PROCEEDINGS

6TH EUROPEAN SYMPOSIUM OF PORCINE HEALTH MANAGEMENT

SORRENTO - ITALY

7th - 9th May, 2014

ORGANIZING COMMITTEE

EAphm
EUROPEAN ASSOCIATION OF PORCINE HEALTH MANAGEMENT

www.eaphm.org

ECPHM EUROPEAN COLLEGE OF PORCINE HEALTH MANAGEMENT

www.ecphm.org

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www.unipr.it

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WELCOME FROM THE PRESIDENT

Dear Colleagues,

On behalf of the Organizing Committee, I am very delighted and honored to welcome all delegates, partners and supporters to the 6th European Symposium of Porcine Health Management in Sorrento, Italy.

I recognize that the European Symposium and its scientific sessions are principally designed to enhance the development of the porcine industry within Europe. These annual gatherings enable the building of a productive dialogue between the organizing Institution and their members. They also provide an invaluable opportunity for networking and fruitful contacts between researchers and practitioners.

Over the years, since the first edition in Copenhagen in 2009, the Annual Symposium of the European College of Porcine Health Management has quickly evolved from a meeting attended by the diplomates of the College only to the first major event organized in Europe jointly by the European College and the European Association. In the last two editions, held in Bruges and Edinburgh in 2012 and 2013, respectively, the number of participants increased significantly (around one thousand) and more than 250 abstracts were submitted.

This is the sixth edition and the first time that the symposium is being held in Italy. We are delighted to be given the opportunity to host this meeting and we are pleased that as many as 1300 delegates are in attendance - coming from Europe, North and South America and Asia. Every year the European Symposium experiences an increasing attractiveness, a clear indication of the positive feedback on the efforts loaded by the European College and Association.

More than 300 scientific contributions have been submitted and 52 of those have been asked to be orally presented in 10 sessions. The attractive scientific program is completed by 10 keynote lectures by internationally renowned speakers aimed at presenting the most recent and debated issues on porcine health management, including both the latest on science and practical aspects about innovation and biotechnology in porcine health management, antibiotic and feed management, "man-created" diseases and emergencies at EU borders, namely African Swine fever and Trading diseases. The right combination of science and practice is the key element of the success of the annual symposium.

This year the College celebrates the 10th anniversary from its founding. It was in Hamburg in 2004 at the IPVS that the fathers of the College met and decided officially to establish the College. In 10 years we have come long way. Step by step, we have achieved the full recognition by the EBVS in 2013 and nowadays things are going smoothly.

I wish to express my gratitude to all delegates for their full scientific contributions to the 6th ESPHM. I take this opportunity to thank the industrial partners for accepting to participate and providing the necessary funding. Special thanks to the members of the Scientific Committee, the members of the Boards of the College and the Association and to the board of the reviewers. Their efforts have been a key element for the scientific success of this symposium.

I realize that you are fully dedicated to the scientific sessions that will follow but I do hope you will also take time to enjoy fascinating Sorrento area with its typical setting, friendly people and excellent cuisine.

I wish the participants a very fruitful and productive symposium, sure to leave all enriched.

Sorrento, 7th of May 2014

Paolo Martelli
President of the 6th ESPHM

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ANICON LABOR GMBH

www.anicon.eu

The AniCon Labor GmbH was founded in 2005 as a provider of laboratory services.
Our scope of services includes chemical and microbiological analysis of foodstuffs, feedingstuffs and drinking water.
We provide pathologic-anatomic and diagnostic screening for livestock as well as producing flock specific or autogenous vaccines for swine, poultry and commercial fish.
Our portfolio is completed by consulting services.

BAYER ANIMAL HEALTH

www.bayer.com

Bayer Animal Health, part of Bayer HealthCare AG, is a leading global animal health company committed to research and development in order to provide innovative medicines for livestock and companion animals. Bayer Animal Health is represented in well over 100 countries and in all major markets the entire world over and, as one of the world's leading suppliers of veterinary solutions is responding to the challenges posed by the market and its customers' needs. Bayer Animal Health 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. Customer-oriented solutions and services are our goals and effectiveness of products for each individual animal species is confirmed in extensive trials conducted over many years. Simultaneously, safety is examined for animals, mankind, and the environment.

