suitable for monitoring *M.hyo* free herds.

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P041

van Esch, BioChek BV.

INTERPRETATION OF PCV2 ELISA RESULTS, A NEW APPROACH.

Introduction: PCV2 is endemic in almost all swine herds in the world and therefore antibodies against PCV2 can easily be found in animals. Serology is commonly used to establish herd profiles to evaluate the PCV2 dynamics. Since there are no DIVA vaccines for PCV2 on the market, one cannot easily discriminate between field infected or vaccinated animals. This paper describes an approach to discriminate between vaccinated and field infected animals.

Materials and methods: Sera from natural (field) infected animals and from vaccinated animals where evaluated with the BioChek Porcine Circovirus 2 (PCV2) Antibody Test Kit. Sera were obtained from different herds, different breeds and different ages. For vaccination different commercial vaccines were used.

Results and discussion: Since the introduction of vaccines, it is not only the detection of antibodies evoked by natural infection that is important but also the detection of antibodies after vaccination. In trade, proof of vaccination is often required, but since there are no DIVA vaccines for PCV2 on the market, how can one discriminate between field infected animals and vaccinated animals? The key to this interpretation lies in the mean titre and percentage of coefficient variance (%cv). From the results it is clearly evident that although the mean titre can be the same in field infected and vaccinated animals, the %cv is different. The differences between field infected and vaccinated animals were consistent for almost all commercial vaccines, proving that the approach for interpretation is meaningful. Establishing more specific baselines for different vaccines and vaccination protocols is on-going.

Conclusion: When using mean titre and %cv it is possible to discriminate between PCV2 field infected animals and PCV2 vaccinated animals. Baselines for this are essential for interpretation.

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P042

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EVALUATION OF SERUM METHYLMALONIC ACID AND HOMOCYSTEINE CONCENTRATIONS IN POSTWEANING PIGS BETWEEN 6 AND 26 WEEKS OF AGE

Cobalamin and folate play important roles in amino acid metabolism and RNA/DNA synthesis. Two intracellular enzymes, methionine synthase and methylmalonyl-CoA mutase are folate and/or cobalamin-dependent, respectively. A lack of folate and/or cobalamin on the cellular level leads to accumulation of serum homocysteine (HCY) and methylmalonic acid (MMA), respectively. Altered serum MMA and HCY concentrations can influence amino acid metabolism and nucleic acid synthesis in pigs. Therefore, we aimed to evaluate serum MMA and HCY concentrations in postweaning pigs at 6 to 26 weeks of age.

Serum samples from pigs (n=12) were collected at week (wk) 6, 7, 8, 9, 10, 14, 18, 22, and 26 as part of an unrelated study. Serum MMA and HCT concentrations were measured using gas chromatography-mass spectrometry method and compared in pigs among the different time points by using a Friedman test with a Dunn's post test.

In pigs, serum MMA concentrations differed significantly among the time points (medians: wk-6: 1,661nmol/L, wk-7: 734nmol/L, wk-8: 799nmol/L, wk-9: 647nmol/L, wk-10: 655nmol/L, wk-14: 336nmol/L, wk-18: 363nmol/L, wk-22: 396nmol/L, and wk-26: 318nmol/L; $p<0.0001$). The pigs had significantly higher serum MMA concentrations at wk-6, -7, -8, -9, and -10 than at wk-14, -18, -22, and -26 ($p<0.001$). Serum HCY concentrations differed significantly among the time points (medians: wk-6: 23.9µmol/L, wk-7: 24.4µmol/L, wk-8: 20.3µmol/L, wk-9: 18.4µmol/L, wk-10: 23.5µmol/L, wk-14: 17.6µmol/L, wk-18: 18.2µmol/L, wk-22: 18.1µmol/L, and wk-26: 18.1µmol/L; $p<0.0001$) in pigs. The pigs had significant higher serum HCY concentrations at wk-6, -7, and -10 than at wk-8, -9, -14, -18, -22, and -26 ($p<0.01$).

This study suggests that serum MMA and HCY undergo age dependent changes post-weaning, possibly reflecting decreased availability of intracellular cobalamin and folate for amino acid metabolism and nucleic acid synthesis in pigs.

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P043

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FIELD EVALUATION OF *LAWSONIA INTRCELLULARIS* (LI) QUANTITATIVE PCR (QPCR) TOOL COMPARING INDIVIDUAL FAECAL EXCRETION PROFILES (QPCR) AND INDIVIDUAL SEROCONVERSION PROFILES (ELISA LI) OF PIGS FROM WEANING TO SLAUGHTER

In a farrow to finish farm located in Brittany (France), subclinically infected by *Lawsonia intracellularis* (Li), we compared individual faecal excretion profiles obtained by Li quantitative PCR (developed by National Veterinary Institute, Denmark) and individual seroconversion profiles obtained by Li ELISA (developed by Bioscreen Laboratory, Germany); 14 pigs have been followed individually from weaning to slaughter; faecal samples have been collected every two weeks, and blood samples every four weeks. All tests have been performed in LABOFARM-Finalab laboratory, in Loudéac (France). This field study shows very consistent results when comparing individual profiles obtained with these two different diagnostic tools; in most cases, Li seroconversion appears two to four weeks after infection peak detected by qPCR, in accordance with Guedes and Guebhart observations on Li pathogenesis and immunology (2003). Moreover, it also demonstrates a good concordance between individual qPCR results and qPCR results obtained at pen level (with "pedichifs" = boot swabs). This Li qPCR, now available in France, should allow swine veterinarians to investigate more deeply Li infection dynamics at farm level, using a very easy and useful field tool: "pedichifs".

NOTES

P044

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INFLUENCE OF ANTIBIOTIC USE AND EXTERNAL BIOSECURITY ON THE ACUTE PHASE RESPONSE OF PIGLETS USING A PIG-MAP ELISA

Primary objective of this study was to investigate the practical use of the acute phase protein Pig-MAP in the surveillance and monitoring of the health status and biosecurity practices on sow farms. Pig-MAP has been suggested as the most sensitive APP for swine (Heegaard 2011) and could be used to differentiate the herd health status of swine farms (Pineiro 2006).

Materials and methods: The first trial was carried out to estimate the effect of antibiotic use on Pig-MAP profile. In a case control setting 3 farms with a low antibiotic usage (DDD<5, LAU) were compared to 3 farms with a high antibiotic usage (DDD>50, HAU).

The second trial was carried out to estimate the effect of a high external biosecurity on Pig-MAP profile. In a case control setting 3 farms with an High External Biosecurity (SPF farms, HEB) were compared to 3 farms with a Low External Biosecurity (absence of external biosecurity protocols, LEB).

Blood samples were taken from 10 healthy piglets (5 male/5 female) on each farm. To exclude stress due to weaning piglets were sampled at the age of 8 weeks. Pig-MAP concentration was determined using a commercial available Pig-MAP-Elisa (Pigchamp-Pro, Spain).

Results: In the first trial, HAU had a significant lower Pig-MAP ($p<0,001$) concentration. No significant results were obtained from the second trial although LEB tended ($p = 0,09$) to an increased Pig-MAP profile.

Conclusion/discussion: High use of antibiotics results in a low Pig-MAP profile and should be taken in consideration when using Pig-MAP to assess the biosecurity level on a farm level. Farmers can be motivated to improve and monitor their management skills by the assessment of an acute phase profile. The presence study shows that on average more than 10 samples are necessary to significantly measure the health status on herd level.

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P045

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CAN YOU TRUST THE RESULTS FROM HANDHELD HEMOGLOBIN ANALYSERS USED ON BLOOD OBTAINED FROM SIMPLE VEIN PUNCTURE?

Blood sampling is necessary to obtain hematological and clinical chemical parameters. Trials have shown different results according to different equipment and sampling methods. Handheld analysers, that needs only a droplet of blood and can be used on site, have increased popularity. Veterinarians seek easier accessible veins than the jugular veins for blood sampling. The objective of this study was to compare hemoglobin concentrations in blood from different veins analysed with a handheld analyser with results from an accredited laboratory.

Fifty pigs, weight 8-26kg, were blood sampled in the jugular vein using 5ml EDTA vacutainers. An ear vein, a milk vein and a tail vein were punctured on the same pigs and a droplet blood was directly absorbed into a cuvette in HemoCueR Hb 201+ hemoglobin analyser. The blood in the vacutainers was analysed the same day at the Central laboratory at Norwegian School of Veterinary Science as well as in the HemoCueR. The results from the laboratory were regarded as reference values and correlation coefficients between these and the results from the HemoCueR used on blood from the different veins were calculated.

The correlation coefficient between the laboratory results and the HemoCueR on the same blood was 0.97. The correlation coefficient between ear vein and laboratory results was 0.76, between tail vein and laboratory 0.81 and between milk vein and laboratory 0.92.

The results showed a good correlation between the HemoCueR and the laboratory on the same blood. Correlations between the hemoglobin concentrations in blood from ear and tail veins blood and the reference laboratory results were surprisingly low. Conclusions based on blood from these veins with the technique described should be interpreted carefully. Hemoglobin concentrations in blood from the milk vein had the best correlation with reference values and can be used in clinical work.

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P046

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HANDHELD HEMOGLOBIN ANALYSER USED ON SOWS BLOOD SAMPLED FROM DIFFERENT VEINS

Trials have shown different hematological results according to equipment and techniques for blood sampling. Handheld analysers, that needs only a droplet of blood and used on site, have increased popularity, specially in sows, to avoid fixation of the sows with rope on the jaw, veterinarians seek easier accessible veins than the jugular veins for sampling. The objective of this study was to compare hemoglobin concentrations in blood from different veins analysed in a handheld analyser with results from an accredited laboratory.

Thirty-two sows were blood sampled in the jugular vein using 5ml EDTA vacutainers. At the same time puncture of an ear vein and a tail vein were done on the sows. From a milk vein one ml blood was taken into a syringe. A droplet blood from each vein was absorbed into a cuvette in HemoCueR Hb 201+ hemoglobin analyser. The blood in the vacutainers was analysed the next day at the Central laboratory, Norwegian School of Veterinary Science as well as in the HemoCueR. The results from the laboratory were regarded as reference values and correlation coefficients between these and the results from the HemoCueR used on blood from the different veins were calculated.

The correlation coefficient between the laboratory results and the HemoCueR on the same blood was 0.97. The correlation coefficient between ear vein and laboratory results was 0.56, between tail vein and laboratory 0.32 and between milk vein and laboratory 0.82.

The results showed a good correlation between the HemoCueR and the laboratory on the same blood. Correlations between hemoglobin concentrations from ear/tail veins blood and the laboratory results were surprisingly very low. One should therefore be careful drawing conclusions using blood from these veins with the technique described. Hemoglobin concentrations in blood from the milk vein had highest correlation with the reference values.

NOTES

P047

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IMPULSE OSCILLOMETRY IN THE SEARCH FOR BIOMARKERS FOR LUNG SOUNDNESS IN SWINE – COMPARISON WITH CLINICAL AND PATHOLOGICAL FINDINGS

Objectives: Porcine health management needs to guarantee swine production regarding economy, animal welfare and consumer protection. Early diagnostics are among the most important requirements to realise this goal in a satisfactory and sustainable way. Therefore, the development of biomarkers will embody an important objective in order to detect early onset of pneumonia which needs an engrossed understanding of the complex pathogenesis and interacting agents causing the porcine respiratory disease complex (PRDC). The present study verifies and validates the diagnostic potential of impulse oscillometry as an advanced clinical method to examine PRDC.

Materials and methods: Sixty four early fatteners (25-30kg) from herds with a different PRDC status have been examined by standard clinical, pathological and microbiological methods. The examination was complemented by impulse oscillometry and bronchoalveolar lavage (BAL). BAL and lung tissue samples were examined for all relevant airway pathogens in swine using molecular and microbiological methods.

Results: Parameters obtained from living pigs by impulse oscillometry were highly correlated with substantial clinical, pathological and microbiological findings. Detailed information on quality, quantity and stadium of PRDC (e.g. acute, chronic) could be derived from lung function testing which complied well with the overall outcome of lung pathology. Information contents were far above standard clinical indices.

Discussion: Our preliminary results show interesting and specific associations between distinct pathogens and lung function parameters. Thus, impulse oscillometry might be a sensitive method for the detection and classification of respiratory diseases and for the detection and assessment of biomarkers for lung soundness in the future.

NOTES

P048

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DEVELOPMENT OF A NEW IDEXX ELISA FOR THE DETECTION OF PRRS ANTIBODIES IN SWINE ORAL FLUIDS

Testing of swine oral provides a convenient and cost-effective tool for disease surveillance in commercial pig herds. Recently, Kittawornrat *et al.,* (J Vet Diagn Invest. 2012 Mar;24(2):262-9.) described detection of antibodies to PRRS in oral fluids adapted using an overnight sample incubation format adaptation of the HerdChek® PRRS X3 ELISA, (IDEXX Laboratories, Inc.). In this study, we describe a new PRRS oral fluids ELISA (IDEXX PRSS OF Ab Test) for same-day detection of PRRS antibodies in swine oral fluids. An S/P ≥0.4 is considered a positive result. A comparison between the new protocol and the standard overnight protocol (SOP) using a set of reference standards consisting of pooled oral fluids from vaccinated pigs indicated 100% agreement between the two tests, with average S/P values 1.4 to 1.5-fold higher than SOP. Moreover, analysis of a temporal series of paired oral fluids and serum collected from individual boars 0-7 days before (negative exposure status) and 21 days after (positive exposure status) vaccination or experimental infection with type I or type II PRRSV indicated a specificity of 98.7% and a sensitivity of 100% with new IDEXX PRRS OF Ab Test. A temporal analysis of oral fluids from the pigs infected with either type I or type II PRRSV revealed a similar ability to detect both strains. Finally, evaluation of pen-based oral fluid samples collected at various levels of prevalence (0%, 4%, 12%, 20%, and 36%) of antibody-positive vaccinated pigs introduced at 14 days post-vaccination into pens of PRRS-negative pigs indicated that the new test detects PRRS antibodies in ≥96% of all collection events in pens of at least 20% prevalence. These results describe the first commercially available test for antibodies to PRRSV, in support the emerging use oral fluids for frequent surveillance of pig herds by the swine industry.

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P049

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MONITORING PRRSV SEROCONVERSION BY USING ORAL FLUID SAMPLE

Purpose: The aim of the present study was to follow the PRRSv post-infection sero-conversion by analysing Oral Fluid (OF) sample at different times post-challenge by ELISA and PCR.

Method: The study started with 30 groups of 9 gilts from PRRSV-free farms (as confirmed by PCR and ELISA). After week 2 (wk2) 10 groups were selected until the end of the study. Each group was infected in isolation at wk0 using a field strain of PRRSV Type 1. The study lasted for 8 weeks with weekly sampling of OF. The presence of antibodies to PRRSV was evaluated by using the CIVTEST SUIS PRRSV E/S (Hipra). OF samples were also analysed by qPCR. Individual serum samples of all animals were also analysed at wk3 and wk7.

Results: 80% of the OF samples were positives by ELISA at wk2 and 100% of the samples resulted positives at wk3. Although the positivity to the ELISA was maintained until the end of the study, PCR gave negative results from wk4 to wk6 depending on the group. The kinetics of sero-conversion presented a characteristic profile that had not been previously observed in the serum samples. The use of an anti-IgA conjugate improved sensitivity at the start of sero-conversion.

Conclusions: CIVTEST SUIS PRRS E/S presented good diagnostic performance with OF. The results indicate that the ELISA is showing adequate sensitivity even as an alternative to PCR. The kind of conjugate used in the test has a certain effect on the earliness of detection of sero-conversion

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P050

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USE OF BUFFERED SWIFFER® CLOTH TO ASSESS THE RISK OF PRRS VIRUS SPREAD BY EMPLOYEES AND FOMITES DURING WARM WEATHER

Objective: To survey high risk areas to determine the risk for PRRS virus contamination.

Methods: Each sampling kit included one unscented Swiffer® sweeper pad (P&G Co.), one 50ml tube containing diluted neutralising broth, one pair of latex gloves, and one resealable plastic bag. To establish a baseline for the study, the Ingelvac PRRS MLV vaccine was used as a positive control and sterile water as a negative control on clean service vehicles. Sampling was completed by inserting the pad into the tube containing neutralising broth and allowing it to soak. Latex gloves were changed between samples. The pad was then removed from the tube and wiped over the designated sample area. On service vehicles, there were six sampling areas including the steering wheel, cell phone, pedals, door handles, toolbox, and supplies. For warehouse and laboratory testing, six high risk areas were chosen and sampled. Clothing was sampled after wearing disposable coveralls in barns. After sample collection, the soiled pad was placed into a resealable bag and squeezed to remove the fluid. Contents from the bag were drained back into the tube, labelled and placed on ice. In addition, a survey was given to assess employee and farm biosecurity practices. All samples were shipped to BIVI's Health and Management Center where they underwent qPCR analysis.

Results: Fifteen trucks, two labs, two warehouses and twelve clothing samples were collected for a total of 204 samples. All samples, other than the Positive control, were PCR Negative for PRRS virus. The temperatures during sample collection days ranged from 28.8 to 31.1 degrees Celsius. Though it was possible for PRRS to be detected on surfaces, as demonstrated by the positive control, the heat, time to sample collection or effective use of PPE by personnel may have contributed to the negative results seen.

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P051

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SET UP OF A SEMI-QUANTITATIVE SCALE FOR PCV2 ANTIBODY LEVELS IN PIG ORAL FLUIDS (OF) USING AN IN-HOUSE-DEVELOPED ELISA TECHNIQUE

Introduction: PCV2 is an ubiquitous pathogen and the presence of antibodies by itself is of poor meaning, rendering an only qualitative evaluation useless. The objective of this study was to establish the semi-quantitative scale for PCV2 antibody levels in oral fluids (OF) obtained with an LDA22 in-house developed ELISA, best related to blood sample antibody titres obtained with a commercial ELISA kit in the same pigs.

Material and methods: A total of 38 collective pen-based OF samples were collected from 4 to 22 week-old pigs of eight conventional farms using cotton ropes. In the same pens, each pig was also blood sampled individually. A pen-based "average" serum sample was prepared by iso-volumes mixing from the individual serum samples. The OF samples were assayed for anti-PCV2 antibodies by a ELISA technique developed at LDA22. Three OD scales giving an ordinal score ranging from 1+ (low anti-PCV2 antibody level) to 4+ (very high anti-PCV2 antibody level) were compared. Serum pools were titrated for anti-PCV2 antibodies using a commercial ELISA technique (SERELISA PCV2 Ab, Pfizer Diagnostics). Linear regression models were fitted to choose the best predicting scale. Mac Nemar's test was used to statistically characterise the relationship between OF levels and serum titres following categorisation.

Results and discussion: Relationship between OF sample levels and serum sample titres was shown to fit with a linear model for each scales ($p<0.001$). The chosen scale provided a correlation coefficient of 90.8% and a determination coefficient of 82.4%. There was no significant sensitivity difference between the two techniques ($p=0.174$).

NOTES

P052

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INVESTIGATIONS ON THE USE OF SWIFFER® SAMPLING TO DETECT DIFFERENT RESPIRATORY PATHOGENS VIA ENVIRONMENTAL SAMPLE COLLECTION IN PIGBARNS

Introduction: It has been shown, that even after cleaning and disinfection PRRSV could be found in livestock transporters (1) by Swiffer® sampling. The question was: Is Swiffer® sampling suitable to detect also other porcine respiratory pathogens in the environment.

Material and methods: The investigation was performed in two farms with the history of respiratory disease. In farm A the samples were taken in a large group nursery compartment with 120 piglets of 28kg in one group. In farm B three groups of 120 piglets were tested. In farm A 10 tracheo-bronchial-swab (TBS) samples (2) in one group and 10 Swiffers® samples (1) of the environment were taken. In farm B 10 tracheo-bronchial-swab samples per age group and 10 Swiffer® samples were taken. Samples were tested by nonaplex RT-PCR.

Results: Following pathogens could be detected:

Farm A: (TBS n=10/Swiffer® n=10): M. hyorhinis (10/7), PRCV (0/0) PRRSV (EU) (3/2), M. hyopneumoniae (0/0), SIV (1/3), PCMV (1/0) PCV2 (0/0).

Farm B: (TBS n=30/Swiffer® n=10): M. hyorhinis (28/7), PRCV (2/1) PRRSV (NA) (1/0), M. hyopneumoniae (9/1), SIV (0/0), PCMV (10/3) PCV2 (0/0). There were more weakly positive results (3/15, cumulative) and not analysable (0/2, cumulative) samples in the Swiffer®-Groups.

Discussion: In principle detection of porcine respiratory pathogens (PRRSV, SIV, M. hyopneumoniae, M. hyorhinis) in the environment by Swiffer®-sweeping is possible, but further investigations are needed.

References:

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P053

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EXPERIMENTAL REPRODUCTION OF GLÄSSER'S DISEASE IN FOUR MONTH OLD PIGS

Haemophilus parasuis is a coloniser of healthy piglets and the etiological agent of Glässer's disease, a systemic disease characterised by fibrinous polyserosytis. Historically, Glässer's disease has been considered a sporadic disease of young swine compromised by stress. However, the epizootiologic picture in specific-pathogen free or high-health-status herds that represent an immunologically naive population is much different. Experimentally, some diseases are easily reproduced in young piglets, but seem to be difficult in older ones, probably due to their more mature immune system. The objective of this study was to examine the effect of a *H. parasuis* infection in fattening pigs. Thus, five four-month-old snatch-farrowed colostrum-deprived pigs from a conventional farm were intranasally inoculated with reference virulent strain Nagasaki (107 UFC/animal). Clinico-pathological evaluation was performed and remaining pigs were euthanised at 4 days post-infection (dpi). Lesions were assessed and samples from peritoneal, thoracic, pericardial and nasal cavity, meninges, bronchoalveolar lavage fluid (BALF) and joints were taken for bacterial cultures. H. parasuis growth was semi-quantified as previously described. After challenge, one pig had high rectal temperature (1 dpi). At necropsy, 2/5 pigs had lesions of Glässer's disease: one pig with fibrinous poliserositis (pig which had to be euthanised at 2 dpi) and one with arthritis (4 dpi). Remaining pigs had slight multifocal pulmonary consolidation. H. parasuis was recovered from 4/5 pigs. Pig euthanised at 2 dpi showed systemic infection (isolation in brain, pericardium, BALF, blood and joints). At 4 dpi pigs exhibit large amounts of bacteria, mainly localised in brain and BALF. Overall, these results show that Glässer's disease can be experimentally reproduced in growing-finishing pigs.

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P054

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COMPARISON OF ANTIBODY RESPONSES IN SERUM FROM PIGS INOCULATED WITH DIFFERENT DOSES OF *SALMONELLA* TYPHIMURIUM AND *SALMONELLA* DERBY USING THREE COMMERCIAL ELISA TEST KITS

Serology is widely used for salmonella screening purposes on pig herd level. However, for the detection of salmonella infection in the individual pig, a serological test is more dubious.

Thirty six, ten-week old pigs from a salmonella negative herd were transported to experimental facilities and grouped into six groups. After one week of acclimatisation each pig was orally inoculated with salmonella. Each group of six pigs received one serotype of salmonella (S Typhimurium or S Derby) in a low (0.65 x 103 CFU), medium (0.65 x 106 CFU) or high dose (0.65 x 109 CFU).

Faecal and blood samples were collected during eight weeks. The levels of antibodies in serum were analysed using three commercial ELISA kits (Svanovir® Salmonella, Herdcheck Swine Salmonella and Salmotype® Pig Screen).

Results revealed differences between the three ELISA-kits on group level as well as in individual pigs.

For Typhimurium, all three ELISA-kits demonstrated positive titers in the six pigs in the high dose group, while only two out of six pigs inoculated with a high dose of S Derby showed a clearly positive serological response in all three test-kits.

In the medium dose groups, the seropositive response in pigs inoculated with S Derby were in general seen a couple of weeks later than in pigs inoculated with S Thypimurium. Also, in spite of several weeks of faecal excretion of the bacteria, one pig in the Thypimurium medium dose group were seronegative throughout the study period.

In the low dose groups no salmonella excretion was demonstrated and, with two exceptions close to cut-off, no pigs became seropositive.

The detection of antibodies due to infection with Salmonella spp. is dependent on several factors, e.g. the serotype of salmonella, the immune response of the individual pig, the dose of exposure and the test-kit used.

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P055

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DIAGNOSTIC PROTOCOLS FOR DETECTION OF NON-TREATMENT-REQUIRING DIARRHOEA AT BATCH-LEVEL

Introduction: Diarrhoea post weaning is the most common reason for batch medication in Danish pigs. In approximately 25% of the diarrhoea outbreaks only a few or no pigs have bacterial enteritis/colitis. Such outbreaks should potentially not be subjected to antibiotic batch medication.

Two aspects need to be addressed before recommendations on non-treatment can be given. 1: is it possible to accurately diagnose such non-bacterial diarrhoea outbreaks in practice and 2: will omission of antibiotic treatment result in compromised animal welfare and/or reduced productivity. The objective of the current study was to determine if non-treatment-requiring diarrhoea in batches with pigs post-weaning could be accurately diagnosed.

Material and methods: Each of 20 diarrhoea outbreaks (20 herds) was classified as treatment-requiring (= positive outbreak) or non-treatment requiring (= negative outbreak). Definition of non-treatment-requiring outbreaks was: <15% of all the pigs in a room had bacterial enteritis/colitis.

Different diagnostic protocols (n=29) using qPCR testing of faeces (Lawsonia intracellularis, Brachyspira pilosicoli, Escherichia coli) were developed and preliminary evaluated based on these outbreak classifications. For the most promising diagnostic protocols diagnostic sensitivity (Se), specificity (Sp), positive (PPV) and negative (NPV) predictive values were calculated at batch-level using another set of field data.

Results: The best two protocols included selecting 10 random diarrheic pigs for qPCR analysis. The two protocols applied different cut-offs (low/high) for faecal bacterial load for classification of test-positive pigs. An outbreak was considered positive (treatment-requiring) if one examined pig was above the qPCR cut-off. The low cut-off provided batch-level Se=1.00, Sp=0.20, PPV=0.79 and NPV=1.00. The high cut-off provided batch-level Se=1.00, Sp=0.60, PPV=0.88 and NPV=1.00.

Discussion: The non-treatment-requiring diarrhoea outbreaks can be detected with an acceptable accuracy under field conditions. This could lead the way for a reduction in antibiotic use, but effect of omitting antibiotic treatment in these outbreaks must be further evaluated.

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P056

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ORAL *E. COLI* CHALLENGE IN WEANED PIGS TO INDUCE AN ENDOTOXIN SHOCK

E. coli contributes colibacillosis, oedema diseases and endotoxin shock in piglets and causes financial losses. Endotoxin is a virulence factor in the cell wall of *E. coli*. It triggers inflammation and in worst case leads to an overreaction, shock and death. Antibiotics are used to treat *E. coli* related diseases. Bactericidal antibiotics lead to liberation of endotoxins. In weakened animals this may have a fatal outcome. Aim of the study was to induce a controlled endotoxin shock in weaned pigs by oral application of *E. coli* in combination with an antibiotic.

Nine pigs were divided into three groups: group I and group II received 5x10^10 cfu of lyophilised E. coli (O55B5) as well as 2.5 mg per kg body weight of enrofloxacin orally. Pigs in group I were administered 40 mg of omeprazol intravenously 8 hours before they received E. coli. Group III served as a control group. Blood samples were taken 10 min before application and then every two hours for 16 hours. At the end all pigs were euthanised and necropsy was performed. Blood samples were tested for the concentration of LPS, IL-6, IL-10 and TNF-α.

No severe clinical signs were observed. Only one pig in group II was vomiting foam and refused feed intake. No severe macroscopic or histological lesions were observed in the intestine beside dilatation of the small intestine with watery contents. Small and large intestine of all pigs were examined bacteriologically; no pathogens could be isolated. No increase of blood concentration of LPS or TNF-α was determined. The IL-6 and IL-10 concentration did not increase.

We were not able to induce an endotoxin shock with oral application of *E. coli* in combination with an antibiotic. So far there is no information on how to induce the endotoxin shock by oral application of endotoxin.

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P057

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EVALUATION OF A COMMERCIAL ELISA TEST KIT ON CLASSICAL SWINE FEVER ANTIBODY DETECTION USING ORAL FLUID SAMPLES

This study is to evaluate possible use of a commercial enzyme-linked immunosorbent assay of classical swine fever (CSF) antibody using oral fluid samples. Oral fluid and serum samples were collected from 3 experimental groups of 20 days-old pigs (n=20); challenged (n=8), vaccination (n=8) and negative control (n=4) groups. CSF antibody was detected from an individual serum and pooled oral fluid in each group using a selected ELISA compared to the results of neutralising peroxidase-linked assay (NPLA). High levels of serum NPLA titers, possibly from maternally-derived antibodies, were detected at 3 days post inoculation (dpi) in all groups. As expected, the levels of serum NPLA titer increased only in the challenged group at 10 dpi and the vaccination group at 14 dpi. Interestingly, the low levels of NPLA antibody titers could evidently be detected in the oral fluid samples. Using an ELISA protocol as suggested by the manufacturer compared to the conventional NPLA method demonstrated cut-off positive NPLA titer when over log2 4. It should be noted that NPLA titers detected in the pooled oral fluid samples in each group were equal to or less than log 2 3, resulting in negative detection when tested by the ELISA test kit. This experiment proved that CSF antibody could be detected in the oral fluid samples using NPLA and ELISA methods. However, validation of this commercial ELISA test kit is still needed to improve the sensitivity and specificity of the detection when using oral fluid samples. This evaluation contributes not only in the facilitation of CSF antibody detection method, but nevertheless helps in the rapid diagnosis and controlling aspects of CSF, particularly in the CSF-free country.

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P058

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ZEARALENONE VALUES IN THE BILE OF UK FINISHING PIGS

The mycotoxin zearalenone (ZON) is thought to be a common contaminant of pig feeds and bedding in Northern Europe due to wet harvest conditions causing spoilage by Fusarium graminearum during storage. Conditions such as premature puberty in gilts and infertility in sows have been attributed to suspected mycotoxin contamination, in the absence of other discernible causes.

There is little information on typical exposure levels of pigs to ZON under standard commercial conditions in the UK, thus 450 bile samples from healthy finishing pigs were collected for testing. The pigs came from 52 unrelated units. The aim was to obtain baseline data on the range of values obtained from a representative sector of the British pig industry.

The bile samples were tested individually. The process involved initial overnight incubation with beta glucuronidase, then extraction of ZON and ZON metabolites by immunoaffinity columns, then quantification of captured material by ZON ELISA, with correction for percentage recovery calculated from the spiked control values. The minimum detection level of the test was 0.05ppb.

Eighteen herds (35%) had ZON values of <5ppb in all pigs, consistent with low levels of exposure. Other herds showed considerable variation in values between individual pigs. Fourteen herds (27%) had average values of between 5-10ppb and 20 herds (38%) had average values of >10ppb. Some results for individual pigs were as high as 60-80ppb.

Although the value of ZON in bile does not necessarily correlate with the concentration in the feed (Dänicke *et al.*, 2008), values of >5ppb indicate a source of ZON in the pigs' environment, with the potential for harmful consequences. The data presented provides useful baseline information for comparison and interpretation of test results in the future.

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P059

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DIAGNOSIS OF SWINE INFLUENZA VIRUS IN ORAL FLUIDS SAMPLES IN 20-DAY-OLD PIGLETS: A FIELD CASE

Introduction: Oral fluid (OF) samples have been used for PRRSV, PCV2 or swine influenza viruses (SIV) detection. This report describes the on-field implementation of OF sampling for SIV detection in piglets aged 20 days.

Case description: The farm, a 130-sow farrow-to-finish operation, is located in Brittany, France. In October 2011, sows first displayed anorexia and later, late abortions and/or early farrowings or gave birth to weak piglets. No PRSSV DNA (PCR) was found in sow blood samples nor PCV2 antibodies (ELISA) in body fluid obtained from aborted foetuses. In February 2012 coughing was seen during fattening. Flu infection (H1N1 avian-like subtype) was evidenced in ill fatteners. Four days after, clinical signs spread back to weaned piglets then to suckling piglets.

Following the first clinical signs in suckling piglets and laboratory confirmation of SIV presence on nasal swabs from 2 litters, pen-based OF samplings were performed using rope in suckling piglets. One rope per 6 piglets (12 and 16-mm diameter, cotton or cotton/nylon) was suspended at snout height during at least 60 minutes approximately every 2 days until weaning. The two ends of the rope were chewable. Piglets clinical status and behaviour was recorded. OF were extracted by rope milking following in some cases lavage with 5ml of isotonic solution and then centrifuged. Supernatants were assayed by RT-PCR for the detection of Influenza m gene at LDA22.

Results and discussion: This study provided new insight about OF sampling: piglets did not chew the rope(s) during the early febrile phase. At least a 60-minute exposure seemed also to be necessary to collect sufficient material. Only the 12-mm cotton rope was chewed. SIV was detected in each oral fluid sample confirming the efficiency of this sampling method. Nevertheless, quantities of virus collected were low and did not allow SIV sub-typing.

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P060

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EVENTUAL IMPACT OF SEASONAL EFFECTS ON THE *MYCOPLASMA HYOPNEUMONIAE* PREVALENCE IN BELGIAN AND DUTCH PIG HERDS USING A TRACHEO-BRONCHIAL SWAB TECHNIQUE

Mycoplasma hyopneumoniae (M.hyo) is still important in modern intensive swine farming in Europe. Diagnosis of infections with *M.hyo* can be performed using different approaches, including the detection of the pathogen through polymerase chain reaction (PCR) assays. Recently, a tracheo-bronchial swab (TBS) technique has been developed for the detection of M.hyo in pigs. Weather conditions can affect the circulation and excretion of *M.hyo*, resulting in a different clinical picture. The aim of the present study was to obtain data on the distribution of *M.hyo* infections in closed pig herds in Benelux using the TBS technique and to study eventual seasonal effects on this distribution. Hundred and sixty-three closed pig herds were randomly selected in Belgium and the Netherlands. In every herd, at least 30 piglets were sampled in two age groups. TBS were collected and analysed as described previously. Several meteorological data related to the specific sampling period were collected from a central weather station point in the Benelux. Statistical analysis was performed using logistic regression models. The presence of *M.hyo* at herd level at 3-5 weeks of age was significantly affected by the precipitation rate (β = -0.026; P = 0.03) during the week preceding sampling. In older post-weaning piglets, the risk for a herd to be M.hyo-positive was significantly affected by season [with the highest risk (OR = 1.91) for M.hyo positivity during autumn and the lowest risk (OR = 9.8) during summer (β = 0.65; P = 0.003)] and the average outdoor temperature (β = 0.02; P = 0.007) during the week preceding sampling. These results are in accordance with Segalés *et al.*, (2011), who also observed a seasonal variation in *M.hyo* prevalence and circulation. In conclusion, although early *M.hyo* infection may show a seasonal effect, piglets may be infected with *M.hyo* throughout the entire year.

NOTES

P061

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PREVALENCE OF DIFFERENT RESPIRATORY PATHOGENS DURING POST-WEANING AND FATTENING PERIOD IN BELGIAN AND DUTCH PIG HERDS USING A TRACHEO-BRONCHIAL SWAB TECHNIQUE

Besides Mycoplasma hyopneumoniae (M.hyo), many other viruses and bacteria can be concurrently present during respiratory problems in pigs. Diagnosis of infections with these pathogens can be performed using different approaches, including the detection of the pathogen through Polymerase Chain Reaction (PCR) assays. Recently, a new sampling technique has been developed and validated for the detection of M.hyo in pigs using PCR, namely the tracheo-bronchial swab (TBS) technique. A multiplex (m) [porcine respiratory coronavirus (PRCV), porcine reproductive and respiratory syndrome virus (PRRSV), swine influenza virus (SIV), porcine cytomegalovirus (PCMV), porcine circovirus 2 (PCV2)] and duplex (d) [Actinobacillus pleuropneumoniae (App), Haemophilus parasuis (Hps)] PCR assay were used to detect the different pathogens in the TBS. The aim of the present study was to obtain data on the distribution of different pathogens involved in PRDC in closed pig herds in Belgium and the Netherlands using the TBS technique. Closed pig herds were randomly selected in Belgium (n = 107) and The Netherlands (n = 91). In every herd, at least 30 piglets were sampled in at least two age groups (3-5, 6-11 and 12-20 weeks of age). TBS were collected as described previously and analysed using mPCR and/or dPCR (IVD GmbH, Hannover, Germany). PCR results were reported as negative or positive for the presence of PRCV, SIV, PCMV, PCV2, App and Hps. For PRRSV, strain type EU/US or both was also reported. The present study clearly shows that different viral pathogens responsible for PRDC may already be present during the post-weaning period. Concerning PRRSV, the most prevalent type was PRRSV-EU, whereas PRRSV-US was far less frequent. Hps was more prevalent than previously assumed. In conclusion, the present study showed that many other respiratory pathogens are present during the post-weaning and fattening period, which may complicate the clinical picture of respiratory disease.

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P062

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TENTATIVE INDEX MODEL FOR THE ASSESSMENT OF TECHNICAL PERFORMANCES IN FRENCH SWINE FARMS

Introduction: Decision to vaccinate against pathogens inducing subclinical troubles is not easy. The aim of this study was to set up a synthetic index to summarise weaning-to-slaughter pig performance based on growth, feed efficiency and mortality to help making this kind of decision.

Material and methods: Every year, a detailed technical analysis uses to be performed in more than 2000 French farrow-to-finish or wean-to-finish reference farms independently of the economic environment. In 2011, a wean-to-finish (standardised 8-to-115-kg or W-F) margin index expressed per pig was calculated and expressed in a normalised way with an index base of 100: the higher the index, the better the technical performances of the farm, in other words: >100 good to average performance, =<100 average to low performance. The index was then analysed using regression models to identify explanatory variables in routinely recorded criteria measuring technical performances.

Results and perspectives: The selected model explained 99% of the index variability with the following 3 significant (p<0,001) parameters, i.e. growth (ADWG 8-115, g per day), feed conversion ratio (FCR 8-115) and mortality (%):

W-F Index = -83.26214 x (FCR 8-115) + 0.06533 x (ADWG 8-115) + 4.06105 x (100 – mortality) -113.49504.

Further large scale data collection before and after vaccination is necessary to evaluate the relevance of such an index.

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P063

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PREVALENCE OF PRRS VIRUS IN WALLONIA (BELGIUM)

Porcine reproductive and respiratory syndrome (PRRS) causes major economical losses in pig farms. In different parts of the world, there is a growing consensus that PRRS virus (PRRSv) eradication should be performed on a regional basis, particularly in low density areas of pig production. The objective of the present study was to evaluate the apparent prevalence of PRRSv in Wallonia, a low density area of pig production (0.05 pig farms/km²). At this stage of the study, a phone survey has been addressed to 61/276 Walloon breeding pig owners. Fifty-eight answered to the questionnaire: 51 are responsible of a farrow-to-finish farm, 6 of a farrowing farm and 1 of a PRRS-free boar station. In 35% of the tested farms, sows are vaccinated with a modified live virus (MLV) PRRS vaccine (n=11) or with a killed PRRS vaccine (n=9). In two farms, both sows and piglets are vaccinated with a MLV PRRS vaccine. Replacement gilts are purchased in 33% farms. Among the 38 farms raising replacement gilts, 39% purchase boar(s). Boar semen is purchased in 86% of the farms: 56% purchase only boar semen; 30% purchase both semen and boar(s) and 14% of farms only purchase boar(s). In 22/57 tested farms, clinical signs evocative of PRRSv infection were observed over the last 10 years. In 30 farms a PRRS diagnostic test was performed in the past with a positive result in 17. When the pig owner did agree and if no vaccination was carried out on sows or on piglets, a serological Elisa test was performed in 10 breeding pigs and/or 5 feeder pigs >70kg (or in all available sera if a smaller number of pigs was present). Globally, at herd level and at animal level, the apparent prevalence were respectively 35.2% (95% CI: 23.0-47.4%) and 23.4% (95% CI: 20.1-26.6%).

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P064

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PREVALENCE OF PRRSV AND PCV-2 ASSOCIATED ABORTIONS IN UKRAINE IN 2007-2012 PERIOD.

A longitudinal study was carried out in Ukraine to determine whether PRRSV and PCV-2 were causes of abortions at different stages of gestation in pigs. It is widely known that these pathogens can directly influence the development of the foetus, causing specific changes in them.

The histological analysis in the case of PCV-2 identified myocarditis, whereas the most frequently observed PRRS lesions are pneumonia, depletion of thymus, bleeding in the lungs and the presence of hyperplasia and hypertrophy of pneumocytes II.

Over a period of 5.5 years 1156 tissue samples from swine foetuses were tested by PCR for the presence of 9 different infectious pathogens. From this number, the amount of PCV-2 positive ones is 192, which is nearly 17%. At the same time, PRRSV was detected in 125 samples (nearly 11%).

Interestingly, co-infection by the two mentioned pathogens was observed in just 17 cases, which is under 2%. We compared our data from 2007-2009 with our results from 2010-2012 and detected an increasing number of abortions connected with PCV-2 and PRRSV. During the last 5.5 years we used the same method and the same PCR test system for this research. We can make some deductions about the tendency of PCV-2 and PRRSV to spread.

There are a number of factors contributing to the increase of the aborting level connected with PCV-2 and PRRSV such as animal well-being, increased herd size, presence of carriers from purchased animals, and sperm. The main reasons accounting for an increased spread of PCV-2 and PRRSV in Ukraine over the last 3 years are an active animal trade, the purchase of pigs and semen from different farms in Ukraine or from abroad, and insufficient management.

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P065

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CONTROL OF PORCINE RESPIRATORY DISEASE COMPLEX BY SEROLOGICAL TESTING OF BLOOD SAMPLES COLLECTED AT THE ABATTOIR

Control of porcine respiratory diseases complex (PRDC) is a challenge in intensive pork production systems. The purpose of the present study was to assess the potential of blood samples collected at slaughter as a new source of information to detect herd specific pathogens.

The objective of the study was to evaluate the degree of similarity for detection of *Mycoplasma hyopneumoniae* (Mhyo), swine influenza viruses (SIV), porcine reproductive and respiratory syndrome virus (PRRSV), and porcine circovirus type 2 (PCV2) in pig lungs and slaughterhouse blood by PCR and serological tests.

The study encompassed 20 farms, 491 pairs of blood and lungs were gathered in a Southeast Bavarian slaughterhouse between May 2011 and February 2012. For PCR pools of 4-6 lungs originating from one farm were generated.

The agreement between ELISA serology on blood and PCR on lungs was for Mhyo 67.83%, for SIV 58.04%, for PCV2 53.04% and for PRRSV 26.95%. The only significant ODDS ratio appeared for Mhyo 12.4 (Fisher $p<.0001$).

Infection with PRRSV and PCV-2 typically occurs early in the life cycle of the pig and virus is already eliminated at slaughter. In contrast, antibodies to Mhyo are associated with this pathogen in the lungs.

As PCR analysis on lungs is expensive, the slaughterhouse blood is a cheaper alternative to receive an insight in the herd specific pathogens. However, in case of uncertainty the lungs of the herd should be analysed by PCR.

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P066

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DETERMINATION OF PATHOGENS INFLUENCING PIG HERD PERFORMANCE BY ANALYSING SLAUGHTERHOUSE BLOOD

Decisions in pig health management are rarely based on monitoring slaughterhouse blood. Based on the serological analysis of blood at slaughter the present study quantified the influence of pathogens associated with the PRDC on the degree of pneumonia and herd performance.

20 pig herds in the Southeast of Germany were selected. Randomly 30 blood samples were collected in four fattening periods.The samples were submitted for ELISA-serology for *Mycoplasma hyopneumoniae* (Mhyo), *Actinobacillus pleuropneumoniae* serotype 2 (APP2), Swine Influenza Viruses (SIV), porcine reproductive and respiratory syndrome virus (PRRSV) and porcine circo virus type 2 (PCV2). Percentage of pigs with pneumonia was determined based on the meat inspection results. Average daily growth rate (ADGR) and average feed conversion rate (AFCR) were provided by the farmer. Multiple regression analysis with backward elimination was applied to determine the most influential pathogens.

APP 2 and SIV H1N1 were observed to increase the percentage of pigs with pneumonia per herd. The presence of APP2 and SIV increased in period 1 the ratio by 13.5 %, 20.8 % (P2) 32.1 % (P3), 23.5 % (P4). PRRSV influenced mostly ADGR and AFCR during the first two fattening periods. If all samples were positive for PRRSV, ADGR decreased by 72g (P1) and 133g (P2). AFCR increased by 200 g feed for on kg of growth (P1 & P2), for example from 1:2.6 to 1:2.8. In the third and fourth period, PCV2 decreased ADGR by 79 g (P3) and increased AFCR by 200g (P4). APP2 increased the AFCR by 200 (P3).

In conclusion, the pathogens influencing the occurrence of pneumonia, ADGR and AFCR vary between the fattening periods. Therefore, no generalisation is possible based on one round sampling to assess the herd status. The results indicate that serology in slaughterhouse blood is a valuable source of information.

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P067

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SERO-PREVALENCE OF PPV ANTIBODIES IN SOW HERDS WITH AN SPF STATUS AND A HIGH LEVEL OF BIOSECURITY IN THE NETHERLANDS

Introduction: PPV (Porcine Parvo Virus) causes fertility problems in pigs like mummification, small litters and stillborn piglets. Co-infection with PCV2 possibly plays a role in the pathogenesis of PMWS (Porcine Multisystemic Wasting Syndrome). PPV is endemic in the Netherlands and in pig keeping countries worldwide. A large scale inventory in the Netherlands in 1989 estimated the sero-prevalence at 84% in sow herds. A recent study in Belgium mentioned a sero-prevalence of over 95%.

However, in today's pig farming it is conceivable that because of intensive vaccination and improved biosecurity on farms, within certain sow herds the prevalence of PPV might be considerably lower. As a result, antibody titers in sows and maternal antibody levels in piglets can be decreased and a substantial amount of piglets will have no passive immunity against PPV. In that case we might have to reconsider vaccination programs.

A small scale screening of test results at the laboratory of the Animal Health Service in the Netherlands in 2009, showed that of 267 submitted samples form sow herds, only 65% was sero-positive. Differences between sow herds seemed large.

Method: Four Dutch SPF sow herds were involved in the study. Blood samples from 60 randomly selected representative sows per herd were tested for PPV antibodies with an haemagglutination inhibition test (HI). Antibody titers larger than 1:256 are considered to be related to a field virus infection. Titers between 1:8 and 1:256 can be caused by either vaccination or a field virus strain. A titer smaller than 1:8 is sero-negative.

Results: In two of the farms the sero-prevalence (titers below 1:256) was significantly lower than 80%, in two other farms it was above 85%. A possible relationship with specific biosecurity measures on the farms is under investigation.

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P068

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ONLINE MONITORING OF PIG HEALTH IN THE NETHERLANDS

The GD Animal Health Service in the Netherlands uses information from phone calls, farm visits, and results from post mortem investigations and laboratory tests to monitor pig health in the Netherlands. The GD started the monitoring system for the pig industry and the Dutch ministry of agriculture back in 2003. It appeared to be an accurate way of detecting unexpected and special events concerning pig health. However, this reactive and in fact passive tool is not very suitable for trend analysis. For instance, in 2008 – 2009 GD veterinarians received many phone calls about PCV2 but this was mainly caused by the introduction of new diagnostics and vaccines, not because of serious health problems. Yet, trend analysis is desired by the pig industry to be able to respond to certain developments, for instance in relation to antibiotics use.

In order to get a more active and representative impression of the pig health situation in the Netherlands, the GD developed an online monitoring tool for veterinary practitioners. This application allows practitioners to capture simple information during their consultancy visits at pig farms and to send the data to the GD. This information includes the age group involved (e.g. finishers), affected body system (e.g. respiratory system), symptoms (e.g. coughing), probable diagnosis (e.g. Influenza infection) and, if applicable, additional confirming laboratory tests (e.g. serological tests). The GD processes the data to make analyses of trends and regional differences, and links back the results to the practitioners. Besides, the GD generates relevant reports to support the pig industry. In the successful pilot phase of the project four large veterinary practices participated. Shortly more practices will be included and in the foreseeable future interactive features will be added to the monitoring application to support the participants with real time information.

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P069

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SEROTYPING AND SEROLOGICAL PREVALENCE OF *ACTINOBACILLUS PLEUROPNEUMONIAE* IN THE NETHERLANDS

Introduction: Kamp was the last to report data with respect to *A.pleuropneumoniae* serotyping in the Netherlands1. This study concerns serotyping of *A.pleuropneumoniae* isolates from 84 Dutch cases of pleuropneumonia between 2009-2012. The seroprevalence during that period was also studied.

Material and methods: 84 isolates from cases of pleuropneumoniae were serotyped (RingPrecipitation)2 by MSD-AH laboratories between 2009-2012.

ResPig is a program with cross-sectional serological investigations. The data were used to determine the seoprevalence (OMP elisa) in 10-week old nursery pigs and 22-week old fatteners.

Results:

1. App isolates 2009-2012: type 1:2(2.4%) type 2:45(53.5%) type 5b:5(6.0%) type 9:31(36.9%) type13: 1(1.2%)

2. App seroprevalence:

Nursery: 2009:73%-2010:88%-2011:100%

Fatteners: 2009:98%-2010:99%-2011:100%

Discussion: Of the 84 *A.pleuropneumoniae* isolates, 45 (53.5%) were of serotype 2. The next most common was serotype 9: 31(36.9%)) followed by serotype5b,1 and 13. In the 1984-1985 study, the predominant serotypes were 9(49%) and 2(32%) followed by serotypes 1 3 5,7 and 8.

25 years after the last serotyping study, serotypes 2 and 9 are still the commonest strains in the Netherlands, although serotype 2 now predominates, instead of serotype 9.

Serotype 9 is regarded as the more virulent of the two, likely due to the difference in toxin production. Following the shift towards the prevalence of serotype 2, less severe *A.pleuropneumoniae* problems might have been expected in the field. However, practitioners submitting the isolates complained about an increase in acute pleuropneumonia problems and a tendency towards an increased incidence of acute pleuropneumonia in the nursery (<10-week old pigs). This is supported by the increased seroprevalence on farms between 2009-2011 (up to 100% in 10-week old piglets)

The increase in problems and seroprevalence has probably been influenced by the restrictions imposed on the use of antibiotics on Dutch pigfarms.

Literature:

1.Kamp.E. *et al.*, (1987) Vet.Microb. 13p.249-257; 2.Mittal.K. *et al.*, (1982) Journ.Vet. Microb.,6p.1019-1023

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P070

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RELATIONSHIP BETWEEN LUNG LESIONS AT SLAUGHTER AND PERFORMANCE OF PIGS

Mycoplasma hyopneumoniae (M.hyo) is the primary pathogen of enzootic pneumonia and is a primary agent of the porcine respiratory disease complex. As such, M.hyo causes major economic losses to the pig industry due to a slower growth and higher feed conversion. The objective of this study was to study the relationship between the severity of lung lesions at slaughter and the performance of pigs. In total 9324 pigs coming from 13 French pig herds having respiratory disease due to M.hyo were included. The severity of lung lesions at slaughter was evaluated using the lung lesion score method of Madec and Kobisch (1982) and pigs were classified into four categories: score of 0 (n=5241), score of 1 to 3 (n=2196), score of 4 to 8 (n=1431), score of 9 to 24 (n=456). The performance was evaluated using the average daily weight gain (ADWG) between birth and 115kg, the age at 115kg and the weight at 180 days of age. The ADWG between birth and 115kg was 12, 18, and 44 g/day lower in pigs having lung lesion scores between 1 and 3, between 4 and 8, and between 9 and 24, respectively when compared to pigs without lung lesions. Similarly, pigs having lung lesion scores between 1 and 3, between 4 and 8, and between 9 and 24 needed 4, 6, and 14 days longer to reach a weight of 115kg and their weight at 180 days of age was 2.4, 3.7, and 9.4kg lower when compared to pigs without lung lesions. The differences between the four groups with different categories of lung lesion scores at slaughter were statistically different between each other for all three performance parameters. This study confirms that pneumonia has a major impact on the performance of pigs.

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P071

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PREVALENCE OF SHOULDER AND PASTERN ULCERS IN DANISH SOW HERDS

Introduction: In Denmark, shoulder ulcers are a common problem but little is known about the prevalence in different stages of the lactation period. Even less is known about pastern ulcers and to our knowledge estimates of prevalence have not yet been reported. Hence, the aim of this study was to estimate the prevalence of shoulder – and pastern ulcers in lactating sows in Danish herds.

Materials and methods: The study design was cross-sectional. To ensure a precision of +/-5% of the expected estimated prevalences, 19 herds needed to be included. The herds were recruited from northern Denmark, and was only included if they had more than 20 sows per farrowing group and kept reliable productivity recordings. Organic and outdoor herds were excluded. In each herd, 20 sows that had farrowed within the last 1 to 4 days (grp1) and 20 sows closer to weaning (grp2) were randomly selected and clinically examined once by the same person. Any damage of the dermis in shoulder/pastern regions was defined as "Ulcer" and the location was recorded.

Results: During May 2011 to December 2012, 29 herds were visited. In total, 1153 sows were examined. The overall prevalence of shoulder ulcers were 1.6±0.7% in grp1 and 8.2±1.6% in grp2. The overall prevalence of pastern ulcers was 8.3±1.6% in grp1 and 12.6±1.9% in grp2. The within-herd prevalence of shoulder ulcers ranged from 0 to 12.8% in grp1 and 0 to 20.0% in grp2. For pastern ulcers the within-herd prevalence ranged from 0 to 20.0% in grp1 and 0 to 30,0% in grp2.

Conclusion: In spite of large between-herd variation, the overall prevalence of ulcers in grp2 was significantly higher than in grp1 ($p<0.001$ for both shoulder and pastern ulcers), suggesting that the prevalence of ulcers increased during the lactation period.

NOTES

P072

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RETROSPECTIVE STUDY OF CONDEMNATION ASSOCIATED WITH LYMPHADENITIS IN PIGS REARED IN FREE-RANGE SYSTEMS

Pigs reared in outdoor systems interact with other domestic and wild animals, being difficult to control the circulation of pathogens among them. The present study is focused on a retrospective study from an abattoir, where only free-range pigs are slaughtered, to determine the impact of lymphadenitis in the condemnation of pig carcasses. A documentary analysis of slaughtered animals from 5 seasons (January-April), from 2007 to 2011, was performed. A database was created compiling information regarding the main cause of condemnation, location of the herds, geographical characteristics and the environment. In addition, the following parameters were recorded: number of animals slaughtered per year (ASY), number of slaughtering with condemned animals (SCA), number of animals slaughtered in each slaughtering with condemned animals (ASSCA), number of condemned carcasses (CC), number of carcasses condemned due to lymphadenitis (CCL), number of days of slaughtering (DS), and number of days of slaughtering with condemnation of carcasses (DSC). In addition, samples from submandibular lymph nodes, lung, liver and spleen were collected during 2011 from condemned animals and subjected to microbiological analysis, being corynebacteria and Streptococcus the most frequently isolated (65.57%). An average of 91,032 animals were slaughtered/season, with 6,946 (7.63%) partial or complete carcass condemnation. One hundred and ninety six carcasses were totally condemned, with a 85% condemned due to disseminated lymphadenitis. An average period of 75,2 days of slaughtering was recorded counting with a mean of 37,4 days of slaughtering with condemned carcasses. Significant differences between years and areas were observed. A marked association between cases of lymphadenitis and proximity to natural parks was observed, highlighting the impact of the interaction with wild species. This is the first study carried out to determine the distribution and importance of lymphadenitis condemnation in free-ranged pigs, and shows the main bacterial genera to be considered in control measures.

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P073

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ARE ENZOOTIC PNEUMONIA LESIONS AT SLAUGHTERHOUSE PREDICTABLE BY MEANS OF *MYCOPLASMA HYOPNEUMONIAE* SEROLOGY?

The objective of the present study was to assess the potential association between mean *Mycoplasma hyopneumoniae* (*M. hyopneumoniae*) serological S/P ratios using a commercial kit with enzootic pneumonia (EP) lung lesion scoring in slaughter-age pigs. A total of 56 batches of pigs from 56 different farms were included in the study. A batch was defined as a group of pigs (with a mean of 97 animals per batch) belonging to the same farm that were sacrificed on the same day at the slaughterhouse. Cranio-ventral pulmonary consolidation (EP-like lesions) was individually examined using the Madec & Kobisch method. An EP-like lesion average value per farm (sum of individual lung EP-like lung scores/number of scored lungs) was calculated. In addition, blood samples from 20 randomly selected pigs within each batch were collected. Blood samples were tested with a commercial kit (*M. hyopneumoniae* antibody test kit, Biochek).

A statistically significant association was observed between mean M. hyopneumoniae S/P ratio of the randomly selected pigs and the mean lung lesion scoring. Such association was observed both with the proportion of animals showing EP-like lesions (p= 0.007 R= 0.36) as well as with the mean S/P of the whole batch (p= 0.003 R= 0.38). The higher the S/P value, the higher the mean lung lesion score. Results of this preliminary work suggest that mean S/P ratio at slaughterhouse could be used as a predictor of mean EP-like lesion scoring.

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P074

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ENZOOTIC PNEUMONIA SURVEY IN ITALIAN SLAUGHTERED PIGS

From January 2010 to December 2012, lungs from 15174 pigs (160kg slaughter weight, aged 9-10 months) belonging to 136 Italian farms, were evaluated using the Madec grid. Bronchopneumonic lesions suggestive of Enzootic pneumonia (EP like) were detected in 6976 lungs (45.9%). The EP-like lesion average value for all batches was 1.07, ranging from 0.16 and 3.11 among the 136 batches. The EP-like lesion average values, obtained for each batch, were organised in four categories (quartiles): best quarter <0.66; intermediate best quarter from 0.66 to 0.98; intermediate worst quarter from 0.98 to 1.35 and worst quarter >1.35. The distribution in categories of EP average values can be used to rank a batch in comparison to the whole population. In order to determine the possible differences in EP-like lesions between different periods, a study was performed comparing the considered period (2010-2012) to the data collected from January 2004 to December 2009 (lungs from 6380 pigs belonging to 60 batches). In the latter period (2004-2009) EP-like lesions were detected in 3249 lungs (50.9%) and the average value for all batches was 1.4 ranging from 0.43 and 4.44. The application of Madec's grid in the two considered periods confirms the high incidence of these lesions in Italian swine herds. However, the EP-like average value (1.07) of batches scored in 2010-2012 was significantly lower as compared to that (1.4) obtained in the survey carried out in 2004-2009 (one way Anova test $p<0.01$). These values are definitely lower than those reported by Ostanello *et al.*, (2006) based on lungs from 10041 pigs scored in the period 2003-2004, in which the overall Ep-like average value was 2.11. Overall, the results of the survey reported in this paper shows an improvement of the control of EP in Italy.

NOTES

P075

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SEROLOGIC EVALUATION OF VACCINATION HISTORY WITH CIRCOVAC®

Objective: The objective of the study was to show an anamnestic serologic response in piglets vaccinated with CIRCOVAC at 3 and 10 weeks of age which differs from the serologic response of piglets only vaccinated at 10 weeks of age.

Materials and methods: A selection of 20 piglets of 3 weeks old were divided into 3 groups. One group (NVNV, 5 piglets) was not vaccinated, a second group (NV10V, 5 animals) was vaccinated with CIRCOVAC (0.5ml) at 10 weeks of age and one group (3V10V, 10 piglets) was vaccinated at 3 and 10 weeks of age with 0.5ml CIRCOVAC. The animals were blood sampled at 3, 10 and 12 weeks of age. Sera were analysed with INGEZIM Circovirus IgG ELISA and optical density (OD)-values were evaluated.

Results: At 3 weeks of age, NVNV and 3V10V animals had an OD-value of 1.11 and 1.18, indicating good colostrum intake and animals of group NV10V showed a lower OD-value (0.30). At 10 weeks of age, all groups showed low OD-values for IgG, due to decreased maternal antibodies. These titres were 0.23 (NVNV), 0.32 (3V10V) and 0.15 (NV10V) for the respective groups. At 12 weeks of age, there was a clear increase of OD-value in the 3V10V group (0.53), while the OD-values in the piglets not vaccinated at 3 weeks of age remained low: 0.14 for the NVNV group and 0.14 for the NV10V group.

Conclusion: The serologic response after vaccination with CIRCOVAC at 10 weeks of age differs according to the vaccination history at 3 weeks of age. When no vaccination was performed at 3 weeks of age, no increase in OD-value is observed. In conclusion, a 0.5-ml CIRCOVAC injection at 10 weeks of age effectively recalls immune response after a CIRCOVAC priming at 3 weeks of age.

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P076

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COMPARISON OF PIGLET VACCINATION WITH CIRCOVAC® AND ANOTHER PCV2 PIGLET VACCINE REGISTERED IN EUROPE ON PRODUCTION PARAMETERS UP TO SLAUGHTER IN THREE DANISH FARMS

Introduction: The objective of this study was to compare the efficacy of CIRCOVAC and another PCV2 piglet vaccine registered in Europe (Vaccine X) vaccination on performance parameters under Danish field conditions.

Material and methods: The study included two 2-site operations (A,B) and one farrow-to-finish operation (C), breeding at between 340 and 725 sows, located in Denmark. In each farm, around 600 piglets weaned at 3 to 4 weeks of age were included and vaccinated either with 0.5ml CIRCOVAC or injected with 1.0ml Vaccine X. The experimental groups were randomised according to weaning bodyweight, sex, age, dam parity, and litter size. The pigs were weighed at weaning and at slaughter. Mann-Whitney's W test or Student's t-test was used to compare standardised average daily weight gain (ADWG 6-to-106kg) within each farm. Mortality was compared between the groups using a Chi-square test.

Results: Whatever the farm, no significant difference in growth performances was observed between the CIRCOVAC-vaccinated group and the Vaccine X group. The real overall ADWG for the 3 farms were respectively 751, 722 and 775 g/day. The average difference in standardised ADWG (6-to-106kg) were for farm A: -5 g/day (p=0.32), farm B: +4 g/day (p=0.60) and farm C: -2g/day (p=0.64) in favour of the CIRCOVAC groups. Slaughter weights did not significantly differ between the vaccinated groups. Overall average mortality rates was similar 4.4% (Min 3.5 – Max 6.2) in the CIRCOVAC groups vs. 3.6% (Min 3.1 % – Max. 4.3%) in the Vaccine X groups. (p>0.05).

Conclusion: Performance of pigs vaccinated with CIRCOVAC was found as good as the one of piglets vaccinated with another PCV2 piglet vaccine registered in Europe in the same Danish farms.

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P077

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PREVALENCE OF *MYCOPLASMA HYOPNEUMONIAE* AND RISK FACTORS FOR THE INFECTION IN SUCKLING PIGS AT THE AGE OF WEANING

The aim of the present study was to investigate the frequency of *M. hyopneumoniae* infections in suckling pigs of endemically infected herds and to identify individual risk factors potentially influencing the infection status of suckling pigs at the age of weaning.

The animal level prevalence of *M. hyopneumoniae* infections in suckling pigs examined in three conventional pig breeding herds was 3.6% (41/1127) at the time of weaning. A prevalence of 1.2% was found in the same pigs at the end of their nursery period. In a multivariable Poisson regression model it was found that incidence rate ratios (IRR) for suckling pigs are significantly lower than 1 when teeth grinding was conducted (IRR: 0.10). Moreover, adequate temperatures in the piglet nest during the first two weeks of life decreased the probability of an infection (IRR: 0.23-0.40). Contrary, the application of PCV2 vaccines to piglets was associated with an increased infection risk (IRR: 9.72).

Several individual risk factors being associated with the detection of *M. hyopneumoniae* in suckling pigs at the age of weaning have been identified. Since single infected piglets are supposed to act as initiators for the transmission of this pathogen in nursery and fattening pigs, the elimination of the risk factors described in this study should help to reduce the incidence rate of *M. hyopneumoniae* infections and thereby might contribute to a reduced probability of high prevalence in older pigs.

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P078

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CLASSICAL SWINE FEVER VACCINATION IN FYR OF MACEDONIA – COST BENEFIT STUDY

Classical swine fever (CSF) is an infectious viral disease affecting domestic pigs and wild boar. It is not a zoonosis and does not affect other livestock species. Its principal impact is therefore in terms of the economic losses that it causes and its impact on international trade. The disease has been reported sporadically from several Western Balkans countries, including FYR of Macedonia.

This study assesses alternative strategies to control and eradicate the disease in domestic pigs and wild boar within FYR of Macedonia. The study considers the strategic context within which programmes for the control and eradication of CSF must be implemented. It considers the role that backyard pigs and free-ranging wild boar might play in endemic disease.

The study considers the costs, benefits and risks of a shortlist of control and eradication strategies, including mass vaccination in domestic pigs, eradication of disease by stamping out, the use of emergency vaccination in the face of an outbreak and systematic vaccination of infected wild boar populations. The study identifies the combination of options that offers the best value for money overall.

Finally, the study considers how implementation of the recommended option might be funded, taking account of significant drivers in the national economy.

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P079

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SURVEY ON FINNISH PIG FATTENING UNITS WITH RESPIRATORY CLINICAL SIGNS

A total of 15 fattening pig units with an average of 246 (sd 122 pigs) were included in a survey to investigate severity of symptoms and pathogens involved during acute occurrence of respiratory signs and the second time one month later. Altogether 182 pigs per herd (sd 111) were clinically observed during the herd investigation for: coughing, sneezing, eye discharge, sitting and other symptoms. In each herd, 23 affected pigs were examined more closely (temperature measurement and nasal swab) and three clearly symptomatic pigs were euthanised and their lungs and hearts were sent to laboratory for bacteriological investigation. On average, 12% of the pigs observed were sneezing and 5% coughing during a 5 minute follow-up time. Altogether 23% had eye discharge and 4% was sitting on their back legs. After laboratory examination of the lungs, 7 herds were diagnosed with only *Actinobacillus pleuropneumoniae* (APP) infection, 2 with a mix infection of APP and PCV2, 2 with *Ascaris suum*, 1 with a mixed infection of *Pasteurella multocida* and APP, 1 with *Ascaris suum* and APP, 1 with only PCV2 and 1 with mixed Gram – bacteria. All nasal swabs for swine influenza virus were found negative. Thirty days later, after appropriate treatment with antibiotic or anthelmintic, on average 5% of the observed pigs were sneezing and 0,5% coughing, 14% had eye discharge and 5% was sitting on their back legs. From this preliminary survey we found that in Finland the main pathogen involved during respiratory outbreaks in fattening pigs was APP and that *Ascaris suum* should be more considered when coughing is present in fattening pigs units.

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P080

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DETECTION AND PREVALENCE ESTIMATION OF *BRACHYSPIRA HYODYSENTERIAE* IN POSITIVE BREEDING HERDS IN NORTH CAROLINA, USA

The re-emergence of Swine Dysentery (SD), caused by *Brachyspira hyodysenteriae* (B hyo) in North America has brought focus back to this disease. While focus has been on diagnosis and impact of the disease in growing pigs, there are a number infected breeding herds. One challenge in controlling SD is the identification of positive breeding herds which serve as a source for growing pigs. Diagnosis of SD presents a challenge in breeding herds where estimated disease prevalence is low. Detection in breeding herds is also important to validate the success of medication and elimination programs. To better understand the prevalence of B hyo, two field studies were conducted on SD positive sow farms.

In study 1, samples were collected from a 2,200-sow farrow-to-wean farm from 8 weanings over 17 weeks. Rectal swabs (liquid Stuart medium) were collected from 60 sows and 60 pools (3 piglets per pool) of piglet swabs, from the sows' litter at each collection. Swabs were shipped to the Iowa State University Veterinary Diagnostic Laboratory, Ames, Iowa, USA for culture. The overall percent positive was 1.04% (range 0-5%) for sows and 1.88% (range 0-5%) for piglet pools. In total, 5 of 8 samplings had at least one positive sample. In study 2, 150 sows were randomly selected from each of five farrow-to-wean farms (size: 2,400-3,600 sows) and sampled as in study 1. The percentage of sows positive for B hyo ranged from 0-1.33%. B hyo was identified in at least 1 sample on 3 of the 5 herds.

The detection of B hyo in these studies ranged from 0 to 5% with 95% confidence, which is consistent with limited published data. This suggests that sampling schemes detecting disease at these levels should be used in breeding herds to assist in identifying positive SD status.

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P081

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RESULTS RANKING ALTERNATIVES FOR ANTIMICROBIALS FROM 4TH ESPHM

Introduction: During the 4th ESPHM in Bruges 2011 a paper questionnaire was handed out to participants in which they were asked to rank alternatives for antimicrobial usage for the European consortium project "MINApig" (www.minapig.eu).

Materials and Methods: The questionnaire consisted of two general questions (active practitioner, country), one question describing their ultimate measures, two questions on the extend to what they motivate their clients in reducing antimicrobial usage, two questions in which they had to mention pro's and contra's for motivating clients. The last part asked to rank 12 pre-listed alternatives for antimicrobial usage on their effectiveness, feasibility and financial impact (ROI).

Results: 39 ESPHM participants returned the questionnaire, reflecting 15 different countries. Alternatives proposed by respondents were most frequently (19.1%) in the area of "internal biosecurity" and the increased use of "vaccination and/or anti-inflammatory products" (13.9%). On average respondents motivate their clients "strongly" to reduce antimicrobial usage. Pro's for motivation on reduced antimicrobial use were "cost reduction" (28%), "public health/antimicrobial resistance" (28%) and "better work joy/better results" (24.7%). Contra's were "animal welfare impair/higher mortality/outbreaks" (22.2%), "ease of antimicrobials/improve results/cover up management imperfections" (15.9%) and "higher workload" (14.3%).

Ranking: Regarding "effectiveness" the highest scores were seen for "improved internal biosecurity", "reduced stocking density" and "improved climate". "Supplemental/improved vaccination" ranked highest for "feasibility" as well as for "return on investment". "Phytotherapy" scored lowest for all three parameters. Based on all three parameters, the overall five highest scoring alternatives were: improved internal and external biosecurity, supplemental/improved vaccination, climate and feed quality improvement.

Conclusion: This limited number of results provides a first impression on the practitioners' opinion on possible alternatives to antimicrobial usage. The MINApig consortium will add complimentary information and use these results to inform future field studies.

NOTES

P082

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PILOT VENTILATION PROJECT AS PART OF THE PIG HEALTH IMPROVEMENT PROJECT (PHIP)

Good ventilation systems are essential for providing optimum living conditions for pigs and those working with them. A well-managed, functioning, efficient ventilation system draws fresh air into a building and removes stale air containing microbes, dust, harmful gases and water vapour. Pigs are very susceptible to drafts and the climatic zones within a pen influence behaviour, especially lying and dunging as well as being a trigger for vices such as tail biting. All of these factors have implications for pig hygiene, health, welfare and physical performance. Pleurisy and respiratory disease are significant health problems affecting the welfare of pigs in England.

Evidence from BPEX knowledge transfer activity on-farm and producer enquiries highlighted the issue that many pig buildings have ventilation problems which are impacting negatively on pig performance, health status and hygiene. These problems are found in both older and new buildings.

The consequences of poor ventilation carry on after the pigs have left a pen, as surfaces can be dirtier and harder to clean increasing the likelihood of disease causing organisms to build up making Pig Health Improvement Project (PHIP) objectives of disease control and elimination harder to achieve.

Ventilation was reviewed in detail on the units of 25 English pig producers who were participating in PHIP producer groups. The reviews generated reports containing on-farm recommendations. The reports and recommendations formed the basis of group discussions on best practice for ventilation at the local PHIP producer group meetings along with veterinary surgeons. This innovative pilot will support development of a Best Practice Ventilation Guidance booklet for the whole industry with case studies looking at improvements made on-farm and the subsequent effect on health. The pilot encourages a collaborative approach to problem solving in producer groups.

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P083

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MOLECULAR EPIDEMIOLOGY OF SWINE DYSENTERY IN THE NORTH OF ENGLAND: AN INVESTIGATION INTO ROUTES OF TRANSMISSION

Swine dysentery (SD), caused by Brachyspira hyodysenteriae, is an endemic disease of economic importance to the British pig industry, causing mucohaemorrhagic diarrhoea with anorexia, fever and wasting. It causes considerable losses in pig production through reduced feed conversion efficiency, reduced daily live weight gain and increased mortality, and is detrimental to pig welfare. The levy board for pig producers in England (BPEX) has been working with farmers in the north of England to eliminate SD from the local area, following an outbreak in 2011.

Multi-locus sequence typing (MLST) of B. hyodysenteriae isolates from infected farms in the target area has shown the existence of genetically distinct groups of B. hyodysenteriae isolates. This study aims to utilise this and more extensive MLST and whole genome sequencing data derived from a substantial national archive, in an exploratory epidemiological analysis to identify possible routes of transmission during a recent outbreak.

A participatory survey of producers in the target area has documented movements of pigs and potential fomites such as livestock hauliers to and from affected farms during the period of concern, and assessed individual units' biosecurity arrangements. The data have been visually represented in combination with the geo-phylogenetic MLST profile of B. hyodysenteriae isolates in the area to produce a spatio-temporal map showing the spread of distinct SD strains and hypothetical transmission routes. MLST has value in exploring risk factors for transmission in the target area and suggesting possible epidemiological links. Findings are communicated to producers and incorporated into strategies for SD prevention and control via BPEX's Pig Health Improvement Project. Statistical regression analyses applied to explore causal relationships further allow the possibility for the outputs of this investigation to be used in a future modelling exercise as part of a control or eradication programme.

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P084

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PREVALENCE OF *LAWSONIA INTRACELLULARIS* INFECTIONS IN WEANER AND SUCKLING PIGS IN GERMANY

In Germany around 90% of finisher farms were tested seropositive for *Lawsonia intracellularis* (LI). The current studies were done to confirm that these results are still valid today and to investigate the prevalence of LI infections in weaner pigs to optimise vaccination schedules. In a first screening 10 pigs of three different age groups were sampled on each of 51 farms. At least one seropositive animal was detected at the age of 8 weeks in 10.9%, at the age of 12-14 weeks in 40.8% and at the end of the fattening period in 96.0% of the farms. In a second screening only oldest weaner pigs in the nursery units of 101 breeding herds were tested, but sample size was increased (n=20) to find also farms with lower intra-herd prevalence. Additionally faeces samples of suckling pigs were examined by PCR to find out, if piglets already may be infected by LI shortly before weaning.

At herd-level on 39.2% of the farms antibodies against LI were detected. In 26 of 40 herds there was only one serologically positive pig among the tested weaners.

Because intra-herd prevalence often was low or pigs from nursery units were LI negative a vaccination against LI shortly after weaning thus should lead to a sufficient active immunity in most of the herds in time.

A LI infection could be detected in only 4 out of 600 faecal samples of suckling pigs (0.7%) from 60 herds. However, these findings show that a carry-over of LI into rearing units is possible this way.

Furthermore, based on information about farm and reproductive data as well as herd management (housing, feeding, measures with regard to hygiene, prophylaxis and treatment) potential risk factors for an LI infection of weaners will be identified by a statistical analysis.

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P085

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HERD HEALTH SCORE AND ITS FEASIBILITY FOR PIG HERDS IN THE UK

Pig health is at the centre of a sustainable national pig herd that contributes fully to national food security with reduced environmental impact. These targets will be achieved by disease elimination and disease impact reduction. Our objective was to investigate the feasibility of developing a new or improved methodology to measure herd health score (HHS) and cost calculator for pig breeding and finishing herds in the UK. We have reviewed the literature to identify existing HHS approaches and methods of estimating the costs of disease. Two main HHS developed in Germany and France were found in our review. The German methodology combines four health parameters including: mortality rate, frequency of pathological lesions on carcasses, animal-treatment index and duration of finishing period. The French approach consists of evaluation of 14 health indicators such as: hygiene, pneumonia, sows gait problems, bio-security, etc.

A total number of 2,608 batches belonging to 1,281 herds from the BPHS dataset (January-June 2012) was then used to evaluate the pathological indicators of the two HHS. Agreement between the two approaches was tested using a Cohen kappa agreement test. Results showed that the majority of batches and herds (58.4% for both) were considered to have a good health score using the German HHS. Using the French HHS, around 14% of batches and 9.7% of slap marks were considered to have a good health score. There was a low agreement between the two HHS. This evaluation exercise demonstrates the feasibility of using the BPHS dataset in a HHS. However, farm level management and clinical data are also needed to be included in a HHS. For a HHS to be adopted it must be simple, like the German HHS, and should be adapted to the British pig production system (e.g. replacing 'duration of finishing period' by 'average daily weight gain').

NOTES

P086

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INTERPRETATION BY CLUSTER ANALYSIS OF *ESCHERICHIA COLI* ANTIBODIES TITRATION TESTS IN SOW COLOSTRUM FOR THE ASSESSMENT OF THE QUALITY OF VACCINATION AGAINST NEONATAL *E. COLI* DIARRHOEA IN PIGS

Titration of E. coli antibodies in colostrum is used in the field to assess quality of vaccination of sows but the interpretation of the herd profiles can be difficult and disconcerting mainly because of non-consistent results between the different antigen-specific antibody titres. Thus, the objective of this study was to analyse field data by cluster analysis and therefore suggest new rules of interpretation.

Colostrum was sampled, at the latest 6 hours after farrowing, out of 662 in 36 herds (18.4 colostra per profile) and information of the vaccination scheme of sows against E. coli was obtained. Samples were distributed between first, second and third and more parity ranks.

The colostrum samples were tested for the presence of antibodies against E. coli virulence factors F4ab, F4ac, F5 and F6 fimbrial antigens and Heat-Labile E. coli enterotoxin (LT) toxoid in ELISA (MSD R&D Laboratory, Boxmeer, NL). The titres were expressed as 2log values and the mean titre was calculated for each herd and each antigen. Four published profiles where the same ELISA was used (1,2), two from non-vaccinated animals and to from Porcilis® Porcoli DF vaccinated sows, were added to the dataset as references.

A typology of the herd profiles, using Principal Components Analysis and Ascending Hierarchical Clustering was performed.

Clustering allowed classifying the profiles in 6 clusters which gathered respectively 5, 5, 4, 9, 7 and 10 herds. We formulated and discussed the hypothesis that cluster 1 contained non-vaccinated herds, cluster 2, Porcilis® 5C vaccinated herds, cluster 4, and 6 Porcilis® Porcoli DF vaccinated herd with medium and high levels of antibodies whereas the biological meaning of clusters 3 and 5 remained unclear.

The results of this study may be used as a decision-support tool for the interpretation of new profiles.

1. Riising, H.-J. *et al.*, (2005); 2. Besson, H. *et al.*, (2010)

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P087

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EFFECT OF VACCINATION WITH ECOPORC SHIGA ON OVERALL MORTALITY AND USE OF ANTIMICROBIAL MEDICATION DUE TO EDEMA DISEASE (ED)

ED caused by Shigatoxin Stx2e producing strains of E. coli occurs worldwide and is responsible for severe illness in pigs resulting in a high mortality during the nursery period and substantial economic loss. Therefore a new recombinant Stx2e-vaccine (ECOPORC SHIGA) was developed as a one shot injection for active immunisation of piglets from an age of 4 days on. The vaccination induces the development of neutralising antibodies against Stx2e and therefore ensures protection from ED after weaning during the entire nursery period.

For the assessment of efficacy regarding mortality and medication longitudinal field studies were performed on two pig farms in Germany. Both farms had a well-documented anamnesis of clinical ED. Vaccination with ECOPORC SHIGA took place on the 4th day of life. On farm1 piglets were weaned at 3 weeks of age and nursery period lasted for another 9 weeks. Nine vaccinated farrowing groups (2792 piglets) were compared with 6 unvaccinated groups. On farm2 weaning took place at 23 to 28 days of life and nursery period lasted for another 10 weeks. 24 vaccinated farrowing groups (12344 piglets) were compared with 8 unvaccinated groups. In the unvaccinated previous control groups ED was suppressed by the oral use of Colistin after weaning.

The all-cause mortality in nursery was lowered by vaccination on farm1 from 3.66%±1.28 to 1.68%±0.85 (p-value=0.003) and on farm2 from 2.58%±1.01 to 1.13%±0.48 (p-value<0.001). On both farms the need for routine medication with Colistin changed from a 3 weeks period after weaning in unvaccinated groups to 0 days in vaccinated groups (p-values<0.001).

The mortality in the vaccinated groups was significantly reduced by 2% resp. 1.5%. The use of E. coli-effective antibiotics was lowered to zero. The vaccine ECOPORC SHIGA is an effective tool to reduce the mortality due to ED and to lower the use of antibiotics in modern pig husbandry.

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P088

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THE ETIOLOGICAL DIAGNOSIS OF DIARRHOEA IN NEONATAL PIGLETS IN ONTARIO, CANADA, BETWEEN 2001 AND 2010

The passive laboratory surveillance data of the etiological diagnosis of neonatal piglet diarrhoea between 2001 and 2010 from the Animal Health Laboratory, University of Guelph were analysed to determine the relative importance and trends of different enteric pathogens associated with neonatal piglet diarrhoea in Ontario. A total of 237 cases that included live or dead 1-to 7-day-old piglets were submitted for the diagnosis of gastrointestinal illness between 2001 and 2010. The combined frequencies for gastrointestinal illness cases involving Escherichia coli, Clostridium perfringens type A, rotavirus, and Clostridium difficile either as single pathogens or a complex of pathogens accounted for 56% of the total cases. A total of 33% of gastrointestinal illness cases did not have an etiological agent identified. The frequency of cases diagnosed with enterotoxigenic E. coli had a decreasing trend from 2007. Cases submitted in 2010 were more likely diagnosed with C. perfringens type A compared to cases submitted in 2002-2007 ($P<0.05$). A significant trend for submission of samples in the winter was observed in cases diagnosed with C. perfringens type A, enterotoxigenic E. coli, rotavirus, and Isospora suis ($P<0.05$). Enterotoxigenic E. coli was less likely diagnosed if C. difficile, C. perfringens, or rotavirus were detected ($P<0.05$). Younger piglet cases were more likely to be diagnosed with C. perfringens type A ($P<0.05$) and C. difficile ($P<0.05$) than older piglets. This study indicated that E. coli, C. perfringens type A, rotavirus, and C. difficile are enteric pathogens of concern for the Ontario swine farrowing operations, and that further research is required to understand the reasons for non-diagnosed cases.

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P089

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MOLECULAR FEATURES OF *E. COLI* ISOLATES, SELECTED FROM PIGS WITH ENTERITIS

Escherichia coli is an opportunistic symbiotic organism and one of the representatives of gastrointestinal tract of animals. However, the pathogenic forms of this organism can cause diarrhoeal diseases in hosts in case of disorder of its normal condition (such as depression of the immune system, development of the co-infections). Such consequences could appear due to the action of the virulence factors that characterise only pathogenic E. coli. The diseases caused by diarrheic strains of E. coli are called colibacillosis. Exactly, ETEC (Enterotoxigenic Escherichia coli) and EHEC (Enterohemorrhagic Escherichia coli) are the most frequent causes of diarrhoea and death in neonatal pigs.

In this study, the samples from 29 piglets received from 22 farms located in 12 Ukraine regions were analysed. All pathological lesions were examined at necropsy and the fragments of lymph nodes and intestine were sampled for PCR analysis. The targets for reactions were: heat labile enterotoxin (LT), heat stable enterotoxin type A (STa) and type B (STb), Shiga toxin type I (SLT-I) and type II (SLT-II).

After processing we marked the result as positive in case of detection even one toxin. Thus we showed that diarrheic strains of E. coli were present in 26 samples of the 29 tested (89%). Moreover, we set the frequency of appearance of all examined toxins: LT-toxin was detected in 62% (18 from 29) cases, STa-toxin in 28% (8/29), STb-toxin in 62% (18/29), a SLT-II -toxin in 3% (1/29) cases, and SLT-I – was not detected. After the study the map of pathogenic E. coli spreading in Ukraine was characterised and it was shown that cases of colibacillosis were diagnosed in 11 regions of the 12 tested.

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INFLUENCE OF A PHYTOGENIC FEED ADDITIVE ON INFLAMMATORY PROCESSES IN INTESTINAL CELLS

Several pathologic stimuli, including bacteria and viruses, are known to stimulate inflammatory processes in the intestinal mucosa by cytokine-mediated activation of the pro-inflammatory transcription nuclear factor kappa B (NF-κB). NF-κB is considered the master regulator of inflammation because its activation causes an up-regulation of a series of genes mediating inflammatory response.

Through the subsequent release of inflammatory mediators, such as tumor necrosis factor-alpha (TNFα), interleukin 6 (IL-6) or interfon γ, (IFNγ) the inflammatory process is not only restricted to the intestine, but may also affect other tissues. Considering that such processes lead to an impairment of animal performance, the inhibition of excessive inflammatory processes in the intestine is a reasonable approach to maintain performance characteristics of livestock animals. Protective effects on tissues, including intestine are mediated by activating the Nrf2 pathway, which leads to the induction of genes responsible for cellular defence against reactive oxygen species and detoxification of xenobiotics.

The objective of this study was to explore the anti-inflammatory potential of the phytogenic feed additive Digestarom® using polarised Caco-2 cells, which are an established in vitro model for intestinal epithelial cells.

To evaluate the anti-inflammatory action of Digestarom®, its effect on TNFα-induced transactivation of NF-κB and mRNA levels of selected NF-κB target genes interleukin-8 (IL-8), intercellular adhesion molecule-1 (ICAM-1) and monocyte chemoattractant protein-1 (MCP-1) was investigated. To study the effect of Digestarom® on activation of the Nrf2 pathway, the mRNA levels of selected Nrf2 target genes heme oxygenase-1 (HO-1), cytochrome P450 isoform 1A1 (CYP1A1) and UDP-glucuronosyltransferases isoform 1A1 (UGT1A1) was determined.

The study shows that Digestarom® is capable of inhibiting transactivation of the proinflammatory transcription factor NF-κB and, thereby, the expression of several inflammation-related genes in Caco-2 intestinal epithelial cells. Thus, Digestarom® may be useful in (I) inhibiting inflammatory processes and (II) activating cell protecting pathways in the intestinal mucosa of livestock animals.

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EFFECT OF ADMINISTRATION OF A SINGLE DOSE OF SACCHAROMYCES CEREVISIAE CNCM-I 1079 ON INCIDENCE OF NEONATAL DIARRHOEA

Neonatal enteric health is dependent upon colostral intake, milk consumption and pathogen exposure. In addition gut microflora is especially important with regards to nutrition, pathogen prevention and gut development. Early introduction of beneficial microbes, probiotics, may benefit microflora; Saccharomyces cerevisiae CNCM-I 1079 (SCB) is a yeast probiotic which affects the host's pro-inflammatory response and has anti-toxin and trophic effects in the gut. SCB has also been reported as an effective therapy during rotavirus and Clostridium difficile (C.diff) infection in human infants. The effect of SCB against these pathogens, and its other beneficial qualities, suggest it may improve porcine neonatal enteric health.

To investigate SCB's effect a blinded randomised control trial was conducted on a 600 sow unit in France. Within 24h of life litters were given an oral dose of a control or probiotic paste (3.3 x 109 cfu SCB). Incidence of neonatal diarrhoea was determined for the first week of life incorporating 23 control and 23 SCB litters. Within diarrhoeic litters the three pigs exhibiting the most severe clinical signs were tested for Group A rotavirus (GARV), C.diff and C.diff toxin A and B using rapid diagnostic kits. Piglets were weighed at birth, day 7 and day 21. During the study the SCB group had significantly less days of scour than controls p=0.01. There was no significant difference in weight gain (to 21 days). In diarrhoeic pigs the incidence of GARV and C.diff was the same between treatments. We therefore conclude a single dose of SCB decreases the incidence of diarrhoea in young pigs. We hypothesise SCB benefits the enteric health of the pig and that subsequent doses, or inclusion in feed, may lead to continued enteric health and improved production. We continue to investigate the mechanism by which SCB reduced diarrhoea in this study.

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A STUDY ON THE VIRULENCE FACTORS AND ANTIBIOTIC RESPONSE OF *E.COLI* STRAINS ISOLATED IN CASES OF DIARRHOEA IN SUCKLING PIGLETS IN SPAIN

From 2009 to 2012, a total of 147 samples of fresh feces coming from suckling piglets suffering diarrhoea were processed at the Laboratori Veterinari de Diagnosi de Malalties Infeccioses (UAB). E.coli isolation and antibiogram was done to all samples, and typing was done running a multiplex PCR of the fimbriae K88ab (F4), K88ac (F4), K99 (F5), 987P, F41, F18 y EAE and toxins Sta, STb, LT, EAST1, VT1 y VT2. The majority of the samples were also tested against the presence of C.perfringens and if positive, PCR typing of its toxins, and against Rotavirus using ELISA test.

Results: Regarding to the fimbriae, K88ab and K88ac were found in 4,7% of the isolates. K99 in 2%, and 987P and F18 in only 1,3%. F41 was in 10,9%, and the most common fimbriae was EAE, found in 36.7% of the samples. Regarding to the toxins, the most common one was EAST1 (90,5%), followed by STa (21.7%), STb (16,3%), VT1 (4,7%), VT2 (0,7%) and LT (1,3%). 82% of the isolates were non-ß haeomlytic. Only 14 samples were positive to Rotavirus, and 11 showed positive PCR to ß toxin of C.perfringens. Isolates showed the highest resistance to tetracycline and streptomycin (100%), followed by amoxicillin (91%), ampicillin (91%), doxicillin (86%), trimethoprim/sulfamethoxazole (58%), lincospectin (50%), flumequine (52%), enrofloxacine (40%), gentamicine (37%) and neomicine (36%) The antibiotics showing higher sensibility were colistine (60%), cefquinome (66%), apramicine (75%), florfenicol (84%) and tiamuline (89%).

Discussion: EAE and EAST1 were the most common fimbriae and toxin. Although its pathological importance is not clear, these results suggest that might be involved in clinical diarrhoea. K88ab, K88ac, K99 and 987P were only found in not vaccinated farms. Nevertheless the majority of the strains were non-ß haeomlytic and not enterotoxigenic, highlighting the importance of controlling other points as management and environmental factors.

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GROSS AND HISTOPATHOLOGICAL LESIONS ASSOCIATED WITH A NEW NEONATAL DIARRHOEA SYNDROME IN PIGLETS

Introduction: During recent years, an increased prevalence of neonatal diarrhoea in piglets has been reported and different authors have suggested that a new diarrhoeal syndrome has emerged (Gin *et al.*, 2010; Melin *et al.*, 2010). Apparently, the previously well-known neonatal diarrhoea pathogens are not related to this syndrome (Kongsted *et al.*, 2012). The aim of this study was to evaluate gross and histopathological lesions in diarrhoeic and healthy piglets from Danish herds affected by a neonatal diarrhoea syndrome which was not caused by any common microbiological pathogens.

Materials and methods: In four herds, 51 piglets with diarrhoea for two days or more and 50 healthy piglets were evaluated for gross and histopathological lesions at the age of 3-7 days. All herds had a 1-2 year history of neonatal diarrhoea, despite vaccination against Escherichia coli and Clostridium perfringens type C. Microbiological examinations for classic pathogens had not revealed any causative agents. A general examination for gross lesions and histopathological examinations of intestinal tissues were performed. Fisher's exact test was used to test differences between diarrhoeic and healthy piglets (α=0.05).

Results: Findings statistically associated with diarrhoea were; poor body condition, flaccidity of the small and large intestine and liquid contents of the large intestine. Empty stomachs were not seen in any diarrhoeic piglets. Histologically, villous atrophy in the small intestine was statistically associated with diarrhoea. Inflammatory changes were rare and not associated with diarrhoea.

Conclusion: Neonatal piglets suffering from a diarrhoeal syndrome without involvement of traditional pathogens had gross and histopathological lesions which differentiated them from healthy piglets. The lesions were, however, similar to those observed in common neonatal diarrhoea outbreaks. Flaccidity of intestines and intestinal villous atrophy were the most prominent findings, whereas starvation was not a feature of the investigated syndrome

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PLANT EXTRACTS CONTAINING POLYPHENOLS INHIBIT IN VITRO VIABILITY OF *LAWSONIA INTRACELLULARIS*

The Gram-negative bacteria *Lawsonia intracellularis* (LI) are the causative pathogens of proliferative enteropathy (ileitis) in pigs and similar intestinal diseases in various other animal species. Ileitis is a disease complex: the acute form can cause sudden mortality in finishing pigs and induce abortion in sows, the chronic and subclinical forms can cause poor and uneven growth in grower pigs. In vitro research of LI is difficult, because it requires co-cultivation with a host cell culture under microaerophilic conditions. In the present study, an assay for fast and simple screening of potentially antibacterial phytogenics without using host cells was developed. LI were obtained from a live ileitis vaccine (Enterisol® Ileitis; Boehringer Ingelheim) by dissolving the lyophilisate in PBS and seeding it in 96 well plates. Solutions of phytogenic samples in PBS or PBS alone (negative control) were added and incubated for 30 min under microaerophilic conditions. LI were stained using a commercial viability kit (LIVE/DEAD® BacLightTM; Invitrogen) and analysed by flow cytometry (ACCURITM C6; Becton Dickinson). Viable and dead bacteria were distinguished by their fluorescence signals to determine viability rates. The viability rates of sample-treated wells were compared with the mean viability of the control wells to calculate relative viability rates. Samples that showed a dose-dependent antibacterial effect were used to calculate EC50 values by probit regression. Several phytogenic samples that showed antibacterial activity contained polyphenols. For example, an oak wood extract inhibited LI at an EC50 of 172µg/mL. Oak wood and bark are known to be rich in hydrolysable tannins, a class of polyphenols. More detailed investigation of the bioactive compounds and field trials are needed to provide insights into the mode of action and to confirm findings from in vitro research. Phytogenics with reliable antibacterial effect against LI may help in future control of proliferative enteropathy.

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BEHAVIOUR OF WEANERS WITH *LAWSONIA INTRACELLULARIS* INFECTION USING A NOVEL ARENA-TEST

Introduction: Massive infection with *Lawsonia intracellularis* is known to cause diarrhoea and severe intestinal lesions which may cause pain and discomfort in affected pigs. The objective of this study was to determine whether infection with *Lawsonia intracellularis* was associated with change in behaviour and welfare of pigs.

Materials and methods: The study was conducted in a Danish pig herd at an outbreak of diarrhoea. A Novel arena-test in which pigs were observed after transfer to a new environment, was performed on 145 randomly selected pigs from 5 sections. Two arena types occurred: One with access to snout contact amongst pigs and another without physical contact. Expressed predefined behaviour types were registered at 10 second intervals for 5 minutes. *Lawsonia intracellularis* was determined by qPCR and categorised into four levels of infection: Negative: 0, Low: <100000, Moderate: ≥100000 and Massive: ≥10000000 bacterial genomes/gram faeces.

Results: Of the examined pigs 42% suffered from diarrhoea. Significant behaviour observations were made only in the stable with snout contact to other pigs (n=87). Amongst these pigs 27 did not run at all, and a significant relation between the level of *Lawsonia intracellularis* and whether the pigs ran or not, was determined (p=0.02). Amongst 13 massively infected pigs, 5 (38 %) were observed running, whereas 55 (74%) of the 74 pigs with lower infection levels of Lawsonia intracellularis were observed running.

Conclusion: In this study performing a Novel Arena observation test, a difference in behaviour of *Lawsonia intracellularis* affected pigs was determined in an arena with contact to other pigs. More pigs massively infected with Lawsonia intracellularis spent no time running, compared to pigs with a lower level of infection. The reluctance of massively affected pigs to run may indicate weakness or pain and thereby also reduced welfare in affected pigs.

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BEHAVIOUR AND WELFARE IN PIGS SUFFERING FROM *LAWSONIA INTRACELLULARIS* INDUCED DIARRHOEA

Introduction: Massive infection with Lawsonia intracellularis is known to cause diarrhoea and severe intestinal lesions, which may cause pain and discomfort in affected pigs. The objective of this study was to determine whether infection with Lawsonia intracellularis was associated with change in behaviour and welfare of pigs.

Materials and methods: The study was conducted in a Danish pig herd at an outbreak of diarrhoea. Amongst 1,200 pigs 59 pigs were selected at random and observed in the pen. Predefined behaviour types and diarrhoea were registered. Faeces from 29 of 59 selected pigs were analysed for Lawsonia intracellularis by qPCR and categorised into two levels of infection: Low: <100,000 and High: ≥100,000 bacterial genomes/gram faeces.

Results: Pigs with diarrhoea (n=28) spent more time resting (74% vs. 67% of the observation time, $p<0.05$) compared to pigs with normal faecal consistency. When lying, pigs with diarrhoea more often lay in a sternal posture with forelegs in front compared to pigs with no diarrhoea (22% vs. 8%, $p<0.05$). Normal pigs preferred a total lateral position lying flat on the side with a straightened body compared to diarrhoeic pigs (34% vs. 15%, $p<0.05$). Pigs in the High-level Lawsonia-group (n=10) spent more time in sternal position compared to pigs with a low level of Lawsonia intracellularis (n= 19), (46% vs. 25%, $p<0.05$). Pigs in the low level Lawsonia-group preferred lateral posture, compared to the high level Lawsonia-group 30% vs. 15%).

Conclusion: In this study a changed behaviour of pigs with diarrhoea was observed. Also a difference in lying posture was found between pigs with either minimal or high level of Lawsonia intracellularis in faeces. This may indicate that pigs with a high infection level of Lawsonia intracellularis suffer from abdominal pain and thereby suffer from reduced welfare.

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NEONATAL PORCINE DIARRHOEA ASSOCIATED WITH SMALL INTESTINAL COLONISATION OF *ENTEROCOCCUS* SPP.

Introduction: Several countries report problems with neonatal porcine diarrhoea (NPD) that cannot be attributed to infections caused by traditional enteropathogens. The aim of this study was to describe characteristic pathological findings discovered in several neonatal piglets with diarrhoea.

Material and methods: Fifty neonatal diarrhoeic piglets and 20 healthy controls were selected from herds with a history of NPD and examined post mortem. A subset of 18 diarrhoeic piglets was selected based on the observation of enteroadherent cocci by light microscopic (LM) inspection of the small intestine. Selected intestinal sections were examined by Brown and Brenn-stain, immunohistochemistry for active caspase 3 and fluorescent in situ hybridisation (FISH) with a probe for Enterococcus spp (3, 4).

Results: Macroscopically 15 of 18 diarrhoeic piglets displayed a dilated large intestine and five a dilated and/or congested small intestine. The characteristic LM-finding was the small intestinal colonisation of Gram-positive cocci only found in diarrhoeic piglets. FISH-analysis recognised the enteroadherent cocci as Enterococcus spp. The major histopathological findings included epithelial lesions and villous atrophy, observed in ten and four animals, respectively. Epithelial changes consisted of mostly shallow erosions of villous tips with apoptotic, caspase 3-positive enterocytes. Infiltration of inflammatory cells was similar in diarrhoeic piglets and controls.

Discussion and conclusion: Only few previous studies report intestinal colonisation by Enterococcus spp. in association with NPD (1, 2). Our pathological findings correlate well with these reports. However, the presence of apoptotic enterocytes and demonstration of enterococci in situ have previously not been published.

In conclusion, the present results suggest that intestinal colonisation of enterococci should be considered in studies of NPD.

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DEVELOPMENT OF OESOPHAGEAL STOMACH ULCERS IN FINISHING PIGS

Finely ground feed predisposes pigs to develop oesophageal ulcers. Studies in a small number of pigs using endoscopy have shown oesophageal changes within days. However, considerable variation among pigs on the same feeding regime is seen. The aim of this study was to follow the development of oesophageal stomach ulcers in a large group of pigs. A total of 440 pigs were fed non-pelleted coarse feed from weaning to 30kg to ensure good stomach health. At 30kg, the pigs were moved to the finisher unit, where they were fed finely ground pelleted feed for four weeks. The feeding was then changed to coarsely ground non-pelleted feed for six weeks. Throughout the ten weeks of the study, 40 pigs were slaughtered each week. All stomachs were macroscopically investigated for pathological changes in the oesophageal area of the stomach using a scale from 0 to 10, with a score of 6 to 10 indicating stomach with ulcer and/or scars in the oesophageal area.

Results: After nine days with fine feed 76% of the pigs had ulcers in the oesophageal area of the stomach (score 6 to 10). After four weeks with finely ground feed, an average of 84% of the pigs had ulcers or scars in the stomach at slaughter. The feeding was then changed to coarsely ground feed in order to resolve the ulcers. The frequency of stomach ulcers was reduced to an average of 49% in the last six weeks, during which the pigs were fed coarse feed. The results emphasise that pathological changes may develop in large numbers of pigs within days and that these can be resolved within days or weeks if the feed is changed to a coarse structure. Although other factors may induce stomach ulcers, these were not included in this study.

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INTER-OBSERVER AGREEMENT FOR ENUMERATION OF DIARRHOEIC FAECES POOLS ON THE PEN FLOOR

Introduction: In Denmark batch medication of diarrhoea is initiated by the farmer based primarily on assessment of diarrhoeic faecal pools on the pen floor. Assessment of faecal pools is subjective and could be subject to large variation between different observers. The objective was to investigate inter-observer agreement for enumeration of diarrhoeic faecal pools on the pen floor using a standard enumeration procedure.

Material and methods: One Danish nursery herd and four observers were selected by convenience. The four observers were veterinarians having different levels of practical experience with pigs. A standard procedure for enumeration of diarrhoeic faecal pools was developed, including explanations in text and pictures. The observers performed a simultaneous examination of 48 pens but they were not allowed to discuss the findings during the examination.

Results: Diarrhoeic faecal pools in the 48 pens were for Observer 1: min=0, max=15, mean=2.9, standard deviation (sd)=3.3; Observer 2: min=0, max=6, mean=1.6, sd=1.7; Observer 3: min=0, max=11, mean=1.7, sd=2.5 and Observer 4: min=0, max=7, mean=0.9, sd=1.4.The coefficient of variation (CV) for each of the 48 pens ranged from was 20% to 200% (mean=106%). All four observers agreed on the number of diarrhoeic faecal pools in only 4 pens (8%). The larges difference between two observers in a pen was 11 diarrhoeic faecal pools. In 27 pens (56%) the observers disagreed on the presence or absence of diarrhoeic faecal pools.

Discussion: A very poor inter-observer agreement for enumeration of diarrhoeic faecal pools was demonstrated. The use of a standard procedure has probably even increased the agreement compared to the level that can be expected between different veterinarians or farmers in the field. The result indicates that teaching and calibration is extremely important when enumeration of diarrhoeic faecal pools is performed, including the use in relation to antibiotic batch medication.

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APPLICATION OF CONCURRENT CLINICAL SIGNS FOR DETECTION OF DIARRHOEA IN NURSERY PIGS

Introduction: Diarrhoea in individual pigs can be difficult to detect in practice because a large number of pigs have to be examined on a daily basis. In Denmark farmers fail to detect a large number of nursery pigs with diarrhoea1. Application of more permanent concurrent clinical signs can potentially increase detection of pigs with diarrhoea. The objective was to identify and evaluate the diagnostic performance for such clinical signs.

Material and Methods: A cross-sectional study was performed in 16 Danish herds. In each herd 200 nursery pigs were selected and subjected to a clinical examination including faecal consistency assessment.

Association between diarrhoea and concurrent clinical signs were investigated in a predictive mixed model. For clinical signs significantly associated with diarrhoea diagnostic sensitivity and specificity were calculated.

Results: A total of 3060 pigs were included in the analysis. The prevalence of diarrhoea was 33%. The concurrent clinical signs: body condition, hollow lumbar region, rounded belly, long hair coat, pale appearance, perianal faecal stain or irritation and unthrifty appearance were combined to a single variable, because each individual clinical sign had a very low prevalence. In total 3% of the pigs had one or more of these clinical signs and the occurrence was significantly associated to diarrhoea ($p<0.0001$). Using the combined clinical signs for identification of pigs with diarrhoea provided diagnostic sensitivity = 0.05, diagnostic specificity = 0.98, positive predictive value = 0.53 and negative predictive value =0.68.

Discussion: Applying the identified clinical signs for identification of individual pigs resulted in unacceptable diagnostic performance. Therefore these clinical signs do not offer an alternative to faecal assessment from each individual pigs. This has practical implications, including identification of pigs for individual antibiotic treatments.

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1. Jakobsen, A., Pedersen, K.S., Nielsen, J.P., 2011. Occurrence of diarrhoea in non-medicated growing pigs. IPVS, 2012, p. 285.

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CRUDE DIETARY PROTEIN AND PARTICLE SIZE IN FEED IS NOT ASSOCIATED TO DIARRHOEA IN DANISH NURSERY PIGS

Introduction: Diarrhoea in nursery pigs is the most common cause of antibiotic treatment in the Danish pig industry. *Escherichia coli, Lawsonia intracellularis* and *Brachyspira pilosicoli* are the most prevalent intestinal infections. In some cases of diarrhoea no infection can be demonstrated and protein-associated diarrhoea has been proposed under field conditions.1

The objective was to investigate association between dietary protein, particle size, intestinal infections and diarrhoea under field conditions.

Material and methods: A cross-sectional study was performed in 12 Danish herds using home-mixed feed. In each herd randomly selected nursery pigs were subjected to a clinical examination including faecal consistency assessment. Faecal samples from a subsample of pigs were examined for *E. coli, L. intracellularis and B. pilosicoli* by qPCR. Feed samples were collected at pen-level and analysed for crude protein content and particle size. Association between diarrhoea, age of the pigs, crude protein, particle size and intestinal infections were investigated in a mixed logistic model.

Results: A total of 770 pigs were included in the statistical analysis. Dietary protein and particle size were not associated to diarrhoea. Demonstration of intestinal infections was boarder line significantly associated to diarrhoea ($p=0.09$; OR=1.4).

Discussion: Apparently dietary protein was not associated with diarrhoea. This implies that a simple assessment of dietary protein in practice should not be applied when feed is evaluated as a possible cause of diarrhoea on a farm. Assessment of dietary protein could be an oversimplification. Digestibility, protein source and interactions between raw-materials should probably also be taken into account. Similar interactions could explain that no effect of coarsely versus finely ground feed could be demonstrated.

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DIARRHOEIC POOLS AT PEN FLOORS IS A POOR INDICATOR OF HIGH LEVEL OF INTESTINAL DISEASE IN NURSERY PIGS

Introduction: Treatment of diarrhoea is common in Danish pig herds. Batch medication is initiated by the farmer based on clinical signs, including assessment of diarrhoeic faecal pools on the pen floor. Previous research has demonstrated that farmers fail to detect some batches (rooms) of pigs with a high prevalence of diarrhoea and intestinal infections1. The objective was to investigate association between diarrhoeic faecal pools, prevalence of diarrhoea and intestinal infections.

Material and Methods: Data originated from a cross-sectional study performed in 16 Danish herds1. In each herd 200 nursery pigs were randomly selected. Prevalence at room-level for diarrhoea and intestinal infections (Escherichia coli, Lawsonia intracellularis, Brachyspira pilosicoli) were estimated. The number of diarrhoeic faecal pools (loose and watery faecal pools) at the pen floors was counted.

Results: A total of 62 rooms were examined and included in the analysis. Diarrhoeic faecal pools could not be demonstrated on the floor in 8% of the rooms (diarrhoea prevalence= 28%, intestinal infection prevalence= 38%). In 52% of the rooms the average number of diarrhoeic pools per pen ranged from >0 to1 (diarrhoea prevalence= 27%, intestinal infection prevalence= 42%). Finally 40% of the rooms contained more than 1 (max = 2.1) diarrhoeic pools per pen (diarrhoea prevalence= 41%, intestinal infection prevalence= 47%).

Discussion: Apparently a high prevalence of diarrhoea and intestinal infections may occur although few diarrhoeic pools are observed on the pen floors in a nursery room. This probably explains the difficulties in detection of treatment requiring batches with high prevalence of intestinal disease. More successful parameters are needed for decisions on batch medication of nursery pigs.

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1. Jakobsen, A., Pedersen, K.S., Nielsen, J.P., 2012. Occurrence of diarrhoea in non-medicated growing pigs. IPVS, p. 285.

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THE IMMUNE PROPHYLAXIS AS A PART OF THE CONTROL OF DIARRHOEA IN PIGLETS ASSOCIATED WITH *CLOSTRIDIUM PERFRINGENS* TYPE A

Objective: *Clostridium (C.) perfringens* type A is often associated with diarrhoea in suckling piglets. The impact of the alpha (α) and beta (β) 2 toxins for the pathogenesis of the disease has not been answered conclusively. In the past autologous vaccines were used to control this disease. The aim of our investigation was the testing of the efficacy of a commercial vaccine against the *C. perfringens* type A associated diarrhoea using an animal intoxication model. Material and methods: In order to test the α and β2 toxoid containing *C. perfringens* type A vaccine (Clostriporc A, IDT Biologika GmbH), 18 gilts were vaccinated twice in the last third of gestation. A total of 19 gilts were administered a placebo and served as controls. Before the 1st and 2nd vaccination and after birth serum and colostrum samples were taken and tested for antibodies against α and β2 toxins using ELISA tests. For the evaluation of the vaccine, piglets of the vaccinated and control sows were challenged intraperitoneally with a α and β2 toxin containing supernatant of a heterologous *C. perfringens* type A strain on the first day post natum.

Results: The vaccination produced antibodies against the α and β2 toxins in the serum of the sows which were transfered to the offspring by colostrum. Piglets were significantly protected ($p<0.05$) by the antibodies after being challenged with the α and β2 toxin containing supernatant of a *C. perfringens* type A strain.

Conclusion: Using the intoxication model, this vaccine showed significant protective effects against the α and β2 toxins. The first results of the clinical field trials support the results of these laboratory trials.

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PATHOGENICITY OF CURRENT PORCINE EPIDEMIC DIARRHOEA VIRUS INFECTIONS IN CHINA

Recent outbreaks of highly pathogenic porcine epidemic diarrhoea (PED) in east Asia are of major concern. Previous challenge exposure studies in pigs with Asian PED strains have largely been limited to vaccine-related inoculations, with a consequent difficulty in relating the genome shifts in current Asian wild-type PED strains to pathogenicity. We detected PCR products consistent with PED virus in 426/756 intestinal samples (56%) derived from 26/48 farms (54%) located across China, which had had clinical outbreaks resembling PED. We isolated and partially sequenced wild-type PED virus from nine of the PCR-positive samples. Phylogeny tree analyses based on the deduced amino acid sequences of the M gene and the nucleotide sequence of ORF3 gene of these recent isolates indicates that several isolates formed new clusters of distinct lineages, suggesting that the Chinese PED coronavirus strains show strong mutation and possible recombination potential. A total of 24 piglets were challenged orally (4 pigs per isolate) with 4 control sham-inoculation piglets. Three days after inoculation, all challenged piglets showed clinical, pathological and PCR reactions consistent with PED virus. This suggests that the recent PED isolates retain their strong pathogenicity in the field and challenge study situation, even though considerable shifts have occurred in major viral membrane protein genes.

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RESPIRATORY DISEASE IN NEONATAL PIGLETS CAUSED BY PCV2A

Pig rearing is one of the most important occupations of rural society in India. Porcine Circovirus 2 (PCV2) is considered to be an important emerging pathogen associated with a number of different syndromes and diseases in pigs. In an investigation conducted in 2012 to elucidate the cause of heavy neonatal mortality in an organised farm in Uttar Pradesh, India, evidence of PCV2 involvement with respiratory disease was found. Piglets with a history of respiratory distress and sudden death at necropsy revealed important lesions such as edematous, enlarged and congested inguinal lymph nodes, non-collapsing pneumonic lungs, and rarely, icteric liver. Severe hydrothorax and ascitis were presented in most of the cases. Histopathological examination revealed severe lymphoid depletion in various lymphoid organs with infiltration of histiocytes. Multiple, sharply demarcated large spherical basophilic or amphophilic intracytoplasmic inclusions were detected in cytoplasm of histiocytes. Lungs revealed interstitial pneumonia, multinucleated giant cells in thickened interstitium, hyperplasia and hypertrophy of type II pneumocytes. PCV 2 antigen in affected lungs and lymphoid organs could be demonstrated by immunohistochemistry using PCV2 specific sera. Samples were analysed by PCR with in-house designed primers specifically amplifying the ORF 2 region of PCV2. The PCV2 ORF gene sequence confirmed that the isolate showed closest homology with PCV2a circulating in Canada, Netherland and Germany.

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LESIONAL DIAGNOSIS OF ATROPHIC RHINITIS: COMPARISON OF THE LESION SCORE PERFORMED ON SNOUTS SECTIONS AND THOSE MADE ON COMPUTER TOMOGRAPHY IMAGES (CT)

Atrophic Rhinitis prevalence is often assessed by scoring nasal lesions after cutting snouts at the slaughterhouse, however, the saw blade can damage the snout structure. The objective of this study is to compare the rhinitis lesions scored performed on snout sections with a saw and those made on computer tomography images (CT). The influence of the anatomical area section is also studied.

203 snouts, from 5 batches, with intensity lesions from medium to high atrophic rhinitis were collected at the slaughterhouse. Cross sectioned images were taken every millimetre by CT, then snouts were cut with a hand-held saw. Sections of snouts and CT images obtained at the first premolars were graded by an experienced operator; according to the IFIP reference method (scored 0 to 20). To assess the impact of the cutting area, 50 snouts were scored on three tomography images taken at the first premolars, at one centimetre in front and one centimetre behind, by 5 experienced operators.

Cutting with a saw did not change the nasal septum and the turbinates structure: 99 % of the snouts had the same score as CT. The atypical morphologies of the turbinate structure (turbinate crushed, partially joint or with a winding inverted concave structure instead of convex), observed after sectioning some snouts, were still present on the CT images. These atypical morphologies reduce the filtering effects of the turbinates and increase the expression of respiratory disease. The causes of which need to be examined; genetics, ambient conditions, some pathogens or their toxins?

At one centimetre in front of the first upper premolars, the score was significantly higher (more atrophys of turbinates and less deviated septum); one centimetre back, the score was the same. It is advisable to make the cut just after the first premolar and not score the snouts before cutting.

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RELATIONSHIPS BETWEEN COUGH, PNEUMONIA-LIKE GROSS LESIONS AND *MYCOPLASMA HYOPNEUMONIAE* INFECTION DYNAMICS IN 125 FARROW-TO-FINISH HERDS

The aim was to investigate the relationships between coughing, pneumonia-like gross lesions and Mycoplasma hyopneumoniae (Mhp) infection in 125 farrow-to-finish herds. In each herd, coughing was recorded in four batches (4, 10, 16 and at least 22-weeks-old). Tracheo-bronchial swabs were taken from 10 pigs of 4, 10 and 16 weeks of age. Pneumonia was scored at slaughter and lung samples were collected from 30 pigs corresponding to the batch aged of at least 22 weeks. Swabs and lung samples were analysed by nested PCR to detect Mhp. Hierarchical clustering was performed to relate frequencies of coughing, pneumonia scores and n-PCR results. Three clusters of herds were identified. A cluster (30 herds) was characterised by a high frequency of pigs without pneumonia, a low level of coughing at 16 and 22-weeks-old and low frequencies of pigs infected by Mhp (average within-batch frequencies of n-PCR-positive pigs of 5.6%, 5.6%, 10.7% and 46.5% at 4, 10, 16 and 22 weeks respectively). A cluster mainly comprised herds with a low level of coughing from 4 to 22 weeks, a high frequency of pigs with moderate pneumonia scores and a high frequency of n-PCR-positive pigs for Mhp at 22-weeks-old (average within-batch frequency of 85.9%). The third cluster (36 herds) was characterised by a high level of coughing in batches of 4, 10, 16 and 22-weeks-old (with 2.6, 4.1, 7.2, and 11.4 coughing per 100 animals/6 minutes respectively), a high frequency of pigs with high pneumonia scores and high frequencies of pigs infected by Mhp (average within-batch frequencies of n-PCR-positive pigs of 26.9%, 28.4%, 58.0% and 92.6% at 4, 10, 16 and 22 weeks respectively). A low Mhp infection pressure throughout the pigs' lifetime decreases the probability of pneumonia incidence and related symptoms. Acute symptoms and high pneumonia scores are associated to early massive Mhp infection.

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FACTORS ASSOCIATED WITH *ACTINOBACILLUS PLEUROPNEUMONIAE* SEROTYPE 2 INFECTION IN 125 FARROW-TO-FINISH HERDS

The aim was to identify the factors associated with Actinobacillus pleuropneumoniae serotype 2 (App2) infection in slaughter-aged pigs from 125 farrow-to-finish herds. Pigs from four different batches in each herd (aged 4, 10, 16 and ≥22 weeks) were sampled. Data related to biosecurity, management, housing and climatic conditions were collected during a farm visit. *Mycoplasma hyopneumoniae*, porcine reproductive and respiratory syndrome virus (PRRSV) and porcine circovirus type 2 (PCV2) were detected by serological or PCR tests from samples taken in the four batches. Samples from the slaughter-aged pigs (≥22-weeks-old) were tested for App2 antibodies and swine influenza viruses (SIV) H1N1 and H1N2 antibodies by serological tests. A herd was deemed infected by App2 if at least one pig was sero-positive for App2. Multiple correspondence analysis was used to identify factors associated with App2 infection at the herd level. Large herd size, low biosecurity measures and no SIV vaccination of the replacement gilts were factors associated with App2 infection. Herds infected by App2 were also characterised by the lack of warming the post-weaning room before loading the pig, old post-weaning buildings (>25 years), a low mean inside temperature in the finishing room (≤23.5°C), a temperature range of less than 5°C for the ventilation control rate and a temperature setpoint of the ventilation controller in the finishing room below or equal to 21°C. PRRSV and SIV infections and a high infection pressure towards PCV2 before 16 weeks old were associated with App2 infection. Risky herd profiles were therefore found as regard to App2 infection. Improvement of management, housing and climatic conditions at all rearing steps should significantly reduce the risk of App2 infection in slaughter-aged pigs.

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COMPARISON OF TWO DIFFERENT CHALLENGE PROCEDURES (TRANSTRACHEAL INJECTION VS. ENDOTRACHEAL INOCULATION) AND TWO DIFFERENT INOCULUM PREPARATIONS (LUNG HOMOGENATE VS. FRESH M. HYO. CULTURE) FOR THE INDUCTION OF *MYCOPLASMA HYOPNEUMONIAE* INFECTION IN YOUNG PIGS

Thirty six 5-week-old conventional pigs, serologically negative to M. hyo were assigned to five experimental groups. Two groups were inoculated with 10ml of a lung homogenate containing 4.6log10 CCU/ml of the pathogenic M. hyo strain 232, via the transtracheal (T01) and the endotracheal (T02) routes; another two groups were inoculated with 10ml (8.5log10 CCU/ml) of an M.hyo culture prepared from the same lung homogenate, via the transtracheal (T03) and the endotracheal (T04) routes. Four pigs were left as controls (NTX group). Animals were randomly assigned to treatment groups using a generalised randomised block design based on body weight and room. This experiment was carried out in compliance with national legislation and subjected to local ethical review.

Pigs were monitored for the presence of clinical signs every 2-3 days. At day 29, pigs were euthanised and lungs were evaluated for the presence of M.hyo-associated lesions. Bronchi were swabbed to detect M.hyo genome by qPCR and lung tissue was collected to perform an in situ hybridisation (ISH) technique.

M.hyo challenge was successful regardless of treatment group, since the percentage of pigs showing lung consolidation ranged from 75 to 100%. Back transformed least square means varied from 2.0 to 7.3. The presence of M.hyo genome was confirmed by qPCR and ISH in 87% and 46% of the inoculated pigs, respectively. Challenge groups did not differ statistically on the percentage of consolidated tissue, neither did they on the amount of M.hyo DNA copies detected by qPCR. Clinical signs compatible with an M.hyo infection were observed in all four challenge groups and included coughing and to a lesser extent sneezing and dyspnea. Significantly higher percentage of pigs showing dyspnea was detected in T01 group compared to T02. No significant differences were observed among groups in any of the other clinical signs evaluated.

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ACTINOBACILLUS PLEUROPNEUMONIAE SEROTYPES ASSOCIATED WITH PNEUMONIC LESIONS IN FINLAND

Objectives: Pleuropneumonia caused by *Actinobacillus pleuropneumoniae* (APP) is a significant respiratory disease in pigs in Finland. Worldwide a total of 15 APP serotypes have been identified, while the virulence and geographical distribution of the serotypes vary. The aim of this study was to determine which APP serotypes cause respiratory disease in the Finnish pigs. There is an interest to examine herds serologically for their status concerning virulent APP serotypes.

Material and methods: The analysed APP isolates were recovered from pneumonic lesions of pigs obtained for pathological examination from 19 farms during 2011-2012. A total of 27 APP isolates were analysed using three multiplex PCR assays: one for serotypes 2, 5 and 6 (1), one for serotypes 1, 7, 12 (2) and one for serotypes 3 and 8 (3).

Results and conclusions: All the isolates from inflammatory lung lesions were of APP serotype 2. This is the first time where APP isolates from Finland were serotyped using PCR. In a previous study from the 1990s, antibodies against several APP serotypes were detected in the country, and those to serotypes 3 and 2 were the most prevalent (4). This study indicates that at present APP pneumonia is caused by serotype 2 in Finland, and we can focus serological testing for APP pneumonia on this serotype. In contrast to serological monitoring for freedom from Mycoplasma hyopneumoniae infection, serological testing for APP was never included in the Finnish health monitoring schemes of pig herds. Future testing will show if herds free from APP serotype 2 exist in Finland.

1. Jessing SG *et al.*, (2003) J Clin Microbiol 41:4095-100. 2. Angen O *et al.*, (2008) Vet Microbiol 132:312-8. 3. Zhou L *et al.*, (2008) J Clin Microbiol 46:800-3. 4. Levonen K *et al.*, (1996) J Vet Med B 43:489-495.

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PREVALENCE OF *MYCOPLASMA HYOPNEUMONIAE* INFECTIONS AT WEANING AGE IN EUROPEAN PIG HERDS

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 due to a slower growth and higher feed conversion. 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, 255 pig herds in Belgium, France, Germany, Italy, the Netherlands, Portugal, and Spain were included. In each herd, a minimum of 20 tracheo-bronchial swabs were collected from 3 to 5-weeks-old piglets and tested for the presence of M.hyo using PCR. To date, 105 out of the 255 tested herds (41.2%) and 492 out of the 6985 tested piglets (7.0%) tested positive for M.hyo. The minimum within-herd detection rate was 0.0% and the maximum within-herd detection rate was 96.7%. In conclusion, the present study confirmed that 3 to 5-weeks-old piglets may already be infected with M.hyo.

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RESPIRATORY INFECTIONS IN NURSERY PIGLETS OF LARGE SOW FARMS – PRELIMINARY RESULTS

Pleuritis and pneumonia are common findings in slaughter pigs. Partly the respiratory problems in fattening farms originate from sow herds and nursery units. The aim of this work was to study the progress and level of respiratory infections in nursery units of large herds.

In three sow farms (2400, 900 and 1990 sows) piglets were sampled at the age of 3.5 (before weaning), 7 and 11 weeks. Clinical signs of respiratory infections were recorded as the number of coughs and sneezings in 5 minutes after the piglets were forced to stand up. Altogether 48 piglets (16 per age group) in each farm were euthanised for autopsy.

In two herds observed coughing was very little or no coughing at all. In one herd it increased from 0 coughs before weaning to 11.3 coughs per 100 piglets. Sneezing was more common (average 11.6 sneezings per 100 piglets). Altogether 12 (8.3%) out of 144 piglets had small local pleural attachments while no large attachments were found. Pneumonic lesions were detected in 34.7% of the piglets. Most commonly cultured bacteria with pneumonic lesions was Actinobacillus pleuropneumoniae (16.7%) and Streptococcus suis (14.6%). In nasal cavity mild to severe turbinate atrophy (TA) was detected in 47.9% of the piglets. Most common bacterial foundings with TA were Bordetella bronchiseptica (33.3%) and nontoxigenic Pasteurella multocida (20.3%).

Though the respiratory signs were low, pathological pneumonic lesions were found in 1/3 of sampled piglets. Hence the clinical signs don't seem to correspond with spread and severity of respiratory infections.

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DETECTION OF CLINICAL SIGNS AND HISTOLOGICAL LESIONS IN THE LUNGS OF PIGS FOLLOWING INOCULATION WITH PCV2

Porcine circovirus 2 (PCV2) is an important pathogen affecting the global swine population. It causes a variety of syndromes and is now recognised as a major respiratory pathogen. Twelve weaned, colostrum fed pigs were recruited. Before enrolment onto the study pigs screened by PCR and ELISA for PCV2 antigen and antibody. On Day 0 of the study, pigs (N=6) were intra-nasally inoculated with a field strain of PCV2 and control pigs (N=6) were intra-nasally inoculated with virus free culture media. Clinical signs were recorded daily and body weight documented weekly. Pigs were euthanased 8 weeks post inoculation. Cadavers were subject to post mortem examination and standard samples were collected from the lung lobes and bronchial lymph nodes. Sections were submitted for histological analysis, immunohistochemistry and quantitative polymerase chain reaction (qPCR) was used to determine viral load. PCV2 inoculated pigs displayed increased sneezing ($p<0.05$) and diarrhoea ($p<0.05$) compared with the control pigs. Although no gross lung lesions were observed in the PCV2 inoculated group a range of histological lesions observed. A mild, diffuse, bronchiointerstitial or interstitial pneumonia predominated (N=4) the PCV2 inoculated group, of which two had granulomatous exudation into the bronchioles. Interstitial infiltration was mononuclear and affected the cranial lobes more severely. Immunohistochemistry targeting PCV2 antigen failed to convincingly label any positive cells within the lung tissue but there was positive staining in the bronchial lymph nodes within follicular centres. In the control group, all pigs remained negative for PCV2 throughout the study. All PCV2 inoculated pigs tested positive by qPCR. In conclusion histological lung lesions typical of PCV2 infection and clinical signs consistent with PCV2 infection were significantly higher in animals inoculated with a field strain of PCV2 compared with control pigs.

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EICOSANOIDS IN HEALTHY AND DISEASED PORCINE LUNGS: IMMUNOHISTOCHEMICAL AND BIOCHEMICAL INVESTIGATIONS

Eicosanoids derive from the metabolism of arachidonic acid and serve as intracellular and extracellular signals, which are able to affect a wide variety of biologic processes, including inflammation.

We summarise herein our data about 5-lipoxygenase (5-LOX) and cyclooxygenase-2 (COX-2) dependent enzymatic pathways in healthy and diseased porcine lungs. In detail, the following pulmonary diseases were investigated: Metastrongylus spp.-induced porcine parasitic bronchopneumonia, chronic enzootic pneumonia caused by Mycoplasma hyopneumoniae (Mh), acute pleuropneumonia by Actinobacillus pleuropneumoniae (App) and interstitial pneumonia caused by Porcine Circovirus type 2 (PCV2). Pulmonary tissue samples from healthy controls and diseased pigs were collected from slaughtered (healthy controls, Metastrongylus spp. and Mh-infected pigs) or spontaneously died (App and PCV2-infected pigs) animals, and adequately processed for histopathology, immunohistochemistry (IHC) and biochemical investigations. IHC was carried out by using polyclonal goat antibodies anti-5-LOX (C-19, Santa Cruz Biotechnology, 1 in 500) and anti-COX-2 (C-20, Santa Cruz Biotechnology, 1 in 250). 5-LOX and COX-2 dependent enzymatic pathways were further investigated by Western blotting analysis and enzymatic activity assays. Arachidonic acid metabolites (namely leukotriene B4 and prostaglandin E2) were also quantified (Leukotriene B4 EIA kit™; Prostaglandin E2 EIA kit™; Cayman Chemical Company, USA). Our results confirm that 5-LOX and COX-2 are constitutively expressed in healthy porcine lungs. Furthermore, our data suggest that both investigated enzymatic pathways are significantly modified and/or over-expressed in porcine lungs affected by acute and chronic pneumonia caused by different etiological agents. Remarkably, 5-LOX-dependent biochemical pathway – which has been poorly investigated in veterinary medicine and is not inhibited by nonsteroidal anti-inflammatory drugs – seems to strongly participates in acute and chronic inflammatory response in porcine pneumonia.

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PATHWAY DEREGULATION AND EXPRESSION QTL IN RESPONSE TO *ACTINOBACILLUS PLEUROPNEUMONIAE* IN SWINE

Objectives: Actinobacillus pleuropneumoniae (APP) is among the most important pathogens in worldwide pig production. The agent can cause severe economic losses due to decreased performance, acute or chronic pleuropneumonia and an increased incidence of death. Therapeutics cannot be used in a sustainable manner, and vaccination is not always available, but discovering more about host defence and disease mechanisms might lead to new methods of prophylaxis. Recent research has provided evidence for a genetic predisposition in susceptibility to APP in a Hampshire x German Landrace F2 family.

Material and methods: Under controlled conditions, 170 F2 animals of a Hampshire/Landrace family, with known differences in founder populations regarding A. pleuropneumoniae resistance, were challenged with an APP serotype 7 aerosol followed by a detailed clinical, radiographic, ultrasonographic, pathological and bacteriological examination. Genome wide gene expression from the 50 most and 50 least susceptible F2 pigs was monitored and expressed QTL were mapped. Data were examined by network analyses and functional characterisation using gene set enrichment analysis.

Results: F2 pigs differed distinctly in clinical, pathological and microbiological parameters after challenge with APP. Genome wide transcriptome profiling resulted in 171 genes being differentially expressed. We mapped 193 eQTL for 105 differentially expressed genes, significant on at least a chromosome-wide level. The study identified a functional hotspot on SSC13, including 55 eQTL. The integration of the different results provides a resource for candidate prioritisation for fine mapping strategies, such as TF, TFRC, RUNX1, TCN1, HP, CD14, among others.

Conclusion: The results indicate the genetic background of APP resistance in swine and provide new insights into the genetic architecture of resistance/susceptibility to porcine pleuropneumonia. The results will be helpful in identifying underlying genes and mechanisms.

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WHITE BLOOD CELL COUNTS DURING AN ACUTE OUTBREAK OF *ACTINOBACILLOSIS*

White blood cell (WBC) counts and defining subpopulations is a classic way to reveal infections that only rarely have been used in pigs due to cost. Recently, automatic WBC-analysers have been introduced to veterinary medicine – reducing price and cutting time when defining subpopulations.

A fattening herd with nine units received 300 growers aged 85 days from a piglet producer with 600 sows every fortnight. Both herds effectuated strict age segregated rearing. Despite this, the fattening herd was severely affected by Actinobacillus pleuropneumoniae serotype 2, confirmed by serology and by isolation of the bacteria. At slaughter, 24±5% of the pigs was registered with pleuritis. Entire batches of fattening pigs were suddenly affected with acute actinbacillosis, often around 3-4 weeks after arrival. Probably the short distance between units located in the same building contributed to spread of disease, since the ninth unit that was located in a building 250 meters away from the rest of the farm experienced no problems.

A sudden onset of acute respiratory signs was recorded in a unit 23 days after arrival. At that day, blood was collected from 6 pigs with clinical signs of disease (feed refusal and forced breathing, eventually also coughing) and from 6 apparently healthy pigs.

All pigs were seronegative to Actinobacillus pleuropneumoniae, indicating an acute infection. The WBC counts in the apparently healthy pigs were normal (20.6±2.6 x 109 leukocytes per ml blood) with 42±4% neutrophils and 46±4 % lymphocytes. In contrast, leukocytosis was observed in the pigs with clinical signs of respiratory disease (45.3±14.2 x 109 leukocytes per ml blood), with a pronounced increase of the neutrophils (76±6%) on behalf of a decreasing concentration of lymphocytes (14±4%).

The results indicate that WBC and differential counts is efficient in detecting disease at an early phase of an infection also in pigs.

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CHANGES OF INF-GAMMA, IL10 AND FOXP3 IN PRRSV NATURALLY INFECTED PIGS.

PRRSV is one of the major pathogens affecting the swine industry worldwide. PRRSV is a positive-sense ssRNA enveloped virus of the family Arteriviridae, genus Arterivirus, responsible for the respective syndrome named PRRS. This study aims at assessing the modulation of the gene expression of pro-immune (IFN-γ) and immune-regulator (IL-10) cytokines as well as a transcriptional signal of immune-regulation (FoxP3) in pigs naturally infected by PRRSV. Two groups of animals ageing 21 days were allocated into two groups: one group (10 pigs) was vaccinated with a ML-PRRSV vaccine (EU prototype) (V-PRRSV) at inclusion and the other group was kept un-vaccinated (NV). Three weeks post-vaccination the animals were naturally exposed to a PRRSV field isolate by commingling all of them with infected pigs resident in the recipient barns. At 6, 8, 10, 12, 14 and 16 weeks of age the animals were bled and peripheral blood mononuclear cells (PBMC) were collected from the buffy coat. From serum samples viremia was detected by RT-PCR. Viremia was detected at 8 weeks to 16 weeks of age, peaking at 12 weeks. No differences in term of the magnitude of viremia and of the proportion of viremic animals were detected. The course of IFN-g was different comparing the two groups. In fact, concomitantly to the increase of viral load the V-PRRSV group showed statistically significant higher levels as compared to control. Conversely, NV group showed higher levels of gene expression of IL-10 before the peak of viremia and a significant increase of FoxP3 during the whole course of infection. The obtained results support the hypothesis that PRRSV infection can have a role in the induction of the regulatory compartment of the immune system. Moreover, in vaccinated animals, even if infected, the gene expression of FoxP3 did not show significant changes running together with viremia.

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APPLIED STUDY TO EVALUATE LYMPHOCYTES ASSOCIATED WITH PRRSV INFECTIONS

Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) evades the immune system through various mechanisms including the induction of specialised immune cells, called regulatory T lymphocytes (Tregs; CD4+CD25+FoxP3+). The primary objective of this study was to quantify the numbers of Tregs and other lymphocytes during PRRSV infections in commercial farms. Blood samples were collected from pigs at 2, 4-5, and 7-8 weeks of age. For each age, 20 samples were collected from pigs on farms with clinical PRRSV infections, and from pigs on PRRSV-negative farms. Complete blood cell counts and flow cytometry were used to quantify the number of Treg cells, CD4+, CD8+, CD4+CD8+, γδ cells, CD3+, and CD21+ cells. Quantitative PCRs confirmed the presence of PRRSV (1.75x106 and 4.3x107 copies/ml) in the clinical pigs at 2 and 7 weeks of age. In general, percentages and numbers of immune cells increased with age with few notable differences due to PRRSV status. The number of CD4+ cells increased with age, but the CD4+ percentages were less ($p<0.05$) in pigs at 7 wk than at 2 or 4 wk. Prior to 7 weeks of age, PRRSV status did not affect the percentage of Treg cells; however, the percentage was dramatically greater in PRRSV pigs (29+6.0) compared to the negative counterparts (5.9+0.4) at 7 weeks. The presence of Tregs at this age likely contributes to immunosuppression and increased susceptibility to secondary infections in commercial pigs. With a greater understanding of Tregs, our goals are to develop strategies to manipulate the Tregs, which in turn should facilitate vaccine efficacy and control of the disease.

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HISTOLOGICAL AND SEROLOGICAL SEQUENCES OF EVENTS IN A PCV2 INFECTION

As part of a large study, an in vivo disease model using PCV2 virus was developed. A total of 108 weaned, PCV2 free Large White x Landrace pigs were recruited at 4 weeks of age. Pigs were randomly allocated to 9 pens with two groups of 6 pigs in each pen. Treatment pigs (8 pens) were inoculated intranasally a 1x10^10 PCV2 particles/5 mL virus media. Control pigs (1 pen) were inoculated with 5mL of virus free media. Blood samples were collected weekly and animals were euthanased at 8 or 10 weeks (12 or 14 weeks of age) post inoculation (PI). For the current study, two 10-week kill groups were used. Post-mortem examination was conducted and samples collected. Viral copy numbers as analysed by qPCR of sera showed that control pigs remained virus free for 7 weeks PI. By week 10 PI all control pigs had detectable virus in serum indicating a breach in biosecurity. Virus was no longer detectable in the serum of treatment pigs from 7 weeks PI and IHC detected scant to moderate labelling in lung, lymph node or intestine. In contrast, IHC of tissues from control pigs revealed variable PCV2 antigen labelling in lungs, lymph nodes and intestines from scant to abundant. The primary site of replication of PCV2 is still unknown. However, we have detected PCV2 in a range of tissues in the immediate post-infection period and further examination of these tissues may reveal the primary site of PCV2 replication.

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ONE VACCINATION WITH UNISTRAIN PRRS DURING GESTATION REDUCES VIRAEMIA AND VERTICAL/HORIZONTAL TRANSMISSION OF HETEROLOGOUS PRRS VIRUS INFECTION

Introduction: Vaccination is the main tool for controlling Porcine Reproductive and Respiratory Syndrome virus (PRRSV) infection; however the use of modified live vaccines during gestation has been controversial. There are in vitro evidences for vaccine-induced protective immunity against heterologous challenge (Martínez-Lobo, 2011). In our study the control of the pathogenic virus was evaluated as an efficacy parameter (viraemia, shedding and vertical transmission) in UNISTRAIN PRRS vaccinated gestating sows compared to non-vaccinated group.

Materials and methods: The recommended administration programme of the vaccine was applied at 8-9 weeks of gestation (IM) to 9 naïve sows. Nine control gestating sows remained unvaccinated. The efficacy was evaluated by means of an intranasal infection at 90 days of gestation with a heterologous European pathogenic PRRSV (Spanish strain isolated at 2007; 106.54 CCID50/sow). The homology with the vaccine strain was 86% (ORF5). Virus detection was performed by virus isolation (VI) in alveolar macrophages.

Results and discussion: Vaccination with UNISTRAIN PRRS significantly reduced the percentage of viraemic sows (11.11% in vaccinated vs. 100% in control group) and shortened the length of viraemia induced by the heterologous strain in sows (2.22±4.41 days in vaccinated vs. 21±4.5 days in control group). The viraemia was punctual in vaccinated group whereas in control one was broad in time; in consequence, vaccination significantly inhibited in 90.1% of the cases the vertical transmission of the pathogenic PRRSV to piglets (viraemia at birth). Moreover, there was a significantly shedding reduction in milk (50% control vs. none of vaccinated sows) and a reductive tendency in nasal shedding, decreasing the possibility of a horizontal transmission of the pathogenic PRRSV to piglets during lactation. So vaccination with UNISTRAIN PRRS enabled gestating sows to clear the virus and reduced its vertical and horizontal transmission to foetuses after a heterologous PRRSV infection.

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CAN PORCINE CIRCOVIRUS TYPE 2 (PCV2) BE ERADICATED BY MASS VACCINATION?

The present field study evaluated the feasibility to eradicate Porcine circovirus type 2 (PCV2) in a conventional farm in North Eastern Spain by vaccinating both sows and piglets using a commercially available vaccine. This vaccination strategy implied that all sows, boars and gilts of the farm were vaccinated with 1ml of Ingelvac Circoflex® every four months. In addition, all piglets were vaccinated with 1ml of the same vaccine at 4 and 7 weeks of age. This vaccination strategy was started in December 2010. Previously, piglets had been vaccinated using an off-label scheme. After 12 months (January 2012), mass vaccination was stopped to evaluate if eradication was successful. Blood samples from 15 animals were taken cross-sectional at 4, 8, 12, 16, 20 and 24 weeks of age. All samples were tested by ELISA and PCR. The percentage of PCV2 detection by PCR was 7.7% (n=11/143) and 1.4% (n=3/221) before and during the mass vaccination program, respectively. During the vaccination program, three consecutive groups of animals (n=45) were also followed longitudinally, and no evidence of infection (no seroconversion and negative PCR results) occurred in these batches. These results suggested that eradication might have been successful. However, after stopping PCV2 vaccination, seroconversion and PCV2 infection were observed again (8.3%, n=11/132) in the cross-sectional studied groups. Results of the present study indicate that one year of mass vaccination reduced infectious pressure (below detection limit of the longitudinal sampling scheme), but was not able to prevent PCV2 re-infection when vaccination was stopped.

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EXPLORATION OF THE IMMUNE RESPONSE TO THE PORCINE RESPIRATORY AND REPRODUCTIVE SYNDROME VIRUS (PRRSV) BY A MODELLING APPROACH: CONDITIONS FOR VIRAL CLEARANCE

PRRSV replicates mainly in the pulmonary macrophages which (i) are responsible for inflammation and viral destruction by phagocytosis and (ii) participate in the induction and orientation of the adaptive immune response. Experimental studies have shown that PRRSV is able to inhibit innate immunity, to reduce the gamma interferon synthesis and to limit the efficiency of neutralising antibodies. Moreover the virulence and the resulting interaction with the host immune system are variable between viral strains. Our limited understanding of the interaction between the virus and the immune system is the main obstacle in the evaluation of control measures and the development of more efficient vaccines. To explore these complex mechanisms and test biological hypotheses, we propose an original model of the immune response centred on macrophage – virus interactions in the lung. Comparatively to previous modelling studies we highly detailed the temporal dynamics of the innate immune response to better understand the effect of the macrophage-virus interactions on the viral clearance. To explore the relative influence of the immune mechanisms on the infection outcome we conducted a multivariate sensitivity analysis using the R package multisensi. We showed that the first steps of macrophage-virus interactions are crucial. We used the model to explore the immune response to strains of variable virulence and to determine the required conditions for viral clearance.

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P123

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PHILOGENETIC ANALYSIS OF A PRRS STRAIN IN ORDER TO EVALUATE ITS VARIABILITY

The study identified the strains present in a production pyramid, and their evolution over a period of five years. The pyramid of 14000 females is composed of four production units: a breeding farm (MEP); two farms producing 6kg piglets (MDB1, MDB2); and MEB, 18kg piglets. Since 2005 various outbreaks have been diagnosed, with different degrees of pathology and total of twelve strains were sequenced. It was studied the genomic variability between the field strains, the reference Lelystad virus (M96262), the strain included in the vaccine Amervac PRRS (Hipra), and in Porcilis PRRS (MSD AH). Results were following analysed using a Maximum Probability analysis and a Neighbor-Joining Analyses.

The identity matrix of all sequences show that the strains found in MEP, MDB1 and MDB2 are related to the originary strain that caused first outbreak in 2005, being all strains philognetically very close to each other. The strains MEB 2009 and 2010 seem to be in a different cluster, showing a variance of 5%, which is considered too high to be only due to time genetic drift. Studying the rest of the strains, it can be noticed that while all strains are related, MEB strains follow a different path to the rest.

The high viral activity of this production system makes it especially important to have available information related to homology between strains, its grade of genetic drift and the distribution of the affected farms regarding to its infection date. The results are of main importance in order to control future PRRSv circulation and to determine the adaptation protocol to the replacement stock and the protection of the herd with a modified live vaccine, by intradermal route (IDAL® device), and reinforce the biosecurity measures, in order to maintain PRRSv stability in the production system.

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HIGHER FEED AND PORK PRICES CAN LEAD TO INCREASED DISEASE COSTS IN AFFECTED HERDS

New animal welfare standards, increasing feed prices, strong international competition and a more concerned society are some of the future challenges the European pig production is facing. This paper estimates the impact of changing market prices (pork and feed) on the estimated costs of disease in non-vaccinated and affected herds.

For the analysis a French finishing unit of 2.100 places (wean to finish) was considered. Typical performance data for average daily weight gain (ADWG: 720 g/day), feed conversion rate (FCR: 2.6kg/kg) and mortality rate (Losses: 4 %) were included as a baseline scenario. The costs of disease were estimated for three major swine diseases: Porcine Circovirus Associated Disease (PCVAD), Ileitis and Enzootic Pneumoniae (EP). For each disease a mild and a severe form was assumed. Prices for feed and pig meat ranged from €250/ton – €1,35/kg in 2010 to €320/ton – €1,80/kg in 2012, respectively. The Boehringer Ingelheim Economic Calculator (BECAL) was used to evaluate the impact of the different disease scenarios at the pig level.

The evaluation demonstrated higher costs for 2012 compared to 2010. They moved up in average by 30%. Depending on the disease situation, estimated costs in 2012 ranged from about €2.5/pig to up to €7/pig, compared to about €2/pig to €5.50/pig in 2010.

In conclusion, increasing feed and pork prices lead to higher costs of swine diseases in affected herds. Therefore the prevention of such costly swine diseases becomes more valuable. Vaccination is a widely accepted and successful method to prevent disease. Thus, especially in times of high prices, vaccination helps to minimise cost of disease and maximise producer's profit.

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A NOVEL PLANT EXTRACT REDUCING THE NEED FOR ANTIMICROBIAL AGENTS IN MODERN PIG FARMS IN ORDER TO MAINTAIN THE HEALTH OF PIGLETS: RESULTS OF SEVERAL INTERNATIONAL STUDIES AND VETERINARIAN TRIALS

Conclusion of several studies and trials to evaluate the effect of a novel plant extract on performance,health and prevention of diarrhoea in pig units with the aim to reduce the usage of antibiotics.

The novel plant extract is activated when cell damage in plant cells causes the compounds of the extract to mix with catalytic enzymes.

This triggers a highly efficient wound healing and pathogen resisting response found throughout the plant kingdom.

Injured animal mucosa present enzymes with similar catalytic capability and can therefor be used to target specific challenged areas of the gastro intestinal tract. The first study shows the effect of the plant extract used through the drinking water on the postweaning gut health of piglets. It can be useful in the prevention of postweaning diarrhoea with an associated improvement of performance.

Also was demonstrated that the product resulted in a lower crypth depth, a smaller number of mucosal macrophages after E coli challenge thus confirming the possible protective functional role after bacterial challenge.

The second study shows that the product has an antibacterial activity after proven determination of MIC against selected pathogens with veterinary importance.

In the third study the conclusion is that the novel plant extract displayed a level of LPS binding level comparable to that of tannine which is known to interfere with bacterial adhesion.

In field trials on large pig units in the Netherlands and the USA finally it was demonstrated that the administration of the product reduced scour and mortality before weaning and reduced the need for antimicrobial agents in order to maintain health of piglets.

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THE EFFECT OF IMMUNO-CASTRATION ON THE BEHAVIOUR OF PIGS AT UNLOADING AT THE ABATTOIR

Immunocastration has been shown to affect the behaviour of pigs on farm. However, the effect of immunocastration on the ease of unloading and the behaviour of pigs at unloading at the abattoir has not been studied. The aim of this study was to identify differences in unloading behaviour between immunocastrated pigs compared with unimmunised controls.

Pigs at 11 weeks were randomly allocated to either immunocastration (2ml Improvac® [administered according to manufacturer's directions] Pfizer Animal Health, n=90 pigs, Group I) or control group (2ml saline, n=88, Group C). Group I and C were unloaded separately and recorded using a hand-held video camera. Videos were analysed and time taken to unload recorded. Vocalisations (whistles and shouts) and hands-on encouragement (pats and pushes) by stockmen were also recorded.

Unloading took 4 minutes 4 seconds (I) Vs 7 minutes 35 seconds (C). Vocalisations differed between groups with 45 and 106 (I) and 75 and 161 (C) whistles and shouts required to unload the pigs. Immunocastated pigs required less hands-on encouragement from the stockman 41 (I) Vs 60 (C). All Immunocastrated pigs moved in a forwardly direction whereas 3 control pigs turned 180° and re-boarded the lorry blocking the exit, consequently increasing pushing and fighting between pigs. In conclusion, immunocastrated pigs required less encouragement from the stockman, appeared calmer and unloaded more easily. Quicker unloading and a reduction in unnecessary handling of pigs could benefit the stockmen, producer and abattoir. Less physical unloading will reduce losses incurred by carcass damage as well as improving animal welfare. In addition, the stress experienced by stockmen appeared to be reduced. Although only two groups of animals were studied, the differences in behaviour of the animals were striking and this warrants further confirmation.

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P127

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CAN LOW BIRTH WEIGHT PIGS EXHIBIT CATCH UP GROWTH POST WEANING IF FED ACCORDING TO THEIR SIZE?

Variation in body weight (BW) is a concern for the pig industry, low birth weight pigs (LBW) can contribute to this, exhibiting poor postnatal growth rates. The aim of this study was to determine if LBW pigs will respond to enhanced nutrition post weaning (9-13 weeks of age).

A 3 X 2 factorial design was used with 180 pigs, treatments were BW at day 63 (N, NR and L) and food specification (High or standard lysine). Pigs were selected at birth by BW, either normal BW (N) (1.7 to 2.0kg) or low BW (L) pigs (≤1.2kg). From day 49-63 two groups of N pigs received restricted amounts of feed (NR) with the remaining N and L groups fed ad libitum. From day 63-91 groups were fed a high (16 g/kg) or a standard lysine (13 g/kg) diet. Pigs were weighed twice weekly and feed intake was recorded.

BW on day 63 was 25.41, 21.00, 21.26kg (0.38 s.e.d) for N, NR and L pigs. There was a significant effect of BW on performance (day 63-91), with L pigs exhibiting the lowest ADG and FCE. NR pigs exhibited the highest ADG however there was no difference in FCE when compared to N pigs (P>0.05). There was no difference in performance of pigs fed a high or standard lysine diet (P>0.05), nor was there a significant interaction between BW and food specification (P>0.05).

L pigs did not exhibit catch up growth, even on a higher specification diet, and consistently exhibited the lowest ADG and FCE. NR pigs exhibited higher ADG post restriction than both N and L pigs. This suggests feeding LBW pigs a higher specification diet, has no effect on performance and it might not be possible to enhance the growth of LBW pigs post weaning.

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WELFARE (PRODUCTIVITY) CONSEQUENCES OF THE DANISH "YELLOW CARD" DEBATE

Introduction: During 2010, the concept "Yellow Card" was introduced in Denmark. The authorities wished to reduce the antibiotic (AB) consumption for pigs by pointing out herds with high AB usage and subject them to a number of precautions. Even before the program was instigated, the public debate made many farmers reduce the AB consumption and the overall usage dropped by >20% in the following year. Hence, the aim of this project was to determine if this decrease had any effects on animal welfare (partly measured as productivity) in affected herds.

Material and methods: Herds with an AB consumption of >3,5kg active compound in the year before June 2010 and with a reduction of AB consumption of >10% the following year were randomly selected from the national database, Vetstat. Herds with finishers had to deliver to either one of the two largest Danish slaughterhouse companies. Organic and outdoor herds and herds that had suffered severe disease outbreaks, had performed eradication programs or made any other major changes during the study period were excluded. Data on number of animals produced, mortality, daily weight gain (ADG), lean meat percent, pathological findings and weight at slaughter were collected for the entire study period.

Results: 270 herds were included in the study. At present, data from 63% is collected. The average herd size was 2652 pen places (475-11000). For growers the overall mortality one year before and one year after June 2010 was 2,7% (0,8-6,6%) and 3,1% (0,8-7,3), respectively (P=0,042) and overall ADG before and after June 2010 was 454 g (295/737) and 444 g (296/677), respectively (P=0,314). Complete data including pathological findings will be presented in the final proceeding/poster.

Conclusion: Preliminary results suggest that the AB reduction may have caused increased mortality and a tendency towards decreased ADG in affected herds.

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EFFECT OF OREGANO ESSENTIAL OIL IN THE PREVENTION OF SWINE DYSENTERY RECRUDENCES

The trial was aimed at assessing the potential role of Oregano essential oil in the prevention of the recrudescence of dysentery in pigs recovered from Swine Dysentery (SD) after antibiotic treatment. The efficacy has been evaluated by measuring the clinical signs (score) of dysentery and the re-isolation of Brachyspira hyodysenteriae (Bh) from individually collected faecal samples and the daily weight gain.

Twenty pigs suffering from dysentery, ageing 65 days, were selected from a farm with a history of SD. The day after the arrivals (day 1) all the animals enrolled, suffering from dysentery (confirmed by microbiological investigation from their feces), have been treated with Tiamulin intramuscularly at the effective dose to Bh. At day 5 (recovering from dysentery) the animals have been randomly divided into two groups and identified by a numbered ear tag. Pigs belonging to group A have been fed with a commercial feed with the inclusion of Natural Oregano Essential Oil at 37.5 ppm (Dosto Green at the dosage of 500 ppm) and group B received a commercial feed without any additive. All pigs have been examined and scored twice a day for diarrhoea, level of consciousness, appetite, dehydration. The clinical observations where aimed at assessing the appearance of recrudescence of the watery/mucous-hemorrhagic diarrhoea (dysentery). At the arrival, at 5 (end of Tiamulin treatment), 10, 17, 24, 31 and 38 days fecal rectal samples were collected. On fecal samples microbiological exams have been carried on. In the treated group (A) we observed: no recrudescence of dysentery from day 5 to 38 days of treatment (in untreated/control animals the rate was 19.5%); no isolation of B.h. compared to 62.5% of the controls; an increase of the average daily weight gain (85 gr/day).

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THE EFFECT OF CLEANING AND DISINFECTION ON MICROBIAL LOAD FROM DIFFERENT MATERIALS IN PIG HOUSING

Determining effective cleaning and disinfection (C&D) regimes of pig housing is vital to improve the health of resident animals and reduce zoonotic disease. A cleaning regime consisting of scraping, soaking with or without detergent (treatment and control), pressure washing, disinfection and natural drying was applied to multiple pig pens. After each stage of cleaning samples were taken from stock board, metal (galvanised steel) and concrete and enumerated for total aerobic count (TAC) and Enterobacteriaceae (ENT). Soaking with detergent caused significantly greater reductions in levels of TAC and ENT on metal, and TAC on concrete, compared to control pens. Disinfection effect was independent of prior detergent treatment. Disinfection significantly reduced TAC and ENT on concrete and stock board but no counts on metal. 24 hours after disinfection TAC and ENT on metal and stock board were significantly reduced; no significant reductions occurred in the subsequent 96 hours of drying. Counts on concrete did not significantly reduce during the entire drying period (120 hours). It can be concluded that both detergent and disinfectant have varying bactericidal effects according to the surface they are applied to; despite this variation, both should be included in a C&D regime to lower bacteria levels effectively, along with a minimum drying period of 24 hours.

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NON-SLIP FLOORS IN GESTATION UNITS FOR LOOSE HOUSED SOWS

Lameness and claw lesions are frequent causes of discomfort or pain in loose housed gilts and sows. They are also common causes of compromised animal well-being and economic loss for the producers. Leg problems were identified as the most common cause of sow mortality on 37 Danish farms (1). Causes of lameness are multifactorial, but claw lesions are one of the primary causes of lameness, and they often develop in the gestation unit (2). The lesions probably develop on concrete slatted floor in the activity area during grouping and as a result of aggressions among the pigs at entry to the feeding station. It may be possible to improve the non-slip properties of floors by using "soft flooring" as this increases floor contact and consequently provides an even pressure on the claws. The aim of this study was to investigate whether "soft flooring" reduces medical treatments due to leg problems.

Materials and methods: Three types of flooring in the activity area were included: concrete slatted floor, rubber floor and DUO-plastic modules. The investigation was conducted on a Danish farm with 1,100 sows and loose housing with electronic sow feeding. Gilts and sows were housed in pens with approx. 90 animals, and each floor was tested by seven batches of gilts/sows. The three types of flooring were compared in terms of medical treatments in the gestation pens.

Results: The investigation included recordings of 1,722 gilts/sows. There were 412 medical treatments as a result of leg problems. Sows in the pen with DUO-plastic modules had a significantly higher frequency ($p<0.03$) of medical treatments compared to sows on concrete and rubber floor. Young sows had a higher frequency of treatments.

1. Vestergaard K. *et al.*, (2004) Trial report 656, PRC

2. Anil S. *et al.*, (2005) Allen D. Leman Swine Conference

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A SURVEY OF ATTITUDES AND PRACTICES OF FARMERS AND VETERINARIANS TO PAIN AND THE USE OF PAIN RELIEF IN BREEDING PIGS

This study aimed to assess the level of use of analgesics for breeding pigs by UK pig farmers and veterinarians and gauge their attitudes to pain in pigs. Respondents were asked to identify anti-inflammatory drugs they use and how often they use them for selected conditions in pigs. They were also asked to rate the painfulness of different conditions and indicate their level of agreement with various statements about pain. A web-based survey was distributed to veterinarians. A web or paper-based survey was distributed to UK pig farmers via various industry bodies and publications. Preliminary results indicate that the most frequently used anti-inflammatories are meloxicam and dexamethasone. For vets, males rated lameness and respiratory disease as being more painful compared to females; whilst females scored farrowing and shoulder sores higher than males. There was almost complete agreement that pigs recover better when given pain relief. Many farmers and vets agreed that it is difficult to recognise pain in pigs. Vets were asked if they keep up-to-date with all the latest literature on pain relief for pigs and 56% agreed, 27% disagreed and 15% neither agreed nor disagreed. Both farmers and vets were asked how much they agree that pain relief drugs are too expensive for pig farmers to use regularly. Almost a third of vets agreed with this statement and 24% neither agreed nor disagreed, whereas very few farmers agreed, with the majority disagreeing and some neither agreeing nor disagreeing. Almost all farmers agreed that recognising and managing pain is an important part of pig keeping and a large proportion would like to know more about pain and how to treat pain in pigs. Understanding the attitudes of pig farmers and vets may help target future education, training and research into pain in pigs.

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GRAIN QUALITY AT INTAKE; A STUDY OF QUALITY CONTROL PROCEDURES OPERATED BY IRISH ANIMAL FEED COMPOUNDERS IN 2012

Objectives: To examine the ability of Mill quality control procedures to establish the quality of grain at intake and to forewarn them of a risk of substandard grain being delivered, which if incorporated in a compound feed, could have a negative impact on the health and/or nutritional status of animals to which the final manufactured compound feed is fed.

Materials and methods: Data collection involved the preparation of a questionnaire which contained the key parameters that relate to grain quality. Quality personnel in the individual mills in the Republic of Ireland were contacted by telephone or by plant visit for the purpose of documenting the quality control procedures in relation to the purchase and mill intake of grain (wheat and barley).

Results and Conclusions: Sampling procedures varied between Mills. With the exception of fines the systems adopted would normally predict the bushel weight (kg/hl) and moisture content of the load to within acceptable tolerances. The likelihood of detecting the presence of randomly distributed clumps of mouldy product, caused by poor supplier storage conditions in a 500-1000g sample is very small. Such substandard product could contain high concentrations of highly toxic mycotoxins which could contaminate large quantities of final product within the mill and subsequently impact negatively on animal health. In addition to the supplier, the driver of the delivery truck played a key role in forewarning them of any potential changes in the source(s) or quality of the delivered product since they could visually appraise the grain and the store during the truck loading process.

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EFFECT OF CROSS-FOSTERING ON LITTER PERFORMANCE WITH PARTICULAR REFERENCE TO LOW-WEIGHT PIGLETS

Our objective was to study the effect of cross-fostering on litter performance, focusing on piglets born with less than 1351 g (SP) body weight. The experiment was performed in a Brazilian commercial farm and 68 mutiparous sows and their litters were used. Cross-fostering was performed 24 h post-partum and litters were fixed by number (HL), or fixed with most of the piglets being SP assuring sows with thin nipples (LL). Piglets were weighed on d 1 and 19 post-partum. Mortality was recorded. As expected, LL litters had lower mean BW (mBW) at d 1 than HL litters (1.19 vs. 1.54±0.129; $P<0.05$), and HL litters had higher mBW at d 19 than LL litters (5.52 vs. 4.77±0.129kg; $P<0.001$). LL sows had also lower within litter CV of BW (CVBW) at d 1 than HL sows (17.4 vs. 21.8±4.39 %; $P<0.05$) but they did not differ in CVBW at d 19 (23.2 vs. 23.4±1.72 %; $P>0.10$). HL sows had lower number of dead piglets (0.78 vs. 1.95; $P<0.05$) and lower rate of dead SP (6.5 % vs. 15.7 %; $P<0.05$) at d 19 than LL sows. Cross-fostering small piglets to LL litters did not reduce litter mortality nor did it improve CVBW, moreover, it increased SP mortality rate at the end of lactation. Performing cross-fostering to obtain HL litters is an easier and faster management procedure in the farm than obtaining LL litters and, according to our results, it can be concluded that it is also the best option for SP survival.

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HERD DIAGNOSIS OF IRON DEFICIENCY IN PIGLETS

Introduction: Iron supplementation regimes for piglets are very standardised with little focus on variations in birth weight, growth rate or weaning age. Dose calculations are rarely based on haematological measurements. A critical time for iron deficiency is immediately before weaning. An optimal haemoglobin (Hb) blood concentration may be defined as 110 g/l. The objective of this study was to design a herd diagnostic procedure for evaluation of iron supplementation in the suckling period.

Materials and methods: In a Norwegian sow herd 134 piglets were followed from birth to weaning. All piglets were offered oral iron throughout the suckling period. In addition half of the piglets (split litters) were dosed subcutaneously with 180 mg iron dextran at birth. Piglet Hb concentration and body weight was determined at 35 days of age. Total iron content in piglets was calculated by assuming a blood volume of 8.5 % of the body weight, an iron content of 3.4 mg/g Hb and an additional 25% iron in other body components such as myoglobin and ferritin.

Results: Piglets receiving 180 mg iron dextran had an average Hb blood concentration of 101 g/l compared to 66 g/l in pigs without parenteral iron supplementation ($p<0.001$). The corresponding average body weights were 12.2kg compared to 10.7kg ($p<0.05$). Given the assumptions above the parenterally dosed piglets contained an average 445 mg iron per animal compared to 255 mg iron in the orally dosed animals. This difference corresponds well to the 180 mg iron given parentally.

Conclusion: By measuring Hb values in a representative sample of piglets at weaning, it is possible to determine whether desired Hb levels are reached. Additional iron supplementation required to obtain optimal growth rates may be calculated based on these figures.

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THE ASSOCIATION BETWEEN SERUM VITAMIN D LEVELS AND AVERAGE DAILY GAIN (ADG) AND MORBIDITY OUTCOME IN WEANED PIGLETS

Piglets are born with low serum concentrations of the vitamin D metabolite 25-OH-D3 resulting in a predisposition to vitamin D deficiency. Recent studies have demonstrated that oral supplementation of piglets is necessary to attain serum vitamin D levels within the normal published range. It has subsequently been hypothesised that vitamin D deficiency may predispose the weaned piglet to increased morbidity and decreased ADG. The objective of this study was to determine the association of serum vitamin D levels with ADG and the probability of clinical morbidity in weaned piglets.

One hundred and eighteen piglets, from a commercial farm experiencing high post-weaning morbidity, were individually identified and randomly assigned at weaning (24-days-old) to 1 of 2 treatment groups (Day 1). Group #1 (n=60): administered 1ml strawberry syrup orally. Group #2 (n=58): administered orally 1ml (1.042 g/ml) of commercially prepared vitamin D syrup. Piglets were weighed, and serum samples were taken for vitamin D level analysis, on Day 1 and 28 of the trial. Observations were recorded daily for morbidity outcomes. Investigators were blinded to the treatment groups.

Group #2 had a higher vitamin D serum level when compared to Group #1 at Day 28 ($P<0.05$). However, using multilevel linear regression, there was no significant difference in ADG in the first 28 days after weaning between the two groups. There was also no significant difference, using multilevel logistic regression, in morbidity outcomes between the two groups. All analyses used pen as a random effect, and controlled for repeated measures, sex, parity, and weaning weight.

Supplementation with oral vitamin D at weaning achieved higher serum vitamin D levels when compared to controls. However, supplementation did not decrease the probability of morbidity and did not improve the ADG in weaned piglets.

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FIELD EFFICACY OF POTASSIUM PEROXYMONOSULFATE (PMS) OXIDISING DISINFECTANT (VIRUSNIPTM) AGAINST PORCINE CIRCOVIRUS TYPE 2 (PCV2) IN GILT ACCLIMATISATION UNIT

Potassium peroxymonosulfate (PMS) is an oxidising disinfectant that demonstrate high efficacy against various viruses in vitro. However, no field experiments of this agent existed until the present. This is the first study of determining the virucidal activity of VirusnipTM, the representative of disinfectant containing PMS as an active ingredient, under field condition. In this study, 1:200 concentration of VirusnipTM was sprayed for 15 minutes in gilts acclimatisation area. Environmental swabs from the floor and oral fluid samples were collected to determine the quantitative PCV2 copies between treated and untreated pens using qPCR specific for ORF1 of PCV2. The result demonstrated that the VirusnipTM showed virucidal capability against PCV2 under field condition and the viral load in the environment was minimised dramatically. Interestingly, PCV2 vaccine was used twice when gilts were 25 and 29 weeks old but at the end of this study the untreated group still shed the virus with the higher levels than those VirusnipTM treated group. Significant reduction of PCV2 copies shedding in the oral fluids was demonstrated. Under a various factors according to field condition, proper disinfection practice may play a significant role when combining with a suitable vaccination program in an infected herd. PMS contains disinfection demonstrated virucidal effects in treated environment and specific immunity activated by PCV2 vaccination had an impact on minimising viral shedding detecting in oral fluid samples.

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PRENATAL STRESS INFLUENCES ON PIG HEALTH, WELFARE AND PRODUCTIVITY

A number of experimental studies in pigs have clearly shown that early life experiences can have a substantial impact on outcomes of great relevance to later health, welfare and productivity. In particular, stress or under-nutrition experienced by the sow during pregnancy has been shown to have important effects on how her offspring cope with their social, physical and infectious environment. However, the possible importance of sow management during gestating may be under-appreciated. This paper will briefly review some of the major findings relating to prenatal stress effects in pigs. A number of maternal factors have been found to be positively or negatively associated with later offspring outcomes. In particular, the social environment during gestation has been found to have a major impact on progeny pig welfare. Mixing during pregnancy has been shown to alter offspring behaviour, stress reactivity, immune function and growth rates. Given the current transition from gestation stalls to group housing in Europe and many other regions around the world, optimisation of the social environment during pregnancy is a challenged faced by many producers. On many farms, social mixing as a prenatal stressor could be negatively affecting herd health and performance. The obvious corollary of the negative outcomes previously identified (as a consequence of social stress or other factors) is that optimal prenatal management, through increasing progeny robustness, could play an important role in supporting positive welfare and efficient production. Identifying and understanding the possible contribution of the prenatal environment to farm performance may therefore be an important effort for farmers and veterinarians.

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USE OF ANALGESIA DURING CASTRATION IN PIGLETS: EFFECT OF TOLFENAMIC ACID ON BEHAVIOURAL AND PHYSIOLOGICAL INDICATORS OF PAIN

Surgical castration of male piglets without using pain relief is a common management practice performed to avoid the occurrence of boar taint. For the increasing animal welfare concerns and the public opinion pressure, alternative methods will have to be implemented. Aim of this study was to evaluate, by behavioural and physiological indicators, the effectiveness of tolfenamic acid administered before castration to alleviate the pain. The study involved 96 male piglets of 5 days of age, divided into four groups: 24 handled only (H), 24 castrated without pain relief (C), 24 treated with tolfenamic acid (Tolfedine cs® 0,05ml/kg intramuscular) 1h before castration (T), and 24 treated with placebo (physiological saline solution 0,05ml/kg intramuscular) 1h before castration (P). Twelve piglets for each treatment were assigned to blood collection, whereas 12 were used for behavioural observation in order to avoid modification due to additional handling influence. Behaviour was observed using a scan-sampling technique for 15 minutes at 4 time point from castration (0h00, 0h16, 1h00, 1h15). Blood samples were collected 0h30 and 4h00 after castration for cortisol concentration. Data were processed by PROC MIXED (SAS 9.2, SAS Institute Inc.) using Bonferroni test. Results showed significant differences for all the parameters in H group compared to C and P groups ($P<0,001$), excluding cortisol level at 4h00 which was similar in each group. B ehaviours such as 'walking' and 'standing', and cortisol at 0h30, showed no significant difference between T group and H group ($P>0,05$). In conclusion, administration of tolfenamic acid before castration reduces behavioural and physiological indicators of pain in piglets. The findings suggest that tolfenamic acid administered IM at 2 mg/kg could decrease the pain induced by castration in piglets, improving the health and welfare of piglets in practice.

NOTES

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INFLUENCE OF BIO-ACTIVE PEPTIDES FROM FPP (FERMENTED POTATO PROTEIN) ON LITTER SIZE AND LITTER WEIGHT IN SOWS

Increasing environmental temperature has a potentially large impact on the pig industry, especially during summer season. The sow's litter size is largely impacted by ambient temperatures. Previous research demonstrated a positive effect of Lianol®, a complementary feed based on highly digestible fermented potato protein, on plasma insulin-like growth factor-1 (IGF-1) levels in pigs. IGF-1 is involved in many metabolic processes including fertility. Therefore it can be expected that Lianol® can affect reproduction parameters in sow production.

The objective of this research was to evaluate the effect of this new complementary feedstuff on litter size. Litter size is highly correlated with the total litter weight, which was also observed.

This trial was conducted at Pig Innovation Centre Sterksel (part of Wageningen University, The Netherlands). Most sows were a crossbred (Dutch Landrace * Large White) and they were inseminated with the same Large White growing-finishing boar line. Reproduction parameters of a control group of 43 sows were compared with the results of a group of 43 sows that received Lianol® Ferti Tablet around weaning (from 3 days pre weaning until 2 days post weaning). Both groups had an equal parity distribution. The litter size and litter weight was observed. This trial demonstrated a large effect both on live born and total born piglets per litter. Supplementing the new product resulted in an increased litter size of 0.76 piglets. The number of live born piglets per litter increases by 0.66 per litter. With increasing litter size, an effect on the individual birth weight can be expected. In this trial, only a slight decrease in individual birth weight could be noted (20 grams per live born piglet). The total litter weight in the Lianol® group, however, slightly increased by 135 g per litter.

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INFLUENCE OF PROVIDING BIO-ACTIVE PEPTIDES FROM FPP (FERMENTED POTATO PROTEIN) IN LACTATION DIETS ON PRE-WEANING SURVIVABILITY AND PIGLET WEIGHT AT WEANING

The amount and quality of sow milk is a pivotal factor in piglet survival, growth, development and pre-weaning body composition. Numerous researches have demonstrated that heavier weaning piglets reach market weight faster, reducing the production costs. This has sparked the increasing interest in exploiting the lactation period to enhance overall piglet growth and pork production efficiency.

Previous research demonstrated a positive effect of Lianol®, a complementary feed based on highly digestible fermented potato protein, on plasma insulin-like growth factor-1 (IGF-1) levels in pigs. IGF-1 is involved in many metabolic processes including milk production. Therefore it can be expected that the inclusion of Lianol® in lactation diets can affect pre-weaning production parameters in piglets.

The objective of this research was to evaluate the effect of this new complementary feedstuff on litter weight at weaning and pre-weaning piglet survivability.

This trial was conducted on a group of 192 control sows and 191 treated sows at a commercial Austrian farm. The farm had a history of high pre-weaning mortality. All sows were hybrid sows. Both treated and control animals were housed under identical conditions. The treated group received the same lactation feed as the control group, except for a supplementation of 1kg of Lianol® Solapro per ton of feed. Piglets were weaned at 27 days. Piglet birth weight and the number of live born piglets did not differ significantly between both treatments. The supplementation of the lactation feed with Lianol® Solapro significantly ($P<0.001$) increased the weaning weight by 119 grams; from 7.261 to 7.380kg. Furthermore, the pre-weaning survivability improved significantly ($P<0.004$) from 76.9% to 82.1% in the control and treated group respectively.

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TRIALS TO INACTIVATE ANTIBIOTICS IN THE WATER PIPE SYSTEM AFTER ORAL MEDICATION BY THE WATER HYGIENE BIOZIDE VIRBAC CLEAN PIPE (VCP)

Introduction: Biofilms develop fast in each water pipe system. Beside water intake reduction and to be source of health relevant germs, an existing biofilm is catching up antibiotics during a water medication phase. Field data have shown that these molecules are set free again over 6-8 weeks (depends from the molecule).

Virbac Clean Pipe (VCP) as a special formulation of sodium hypochlorite is giving a strong oxidation power by its 19 % free Chlorine. Therefore laboratory trials and field trials were set up to show the antibiotic inactivation activity.

Material and methods: Double concentrations of common treatment solution of Doxycyclin (Pulmodox 500 mg/g, Virbac) 1000g/1000 litre, Tiamulin (Stalimox 364,2mg/g, Virbac) 400 g/1000 litre and Amoxicillin (Suramox 100%, Virbac) 400 g/1000 litre were mixed 1:1 with the double concentrated Hypochlorite-Product (Virbac Clean Pipe, Virbac) 40ml/1000 litre. After 1, 6 and 24 hours aliquots of 1ml were kept and a logarithmic titration row where build up.

25µl of these 1:10 solutions were given in the test tube with the test germs (PremiTest, biopharm) and incubated over 3 hours at 37°C according biopharm instructions.

An antibiotic effect was detected when the colour of the tube didn't change. Without antibiotic effect the germ growth induces a clear change from violet to yellow.

Results: It was shown that VCP inactivated Doxycyclin and Tiamulin >99% within 6 hours. 90 % of the antibiotic effect of Amoxicillin was stopped to that time. The antibiotic activity was destroyed over 99,99 % within 24 hours for all tested antibiotics.

Discussion: Therefore VCP could be used as a cleaner after each water medication period to stop the antibiotic effect. First field trials confirmed these laboratory test results. A VCP-cleaning phase let control cross-contaminations as a contribution to antibiotic resistance development prevention. Beside this VCP is reducing already resistant germs in system by disinfection.

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EFFICACY OF VEVOSTART® PREMIX IN THE FEEDING OF ESCHERICHIA COLI K88 CHALLENGED PIGLETS

Feed with VevoStart® (a vitamin-mineral premix with benzoic acid) was evaluated as an alternative to medicated feed in weaning pigs challenged with Escherichia coli K88. 140 piglets weaned at 26 d of age were distributed into 28 pens and offered, for 28 days, 4 dietary treatments consisting of a non-supplemented diet (Control) and the same diet supplemented with VevoStart® (2%), Colistin (80 ppm) or Zn-oxide (3,000ppm). All the piglets were given an oral dose of 5x10^8 cfu E. coli K88 at day 4 post-weaning. ADG and ADFI were measured, faecal score was monitored, and fresh faeces were collected to quantify E. coli shedding by traditional plate culture and quantitative PCR. The piglets offered VevoStart® had higher ($P<0.05$) weight gain (366g/d) and better feed efficiency ratio (0.76) than those offered the Control diet (303g/d and 0.69), Colistin (306g/d and 0.69) or Zn-oxide (291g/d and 0.70; $P<0.05$). The piglets offered Colistin had a better faecal score than those fed the Control diet (0.07 vs. 0.21; $P<0.05$). Faecal E. coli shedding (log cfu/g faeces) measured with traditional culture methods was lower ($P<0.05$) in the piglets fed Colistin (1.3) than in those offered the Control diet (2.2), VevoStart® (2.1) or Zn-oxide (2.1). When faecal E. coli shedding was measured using quantitative PCR higher recoveries were obtained, and there was an interaction between dietary treatment and sampling day. E. coli shedding was higher ($P<0.05$) in the piglets fed ZnO than in those fed Colistin, particularly between days 4-13 post-weaning (7.5 vs. 7.0log cfu/g faeces). It is concluded that, under the tested challenge conditions, the feed with VevoStart® premix significantly improved the performance of the piglets and appears to be a valid alternative for the use of medicated feeds.

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EFFECT OF BOVINE COLOSTRUM ON GROWTH PERFORMANCE AND SURVIVAL OF SUCKLING PIGLETS

In the present study the effects of bovine colostrum supplementation (Veracus® Vetilan COLOSTRUM BOOST, Veracus) on growth performance and survival of suckling piglets were examined. In total, 388 newborn piglets of 30 sows were randomly assigned to three different treatment groups. The piglets received either 1ml of bovine colostrum per piglet at the first day of life (group A), on three consecutive days (group B, 1ml/piglet at the first, second and third day of life) or remained as negative controls (group C) with no additional colostrum supplementation. All piglets were clinically investigated daily from study day (SD) 1 to 10 and body weight was measured on the first, forth and 10th day of life. Over investigation time, 35 piglets (9 %) died revealing no significant differences between treatment groups and 25 out of the dead 35 piglets (71 %) had a birth weight less than 1000 g. No significant differences were seen for the average daily weight gain from days one to 10 between the three treatment groups. Piglets weighing less than 1000g at birth had better chances of survival by bovine colostrum intake, which was partly significant. Piglets of group A and group B (p= 0,002) survived one and two days longer than group C piglets, respectively. The results of the present study suggest that supplying bovine colostrum to underweighted newborn piglets improves their resistance providing the farmer more time finding them an appropriate nurse sow ending in better chances for each single piglet to survive.

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A QUESTIONNAIRE SURVEY TO INVESTIGATE ASSOCIATIONS BETWEEN FEEDING PROCEDURES FOR GESTATING FEMALES AND PIGS BORN DEAD IN JAPANESE COMMERCIAL SWINE HERDS

The objective of the present study was to examine associations between feeding procedures for gestating females and percentages of pigs born dead (PPBD) in commercial herds. Questionnaires were sent to 115 herds in 2008 to obtain information about gestation feeding procedures. Data from 96 completed questionnaires (83.5%) were coordinated with the reproductive data of individual females. The dataset included 15,407 gilt records and 74,174 sow records. Participating herds were classified into two groups based on the upper 25th percentile of PPBD: high-PPBD (12.0% or higher) or non-high-PPBD herds. At the herd level, a two-sample t-test was used. Two-level mixed-effects models were applied, by using a herd at level two and an individual record at level one. Mean (± SEM) PPBD of gilts and sows were 8.8 ± 0.12 and 9.8 ± 0.05%, respectively. Feed quantity was increased in mid-gestation in 69.5 and 86.3% of the herds for gilts and sows, respectively. Mean gestation age when the diet was increased for gilts and sows was 68.5 ± 4.45 and 58.8 ± 4.38 days, respectively. Diet quantity was also decreased in 55% of the herds prior to farrowing. The mean diet quantity prior to farrowing was 2.1 ± 0.07kg/day for gilts and 2.3 ± 0.08kg/day for sows. High-PPBD herds had larger herd size than non-high-PPBD herds ($P<0.05$), but no differences between the two herd groups were found significant for number of total pigs born ($P = 0.08$). In two-level analysis, no procedures for sows were associated with higher PPBD ($P>0.10$), whereas in gilts higher PPBD was associated with greater diet quantity pre-farrowing, and increasing the diet at an earlier gestation age ($P<0.05$). Therefore, these results indicate that in gilts PPBD is increased when diet is increased in mid-gestation and pre-farrowing.

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ECONOMIC IMPACT OF CIRCOVAC® VACCINATION IN PIGLETS UNDER SPANISH FIELD CONDITIONS

Introduction: This study aimed to assessing the economic benefit provided by the improvement and homogenisation of pig slaughtering weights pigs after CIRCOVAC vaccination under Spanish conditions.

Material and methods: Animal records: Data was obtained following a controlled, randomised and blinded trial conducted under good clinical practices in 2 Spanish farms (A,B) affected by PCVD. A total of 1239 piglets was included then either vaccinated with CIRCOVAC (n=619) or injected with a placebo (n=620) at weaning. Allocation to treatment groups was performed following randomisation according to weaning bodyweights. The unvaccinated and vaccinated batches were weighed before shipment to the slaughterhouse at 168 and 189 days of age depending on the site. Distribution parameters of the carcass weights were calculated within each batch and farm following the estimation of carcass weights.

Rentability calculation: Individual prices were calculated with a standard slaughterhouse paying matrix with a bonus/penality applied to ranges of weights (paying scheme used in Spain in 2011 as a reference). Carcass quality with a 1.5-euro base price was assumed. The average prices between treatment groups were compared in each farm. Statistical simulation studies using the carcass weight distribution parameters were performed to assess the economic benefit of carcass weight general improvement. The impact of bodyweight homogenisation in each farm was assessed by equalising means.

Results and conclusion: CIRCOVAC vaccination induced a +€2.55 average gain per carcass (GPC) in farm A and +€4.34 in farm B. The simulation study showed an average expectation of respectively +€4.22 and +€3.93 GPC. The gain due to homogenisation of the bodyweights was estimated to a €0.29-0.32 GPC and could reach €1.47. In conclusion and under the condition of the study, a clear economic gain of approximately €4 per pig could be expected following CIRCOVAC vaccination in piglets.

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REAL WELFARE – PREVALENCE OF WELFARE INDICATORS IN THE ENGLISH PIG INDUSTRY

The Real Welfare project has developed and tested a set of practical and useable protocols that will be used in the English pig industry to measure and compare the welfare standards under which pigs are kept.

Ahead of the EU and EFSA recommendations, England has been developing outcome-based welfare measures i.e. how pigs cope with their environment, rather than measuring components of the housing provided. From a wide range of potential welfare indicators, work from 2006 at Bristol University (in collaboration with Newcastle University and BPEX) identified five finisher* (>50kg) and seven sow measures which are scientifically validated and practical comparators of welfare and production in pigs. Working with the English pig industry, BPEX then concentrated on establishing an initial network of assessors, and refining the methods in a wider commercial setting.

22 veterinarians from 14 practices with regular involvement with pigs attended standardisation days to become familiar with the protocols and definitions needed for objective, accurate data recording. These vets completed extended pilot trials of the protocols across 2011, assessing 157 farms, and resulting in the first large scale measures of body marks, tail lesions, lameness, "hospital" pigs, and enrichment use across the UK finisher population, with similar measures including shoulder and vulva lesions and low body condition also scored in dry sows.

These initial prevalences give us a set of benchmarks to use within industry, showing what is achievable commercially, as well as providing useful baseline data against which to assess unit changes and industry trends. The value of this approach has been recognised by the Red Tractor assurance scheme, which incorporates 92% of British pigs; a consultation exercise is underway on the proposal to include Real Welfare assessment of finisher pigs as a requirement for this assurance scheme for inclusion in Spring 2013.

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INFLUENCE OF A PHYTOGENIC FEED ADDITIVE ON THE PERFORMANCE OF SOWS

Weaning up to 30 piglets/sow/year is nearly unexceptional in developed countries.

High selection rates already in early production stages reduce the average utilisation time of sows, thus affecting lifetime performance.

Several studies have shown the positive influence of phytogenic feed additives on sow and litter performance when used in the lactation feed. Sows had higher feed intake during lactation, produced more milk, converted the ingested feed more efficiently, lost less body weight and their litters grew better.

The objective of this study was to explore the influence of the continuous use of the phytogenic feed additive Digestarom® in lactation as well as in gestation feed on production parameters. The study was carried out in a large scale sow unit keeping two different herds, each with an average stock of more than 4.700 sows.

Both herds were fed under the same feeding program, with the same basal diet. Digestarom® Sow, a blend of herbs, spices and essential oils, was applied at a concentration of 150 g/t complete feed in all diets of the trial herd.

The study showed that continuous use of the phytogenic feed additive reduced the losses of sows, especially in early parities, for fertility reasons by more than 30%. Simultaneously production parameters like farrowing rate and piglet index (number of live-born piglets/100 first services) were enhanced over all parities. Compared to the first production cycle in which the additive was applied, the trial herd showed higher and more stable piglet indexes over all parity numbers in the second production cycle.

Finally the replacement rate was reduced in the trial herd (51,5%) compared to the control herd (54,9%).

Thus, the continuous use of the phytogenic feed additive Digestarom® Sow not only enhances the zoo-technical performance, but also contributes to a longer utilisation time and lifetime performance of the sows under field conditions.

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BEHAVIOUR OF LOOSE HOUSED SOWS DURING MATING – ANIMAL WELFARE AND ANIMAL WELFARE

Sows are for animal welfare reasons housed lose in Sweden. Pens with deep-litter-straw provide a large total area, allowing non-dominant sows to avoid confrontations with dominant sows during the dry period. However, during heat the sows differ in behaviour.

Two pens with deep-litter-straw were filmed (12h/day) from weaning to mating. The pens housed 22 (parity number 2.9±2.2) and 17 sows (parity number 6.0±2.1), respectively. The sows were fed a dry feed three times daily and steadily ate for about one hour per day. Following feeding, they were looked up for a total of another two hours per day, thereby being lose for 9 of the 12 hours filmed per day. Day 2 post weaning, they spent 6.3-6.9 hours of this time sleeping or resting.

From Day 2 to Day 4 the activity of the younger and older sows increased from 2.8 to 4.8 hours and from 2.0 to 3.2 hours, respectively. The aggressive interactions increased from 17 to 111 for young, and from 10 to 62 for old sows. These interactions were head-to-head, indicating social competing. Simultaneously, the incidence of mounting other sows from the rear increased, from 2 to 146 and from 0 to 66 among young and old sows, respectively. On day five, the mountings increased to 174 in the young group, whereas it decreased to 38 in the old group. On Day 6, activity, aggressiveness and mountings were significantly reduced in both pens.

The behaviour of the sows mirrored the state of heat well, since the majority (71%) of the old sows was inseminated day 4, while younger sow in general (77%) was inseminated day 5. The results indicate that lose housed sows may hurt each other during heat due to mountings and aggressiveness, and that precautions aimed to prevent this ought to be discussed.

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COATED CALCIUMBUTYRATE: A POTENTIAL TOOL TO CONTROL *SALMONELLA* IN HIGH RISK PIG-HERD

Salmonella is an important foodborne infection in humans. A large number of human Salmonellosis cases is caused by the consumption of contaminated pork. To decrease the number of human cases biosecurity measures are needed at herd-level. An additional measure which may be effective is the administration of additives to feed or drinking water. One specific additive that already demonstrated its beneficial effect on Salmonella is coated calciumbutyrate. This study describes the effect of adding coated calciumbutyrate in the feed of finishing pigs on a Belgian Salmonella high risk pig-herd.

Overshoes (n=14) were taken after cleaning and disinfection and before population. Fifteen randomly selected piglets were sampled at arriving (20kg), 40kg, 75kg and at slaughter by taken individual blood and faecal samples. Overshoes (n=39) were taken at the same times. Blood samples were analysed using an indirect LPS-Salmonella ELISA (Idexx). Bacteriological analysis for Salmonella in feces and overshoes was performed by a standard enrichment method according to ISO 6579-Annex-D (MSRV). Two kg of coated calciumbutyrate (Globamax Performant, Sanluc) per 1000kg feed was added during one fattening period. No additional measures were taken.

Twenty percent of the overshoes taken before introduction of pigs was bacteriological positive. The piglets themselves were serological (S/P<0.1) and bacteriological negative when at arriving. During the fattening period the S/P-ratio increased with the age of the pigs. The highest S/P-ratio was found at slaughter and was 0.24. All individual fecal samples and overshoes during the trial were negative.

In conclusion, as none of the S/P-ratios exceeded the cut-off value of 0.6, coated calciumbutyrate proved to be a useful tool to improve the serological Salmonella status in this specific herd. The results of this study suggest coated calciumbutyrate may also be beneficial in other Salmonella high risk herds. Therefore other future studies may be useful.

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DETECTING *SALMONELLA* IN PIGS AT SLAUGHTER – A COMPARISON OF SAMPLE TYPES

Salmonella infection in pigs represents a potential hazard to public health and it is anticipated that the EU will set targets for reduction for all Member States. Surveys to estimate the prevalence of Salmonella in slaughter pigs are conveniently conducted at the abattoir. In this study, four different samples were collected from each of 622 pigs – ileo-caecal lymph node, caecal content and carcass swabs for culture together with meat juice samples to detect antibodies against Group B and C1 Salmonella in an ELISA test. Considered individually, there were 138, 137, 95 and 294 positive results. Each sample could be positive or negative to each test, yielding 16 different possible combinations of result. All of these were observed in the data. A Bayesian analysis was conducted that enabled these results to be combined and to estimate the sensitivity and specificity of each method. The inevitable imperfect agreement amongst these samples reflects firstly, the nature of the sample and its relationship to the salmonella status of the pig and secondly, the sensitivity and specificity of the laboratory tests that were employed. Crudely, it may be considered that a positive ileo-caecal lymph node arises through infection on farm, that a positive caecal sample arises through infection on farm or ingestion of contaminated material during transport or in lairage, a positive carcass swab result from external contamination through faecal leakage after slaughter or cross-contamination and a MJ ELISA positive reflects prior infection on farm. In addition to providing estimates of prevalence at slaughter, each outcome may be useful to evaluate interventions on farm or in the abattoir. Carcass swabs may reflect public health risk, ileo-caecal lymph node culture and MJ ELISA results to indicate impact of farm factors and caecal content to demonstrate risk at the entry to the abattoir.

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DEVELOPMENT AND VALIDATION OF ZNCP *SALMONELLA* FARM RISK ASSESSMENT TOOL

The control of Salmonella on pig farms is an important measure to reduce the risk to humans of contracting Salmonella from pig meat. In July 2012, the UK Zoonoses National Control Programme for Salmonella in pigs (ZNCP) suspended the serological surveillance of Salmonella exposure in slaughter pigs by ELISA testing of meat-juice samples. The level of serological sampling was only adequate to indicate Salmonella prevalence at a national level; it did not provide sufficient data to effectively assess the prevalence on individual herds (Sayers & Cook, unpublished data) and therefore did little to motivate control measures by farmers. Instead, the ZNCP has introduced a Salmonella Farm Risk Assessment Tool for producers to assess on-farm control of putative risk factors for Salmonella. The Farm Tool requires users to input farm information and answer questions relating to biosecurity practices and pig management. Prior to introduction of the Farm Tool, a pilot study was run on 24 farms where responses to the Farm Tool were compared against ZNCP meat-juice ELISA scores and evidence of Salmonella by faecal culture. The potential impact of biosecurity measures on the proportion of positive samples on each farm was assessed. Principal Component Analysis identified that a farm was more likely to have a lower ZNCP score by adopting a combination of good biosecurity practices, rather than focusing on a single aspect of biosecurity. The pilot study also enabled evaluation of the Farm Tool in terms of scoring, ease of use and relevance. Use of the Farm Tool by pig producers will enable qualitative categorisation of farms according to risk of Salmonella infection, which falls in line with European Food Safety Authority recommendations for measures to reduce risk to consumers. Control efforts could be targeted towards units deemed to be "high risk" by the Farm Tool.

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SEROSURVEY OF *SALMONELLA* SPP. AND YERSINIA SPP. IN FATTENING PIGS REARED IN FREE-RANGE SYSTEMS

Zoonotic agents, such as *Salmonella* spp. and *Yersinia* spp., are considered high-risk zoonotic pathogens by the European Food Safety Agency (EFSA) and have a significant public health impact. Determining the prevalence of these pathogens represents a useful tool for establishing basic control measures directed to reduce their impact. A serological survey was conducted to determine the seroprevalence of *Salmonella* spp. and *Yersinia* spp. in pigs reared in outdoor systems from South Spain. A total of 1,187 serum samples were collected at two different abattoirs from 80 farms and analysed for specific antibodies against the above mentioned pathogens using commercial ELISA kits. Antibodies against *Salmonella* spp. were detected in 1,052/1,187 pigs (88.63% individual prevalence) from 80 of 80 herds (100% herd prevalence), ranging from 40% to 100% positive pigs/herds (median=93.33%), with a cut-off optical density (OD) % of 20. However, when a cut-off OD% of 40 was used, antibodies against *Salmonella* spp. were detected in 669/1,187 pigs (56.36 % individual prevalence) from 80 of 80 herds, ranging from 6.67% to 100% positive pigs/herds (median=53.85%). Antibodies against *Yersinia* spp. were detected in 1,111/1,187 pigs (93.60% individual prevalence) from 80 of 80 herds, ranging from 26.67% to 100% positive pigs/herds (median=100%), with a cut-off OD% of 20. When a cut-off OD% of 40 was used, specific antibodies against Yersinia spp. were detected in 970/1,187 pigs (81.72% individual prevalence) from 80 of 80 herds, ranging from 13.33% to 100% positive pigs/herds (median=86.67%). Different cut-off OD%s may be used depending on the expected seroprevalence of the examined pathogen. A high risk of infection posed by *Salmonella* spp. and/or *Yersinia* spp. might be expected from the targeted population of this study due to their high seroprevalence, however, microbiological analyses are necessary to confirm the impact of these pathogens in meat products.

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INTERANNUAL VARIABILITY ON SEROPREVALENCE OF *SALMONELLA* SPP. IN FREE-RANGE FATTENING PIGS IN SOUTH SPAIN

Salmonella spp. is considered as one of the most important zoonotic pathogens of swine. Despite of several attempts are being conducted to control *Salmonella* prevalence there is still lack of studies to improve control measures in pigs reared in outdoor systems. The aim of this study was to evaluate the effect of interannual variability on Salmonella seroprevalence at herd and individual levels in pigs reared in free-range systems in South Spain. To carry out this study blood samples from 10-15 animals/herd, from 40-62 herds, which belonged to the same stockbreeding cooperative, were collected at the abattoir. Serum samples were analysed to detect specific antibodies against Salmonella spp. using the same commercial ELISA kit (SalmotypePig Screen+E, Labor Diagnostik Leipzig, Leipzig, Germany; cut-off >40%). The sample size was determined using Win Episcope v.2.0 software on the basis of the number of samples required for a previous unknown prevalence, assuming a 95% level of confidence and an accepted error of 9%. The interannual variability was calculated from samples collected during the same season (January-April) from 2008 and 2011. In 2008, antibodies against Salmonella spp. were detected in 136/620 pigs (21.94% individual prevalence) from 48/62 herds (77.42% herd prevalence), ranging from 10% to 90% positive pigs/herd (median = 30%). In 2011, a marked increased in *Salmonella* prevalence was observed both at individual (350/599 pigs; 58.43% individual prevalence) and herd level (40/40 herds; 100% herd prevalence), ranging from 6,66% to 100% positive pigs/herd (median = 60%). The marked increased observed in the seroprevalence of *Salmonella* in our study highlights the importance of including interannual surveys on *Salmonella* seroprevalence in free-range pigs, pointing out to the analysis of serum samples as a useful tool for surveillance and control studies on *Salmonella*.

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SALMONELLA AND *TOXOPLASMA* ANTIBODIES IN FATTENING PIGS – COMPARISON BETWEEN SERUM AND MEAT JUICE

Objective: Various commercial ELISAs to detect antibodies against *Salmonella* spp. or *Toxoplasma gondii* are on the marked. Most of them are validated for serum as well as meat juice. Aim of the study was to compare the results of *Salmonella* and *Toxoplasma gondii* antibody detection with ELISA in serum and meat juice in fatteners at the slaughter.

Material and methods: Serum and meat juice of 1376 slaughter pigs from 73 fattening farms were tested for antibodies against *Salomella* spp. (PrioCHECK® Salmonella Ab porcine 2.0, Prionics) and *Toxoplasma gondii* (PrioCHECK® Toxoplasma Ab porcine, Prionics).

Results: Six (6) farms (8%) had at least one pig with positive antibody result against Salmonella in serum. Four of them were found positive in meat juice, too. 19 farms (26%) were found positive for Toxoplasma gondii antibodies. 11 of them showed also positive results in meat juice.

Salmonella antibodies in serum were found in 30 pigs (2.2%), in meat juice of 23 pigs (1.7%), whereat 14 positive results were according.

Antibodies against *Toxoplasma gondii* were detected in 136 serum samples (9,9%) and in 76 meat juice samples (5,5%), 70 of them were according.

Strongly positive antibody results against both infectious agents in serum were found more often corresponding with meat juice than weak positive results.

Conclusions: Serum seems to be until now the most sensitive medium for *Salmonella* and *Toxoplasma* antibody detection on farm level as well as on individual level.

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EFFICACY OF A BLEND OF ENCAPSULATED ACIDS AND ESSENTIAL OILS TO REDUCE *SALMONELLA* CARRIAGE IN SLAUGHTERING PIGS

Salmonella is one of the most frequent food borne zoonosis along with Campylobacter. Organic acids are well known for their anti-salmonella activity. The antimicrobial effect of specific essential oils has also been proven. The aim of this trial was to evaluate the ability of an encapsulated source of formic and citric acid along with a blend of essential oils (FormaXOLTM) to reduce the rate of Salmonella carrier pigs in a fattening farm. 600 pigs of 90 days of age were allocated in the same barn and randomly split in two groups, control and treatment. The control group received the commercial growing-finishing diets, while the treatment group received the same diet with FormaXOL at 4kg per tonne during the first 4 weeks. After this period FormaXOL was included at 1kg per tonne of feed until slaughtering. At arrival thirty pigs per group were sampled by rectal swab and bled. All rectal swabs tested negative and only one pig of the treatment group had antibodies versus Salmonella. At approximately 200 days of age, environmental contamination was detected in various boxes of both groups by pooled faecal sampling. At slaughtering, 30 mesenteric lymph nodes and 60 blood samples were collected from both groups. The rate of lymph node Salmonella carriers was 23/30 and 2/30 in control and treatment group respectively (Fisher Exact Test, $p<0,01$). The rate of sero-positive pigs was 58/60 and 51/60 in control and treatment groups respectively. The difference between the two groups was not significant but, interestingly, there was a different distribution of S/P ratio with 18 and 8 pigs with S/P ratio >3 in control and treatment group respectively. The results of this study confirm the efficacy of the tested product in reducing the rate of Salmonella carrier pigs at slaughter.

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LOOK NO HANDS! VISUAL INSPECTION OF PIG CARCASES REDUCES MICROBIAL CONTAMINATION

The focus of traditional methods of meat inspection is the detection of gross lesions that make a carcass unfit for human consumption. These methods are not always suitable for detecting some of the important food-borne pathogens (e.g. Salmonellae and Yersiniae). One supporting argument for a move to a visual-only inspection system is that it could reduce the cross contamination of carcasses that may occur via the hands and knives of meat inspectors. In this study we compared the microbiological status of outdoor fattening pig carcasses after both methods of inspection.

Microbiological samples were taken from a systematic random sample of carcasses in a British abattoir, immediately after both inspection points during a field trial of the visual inspection method. Samples were processed for total aerobic plate and Enterobacteriaceae count (indicators for the hygiene process), and *Salmonella* and *Yersinia* spp. isolation.

No Salmonellae were isolated. Thirteen Yersiniae were isolated. There was no statistical difference in the proportion of Yersinia contamination of carcasses found and in the mean of the log10 of total aerobic plate contamination of carcasses after the two inspection methods. There was a statistically significant difference in the mean of the log10 of the Enterobacteriaceae count when present; the level of contamination of carcasses was lower after visual-only inspection compared to traditional inspection.

The abattoir used for the field study had a particularly good hygiene process with considerable attention being paid to procedures on the line to ensure this. It is possible that a change in the inspection method from traditional to visual would lead to a similar result in any abattoir with a level of contamination as low as or higher than the study premises. Measures used within this abattoir could be championed as 'best practice' for hygiene processes in other premises in the UK.

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PREVALENCE AND PREVENTION OF PATHOGENIC *YERSINIA ENTEROCOLITICA* ON PIG FARMS

Yersinia enterocolitica is a foodborne pathogen that causes human yersiniosis. Symptoms include gastroenteritis with fever and diarrhoea. Post-infectious sequela such as reactive arthritis, erythema nodosum and uveitis are possible. Yersiniosis is the third most commonly reported foodborne zoonosis in the EU. Pigs are considered the major reservoir of Y. enterocolitica. The pathogen is carried to the slaughterhouses by pigs that are already infected on farms. The contamination of pig carcasses could be reduced by decreasing the presence of Y. enterocolitica at farm level.

Faecal (n=1481), blood (n=334) and environmental (n=120) samples were collected from 30 pig farms. Y. enterocolitica was cultured from faeces and environmental samples. Yersinia antibodies were determined from blood samples. Farm practices and conditions were recorded during each sampling visit and their association with the presence of Y. enterocolitica and Yersinia antibodies on farms were tested.

Y. enterocolitica was isolated from 67% and antibodies were detected on 88% of farms. The presence of the pathogen varied significantly in different age groups. No Y. enterocolitica was detected in piglets below one month of age. Eighteen per cent of one to two months old piglets excreted Y. enterocolitica in faeces, whereas 41% of two to three months old and 26% of three to five months old pigs excreted the pathogen. Only 16% of five to six months old finishing pigs and 4% of sows excreted Y. enterocolitica. I n contrast, the level of Yersinia antibodies was the highest in five to six months old finishing pigs (78%).

Buying pigs from no more than one supplier at a time, generous use of bedding, using all-in all-out system in the weaning and fattening units and the use of municipal water were discovered to be protective factors against the presence of Y. enterocolitica. These factors should be considered in prevention of Y. enterocolitica on farms.

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A REVIEW OF DISEASE INCIDENTS DUE TO TOXICITY IN PIGS OVER THE LAST TEN YEARS IN ENGLAND AND WALES

Disease events due to toxicity in pigs which are diagnosed by the Animal Health and Veterinary Laboratories Agency (AHVLA) raise concerns regarding food safety. A risk assessment is undertaken taking into consideration the toxic substance identified and whether the exposed pigs are destined for the food chain. Incidents are reported to the Food Standards Agency and, where appropriate, voluntary restrictions are applied requiring withdrawal from the toxic substance and a specified time to elapse before pigs can be slaughtered for human consumption. Between 2002 and 2012, 22 separate disease incidents due to toxicity were diagnosed in pigs submitted to AHVLA. The majority of incidents were due to plant poisoning with bracken toxicity (Pteridium aquilinum) being most common. Bracken poisoning in pigs usually results from exposure over a prolonged period and is due to the thiaminase toxic component. It causes a cardiomyopathy and heart failure and post-mortem findings reflect this with pulmonary oedema, pleural effusion and, sometimes pallor of the myocardium. Clinical signs may be predominantly respiratory distress and dyspnoea but, in many cases, pigs were found dead without signs having been seen. The second most common cause of toxicity is coal tar in which phenol is the main toxin and causes a hepatopathy and non-specific clinical signs including malaise, inappetance and deaths, sometimes widespread. The sources of coal tar included road waste, roofing materials, tar flooring and clay pigeon remnants. Perhaps surprisingly, anticoagulant rodenticide poisoning is rarely diagnosed. Risk factors for poisoning include keeping pigs outdoors in less controlled paddocking than used in large commercial pig herds, with access to a wider range of wild plants in woodland or rough grazing. Cases are also seen where owners have fewer stockmanship skills and unwittingly allow pigs access to toxic materials.

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PK/PD OF FLORFENICOL ADMINISTERED ORALLY AGAINST COMMON SWINE PATHOGENS

Objective: The objective of the paper was to compare the pharmacokinetics (PK) of florfenicol (Florvio ™ – Novartis Animal Health Inc.) administered orally by gavage and in the drinking water with the pharmacodynamics (PD) of various common swine pathogens.

Materials and methods: The PK of florfenicol administered by capsule (1) at 15mg/kg bwt showed the product was very well absorbed giving a Concentration maximum (Cmax) of 14.8µg/ml and Area under the curve (AUC 24h) of 100.5µg/ml. When administered in drinking water (2) for 3 days at 100 and 150ppm (approximately 10-15mg/kg bwt) the AUC 24h for day 1, 2 & 3 at 100ppm was 28.3, 25.7 and 21.6µg.h/ml and 29.8, 27.6 and 22.9µg.h/ml at 150ppm. This was surprising, as there was comparatively little difference between the 100ppm and 150ppm florfenicol treated pigs (6.2%). The AUCs were far lower than the single oral dose with a mean at 100ppm of 25.2µg.h/ml (25.1%) and a mean at 150ppm of 26.8µg.h/ml (26.6% of the oral gavage figure), associated with a marked drop in water intake. The mean Concentration steady state (Css) for 100ppm over 3 days was 1.05µg/ml and at 150ppm 1.12µg/ml. The PD for florfenicol (3) showed the MIC50 and MIC90 for Actinobacillus pleuropneumoniae and Haemophilus parasuis to be 0.25 and 0.5µg/ml for both, respectively; for Pasteurella multocida, 0.5 and 0.5µg/ml, respectively and for Streptococcus suis 2.0 and 2.0µg/ml, respectively.

Results and conclusions: Florfenicol administered at 100ppm in the drinking water reached concentrations in excess of the MIC90 for A. pleuropneumoniae, H. parasuis and P. multocida but not the MIC50 and MIC90 for S. suis.

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PK/PD OF TIAMULIN ADMINISTERED BY INJECTION AGAINST COMMON SWINE JOINT PATHOGENS

Objective: The objective of the paper was to compare and contrast the pharmacokinetics (PK) of tiamulin (Denagard 200 Injectable – Novartis Animal Health Inc.) in joints with the pharmacodynamics (PD) of various common joint pathogens.

Materials and methods: The PK of tiamulin given by injection at 15mg/kg bodyweight in the plasma and joint fluid of young piglets were previously reported (1, 2). Areas under the curve (AUC24h) of 17.4 and 11.2µg.h/ml (64%) were calculated for plasma and joint fluid respectively (1, 2). The Concentration maximum (Cmax) were 1.64 and 0.77µg/ml and Concentration steady state (Css) were 0.73 and 0.47µg/ml for plasma and joint fluid respectively. The MIC90 for Mycoplasma hyosynoviae and Mycoplasma hyorhinis were recorded at 0.025 and 0.25µg/ml, respectively (3). The MIC50 and MIC90 for Streptococcus suis, a common bacterial joint pathogen in piglets, were 1.0 and 2.0µg/ml (4) and for Haemophilus parasuis (UK isolates) were 4.0 and 16µg/ml (5), respectively.

Results and conclusions: The MIC90s for M. hyosynoviae and M. hyorhinis were well below the Css for tiamulin in joint fluid and with AUC/MIC90 figures of 448 and 45h, respectively, showing a strong inhibition of both Mycoplasma spp, especially M. hyosynoviae. However, it is considered unlikely that tiamulin would reach inhibitory joint concentrations for the MIC50s or MIC90s of S. suis and H. parasuis at this dosage rate in young piglets.

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COMPARATIVE EFFICACY OF ZUPREVO 4%® IN THE EARLY TREATMENT OF *H. PARASUIS* INFECTION

The aim of this study was to evaluate the field effectiveness of Tildipirosin (Zuprevo 4%) as early treatment in the control of H.parasuis infection, but also to evaluate its efficacy and profitability in comparison with Tulathromycin.

The trial was undertaken in a closed herd of 1200 sows. All piglets were vaccinated against MHyo (one dose vaccine, 10d of age) and against PCV2 (18-20d, just before weaning). The farm had a known history of Glässer's Disease affecting piglets 7-10 days post-weaning. All piglets were injected on a regular basis at 18-20 days of life with 0.15ml of Draxxin®. Although clinical symptoms improved, results were not totally satisfactory. It was decided to change antibiotic therapy, and all piglets weaned after June 2012 were treated with 0,5ml of Zuprevo 4%® at weaning. The performance of a total of 12198 piglets treated with Zuprevo® was compared with animals treated with Tulathromycin (12630 piglets). No significant difference in production data before weaning was detected, so the two study groups were considered to be comparable.

Mortality during the weaning period was compared between groups (Levene test and Pearson's chi-square test).

Results: The animals treated with Zuprevo showed a significant reduction in mortality rate compared to the ones treated with Tulathromycin. (0.9% Mt Zuprevo group vs 2.4% Mt Tulathromycin group; $p<0.001$). The percentage of culls was also reduced. Additionally, while in the tulatromycine group 70 of the animals should receive an extra antibiotic treatment (amoxiciclyne or enrofloxacine), only 10-30% of the animals of the Zuprevo® group required extra treatment.

Conclusions: An economic model taking account only the differences in mortality yielded a financial benefit of treating with Zuprevo® instead of tulatromicyn of €0,42/pig, including the cost of the product.

Zuprevo 4% was shown to be an effective and profitable investment to control H.parasuis infections.

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MUTATIONS IN L3 AND 23S RRNA OF B. HYODYSENTERIAE FIELD ISOLATES ARE ASSOCIATED WITH MINIMUM INHIBITORY CONCENTRATIONS (MIC) OF PLEUROMUTILINS

Objectives: The causative agent for swine dysentery, Brachyspira hyodysenteriae (B. hyo), is responsible for severe mucohaemorrhagic colitis with considerable financial loss in worldwide 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 mechanisms might lead to efficient molecular resistance testing for a faster and more efficient diagnostic in the future.

Material and methods: We studied mutation patterns in ribosomal proteins L3, L2, L22, L4 and in sequences of the 23S rRNA involved in the PTC. A set of 64 German field isolates, collected between 1990 and 2011 were included. MICs were determined by the broth dilution method. Single nucleotide polymorphisms (SNP) and combinations were associated with minimum inhibitory concentrations (MIC).

Results: We identified 4 SNPs in L3 and 13 SNPs in 23S rRNA of the 64 strains. One of the L3 SNPs and one of the 23S SNPs were significantly associated with MICs for Pleuromutilins. Combined, these SNPs explained 80 percent of MIC variation, with respect to a threshold of 0,625µg Tiamulin/ml. SNPs in L2, L4 and L22 were silent mutations.

Conclusion: We identified significant associations between two SNPs – one in 23S rRNA, one in L3 – and their combinations and the MICs of Pleuromutilins. The explanation of 80% of MIC variation implies further mechanisms of resistance in B. hyo. Together with mutations published by other groups, but not present in the recent strains, our data suggest distinct sets of mutations as the molecular basis of Pleuromutilin resistance. Such patterns could be used by next generation diagnostic tools to provide a closer link between B. hyo diagnostics and antibiotic therapy.

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IN VITRO STUDY, MINIMUM INHIBITORY CONCENTRATION OF PORCINE MYCOPLASMAS TO SIX ANTIMICROBIALS

This study aimed to evaluate the MIC of 209 porcine mycoplasma strains to their six drugs of choice including doxycycline, enrofloxacin, lincomycin, tiamulin, tylosin, and valnemulin. The MICs were carried out using broth micro-dilution method. The test concentration ranged from 0.006-12.5µg/ml for lincomycin, tiamulin, tylosin, and valnemulin, and from 0.048-100µg/ml for doxycycline and enrofloxacin. Result showed the highest MIC90 to enrofloxacin at 25µg/ml, the resistant rate (%) was 38.3% (80/209). Tylosin was the highest resistant antimicrobial to *Mycoplasma* spp. at 40.2% (84/209) with the MIC90 at 12.5µg/ml. Its maximum range of MIC was exceed at >12.5µg/ml. Doxycycline and lincomycin were the susceptible antimicrobials to the tested isolates with lower resistant rate at only 2.9% (6/209) and 5.3% (11/209), and MIC90 at 6.25 and 3.12µg/ml, respectively. The highest MIC value to doxycycline was 25µg/ml while the highest value to lincomycin was exceed the highest concentration in the test (>12.5µg/ml). All tested mycoplasmas were susceptible to tiamulin and valnemulin, the members of pleuromutilin group, Furthermore, the lowest MIC90 to valnemulin was 0.024µg/ml, while that of tiamulin MIC90 was 0.78µg/ml. The MIC90 to pleuromutilin antimicrobials was less than 1µg/ml to all mycoplasmal strains from this study. In conclusions, Porcine mycoplasmas were most susceptible to Pleuromutilins, tiamulin and valnemulin, without any resistance. *Mycoplasma* spp, showed more resistant to tylosin and enrofloxacin.

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MYCOPLASMA HYOPNEUMONIAE ERADICATION IN A 800 SOW HERD BY PARTIAL DEPOPULATION AND MEDICATION WITH TYLVALOSIN (AIVLOSIN®), TULATHROMYCIN (DRAXXIN®) AND TIAMULIN

Objective: Eradication of *M. hyopneumoniae* from an 800 sow nucleus herd. Three elements were considered crucial1: avoidance of reinfection by biosecurity improvements, only pigs (except suckling) older than 11 months and medication.

Tylvalosin was selected for oral antibiotic medication due to its mycoplasmacidal activity at close to MIC level2. Injectable tulathromycin and tiamulin were selected to increase success rate3.

Materials and methods: The farm is in Spain with weaned piglets and replacement animals on-site. Barrows and the remaining gilts are reared off-site.

The property was double fenced surrounded with an extra vegetation border to prohibit wild boars approaching the farm. A closed corridor was constructed connecting the farm with an external loading bay to prevent any contact with outside. In August 2011 800 sows, suckling piglets and 300 replacement gilts (>11 months) were on-site. For 8 weeks all weaners, finishers and replacement gilts were taken off-site. Buildings were cleaned and disinfected with peracetic/peroxide and 4 weeks later quaternary ammonium compound. Slurry pits were cleaned with caustic soda.

All animals received 2,125mg/kg BW tylvalosin in-feed for 4 weeks. Tulathromycin 2,5mg/kg BW was given to piglets (D3/17 days of age) and sows (twice, 15 days apart) Sows at farrowing and with reduced appetite received 9 mg/kg BW tiamulin. Success was based on lung checks (100/month), PCR on lungs (321 in 2011 and 30/month in 2012) and ELISA serology (389 in 2011, 22/month in 2012)

Results: No clinical signs of Mh, i.e. coughing, have been observed in 14 months following the programme and all PCR and ELISA tests and lung checks have been negative.

Discussion: The farm is considered Mh negative. The combination of oral (tylvalosin) and injectable (tulathromycin/tiamulin) treatment proved to be effective in eradicating *M.hyopneumoniae*.

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STUDY OF EFFICACY AND SECURITY OF ZUPREVO 40MG/ML (TILDIPIROSIN) APPLIED TO TREATMENT OF PIG RESPIRATORY COMPLEX

We study the efficacy and safety of ZUPREVO 40 mg/ml intramuscular inject for early treatment of piglets with Respiratory Complex after weaning on commercial closed 1.400-sow farm positive to Pasteurella multocida, Bordetella bronchiseptica, Haemophilus parasuis y Streptococcus suis. All piglets are vaccinated to Mycoplasma hyopneumonia and Porcine Circovirus before weaning.

The trial was carried out over two groups of piglets in the same weaning week. First with treatment at weaning (300) and second without treatment (159). Our study involve 5 weeks period time after weaning, and take some different parameters each week: mortality, PIEC index, failure treatment, piglets way out, piglet treatment, life weight and relapse. No adverse effects of treatment were observed in any of the treated piglets.

Zuprevo piglets group obtain positive statistical significant difference around weight increase time (6,55 vs 6,16kg), average daily gain (191 vs 161g), mortality rate (4,33 vs 10,06%), retired piglets (13,33 vs 27,04 %), index of treatment (1/3,90 vs 1/1,82), PIEC index (1,22 vs 1,41), failure piglets (1 vs 1,67 %) and relapse piglets (5,33 vs 26,42%).

Zuprevo 4% was shown to be safe and efficacious for the early treatment of an acute outbreak respiratory complex disease, with statistically significant improvements over the untreated piglets. The constant effects over 35 days of the trial demonstrated the excellent duration of product action.

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SOLUBILITY AND STABILITY OF VARIOUS CONCENTRATIONS OF FLORFENICOL IN LIQUID FEED FOR PIGS

The use of liquid feed for pigs has increased world-wide during the last decade. In the European Community, it has been estimated that around 30% of finishing pigs are fed liquid diets. The administration of antibiotics through liquid feed is a common practice when medicating pigs, however little is known about the behaviour of antibiotics in such feed preparations. The aim of the present study was to evaluate the solubility and stability of various concentrations of florfenicol (2.3% oral solution, SELECTAN® ORAL), in liquid feed for pigs.

Four samples of liquid feed (dry feed, feedstuffs, water) were prepared. Each sample had a different concentration of florfenicol (FFC) taking into account: 1) a medication of a 20kg b.w. pig with 10 mg FFC/day; 2) the different possibilities of use of liquid feed in pig farms. The four FFC concentrations tested were: C1 (change of soup every 24 hours) = 0.06 g/L; C2 (change of soup every 12 hours) = 0.13 g/L; C3 (change of soup every 8 hours) = 0.20 g/L; C4 (change of soup every 6 hours) = 0.26 g/L. After preparation of the medicated soups, samples were taken at 0, 2, 4, 6 and 24 hours (h) to determine the FFC concentration by HPLC. The recovery of FFC in the different soups were: C1: 0h = 97.6%; 2h = 95.8%; 4h = 101.6%; 6h = 97.4%; 24h = 97.2%; C2: 0h = 96.7%; 2h = 98.6%; 4h = 100.0%; 6h = 96.8%; 24h = 95.9%; C3: 0h = 100.0%; 2h = 101.9%; 4h = 100.4%; 6h = 101.8%; 24h = 101.1%; C4: 0h = 99.7%; 2h = 100.2%; 4h = 99.6%; 6h = 99.7%; 24h = 99.7%. The FFC remained soluble and stable (96-100% recovery) in the liquid feed for 24 hours regardless of its initial concentration.

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ERADICATION OF *MYCOPLASMA HYOPNEUMONIAE* IN A 2,450 MULTIPLIER SOW HERD USING TYLVALOSIN (AIVLOSIN®) WITHOUT PARTIAL DEPOP-REPOP

Objective: To eradicate M. hyopneumoniae (Mh) using tylvalosin medicated feed in a 2450 multiplier sow, with replacement gilts (from 10 weeks of age onwards) on-site and pigs weaned off-site, without production stop or partial depop-repop.

Materials and Methods – Pre-medication actions: All sows received a 1-shot Mh vaccination (Stellamune One, ELANCO). The number of replacement animals was increased to prolong the period before new animals entering the farm to 2 months. Biosecurity was reviewed. All unhealthy and non-productive animals were culled.

Medication: Animals received feed containing tylvalosin at 2.125 mg/kg BW for 28 (sows) or 56 (replacement gilts) days. Sows with reduced feed-intake and all suckling piglets were injected with tulathromycin (2.5mg tulathromycin per kg BW)

Results: No clinical signs of Mh (coughing) for 14 months after eradication. Blood samples taken 1 year after eradication (27 sentinels and 72 young sows born after eradication) tested negative using Mycoplasma hyopneumoniae Antibody Test Kits (BioChek BV, Netherlands).

Discussion: It was concluded that the Mh eradication on a herd level was successful using medication without (partial) depop-repop. Besides the benefits of cost reduction (Mh vaccination, improved FCR, reduced medication cost) due to eradication of Mh1 and treatment of Lawsonia intracellularis2, the major component on PRDC (Mh) is eradicated from this complex giving an additional benefit on the overall health status and performance on the farm.

1 Marco, 2008, Reduction in production costs after an eradication of Mycoplasma hyopneumoniae with tylvalosin from a sow farm, 20th IPVS, 809

2 Miljkovic et al, 2010, Field Evaluation of the Effect of Aivlosin® (Tylvalosin) for the Control of Porcine Proliferative Enteropathy using two Dosing Regimens. 21st IPVS, P.411

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THE EFFECT OF ANTIMICROBIAL SUBSTANCES ON THE OUTER MEMBRANE OF GRAM-NEGATIVE BACTERIA AND THEIR EFFICACY IN WEANING PIGS

The outer membrane (OM) of gram-negative bacteria protects cells from external agents. Permeabilisers destabilise the OM and increase the permeability of the OM to other antimicrobials. The potential of a permeabiliser (PS) (Biomin® Per4izer, BIOMIN, Austria) to weaken OM was tested in in-vitro trials. An increase in the uptake of a hydrophobic probe, 1-N-phenylnaphthylamine was used to measure permeabilisation of OM. The PS was shown to effectively destabilise the OM of Salmonella typhimurium and E.coli.

The effect of the mixture of organic acids, cinnamaldehyde and PS (ACPS) in-vivo was tested in weaning pigs. Growth performance, the pH in the gastro-intestinal tract (GIT), microbial population in the ileum and villus height in the jejunum was determined. Ninety-six weaning pigs were assigned to three treatments and fed commercial diets. The negative control group diet contained no feed additives, whereas the positive control group was supplemented with antibiotics Colistin (100 g/t) and Chlortetracycline (100 g/t). The trial group was fed ACPS (1kg/t). Results showed that at the 56th day of trial, body weight, average daily gain and feed intake were higher in the trial group compared with the two control groups. The pH of digesta collected from the stomach was lower in the group fed ACPS in comparison with the control groups. Microbial analysis showed that the number of E. coli and Salmonella spp. in the ileum of pigs were reduced in the groups fed ACPS and antibiotics in comparison with the negative control. Counts of Lactobacilli and Bifidobacteria in the ileum were higher in the trial group than in the other two groups. The villus height in the jejunum was greater in the positive control group and in the trial group in comparison with the negative control. In conclusion, ACPS positively influenced the intestinal microbiota and growth of weaned pigs.

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FIELD EFFICACY OF FORCYL® SWINE FOR THE TREATMENT OF METRITIS-MASTITIS-AGALACTIA (MMA) SYNDROME IN SOWS

An international, multi-centre, randomised, blinded, parallel design field study was performed, assessing the efficacy and safety of Forcyl® Swine in the treatment of Metritis-Mastitis-Agalactia (MMA) syndrome in sows. Eleven farms in France, Spain and Germany were included.

Recently farrowed sows were selected with clear signs of MMA (hyperthermia, appetite loss, mammary inflammation and/or vulva discharge). The study included 155 sows and they received either Forcyl® Swine (1 injection, 8 mg/kg), or Marbocyl® 10% (3 injections, 2 mg/kg 24h apart). Depending on the affected organ, milk and/or uterine secretions were sampled (D0 and D4), to appraise the bacterial aetiology of the syndrome. Sows were clinically monitored daily (D0 to D4, then D7).

At D4, therapeutic response was observed as 90.2% (Forcyl® Swine group), and 90.4% (Marbocyl® 10% group) ($p<0.001$ for non-inferiority testing). Respectively, 73.2% and 71.2% (Forcyl® Swine, Marbocyl® 10%) of sows treated were deemed cured on D4. All clinical parameters improved similarly in both treatment groups. No relapse was observed during the study. Average daily weight gain of piglets was 185.4g in Forcyl® Swine group and 190.7g in Marbocyl® 10% group (not statistically significant, $p=0.06$).

On D0, Staphylococcus spp. was particularly isolated for milk (38.5% of samples) whereas E. coli was the main isolate found from uterine secretions (36.1%). On D4, E.coli strains were found in only 3.1% of milk samples and in 30.1% of uterine secretions samples.

No adverse event was observed with Forcyl® Swine throughout the study.

In conclusion, a single injection of Forcyl® Swine at 8 mg/kg revealed efficacious and well tolerated in the treatment of MMA syndrome in sows.

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POST FARROWING TREATMENT OF SOWS WITH ORAL MELOXICAM (METACAM® 15MG/ML ORAL SUSPENSION FOR PIGS) OR INJECTABLE KETOPROFEN FOR SUBCLINICAL MMA : COMPARISON OF THE PIGLET WEIGHT GAIN DURING LACTATION

Introduction: In previous field studies, Oral Metacam® 0.4 mg/kg b.w (Boehringer Ingelheim Vetmedica GmbH) has proven to be effective in the treatment of MMA.

The aim of this study was to compare the convenience and the efficacy of the use of a single administration of Metacam® 15 mg/ml oral suspension for pigs (Oral Metacam®) versus other injectable NSAID (ketoprofen 10%) on sows and in piglet performance.

Material and methods: The field trial was conducted on one farrow-to-wean farm (750 sows) located in the northeast of Spain. Overall, 87 sows were randomly allocated the day of farrowing (d0) in two homogeneous groups regarding parity, number of piglets per sow and weight at birth.

One group (n=44) was given 0.4 mg/kg b.w of Oral Metacam® directly into the mouth of the sow on the day of farrowing. The other group (n=43) was treated with ketoprofen 3mg/kg b.w. intramuscular.

Different parameters were evaluated: Average daily gain (per litter), body weight (at weaning) and mortality parameters (n= 1144 piglets).

Results: Total piglet mortality rate up to weaning was lower in the Oral Metacam® group (14,2% vs.15,9%, $p>0.05$). This slight difference in mortality could be due to less piglet crushing rate immediately after the treatment.

Piglets from sows treated with Oral Metacam showed a higher ADG compared to the piglets of ketoprofen group (0.238 vs.0.226 g, respectively; $p<0.05$). This resulted in a higher weight at weaning in Metacam group compared to the piglets of ketoprofen group (6.02 vs. 5.717kg, respectively; $p<0.05$).

Conclusions: This new oral meloxicam presentation reduces the number of injections during the farrowing period and result in additional benefits for sow welfare.

Regarding efficacy, Oral Metacam® treatment in sows significantly increased the pre-weaning piglet ADG and the weight at weaning compared to ketoprofen 10%.

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OPTIMAL SYNERGY BETWEEN TRIMPETHOPRIM AND SULPHAMETHOXASOLE IN COMBINATION FOR ORAL ADMINISTRATION VIA DRINKING WATER FOR PIGS AND POULTRY

Introduction: The aim of this study is to show that plasma time curves of TMP and SMX in poultry and swine show a similar pattern, which would be an prerequisite for the synergy to occur to the maximum extent

Materials and methods: In order to determine the pharmacokinetic properties of the TMP SMX combination following oral administration through the drinking water to pigs a study was performed at RIKILT.

Following a controlled drug free period, twenty-two pigs (inclusive 2 reserves) received medicated drinking water ad libitum for 4 days at a target dosage of 25 mg TMP/SMX (Methoxasol, REG NL 109720 Eurovet Animal Health BV) per kg body weight per day.

Heparinised blood samples were taken from 8 pigs at regular time points hours after start of medication and at 3, 6, and 12 h after cessation of medication and analysed by HPLC.

The HPLC methods were validated according to EU guidelines. The limit of quantification of the HPLC method for TMP was 25 ng/g for plasma. The limit of quantification of the HPLC method for SMX was 50 ng/g for plasma. A similar exercise was performed with poultry.

Conclusion: Following water medication of Methoxasol at an intended dosage of 25 (swine) to 33 (broiler) mg TMP/SMX/kg/day during 4 consecutive days, a fast absorption of TMP and SMX occurred revealing a steady state plasma concentration within 9-12 h after start of medication. The medication induced no clinical noticeable side effects. Following cessation of medication a fast decrease in plasma TMP and SMX concentrations was observed.

With this finding is it shown that pharmacokinetic patterns of both TMP and SMX are very similar both in swine and poultry and that both actives are cleared from plasma relatively fast, leaving no room for single component blood levels inducing resistance.

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MONTECARLO APPROACHES TO PREDICT THE TREATMENT EFFICACY OF RESPIRATORY DISEASE WITH FLORFENICOL IN PIGS

Antimicrobial drugs have been classified as concentration-dependent or time-dependent. The concentration-dependent are those where increasing concentrations at the locus of infection improve bacterial kill. The time-dependent are those where exceeding the minimum inhibitory concentration (MIC) for a percentage of the inter-dosing interval (T>MIC) correlates with clinical efficacy. Florfenicol is an antimicrobial widely used in swine medicine that has been described as concentration or time-dependent relying on the bacterial species involved. Montecarlo approaches involve the use of computer software, via simulation platforms, to provide predictions of the achievement of therapeutic targets.

A model was developed to predict the likelihood of attainment of the Pharmacokinetic (PK)/Pharmacodynamic (PD) parameters that determines florfenicol efficacy on Actinobacillus pleuropneumoniae (APP) and Pasteurella multocida (PM). Area under the curve (AUC)/MIC over 50 and T>MIC 40% of the dose interval are the PK/PD parameters to be associated with antibacterial efficacy according to the literature for florfenicol. For this analysis, Montecarlo simulations were performed using the pharmacokinetic data calculated for Selectan® (HIPRA) and the MICs for Actinobacillus pleuropneumoniae and Pasteurella multocida published in the scientific literature. The software used for the simulations was CrystalBall Software (V. 11.1.2.0.00; Oracle Corporation, RedwoodShores, CA, USA). After running the model, the probability of clinical success, using the AUC/MIC>50 and the T>MIC 40% of the dose interval as a threshold values, were 90% and 94.7% for APP and 87.7% and 94.2 for PM, respectively. In conclusion, it is highly probable that the antibiotic treatment with florfenicol of pig respiratory disease due to APP and PM would be efficacious.

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FLEXIBLE POLYMER AND EMULSION ADJUVANTS FOR COMBINED LIVE AND INACTIVATED SWINE VACCINES

Introduction: Live vaccines are widely used in pig farming practice and are usually not adjuvanted. We have shown previously that the addition of polymeric or oil in water emulsion adjuvants in a PRRS live vaccine enhanced the protection to challenge of vaccinated animals, and allowed to reduce the antigenic load of such vaccine. In this study we show that these adjuvants can also allow the formulation of efficient combined inactivated/live vaccines for swine against Swine Influenza and Aujeszky's disease.

Methods: Inactivated vaccines against Swine influenza (SIV) were formulated with polymer adjuvant Montanide™ Gel 01 (Gel), emulsion adjuvant Montanide™ ISA 15A VG (15A) or without adjuvant. A non vaccinated group was used as negative control. At day 0, 10 seronegative pigs (15kg) were vaccinated in each group intramuscularly in the neck simultaneously with 2ml of inactivated SIV vaccine and 2ml of Aujeszky's disease attenuated live vaccine. Efficacy was followed by antigen specific ELISA and by a challenge procedure against Aujeszky's virus and SIV (day 42). After challenge clinical signs were followed, nasal viral loads and bacterial over-infections of the lungs were scored.

Results: All vaccines tested were safe. Antibody titers and protection to challenge against SIV was significantly superior for Gel or 15A adjuvanted formulations compared to the non adjuvanted vaccine. Protection conferred by the attenuated part of the vaccine was not reduced by the presence of either adjuvant. Moreover, viral shedding after Aujeszky's challenge was reduced in the Gel group.

Conclusions: These results show that relevant aqueous adjuvants such as Montanide™ Gel 01 or Montanide™ ISA 15A VG are compatible with both inactivated and attenuated viral vaccines for swines. Such adjuvants allow the formulation of multivalent combined inactivated/live vaccines. Such combined vaccines can allow the reduction of the number of injections given to pigs in the field.

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FIELD EXPERIENCE USING A NEEDLE-FREE DEVICE FOR INTRAMUSCULAR INJECTION OF A PCV2/*M HYO* VACCINE MIXTURE COMPARED TO CONVENTIONAL INJECTION WITH A NEEDLE

Needle-free devices offer various advantages compared to conventional needles including a reduced risk of haematogenous spread of pathogens and no risk for broken needles. On the other hand, the high pressure that is applied to vaccines when injected needle-free might have a negative impact on vaccine efficacy. While efficacy of the mixture of Ingelvac CircoFLEX® and Ingelvac MycoFLEX® (referred to as FLEXcombo®) with conventional needles and syringe has been demonstrated extensively, little information is available on the use with needle-free devices. This study compared the performances of pigs vaccinated against PCV2 and *Mycoplasma hyopneumoniae (M hyo)*, either using a needle-free device or a conventional needle, under field conditions on a Belgian farm, positive for M. hyo and PCV2.

Piglets were vaccinated and weighed the day of weaning (~21.4 days) with FLEXcombo®. In total, 329 piglets were vaccinated i.m. with a syringe and needle and 330 piglets were vaccinated i.m. with a needle-free injection device. Ten piglets were left unvaccinated as controls, and were blood sampled at 16 and 21 weeks of age. Individual carcass weights were recorded per treatment group.

Serology in the control pigs confirmed challenge with PCV2 and *M hyo*. No significant differences were observed between the treatment groups with regard to weights, growth days or mortality.

Under the conditions of this study pigs vaccinated i.m. with a full dose (2ml) of FLEXcombo® using a needle-free device performed as well as pigs vaccinated with a syringe and conventional needle on a farm challenged with PCV2 and *M hyo*. This indicates that the efficacy of FLEXcombo® was not impaired by the high pressure used when applying the vaccine needle-free. Based on practical experience, special care needs to be taken with needle-free vaccinators to ensure that the device is used properly and a full dose of vaccine is applied.

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P176

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EFFICACY OF SUISENG® AND RHINISENG® WHEN COMBINED IN A SINGLE INJECTION IN GILTS

Objective: The aim of the present study was to compare the serological responses after vaccination of the vaccines Suiseng® and Rhiniseng®, against neonatal diarrhoea and atrophic rhinitis of swine, respectively, when they are mixed together and injected in gilts, in comparison with the injection of these two vaccines separately.

Materials and methods: Twenty-four eight-month old gilts, clinically healthy and free from antibodies against Pasteurella multocida toxin (PMT), Bordetella bronchiseptica (Bb), and main pathogenicity factors of Escherichia coli, were randomly assigned to 4 groups of 6 each. Groups 1-3 were vaccinated twice intramuscularly 3 weeks apart with Suiseng® and Rhiniseng® mixed together (4ml), with Suiseng® alone (2ml), or with Rhiniseng® alone (2ml). Group 4 received a 2ml injection of sterile PBS (placebo). Animals were bled on day 0 (when the first dose was applied), 3 weeks later (when the second dose was applied) and 3 weeks afterwards. Serum samples were stored at -20°C until testing. The serological methods used were: i) a commercially available ELISA assay for the detection of antibodies against Pasteurella multocida dermonecrotic toxin; ii) the micro-agglutination test for Bordetella bronchiseptica; iii) and in-house ELISA assays for the detection of antibodies against relevant Escherichia coli fimbrial adhesins, and heat labile toxin.

Results and conclusions: There were no significant differences in the seroconversion against PMT and Bb, when compared the combination of Suiseng® and Rhiniseng® to the group of Rhiniseng® alone. Similarly, no significant differences were observed in the seroconversion against E. coli when compared the combination of Suiseng® and Rhiniseng® to the group of Suiseng® alone. These results indicate that Suiseng® and Rhiniseng® can be combined, and administered in a single injection to adult pigs, without involving a negative effect in efficacy, as measured by the serological response against all the antigens contained in the two vaccines.

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SAFETY OF SUISENG® AND RHINISENG® WHEN COMBINED IN A SINGLE INJECTION IN GILTS

Objective: The aim of the present study was to asses both local and systemic safety of the vaccines Suiseng® and Rhiniseng® against neonatal diarrhoea and atrophic rhinitis of swine, respectively, when they are mixed together and injected in gilts, in comparison with the injection of these two vaccines separately.

Materials and methods: Twenty-four eight-month old gilts, clinically healthy and free from antibodies against Pasteurella multocida toxin (PMT), Bordetella bronchiseptica (Bb), and main pathogenicity factors of Escherichia coli, were randomly assigned to 4 groups of 6 each. Groups 1-3 were vaccinated twice intramuscularly 3 weeks apart with Suiseng® and Rhiniseng® mixed together (4ml), with Suiseng® alone (2ml), or with Rhiniseng® alone (2ml) following manufacturer's instructions. Group 4 received a 2ml injection of sterile PBS. Body temperature, local and systemic reactions to vaccination were evaluated and recorded.

Results: None of the two vaccines administered alone or in combination, caused abnormal local reactions at the inoculation site. Similarly, no systemic reactions were observed in any of the vaccinated animals, and no significant differences in body temperature were detected among vaccinated animals regardless the vaccination method.

Conclusions: Although Suiseng® and Rhiniseng® are products with safety parameters that fulfil the requirements for their separate administration in adult pigs; usually they are mixed together and injected in a single shot. This is a common practice that clearly reduces labour and animal stress. The results obtained in the present trial demonstrate an optimal safety of this combination under field conditions in gilts. Consequently, there are no safety concerns that may prevent this practice.

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INDUCTION OF MATERNAL IMMUNITY BY VACCINATION OF SOWS AT END OF GESTATION WITH PROGRESSIS®

Introduction: The objective of this report was to assess the benefit of the vaccination with PROGRESSIS at day 90 of gestation (D90) on the antibody titre in piglets and on the PRRSV infection pattern during nursery period.

Material and methods: Data was collected in a well-managed 300-sow farrow-to-finish farm located in one of the most densely populated swine regions in The Netherlands experiencing long-lasting problems ligated with PRSSV in nursery despite a sow vaccination with a commercial EU type MLV vaccine every reproduction cycle, 6 day after farrowing. A new vaccination schedule was applied: primary immunisation, two injections 3 weeks apart, followed by a booster at D90 with PROGRESSIS. Serum samples were collected from piglets of 3 batches (2/3 batches using PROGRESSIS) at 4, 7 and 10 weeks of age for anti-PRRSV antibodies titration by ELISA kit (Idexx) and by IPMA test. Oral fluids were collected from the oldest piglets (7 and 10 weeks of age) of the two last batches for Multiplex PCR test against respiratory pathogens.

Results: Circulation of PRRSV between 5 and 10 weeks of age was serologically confirmed in the batch before implementation of vaccination with PROGRESSIS. Anti-PRRSV maternally-derived antibodies were higher and lasted longer following vaccination with PROGRESSIS. No seroconversion against PRSSV was observed in piglet up to at least 8 weeks of age after implementation of PROGRESSIS. Absence of PRSSV was also evidenced in oral fluids after implementation of PROGRESSIS except in one batch at 10 weeks of age. These last result has nevertheless to be taken with caution regarding low specificity of the Multiplex PCR test.

Conclusion: These results demonstrated that the use of PROGRESSIS just before farrowing can be an efficient tool to induce a prolonged passive immunity and to reduce early infection in piglets. Further investigations on a larger scale are needed to confirm this observation.

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BETTER PERFORMANCE OF PIGLETS BORN FROM UNISTRAIN PRRS VACCINATED GESTATING SOWS AFTER HETEROLOGOUS PRSV SOW CHALLENGE

Introduction: Porcine reproductive and respiratory syndrome virus (PRRSV) can be transmitted from females to piglets during late gestation. Surviving neonates may be weak and can exhibit the respiratory form or be more susceptible to secondary infections during the lactation period. Piglet lactation performance after a heterologous challenge of PRRSV was compared between piglets born from UNISTRAIN PRRS vaccinated and non-vaccinated gestating sows.

Materials and methods: The recommended administration programme of the vaccine was applied at 8-9 weeks of gestation (IM) to 9 naïve sows. Nine control gestating sows remained unvaccinated. The efficacy was evaluated by means of an intranasal challenge at 90 days of gestation with a European heterologous pathogenic PRRSV (Spanish strain 2007; 106.54 CCID50/sow). The homology with the vaccine strain was 86% (ORF5).

Results and discussion: After sow infection, global piglet performance was better in piglets coming from vaccinated sows: piglets were healthiest during lactation period (28d) (respiratory distress was the main amelioration, affecting 6.5% in vaccinated group vs. 10.5% in non-vaccinated one). The mean of weaned piglets/sow also significantly increased in vaccinated group compared to the control one (11.2±1.4 piglets/vaccinated sow vs. 5.7±2.0 piglets/non-vaccinated sow). Moreover, the mean weight at birth was higher in vaccinated group (1.54±0.41kg vs 1.42±0.39kg in non-vaccinated group) and also at weaning time (7.02±0.27kg in vaccinated group vs. the non-vaccinated that was 6.49±1.47kg). Consequently, the average daily gain (ADG) was also drastically improved in the vaccinated group. The mean ADG was of 194.38g/piglet/day (±39.06g) in vaccinated and in the non-vaccinated group was 176.31/piglet/day (±47.64g). In conclusion, vaccination of gestating sows with UNISTRAIN PRRS allowed piglets born from these females, and after PRRSV infection, to survive and clearly perform better during lactation period than piglets born from non-vaccinated and infected sows.

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BETTER PERFORMANCE OF PIGLETS BORN FROM UNISTRAIN PRRS VACCINATED GILTS AFTER HETEROLOGOUS PRRSV CHALLENGE

Introduction: Porcine reproductive and respiratory syndrome virus (PRRSV) can be transmitted from females to piglets during late gestation. Surviving neonates can exhibit the respiratory form or be more susceptible to secondary infections during the lactation period. Piglet lactation performance after a heterologous challenge of PRRSV was compared between piglets born from UNISTRAIN PRRS vaccinated and non-vaccinated gilts.

Materials and methods: The recommended administration programme of the vaccine was IM applied 4 weeks before mating to 8 naïve gilts. Eight control gilts remained unvaccinated. The efficacy was evaluated by means of an intranasal challenge at 90 days of gestation with a heterologous European pathogenic PRRSV (strain isolated in Italy, 106.8 CCID50/gilt). The homology with the vaccine strain was 89% (ORF5 sequence). This study was carried out under a randomised and blinded basis.

Results and discussion: Piglets were examined daily for 28 days after birth. Global piglet performance was significantly better in piglets born from vaccinated gilts: they were healthiest during lactation period (reduction of weakness was the main improvement in 16.7% in vaccinated group vs. 57.2% in non-vaccinated one) and the number of weaned piglets also incremented when vaccinating females with UNISTRAIN PRRS (8.5±2.51 piglets/vaccinated gilt vs. 3.88±2.90 piglets/non-vaccinated gilt). Moreover, piglets of vaccinated group had higher weights at birth (1.65±0.32kg in vaccinated vs. 1.33±0.29kg in non-vaccinated group) and at weaning (8.08±0.18kg in vaccinated group vs. the non-vaccinated that was 6.80±1.76kg). Consequently, the average daily gain (ADG) was drastically better in the vaccinated group. ADG was of 228g/piglet/day (±44.95g) in vaccinated and in the non-vaccinated group was 193.15g/piglet/day (±54.92g).

In conclusion, vaccination of gilts with UNISTRAIN PRRS allowed piglets born from these females, and after PRRSV gilt infection, to survive and clearly perform better during lactation period than piglets born from non-vaccinated and infected gilts.

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ONE DOSE OF UNISTRAIN PRRS IN GESTATING SOWS CLINICALLY PROTECTS AGAINST HETEROLOGOUS PRRS VIRUS INFECTION

Introduction: Vaccination is still the principal means used to control Porcine Reproductive and Respiratory Syndrome virus (PRRSV) infection; however the use of modified live vaccines (MLV) during gestation has been controversial. After evidences for vaccine-induced protective immunity against non-homologous challenge, in this study the heterologous efficacy of UNISTRAIN PRRS was assessed in a naïve gestating sow model. Reproductive performance was the main parameter to claim the efficacy.

Materials and methods: The recommended administration programme of the vaccine was applied at 8-9 weeks of gestation (IM) to 9 naïve sows. Nine control gestating sows remained unvaccinated. The efficacy was evaluated by means of an intranasal infection at 90 days of gestation with a heterologous European pathogenic PRRSV (Spanish strain isolated at 2007; 106.54 CCID50/sow). The homology with the vaccine strain was 86% in the ORF5 sequence. This study was carried out under a randomised and blinded basis.

Results and discussion: Vaccination with UNISTRAIN PRRS significantly reduced reproductive failure caused by wild-type infection during gestation. After vaccine administration there was not any adverse effect derived from vaccination. After experimental infection no abortion occurred in any vaccinated sow (100% farrowing rate) and the gestation length was the optimum for the right foetal development. Consequently, vaccination compared to non-vaccinated group significantly reduced the number of stillborn and the presence of mummies. Also there was an increment of the number of liveborn piglets/sow (12.56±1.67 in vaccinated group vs. 9±2.6 in control group) and a drop in the birth of weak piglets/sow (0.67±0.71 in vaccinated group vs. 2.33±1.80 in control group). Thus it was clearly confirmed that vaccination with UNISTRAIN PRRS during the second term of gestation was safe and able to reduce reproductive consequences of a heterologous PRRS infection at third trimester (were sows are more sensitive to the virus).

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ONE VACCINATION WITH UNISTRAIN PRRS IN GILTS REDUCES VIRAEMIA AND VERTICAL/HORIZONTAL TRANSMISSION OF A HETEROLOGOUS PRRS VIRUS INFECTION

Introduction: Vaccination is still the main tool used to control Porcine Reproductive and Respiratory Syndrome virus (PRRSV) infection. Evidences for vaccine-induced protective immunity against heterologous challenge has been demonstrated (Martínez-Lobo, 2011). The control of the viraemia is essential for the posterior PRRSV consequences, so demonstrate the reduction of viraemia conferred in vaccinated gilts with UNISTRAIN PRRS was the principal goal of our study. The transplacental transmission to piglets of the pathogenic PRRSV and its shedding were also evaluated.

Materials and methods: The vaccine was applied 4 weeks before mating to 8 naïve gilts (IM). Eight control gilts remained unvaccinated. The efficacy was evaluated by means of an intranasal infection at 90 days of gestation with an Italian type 1 pathogenic strain of the PRRSV (106.8 CCID50/gilt). The homology with the vaccine strain was of the 89% in the ORF5. Virus detection was performed by virus isolation (VI) in alveolar macrophages.

Results and discussion: The administration of UNISTRAIN PRRS vaccine statistically reduced the percentage of viraemic gilts (12.5% vaccinated gilts vs.100% control ones) and reduced also the length of viraemic period induced by experimental infection (22.5 days control group vs. 4 days in vaccinated gilts). Furthermore, vaccination significantly inhibited in 59.5% of the cases the vertical transmission of the heterologous PRRSV to piglets (virus detection at birth). There was also a tendency in reducing the shed of the infectious virus in vaccinated gilts, decreasing the possibility of a horizontal transmission to piglets during lactation (50% gilts shed virus by nasal secretions vs. only 12.5% of the vaccinated gilts did). So vaccination with UNISTRAIN PRRS enabled gilts to clear the virus and reduced its vertical and horizontal transmission to their piglets after a heterologous PRRSV infection.

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VACCINATION ONCE WITH UNISTRAIN PRRS IN GILTS CLINICALLY PROTECTS AGAINST HETEROLOGOUS PRRSV INFECTION

Introduction: Vaccination is still the principal means used to control Porcine Reproductive and Respiratory Syndrome virus (PRRSV) infection. The use of modified live vaccines (MLV) has been controversial, but its safety has been now fully proved. Moreover, evidences for vaccine-induced protective immunity against heterologous challenge have been also demonstrated. In this study the heterologous efficacy of UNISTRAIN PRRS was assessed in a naïve gilt model. Reproductive performance was the main parameter to claim the efficacy.

Materials and methods: The recommended administration programme of the vaccine was IM applied 4 weeks before mating to 8 naïve gilts. Eight control gilts remained unvaccinated. The efficacy was evaluated by means of an intranasal challenge at 90 days of gestation with a heterologous European pathogenic PRRSV (strain isolated in Italy, 106.8 CCID50/gilt). It has a homology with the vaccine strain of the 89% in the ORF5 sequence. This study was carried out under a randomised and blinded basis.

Results and discussion: Vaccination with UNISTRAIN PRRS significantly reduced reproductive failure caused by wild-type infection during gestation. After vaccine administration no heat repetition occurred and there was 100% of fertility. After infection no abortion occurred in any vaccinated gilt (100% farrowing rate). Gestation length was the optimum for the right foetal development in vaccinated group (115.3±0.99 days vs. only 113.13±2.17 days in control), and consequently there were more liveborn (9.75±2.05 in vaccinated vs. 7±2.67 piglet/gilt in control group) and less weak-born piglets (0.25±0.46 in vaccinated vs. 1.25±0.89 piglet/gilt in control group). Among vaccinated group there was also significantly less dead-born piglets (stillborn and mummies). Once more, it was demonstrated a heterologous cross-protection capability of the MLV. Thus it was clearly confirmed that the use of a unique dose of UNISTRAIN PRRS vaccine reduces clinical disease associated with a heterologous PRRSV infection.

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ONE-SHOT VS. TWO-SHOT VACCINATION WITH INACTIVATED STX2E-TOXIOD VACCINE TO PREVENT OEDEMA DISEASE: PRELIMINARY RESULTS FROM A FIELD-TRIAL

Introduction: Edema disease is caused by certain Shiga toxin (Stx2e) producing strains of Escherichia coli, and is an important cause of post-weaning mortality in pigs worldwide.

Objective: The aim of this field-trail was to compare the effectiveness of one-shot (off label) vs. two-shot vaccination of a commercially available inactivated Stx2e-toxoid vaccine (Suivac EDT®, Dyntec) in preventing post-weaning mortality caused by edema disease in a Norwegian pig herd.

Material and methods: The herd is self-recruiting farrow-to-feed producer with 5.5-week batch farrowing. The herd has approx. 150 sows and 21.9 weaned pigs/sow/year. It had post-weaning mortality caused by edema disease in the range of 5-8 % over time. Before the start of the field-trial, the diagnosis was confirmed by post-mortem examinations of 34 pigs combined with bacterial cultures and verification of E.coli serotype O139. Vaccination was carried out in two consecutive batches. All piglets (n=686) were vaccinated with subcutaneous injection of a inactivated Stx2e-toxoid vaccine (Suivac EDT®, Dyntec) in the inguinal skin fold at approx. 2 weeks of age. The batches were split by litters, and half of the piglets (n=336) were re-vaccinated two weeks later. The remaining piglets (n=350) were not re-vaccinated.

Results: A total of 4 (0.6 %) pigs died after weaning. There were no post-mortem findings indicative of edema disease in any of the dead pigs, but all had lesions indicative of other cause of death.

Discussion/conclusion: This field trial indicates very good effectiveness of the vaccine in preventing mortality caused by edema disease in this particular herd. There was no difference in effectiveness between one-shot and two-shot vaccination. The trial was carried out in a single herd without the use of control group. Thus, the transferability to a larger population is unknown, and further studies are needed to investigate this.

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COMPARATIVE EFFICACY OF TWO VACCINATION STRATEGIES AGAINST *MYCOPLASMA HYOPNEUMONIAE* AND PORCINE CIRCOVIRUS TYPE 2 IN A FRENCH FARROW-TO-FINISH HERD

Mycoplasma hyopneumoniae (M.hyo) and porcine circovirus type 2 (PCV2) are primary agents of the porcine respiratory disease complex and vaccines against both pathogens are the most widely used swine vaccines in Europe. The objective of this study was to compare the efficacy of two vaccination strategies against both pathogens under field conditions in France. A total of 1074 piglets of 4 consecutive batches of a 600-sows farrow-to-finish herd were randomly allocated to 2 groups: group A (n=536) was vaccinated with Stellamune® One (Elanco) and Circovac® (Merial) at weaning (21 days of age); group B (n=538) was vaccinated with Ingelvac® M.hyo (Boehringer Ingelheim) and Ingelvac® CircoFlex (Boehringer Ingelheim) at weaning (21 days of age). The efficacy was evaluated using clinical [prevalence of lung lesions at slaughter, lung lesion scores at slaughter (Madec and Kobisch, 1982)] and performance [average daily weight gain (ADWG) between birth and 115kg, age at 115kg, lean meat content, carcass price] parameters. Performance parameters were analysed using ANOVA. Prevalence of lung lesions was analysed by Pearson's Chi-square or Fisher's exact test or, if possible, with Mantel-Haenszel test adjusted on batch. Lung lesion scores were analysed by Kruskall and Wallis test. 79.8% and 81.7% of the pigs of groups A and B, respectively had lung lesions at slaughter (P=0.467) and their average lung lesion scores were 4.13 and 4.42 (P=0.230). The ADWG between birth and 115kg was 568.6 and 561.6 g/pig/day in groups A and B, respectively (P=0.092) and their age at 115kg was 202.7 and 205.1 days (P=0.164). The lean meat content was 60.51 and 60.29 in groups A and B, respectively (P=0.165) and their carcass price was €99.62 and €98.45 (P=0.138). Under the current field conditions with a high infectious pressure with M.hyo, there were no differences in efficacy between both vaccination strategies.

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COMPARISON OF PIGLET VACCINATION WITH CIRCOVAC® AND ANOTHER REGISTERED PCV2 PIGLET VACCINE IN EUROPE ON PRODUCTION PARAMETERS UP TO SLAUGHTER UNDER GERMAN FIELD CONDITIONS

Introduction: The objective of this randomised blinded trial was to compare the efficacy of CIRCOVAC® and another registered PCV2 piglet vaccine in Europe (Vaccine X) vaccination on homogeneity of pigs and production parameters during post-weaning and fattening periods under German conditions.

Material and methods: The study was conducted in the north of Germany in a farrowing farm with 600 sows and a nearby connected fattening farm. A total of 338 pigs were included at weaning (21 days) and vaccinated either with 0.5ml CIRCOVAC® (n= 169) or injected with 1.0ml Vaccine X (n= 169). The randomisation was done by litter and sex of the piglets. Piglets were weighed individually after vaccination, at entry into the fattening unit (68 days) and at slaughter (174 days). Student's t-test was used to compare both groups on their weights, growth parameters (average daily weight gain). The homogeneity of bodyweights was compared using a Fisher's test. Chi-square test was used to compare mortality.

Results and conclusion: Following post-weaning and fattening periods, growth was similar between the two groups (CIRCOVAC®: 668 g/day versus Vaccine X: 663 g/day, p=0.54). Moreover, mean bodyweights at slaughter as well as homogeneity of bodyweights were not different (p=0.48, p=0.46 respectively) between the groups. In both groups there was no mortality due to PCV2 and no statistical difference was evidenced regarding global mortality. In conclusion and under the conditions of the study, CIRCOVAC® and Vaccine X provided similar performances regarding growth, homogeneity in bodyweights and mortality.

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IMPLEMENTATION OF PROGRESSIS® VACCINATION IN FATTENERS IN CZECH REPUBLIC: PRELIMINARY FIELD EXPERIENCE

Introduction: The aim of this field study was to assess the benefit provided by the implementation of PROGRESSIS vaccination in fattening unit experiencing high loss rate due to PRSSV under Czech Republic conditions.

Material and methods: The study was conducted in a 6000-pig finishing operation located in Czech Republic. Pigs were purchased from an unique Danish supplier complying with the rules of the SPF Health Status Department (Blue SPF). The herd was free from Swine influenza virus, Actinobacillus pleuropneumoniae but PCV2 circulation was evidenced by IHC in lesions. Pigs regularly experienced an acute outbreak of respiratory disorders 6 weeks after arrival with increasing mortality. At the end of the fattening period. This respiratory syndrome was complicated by Mycoplasma hyopneumoniae and Pasteurella multocida type-D. Interestingly circulation of EU PRRSV in the first month of arrival was serologically and virologically repeatedly confirmed.

Four successive batches before implementation of the PROGRESSIS vaccination program (control group) and 2 successive vaccinated batches were monitored. In order to vaccinate healthy animals with no clinical signs, the pigs were vaccinated twice at 2-week interval with 1.0 mL of PROGRESSIS as early as the second day after arrival. Approximately 640 fatteners were loaded in each batch. Mortality and runts were recorded.

Results and conclusion: PROGRESSIS vaccination induced a clear decrease in both mortality rate (1.2% versus 4.2%) and runt rate (0.5% versus 2.3%). Total loss rates decreased from 6.4% to 1.7%. Further controlled trial would be necessary to confirm this observation.

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SUCCESSFUL REDUCTION OF MORTALITY BY VACCINATION AGAINST OEDEMA DISEASE

Oedema Disease is an Escherichia coli enterotoxaemia in pigs usually occurring in the first two weeks after weaning, but older pigs can also be affected. In Denmark the disease has been caused by haemolytic F18-positive E. coli which produces Shigatoxin Stx2e (verotoxin 2e). Each year 30-50 new cases are diagnosed in Denmark by laboratory examinations. The clinical signs are oedema of the palpebrae and forehead, neurological disorders and sudden death. The disease can be prevented by the same measures as post weaning diarrhoea i.e. low protein, restricted feeding, zinc oxide, antibiotics etc. However, these measures might reduce the performance of the pigs and cause consumer concern about antibiotic use. The objective of this study was to investigate the safety and efficacy of vaccination with ECOPORC SHIGA in preventing Oedema Disease in weaned piglets.

The study was performed on one commercial farm. It was performed as a masked trial with one vaccine group (257 piglets) and one control group (255 piglets). The piglets were vaccinated with 1ml when most piglets were four days old. The inclusion criteria were: healthy pigs, age >2 days, body weight >800 gram. Antibiotic treatments were allowed only by injection. Vaccinated and non-vaccinated pigs were mingled and housed in the same pens. The main response variable was the proportion of pigs that died of post weaning Oedema Disease. All dead piglets were subject to laboratory examinations.

Vaccination reduced the mortality due to Oedema Disease in the nursery from 8% in the control group to 1% in the vaccine group (p=0.01). During the nursery period vaccinated piglets gained numerically 16g/day more weight than the control piglets (p=0.07). No adverse reactions were observed.

Successful control of Oedema Disease by vaccination can reduce the use of other more problematic preventive measures, e.g. zinc oxide and antibiotics.

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NOVEL *MYCOPLASMA HYOSYNOVIAE* VACCINATION OF ONE HERD FAILED TO PREVENT LAMENESS IN FINISHING PIGS

Infection with Mycoplasma hyosynoviae (M. hyosynoviae) is a known cause of arthritis and lameness in finishing pigs. Although antibiotic therapy will cure many cases, other ways of preventing M. hyosynoviae arthritis are warranted. The National Veterinary Institute has recently developed a *M. hyosynoviae* vaccine formulated with formalin-fixed whole-cell *M. hyosynoviae* and CAF01 (Statens Serum Institut, Denmark) as an adjuvant. This vaccine has recently shown promising results in experimentally infected pigs with development of both humoral and cell-mediated immune responses. The objective was to test this novel vaccine in a field trial in one Danish herd with recurrent arthritis problems due to infection with *M. hyosynoviae*.

A total of 399 weaner pigs were included in a clinical trial. The pigs were vaccinated twice, two and five weeks after weaning. Half of the pigs were vaccinated with the novel *M. hyosynoviae* vaccine, and the other half were placebo injected (adjuvant + buffered saline). Two ml doses of both were injected intramuscularly in the neck. Vaccinated pigs and placebo pigs were mixed in the pens. There were no cases of lameness until the pigs were moved to the finishing unit at a bodyweight of 30kg. In the finishing unit, arthritis due to infection with M. hyosynoviae was diagnosed by culture before and during the vaccine trial. Lameness was recorded in 23% of the vaccinated pigs and in 28% of the placebo pigs. The data were analysed by logistic regression, and no significant difference in the prevalence of lameness was found (P=0.157). All lame finishers were treated with Lincosin® and Flunixin® by injection for three days. In conclusion, this novel *M. hyosynoviae* vaccine could not successfully prevent the development of lameness in finishing pigs presumed to have been caused by *M. hyosynoviae* arthritis.

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LOCAL AND SYSTEMIC IMMUNE RESPONSES IN PIGS INTRAMUSCULARLY INJECTED WITH AN INACTIVATED *MYCOPLASMA HYOPNEUMONIAE* VACCINE

The immune response induced by intramuscular administration of a commercial inactivated *Mycoplasma hyopneumonie* whole-cell vaccine (Suvaxyn®MH One) was investigated in conventional *M. hyopneumoniae*-free pigs. The animals were assigned randomly to two groups: non-vaccinated and vaccinated. Pigs in the vaccinated group were injected intramuscularly with the vaccine at 7 days of age, whereas non-vaccinated pigs received physiological saline solution (PBS). Pigs were euthanised and necropsied at 30, 36 and 58 days of age. Blood, bronchoalveolar lavage (BAL) fluid, spleen, lung and bronchial lymph nodes (BLN) were collected. Serum and BAL fluid were tested for the presence of antibodies by ELISA. Monomorphonuclear cells from the peripheral blood and tissues were isolated to quantify the T cell subsets by flow cytometry, and cytokine production by ELIspot and ELISA. Antibodies against *M. hyopneumoniae* were detected in serum of most vaccinated pigs at 30 days of age. *M. hyopneumoniae* specific IgG, IgM and IgA were detected in BAL fluid from vaccinated animals, but not from control animals. Significantly higher numbers of IL-12 secreting cells were observed in the lung at day 58 in the vaccinated than in the non-vaccinated group ($P<0.05$). The number of IL-10 secreting cells from BLN was also higher in the vaccinated group at day 58 ($P<0.05$). After restimulation in vitro, lymphocytes from BLN and lungs secreted significantly higher levels of IL-12 in the vaccinated group at day 58. These results show that the vaccine induced both systemic and mucosal cellular and humoral immune responses.

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EFFICACY OF GRIPOVAC®3/RESPIPORC® FLU3 AGAINST CHALLENGE WITH A RECENT H1N2 SWINE INFLUENZA VIRUS IN PIGS

Introduction: GRIPOVAC®3/RESPIPORC® FLU3 is a trivalent vaccine containing each of the three swine influenza virus (SIV) subtypes that are endemic in pigs in Western Europe. We have examined the efficacy of this vaccine against intratracheal (IT) challenge with a recent H1N2 SIV. Additionally, we compared the IT challenge method with intranasal (IN) challenge, which is closer to the natural route of infection.

Materials and methods: Twenty-four influenza-negative pigs were vaccinated twice, 24 pigs were left unvaccinated. Three weeks after the second vaccination, a vaccinated and a challenge control group of 12 pigs each were challenged by IT or IN route with 7 log10 EID50 of A/sw/Gent/102/07 (H1N2). The pigs were monitored for serum haemagglutination-inhibition antibody titres before challenge and for clinical and virological protection post challenge. Virus titres were determined in nasal swabs and lung samples.

Results: After the second vaccination, all pigs had antibodies against all three vaccine strains and the challenge virus. In most unvaccinated controls IT challenge induced fever, tachypnea and/or dyspnea, whereas IN inoculation produced a largely subclinical infection. In both vaccinated groups, clinical signs were observed in fewer animals and they were milder.

Both inoculation methods resulted in high virus titres in the lungs of unvaccinated control pigs. Both vaccinated groups had reduced mean virus titres in the lungs, but the reduction was only significant at selected time points. Nasal virus excretion was delayed after IT as compared to IN inoculation. With both challenge methods, there was a reduction in nasal swab virus titres in the vaccinated pigs, but it was not significant after IN challenge.

Conclusion: GRIPOVAC®3/RESPIPORC® FLU3 induces a protective response against challenge with a recent European H1N2 strain with 95,5% amino acid homology (HA1) with the H1N2 vaccine strain. The IN challenge method could be used as an alternative for the technically difficult IT method in SIV vaccination-challenge studies.

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COMPARISON OF CIRCOVAC® AND ANOTHER PCV2 PIGLET VACCINE REGISTERED IN EUROPE UNDER BELGIAN CONDITIONS

Objective: The objective of this study was to evaluate the performance of pigs vaccinated at 3 weeks of age with CIRCOVAC during the fattening period and to compare these results with historical data of pig vaccinated with another PCV2 piglet vaccine registered in Europe (Vaccine X) in the same Belgian farms.

Materials and methods: A comparative field study was performed in 14 Belgian farms where performance data of 25 groups of pigs (13420 pigs in total) vaccinated with Vaccine X was compared with data of 14 groups of pigs (7127 pigs in total) vaccinated with CIRCOVAC. All groups were purchased from only one origin and were vaccinated at the different source herds around 3 weeks of age against Mycoplasma and PCV2. All animals were slaughtered between July and December 2011. Average group data including mortality, number of fattening days, feed conversion ratio (FCR) and average daily weight gain (ADWG) were compared between groups. In the slaughterhouse, meat building index of the carcass, meat percentage and average slaughter weight were compared between the different groups. Significance of differences was evaluated using t-tests.

Results: Overall, no significant differences were observed between the groups vaccinated with CIRCOVAC vs. groups vaccinated with Vaccine X. Mortality was on average 2.18% (Min 0.20 – Max 5.00) in the CIRCOVAC groups vs. 3.17% (Min 0.88% – Max. 7.50%) in the Vaccine X groups (p=0.054). Number of fattening days (CIRCOVAC: 134.9 vs. Vaccine X: 135.6), FCR (CIRCOVAC: 3.04 vs. Vaccine X: 3.07) and ADWG (CIRCOVAC: 661.9g/day vs. Vaccine X: 650.5g/day) were not significantly different (p>0.05). At slaughter, no differences were observed for average body weight, meat percentage and meat building index.

Conclusion: Performance of 14 groups of CIRCOVAC-vaccinated pigs was found at least as good as historical data of piglets vaccinated with another PCV2 piglet vaccine registered in Europe in the same Belgian farms.

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COMPARATIVE EFFICACY OF ENTERISOL® ILEITIS AND VIRGINIAMYCIN VERSUS A TYLOSIN FEED PROGRAM FOLLOWING A *LAWSONIA INTRACELLULARIS* CHALLENGE IN PIGS HOUSED UNDER COMMERCIAL CONDITIONS

The objective of this study was to compare an Ileitis vaccine (Enterisol® Ileitis) program to a tylosin (Tylan®, Elanco Animal Health) feed grade program as a control measure for pigs challenged with Li. Three week old pigs (n=2080) were weaned into a two-room wean to finish facility and randomly allocated into 80 pens (26 pigs/pen). Treatments consisted of: 1) Enterisol Ileitis (EI)/Virginiamycin 10 g/ton (Stafac®) or 2) Tylosin Phosphate (Tylan® 100/Tylan® 40). Treatment was randomly assigned to room. Room 1 was vaccinated through the drinking water with EI at 6 weeks of age. At 6 weeks post-vaccination, when vaccine shedding period had ended, 50% of pens were randomly shuffled between rooms. Following pen transfer, 10% of the population (2-3 pigs/pen) was inoculated by gavage with gut homogenate containing 4.5 x 109 virulent Li. Treatment group 1 received 10 g/T virginiamycin from day of inoculation for 80 days. Treatment group 2 received 100 g/T tylosin phosphate for 18 days post-challenge followed by tylosin phosphatet 40 g/T for an additional 62 days. Due to severity of the Li and significant Actinobacillus suis and SIV challenges, all pigs were mass treated with 60 ppm tiamulin (Denagard®) through drinking water on d 45-49 post-challenge. Individual pigs in both groups required treatment with injectable tylosin. Pigs on the EI/virginiamycin program had improved (P=0.05) feed efficiency compared to pigs on the tylosin program (0.420 vs 0.411). No differences (P>0.10) were detected in final BW, ADG, and ADFI between the treatment groups. A significant Li challenge was proven by positive Li histopathological lesions in randomly sampled pigs. Pigs on the Enterisol Ileitis program had a 2.1% improvement in feed efficiency from weaning to day 126 compared to pigs on the Tylosin program.

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FIELD SAFETY STUDY OF PORCINE CIRCOVIRUS TYPE 2 VACCINATION IN PREGNANT SOWS

Recently, field findings have indicated sow vaccination may have a positive impact on reproductive and farrowing unit performance. Practitioners inquire if sow PCV2 vaccination could help stabilise a sow herd. The objective of this study was to evaluate if sow vaccination interferes with piglet vaccination, as well as to evaluate the safety of sow vaccination in late gestation. This abstract focuses on the data related to the safety aspect. The study was conducted in a 2,400 head sow herd located in the Midwest, U.S.A. Sows and gilts were blocked by parity and randomised into two treatment groups, vaccinated (Vx, n=124) and non-vaccinated (NVx, n=128). Vx dams received 2x2ml of PCV2 vaccine (Ingelvac CircoFLEX®, at 6 and 3 weeks pre-farrowing). The elevated dosage (2ml) and two applications were used to test the possible impact on piglet vaccination and safety in sows in a more rigorous situation. Farrowing rate (FR), average total born (TB) and average born alive (BA) were recorded and livability (BA/TB) was calculated. No significant differences in these parameters were observed between the treatment groups. No adverse events were noted following the use of PCV2 vaccine in the sows. Vaccination was administered in the last 42 days of gestation, a time when a negative impact would have affected farrowing rates and in-utero foetus livability. However, this study indicates there was not a negative impact from vaccination. A previous publication had already shown that sow vaccination did not interfere with the efficacy of piglet vaccination (Edler *et al.*, 2008). Future studies are needed to determine the effect of whole herd vaccination on reproductive performance. However, as reproductive failure associated with PCV2 is only seen sporadically, it may be difficult to scientifically prove the benefits of sow vaccination in controlled, side-by-side studies under field conditions.

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FIELD SAFETY STUDY OF PORCINE *MYCOPLASMA HYOPNEUMONIAE* VACCINATION IN SOWS

Sow to piglet transmission of *Mycoplasma hyopneumoniae (M hyo)* might have a relevant impact on the epidemiology of *M hyo* in a herd. While benefits still need to be further clarified, *M hyo* sow vaccination is already commonly practiced in US swine herds. The objective of this study was to evaluate the clinical safety of *M hyo* vaccination in late gestation. A breeding group of sows (n=144), part of a 3,100 head sow herd located in USA, were either vaccinated (Vx, 1ml of Ingelvac MycoFLEX®, at 5 and 2 weeks pre-farrowing, n=72) or not vaccinated (NVx, n=72). Percent farrowed (FR), average total born (TB) and average total born alive (BA) were recorded and percent liveability was calculated. FR was 95.5% for the vaccinates and 98.5% for the non-vaccinates (P=0.62). TB (P=0.81) was 13.1 and 13.3, BA (P=0.99) was 11.8 and 11.8, for Vx and NVx sows, respectively. The percentage of viable pigs post-farrowing (P=0.70) was 90.4% and 89.5% for Vx and NVx groups, respectively. No adverse events were noted following the use of the M hyo vaccine in the dams. In this study, prefarrow administration of an *M hyo* vaccine to sows had no negative impact on reproductive performance. The product is labelled as a one dose administration; however, a two dose application was implemented as a more rigorous evaluation of safety and for use in a subsequent maternal interference study. Based on the results of this study, Ingelvac MycoFLEX® has been shown to have no negative impact on late gestation sows or the in-utero foetuses. A previous publication has already demonstrated the lack of interference with piglet vaccination at 3 weeks of age (Angulo *et al.*, 2012).

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COMPARISON OF THE CONCURRENT USE OF A PCV2 AND AN M HYO VACCINE WITH THE COMBINED USE OF THOSE TWO VACCINES IN PIGS GROWN FOR NINE MONTHS

Reducing the number of injections required to vaccinate pigs against diseases reduces stress for the pigs, time needed for vaccination, the risk of iatrogenic spread of pathogens, broken needles and injuries due to accidental self-injection. Based on efficacy and safety studies, in 2008 a licence was granted in the EU for two vaccines based on the identical adjuvant to be mixed prior to use: Ingelvac CircoFLEX® and Ingelvac MycoFLEX® (mixture referred to as FLEXcombo®). This concept allows protecting pigs against PCV2 and M hyo with a single injection. The present study evaluates the performance of the vaccine mixture compared to separate injections of the individual products under the conditions of swine production in Northern Italy, growing pigs for 9 months or more. On a single-site M hyo and PCV2-positive 700 sow farm in total 880 piglets were vaccinated at weaning (26.5d) either with FLEXcombo® or two separate injections of Ingelvac CircoFLEX® and Ingelvac MycoFLEX®. Losses (mortality and runts) were recorded per production phase. Samples for serology were taken 4 times. Lung scoring was done according to the method described by Madec and Kobisch (1982). ADG was calculated based on carcass weight, an estimated carcass yield of 80%, an estimated birth weight of 1kg and the number of days to slaughter. Serological results confirmed the presence of PCV2 and M hyo during the study. Performance and slaughter check results did not indicate any statistical significant differences between the two treatment groups with regard to losses, ADG, or lung scores.

Under the conditions of this study no significant differences were observed in the performance of pigs vaccinated with a PCV2-*M hyo* vaccine mixture and pigs vaccinated with a PCV2 and *M hyo* vaccine separately. These results confirm the efficacy of the vaccine mixture compared to separate injections of the individual vaccines.

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COMPARISON OF TWO PCV2 PIGLET VACCINATION PROGRAMMES

The aim of this evaluation was to compare the benefits of two different piglet vaccination programmes under commercial conditions in the central region of Spain.

The field observation was carried out in a 2.350 sow farm. The total number of piglets included in this study was 47.780. In the first period, an amount of 18.390 piglets aged 3 weeks, were vaccinated with 1ml of Ingelvac CircoFLEX® and moved to 7 independent fattening units (group A). Afterwards, the vaccination program was changed and an amount of 29.390 piglets were vaccinated with 0.5ml of an inactivated, oily PCV2 vaccine and moved to 10 independent fattening units (group B). PCV2 infection was confirmed in group B by clinical signs, ELISA (IgG, IgM), histopathology and In situ hybridisation (ISH). The fattening performance parameters analysed were: average daily gain (ADG, g/d), feed conversion rate (FCR), mortality (%), medication costs, culls (%), and weight gain (kg) during the fattening period.

Average mortality was 46% less in group A (3.55%) vs. group B (6.52%). The difference of FCR was 33 grams between group A and group B and animals in group A grew 125.8 grams more per day. The medication costs were 53% lower in group A (€0.82/pig) vs. group B (€1.73/pig) and the average percentage of culls was 57% lower in group A, too. Group A needed 6.5 days less to reach the slaughter weight.

Under the conditions of this study, the results of ADG, mortality, medication costs, and weight gain observed in group B were significantly worse compared to the Ingelvac CircoFLEX® group. Taking into account the production costs, the use of Ingelvac CircoFLEX showed a return on investment of €5.92 compared to the other PCV2 piglet vaccination program.

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INVESTIGATION OF THE EFFICACY OF AN INACTIVATED TRIVALENT SWINE INFLUENZA VIRUS VACCINE AGAINST EUROPEAN PORCINE H1N2 VIRUSES

In the course of several reassortment events the novel swine influenza A virus subtype H1N2 emerged in Scotland in the 1990s and spread over Europe. Its lacking cross-reactivity to bivalent H1N1+H3N2 vaccines required the development of a new trivalent swine flu vaccine.

Such a vaccine was developed and licensed in 2010 under the trade names RESPIPORC FLU3 and GRIPOVAC3. This vaccine contains inactivated cell culture grown viruses of subtypes H1N1, H3N2, and H1N2. A substance from the carboxyvinylpolymers group was used as an adjuvant which provides a high safety because it is well tolerated by pigs.

A major focus of investigation was the proof of efficacy against heterologous H1N2 field strains in experimental infection trials. Five challenge experiments were conducted on a total of 158 pigs. Three recently isolated field isolates of subtype H1N2 were used for the experiments. The strains were sequenced and analysed phylogenetically. Pigs were vaccinated twice. Vaccinated pigs displayed neutralising and hemagglutination inhibiting antibodies as early as 7 days after the second vaccination. For proof of efficacy an aerosol method was used in which high doses of field viruses were sprayed by a generator.

Vaccinated animals had almost no clinical symptoms after infection, whereas unvaccinated animals exhibited fever, dyspnea and sleepiness. The viral load in the lungs was significantly lower in vaccinated pigs compared to unvaccinated animals. Lung lesions typical for influenza were observed in the apical parts of medial and cranial lung lobes of the control animals, whereas vaccinated pigs showed no lesions. Moreover, histological investigations revealed a higher degree of inflammation in the unvaccinated pigs.

Vaccinated pigs were protected against all three H1N2 field strains used in the challenge trials.

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AN *M HYO*/PCV2/PRRS VACCINE MIXTURE ACHIEVES COMPARABLE RESULTS AS SEPARATE INJECTIONS OF AN M HYO/PCV2 VACCINE MIXTURE AND A PRRS VACCINE

Diseases in swine production are becoming more complex and on many farms pigs are vaccinated against multiple diseases around weaning. Reducing the number of injections needed to protect pigs against major pathogens, like *Mycoplasma hyopneumoniae* (*M hyo*), PCV2 and PRRSv is not only more convenient, but reduces the stress for the pigs as well. In 2010 a licence was granted in the US for the mixing of Ingelvac MycoFLEX®, Ingelvac CircoFLEX® and Ingelvac® PRRS MLV prior to use (referred to as 3FLEX®). The objective of this study was to compare the efficacy of 3FLEX® with the concurrent application of Ingelvac® PRRS MLV and FLEXcombo® (the mixture of Ingelvac MycoFLEX and Ingelvac CircoFLEX®) under German field conditions.

The experiment was conducted on a commercial 700 sow farrow-to-finish farm in Germany. At 21 days of age one group of piglets was vaccinated with the *M hyo*/PCV2/PRRS vaccine mixture (n=399), while the other group (n=400) received the M hyo/PCV2 vaccine mixture and the PRRS MLV vaccine at two different injection sites. Both groups were weighed individually at 3, 11, 17 and 23 weeks. Blood samples were collected in 2-3 week intervals until slaughter and tested for antibodies against PCV2 and PRRSv. Broncho-alveolar lavage fluid (BALF) samples were collected from 15 pigs per group at 3, 7, 11 and 17 weeks and analysed by PCR.

BALF results confirmed challenge with *M hyo*, PCV2 and PRRSv EU. No significant differences were observed between the two groups with regard to wean-to-finish weight gain, mortality or lung lesions at slaughter. Based on the results of this study it can be concluded that a single injection of the *M hyo*/PCV2/PRRS vaccine mixture provided the same level of efficacy and performance as the separate injections of the *M hyo*/PCV2 vaccine mixture and PRRS MLV.

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HYPER-IMMUNISATION OF PRIMIPAROUS SOWS IMPROVES PRODUCTIVE PERFORMANCE OF THEIR OFFSPRINGS IN NURSERY PERIOD

The aim of this experiment was to evaluate the effect of hyper-immunisation of gilts on productive and health status of their progenies. The experiment was conducted in a farrow-to-finish commercial farm in Mantova (Italy). A total of 48 sows (32 gilts and 16 mature sows) were used for the experiment and managed as follows: 16 gilts (GILT) under usual vaccination program (Aujeszky, PRRS, Erysipela, Parvovirus); 16 gilts (H-GILT) were hyper-immunised adding the ones against circovirosis and colibacillosis; and mature sows (SOW), parities 3-6, under usual vaccination program. Fostering was allowed within sows in the same treatment group. Three nursery rooms, including 12 pens each (12 pigs/pen; 4 pens/treatment and room) were used. Pigs were weighed at birth, weaning (about 21 days of age) and at the end of nursery period (63 days of age). Average daily gain (ADG) was calculated in lactation and in nursery periods. Percentage of mortality and ADG of piglets were analysed by GLM models using glimmix and GLM procedures of SAS. In lactation, ADG was higher in SOW than in GILT pigs, while H-GILT group did not differ from any of them. However, both SOW and H-GILT pigs showed a similar ADG in nursery period, being higher than in GILT pigs (P=0.013). Consequently, final body weight was lower (P=0.0001) in GILT (14.6kg) than in H-GILT (16.2kg) and SOW (16.6kg) pigs. Percentage of mortality was lower in SOW than in GILT pigs, especially in the nursery period (0.64% vs 7.04%; P=0.02). In this sense, antibiotic interventions, especially against diarrhoea, were also higher in GILT than in SOW pigs, while H-GILT were in between closer to GILT group. In conclusion, hyper-immunisation of gilts was efficient to improve productive performance and health status of their progeny during lactation and nursery periods.

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EFFICACY OF A MODIFIED LIVE PRRSV VACCINE (FOSTERA™ PRRS) AGAINST A THAI HP-PRRSV COMPARING TO A MILD PATHOGENIC TYPE 1 PRRSV

A licensed modified live PRRS vaccine (Fostera™ PRRS) was given to three week old PRRSV-free pigs. Comingling among non-vaccinated and vaccinated pigs in each group with equal number of pigs was conducted when challenged at 21 days post vaccination (dpv) by a Thai highly pathogenic-PRRSV (10PL1) (n=11) or a Thai mild type 1 PRRSV (01NP1) (n=12) at 105.5 TCID50/ml in the appropriated groups, respectively. Growth performances, clinical signs, specific cytokine levels, levels of viraemia using real time RT-PCR, mortality rate, and lung lesion scores were evaluated. A few vaccinated animals showed off-feed with no increased rectal temperature after vaccination but average daily weight gain (ADWG) and FCR were not significantly different (>0.05). Evidently, viral vaccine was detected at low levels until 7 dpv. After challenged with the HP-PRRSV, the vaccinated group showed reduced mortality rate (45.5 % mortality rate) and delayed onset of death when compared to the non-vaccinated group (74 % mortality rate), but no pigs died in the 01NP1 Challenged group. However, after challenged with both PRRSV isolates, both vaccinated and non-vaccinated animals had no different averaged levels of viraemia or lung scores. Interestingly, the increased levels of gamma interferon (INF-g) in the vaccinated pigs infected with 01NP1 was observed but not significantly different (>0.05). This present study suggested that Fostera™ PRRS is able to improve survival rate when challenged with the HP-PRRSV but the mechanisms of protection are not clearly elucidated.

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LABORATORY ASSESSMENT OF SILVER NANOPARTICLES AS A POTENTIAL METHOD OF REDUCING INFECTIOUS AGENTS OF PIGS

Silver nanoparticles have been shown to be effective in reducing MRSA loads in the environment of pigs in controlled conditions. *Mycoplasma hyopneumoniae (M. hyopneumoniae)* is the causal agent of enzootic pneumonia (EP) in pigs. Methods to reduce disease cause by *M. hyopneumoniae* include bio-security, vaccination and medication. On an affected herd disease severity will be influenced by many factors but primarily the amount of pathogen to which the pigs are exposed. The aim of this work is to investigate the potential of silver nanoparticles in reducing pathogens including *M. hyopneumoniae* in the environment of pigs. Reference strain *M. hyopneumoniae* 232 was used in the log stage of growth. Briefly, one ml of either Friis medium (F), PBS, dH20 or silver nanoparticles (Ag) was added to a pellet of *M. hyopneumoniae* and re-suspended. Additionally, the efficacy of three commercially available disinfectants (V, T and P) was compared with silver nanoparticles in the same experimental design. Experiments were repeated in duplicate. After incubation growth of *M. hyopneumoniae* was assessed at various time points (1min, 60min and 12h) by direct culture and quantified by colour changing units (CCU). Quantification (CCU) of M. hyopneumoniae showed silver nanoparticles inhibited growth by 60 min (0.5CCU/ml) whereas there was good growth with F, PBS and dH2O at all time points (1min, 60min and 12h) (10 CCU/ml). As expected there was no growth with V, T and P (0 CCU/ml). Colonies were visible on Friis agar in F, PBS and dH2O, but not V, T, P and silver after 60min. Silver nanoparticles have been shown to inhibit the growth of *M. hyopneumoniae* within minutes of application. Further work is needed to determine the efficacy of silver nanoparticles in reducing infectious agents in the environment of the pig.

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DETOXIFICATION OF FUMONISINS – ENZYMATIC DEGRADATION AND SAFETY OF THE RESULTING METABOLITE

Among toxic mycotoxins, Fumonisins (FUM) are of major concern in terms of animal health, economic losses and worldwide occurrence. They are toxic to animals and exert their effects through mechanisms involving disruption of sphingolipid metabolism.

We investigated the potential application of a carboxylesterase as a feed enzyme for gastrointestinal hydrolysis of FUM. This bacteria-borne enzyme possesses the ability to remove the tricarballylic acid side chains of FUM, resulting in hydrolysed FUM (HFUM).

Two separate studies were then conducted in pigs for evaluating both safety and efficacy of the biotransformation strategy. First, our comparative study showed that HFUM, initially obtained by the enzymatic treatment, is much less toxic than the parent compound FUM. The effects were markedly less pronounced in terms of lesions or inflammatory response in liver, alteration of the integrity of the intestinal epithelium, and modulation of the cytokine expression in the digestive tract. This low intestinal and hepatic toxicity of HFUM correlated with its inability to alter the metabolism of sphingolipids. In a second experiment, this similar absence of effect on sphingolipids has been observed in plasma of pigs fed with FUM-contaminated diet treated with the carboxylesterase. This suggests a reduced bioavailability of FUM in the intestinal tract, and most likely accounts for the reduced effects observed in these pigs in comparison to the ones fed the same diet but non-treated with the enzyme. Indeed, the addition of the enzyme was able to partially to totally neutralise the effects on the neutrophil concentration, the pulmonary lesions, and the immune response (cytokine expression and lymphocyte proliferation).

In conclusion, the management of FUM based on the treatment of contaminated commodities with this enzyme would be a suitable approach to limit the toxicity of this mycotoxin.

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ADMINISTRATION OF ORAL METACAM® 15MG/ML TO CONTROL SUBCLINICAL MMA IMPROVED PIGLETS PERFORMANCE WHILE TAKING SOW WELFARE INTO ACCOUNT

Mastitis-metritis-agalactia (MMA) is a complex syndrome in which hypogalactia or agalactia occurs in a clinical or subclinical way within the first hours postfarrowing; subclinical MMA (also called Postpartum Dysgalactia Syndrom PDS) can lead to major financial losses, as it causes mortality and decreased growth performances in sow offspring. Around farrowing, many injections are often performed on sows increasing their stress and pain. Metacam® 15 mg/ml (oral suspension) has already been successfully implemented in farms concerned by subclinical MMA (I. Hernandez-Caravaca and al., 2012, 4th ESPHM), improving piglets performances, while taking sow welfare into account; in this field study, carried out in a French farrow-to-finish farm, ten batches of sows were included in total (5 batches in Group Metacam®: 212 sows, 5 batches in Control Group: 209 sows); every other batch, sows received Metacam® 15 mg/ml oral suspension at the end of farrowing (Boehringer Ingelheim Vetmedica GmbH; meloxicam: 0.2 mg/Kg of body weight). The administration of Metacam® 15 mg/ml was made directly into the mouth using the dosing syringe supplied with the product, and graduated in kg liveweight. The repetition of the study on ten successive batches avoided farrowing room effect. Each batch of sows was also receiving exactly the same treatments and care at farrowing, in accordance with normal farming practices; any adoption between batches was strictly prohibited. In this study, the use of oral Metacam® 15 mg/ml (meloxicam) allowed to reduce the number of postpartum injections, improving sow welfare. It also permitted efficient control of subclinical MMA, decreasing offspring pre-weaning mortality (Metacam® group: 11.5 % vs Control group: 14.7 % $p<0.001$), and leading to an increased number of piglets weaned per sow (Metacam® group: 11.39 vs Control group: 10.99).

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EFFECTS OF PAIN RELIEF UPON LOCOMOTION AND ACTIVITY OF LAME PIGS

A high incidence of lameness has been found in growing pigs and sows, compromising animal welfare. It is not yet common practice to treat these animals with one of the several analgesics registered for use in pigs and the effects of pain medication on the pig's welfare are hardly studied

The objective of this study was to examine the effects of a strong analgesic (buprenorphine) in lame pigs. We hypothesised that the analgesic treatment partially restores normal gait, activity, heart rate and breathing rate.

Twenty piglets, that were clinically lame at one leg, were randomly assigned to a group treated intramuscularly with 0.04 mg/kg buprenorphine or a group receiving placebo (an equal volume of physiologic saline solution). Before treatment visual lameness scoring, footscan, heart rate and breathing rate measurements, and open field test (OFT) were performed. Starting four hours after treatment with buprenorphine or placebo, all measurements were repeated. Then, the pigs were euthanised and submitted for necropsy. Asymmetry indexes (ASI) were derived from the footscans. Data were analysed using Mann-Whitney analysis in SPSS.

Before treatment, activity in the OFT did not differ between treatment groups. Activity in the OFT decreased after treatment in the saline-treated group. This decrease of activity in the second test is a normal finding in repeated OFT. The buprenorphine-treated group, however, appeared to be more active after treatment than before. This difference between treatment groups was statistically significant.

Load rate ASI slightly increased after treatment in the saline-treated group. The load rate ASI of the buprenorphine-treated group decreased after treatment, showing a significant difference between the two groups.

Treatment with analgesics does not only decrease objective lameness scores but also increases activity levels. These findings support the notion that analgesics should be used routinely as part of the treatment protocol for lame pigs.

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POST FARROWING TREATMENT OF SOWS WITH ORAL MELOXICAN (METACAM® 15CM/ML ORAL SUSPENSION FOR PIGS) OR INJECTABLE FLUNIXIN MEGLUMINE AGAINST SUBCLINICAL MMA ON THE PREWEANING PIGLET WEIGHT

Introduction: In several field studies, post farrowing intramuscular administration of meloxicam (Metacam®20mg/ml, Boehringer Ingelheim; 0.4 mg/Kg body weight) to sows significantly increased the proportion of piglets reaching the expected target weight at weaning compared to intramuscular administration of flunixin meglumine (2.2mg/Kg b.w.).

The aim of this study was to compare the convenience and the efficacy of the use of a single administration of Metacam® 15 mg/ml oral suspension for pigs (Oral Metacam®) versus other injectable NSAID (flunixin meglumine) on sows and in piglet performance.

Material and methods: The field trial was conducted on one farrow-to-wean farm (900 sows) located in the southeast of Spain. Overall, 30 sows were randomly allocated the day of farrowing (d0) in two homogeneous groups regarding parity, number of piglets per sow and weight at birth.

One group (n=15) was given 0.4 mg/kg b.w of Oral Metacam® directly into the mouth of the sow on the day of farrowing. In the other group (n=15) sows were treated with flunixin meglumine 2,2mg/kg b.w. intramuscular.

Different parameters were evaluated: Average daily gain (per litter), body weight (at weaning) and mortality parameters (n= 353 piglets).

Results: Mortality rate up to weaning was similar; (p=0.89) in both groups.

Piglets from sows treated with Oral Metacam® showed a higher ADG compared to the piglets in the flunixin group (0.178 vs. 0.155 g, respectively; p<0.05). This resulted in a higher weight at weaning in the Oral Metacam® group compared to the piglets in flunixin group (5.43 vs. 4.86kg, respectively; p<0.05).

Conclusions: This new oral meloxicam presentation reduces the number of injections during the farrowing period and result in additional benefits for sow welfare.

Regarding efficacy, Oral Metacam® treatment in sows significantly increased the pre-weaning piglet ADG and the weight at weaning compared to injectable flunixin.

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[2] Benevet, Beernem, Belgium;
[3] Elanco Animal Health, Suresnes, France.

EFFECT OF A GNRH ANALOGUE (PEFORELIN) ON SUBSEQUENT REPRODUCTIVE PERFORMANCE AND PIGLET BIRTH WEIGHT ON A HIGH PRODUCTIVE FARM

Peforelin, a GnRH analogue, has been shown to influence the estrus behaviour of gilts and sows by stimulating the secretion of follicle stimulating hormone (FSH) from the pituitary. Consequently, peforelin could have a positive impact on oocyte quality, ovulation rate, embryonic survival, and litter weight and uniformity. The purpose of this field study was to investigate the impact of a peforelin treatment on reproduction parameters and piglet birth weight. Gilts (n=36), primiparous sows (n=19) and multiparous sows (n=117) of a high productive farm (WP/S/Y=32.5) were randomly allocated to either C-group (untreated control, n=92) or M-group (peforelin administered at 150µg for gilts and multiparous sows and at 37.5µg for primiparous sows, n=80). Peforelin was administered to gilts at 48 hours after the last supplementation of altrenogest and to multiparous and primiparous sows at 24 hours after weaning. Live-born piglets per litter were recorded and individually weighed within 12 hours after birth (n=1559). The farrowing success rate (the number of litters per 100 animals included) and the piglet index (the number of live-born piglets per 100 animals included) were calculated. Differences between both groups were analysed using a paired T-test. Due to external factors, the farrowing success rate was low, but tended to be higher in M-group (70%) compared to C-group (62%). The piglet index was higher in M-group (980) compared to C-group (928) (P=0.0288). Piglet birth weight was significantly higher in M-group (1235 ± 300 g) compared to C-group (1197 ± 288 g) (P=0.010), but variation was 24% for both groups. Overall, M-group had 4% more piglets above 1600 g and 1% less piglets below 800 g than C-group. From these preliminary results, it can be concluded that peforelin treatment resulted in improved quality of live-born piglets.

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PVS PRESIDENTS – PAST AND PRESENT

I joined the Pig Veterinary Society in 1976 and attended my first meeting in Aberdeen. It had already been going for 13 years and was a small but thriving Society. It was a great privilege to rub shoulders with the good and the great in the pig world and I hoped that a little of their knowledge and expertise would rub off on me. Colin Maclean (75-77) was president at the time and was the first industrial (BOCM) president and future head of the MLC. Alistair Douglas (87-89) kindly helped me with the earlier presidents and the first one Major Hugh Clay (63-65) invited him to join the Framlingham practice in 1971. Dr Jack Done (65), renowned for his work on Atrophic Rhinitis was the second for a short time, followed by Peter Storie-Pugh (67-69), ex Colditz and Cambridge University. John Strang (69-71) was a practitioner from Essex and was followed by Dick Melrose (71-73) from MLC. Gruff but kind, Doug Forsyth (73-75) from Selby, who taught me the value of clinical inspection on farm visits in the first Irish meeting in 1977 was superseded by Prof Richard Penny from RVC London, also a great instructor and enthusiast of the UK pig industry. Richard also started the Pig Journal and after 8 editions it was taken over by Terry Heard (79-81), the first solely pig practitioner, and he edited the Journal until 1998 when I took over. John Stoker (81-83) from Elanco, who have given great support to the Society over the years, was followed by John Oldham (83-85) a practitioner and pig farmer in Hedon, Yorkshire. Tom Alexander (85-87) from Cambridge University, co-discoverer of *Brachyspira hyodysenteriae* with Prof David Taylor (04-05) of Glasgow, was the lead vet in PIC for many years and helped develop MEW and 3-site production for the control of PRRS. Mike Muirhead (89-90) of Beeford was one of my early mentors, when I worked at the Garth practice and brought his outstanding yet steady expertise to two established breeding companies, JSR and NPD (now ACMC). John Walton (90-91) from Liverpool University was a great teacher and was followed by Philip Blackburn (91-92) of Ripon, a meticulous practitioner and author of the Guide to Casualty Slaughter, which is still available today. Bob Stevenson (92-93) from Usk, also a BVA and RCVS President was succeeded by Bill Smith from SAC Craibstone, a notable Scottish diagnostician. Colin Silver (94-95), a great musician and practitioner in Scotland, was followed by John Mackinnon (95-96) who was the first president of the EAPHM (10-12). John Wilkinson (96-97) from Thetford is now a respected humanist and was followed by Christianne Glossop (98-99) who was the President of the IPVS in Birmingham in 1998 and is CVO for Wales. Gareth Williams (98-99) an entrepreneurial practitioner in Cheshire was succeeded by another practitioner, Mark White (99-00), our Society's acknowledged 'Mr Grumpy' and organiser of this ESPHM in Edinburgh. Prof Stan Done (00-01) is the lynch pin of the Society as Honorary Secretary, Chief Scientific Editor of the Pig Journal and all matters scientific, especially CSF, PRRS, & PCV2, even today. Richard Potter (01-02) took over; an expert in outdoor production, he saw us through the FMD outbreak, his early death was tragic. He was followed by Anne Jones (02-03) a diagnostician in MAFF and in her own LVLabs. David Chennells (03-04) from Bedford is an expert in welfare, our great Clinical Club organiser and current Chairman of the Publications Committee, which produces the Journal. Roger Harvey (05-06) a practitioner in Stowmarket set up the 2nd Irish meeting in Dublin, which took place in my year (David Burch 06-07). Prof Jill Thomson (07-08) from SAC Edinburgh, our reference for enteric diagnostics, also saw us through the last FMD outbreak. Derek Armstrong (08-09) of BPEX, often understated but is a fantastic source of knowledge regarding the UK pig industry. Pete Bown (09-10) from Malmesbury, followed with his amazing knowledge from organic farming through to being lead PIC vet. Nigel Woolfenden (10-11) following on the Ripon traditions of sound pig practice was succeeded by Mike Wijnberg (11-12) the main vet of BQP, the largest pig producing group in the UK. Steve McOrist (12-13) is our current President, the co-discoverer of *Lawsonia intracellularis* when at Edinburgh University. Grace Webster (13-14) from Aberdeenshire will take over in May and we wish her every success in her year and as much enjoyment as we all have had.

DGSB 28/3/13

THE PRESIDENTS OF THE PIG VETERINARY SOCIETY

Year	Name	
63-65	H A CLAY	D
1965	J T DONE	D
65-67	W A SCOTT	D
67-69	P D STORIE-PUGH	D
69-71	J R STRANG	D
71-73	D R MELROSE	D
73-75	D W FORSYTH	D
75-77	C W MACLEAN	
77-79	R H C PENNY	
79-81	T W HEARD	D
81-83	J W STOKER	
83-85	J G OLDHAM	
85-87	T J L ALEXANDER	D
87-89	R G A DOUGLAS	
89-90	M R MUIRHEAD	D
90-91	J R WALTON	D
91-92	P W BLACKBURN	
92-93	R M STEVENSON	
93-94	W J SMITH	
94-95	C L SILVER	
95-96	J D MACKINNON	
96-97	J D WILKINSON	
97-98	C J GLOSSOP	
98-99	G V WILLIAMS	
99-00	M E C WHITE	
00-01	S H DONE	
01-02	R A POTTER	D
02-03	M A JONES	
03-04	D J CHENNELLS	
04-05	D J TAYLOR	
05-06	R E HARVEY	
06-07	D G S BURCH	
07-08	J R THOMSON	
08-09	J D ARMSTRONG	
09-10	P BOWN	
10-11	N J WOOLFENDEN	
11-12	M C WIJNBERG	
12-13	S McORIST	

Organised by:

PVS PIG VETERINARY SOCIETY

ECPHM EUROPEAN COLLEGE OF PORCINE HEALTH MANAGEMENT

EAphm EUROPEAN ASSOCIATION OF PORCINE HEALTH MANAGEMENT