BIOMIN

www.biomin.net

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

- Mycotoxin Risk Management (Mycofix®)
- Phytogenics (Digestarom®)
- Acidifiers (e.g. Biotronic®)
- Silage inoculants (e.g. Biomin® BioStabil)
- Dietary health supplements
- Premixes

BOEHRINGER INGELHEIM

www.boehringer-ingelheim.com

The Boehringer Ingelheim group is one of the world's 20 leading pharmaceutical companies. Headquartered in Ingelheim, Germany, it operates globally on all continents in all relevant markets with more than 44,000 employees. Boehringer Ingelheim Animal Health GmbH was founded 1955 and is a part of Boehringer Ingelheim with approx. 3.100 employees worldwide. The vision of the Animal Health business is to foster the health and wellbeing of mankind by contributing to an adequate supply of safe, nutritious food and by promoting the emotional and physical benefits arising from the human animal bond. Research and development, manufacturing, and marketing of therapeutic solutions for animals are the main business activities. In 2012, Boehringer Ingelheim Animal Health GmbH achieved net sales of about €1.040 Mio. Thereby it takes rank 6 of the top 10 leading animal health companies. In 2012 Boehringer Ingelheim Animal Health invests more than 10 % of its net sales in R & D.

CEVA

www.ceva.com

Ceva has been one of the fastest growing top 10 veterinary health companies over the last decade. We supply both pharmaceuticals and vac cines to our customers in the swine sector. By providing a range of innovative vaccines, antibiotherapy and reproduction management solutions together with services, Ceva and its partners go "Together, beyond animal health" to help make swine production more efficient, sustainable and economical.

CHEMIFARMA SPA

www.chemifarma.it

Chemifarma S.p.A. is an Italy based veterinary pharmaceutical company, with an extended experience in Research Development and Production of veterinary drugs and feed supplements for both livestock and companion animals.
Chemifarma manufacturing capabilities cover many finished dosage forms, including solid, liquid and microencapsulated forms
The key areas on which Chemifarma has focused its operations are three:

Medicinal products for veterinary therapy
(more than 430 Marketing Authorizations)

Animal Nutrition Supplements
(from concentrated premixes to liquid supplements)

Biocides and Disinfection
(from the dog barn to the livestock farm)

Its products are exported to more than 35 countries
The company is:
- **EU-GMP** approved for drugs manufacturing
- **FAMI-QS** certified for nutritionals and special complementary feed.
- **GMP+** certified for HACCP management.

Promoting and producing innovation is the very nature of Chemifarma

DOPHARMA

www.dopharma.com

Dopharma, established in 1969, is an independent Dutch veterinary pharmaceutical family owned company. For 45 years, beside the production of veterinary pharmaceuticals, the company has also conducted research, regulatory affairs, distribution and marketing under direct management.
Currently, the organisation has approximately 125 employees. It mainly involves production staff, analytical chemists, scientists, veterinarians, laboratory workers, shipping employees, administrators, purchase-, marketing- and sales people.
In the Netherlands, Dopharma delivers directly to veterinarians and through veterinary wholesalers. Here Dopharma Veterinaire Farmaca is market leader in veterinary pharmaceuticals for consumption animals. Our product range covers anthelmintics, analgesics, anaesthetics and vitamin and mineral specialties.
All activities outside our domestic market are managed by Dopharma International and our regional branch offices. An extensive network of exclusive agents and distributors covering approximately 50 countries. Our branch offices are located in Belgium, Romania, Germany and Lithuania (Baltic).
For more information, please visit www.dopharma.com or follow us on LinkedIn, Facebook or Twitter.

ECO ANIMAL HEALTH

www.ecoanimalhealth.com

Aivlosin®, ECO's patented leading macrolide Brand, is successfully used for the targeted treatment of a variety of economically important respiratory and enteric (gut) diseases including Enzootic pneumonia, Ileitis and Swine dysentery in pigs. Aivlosin® provides outstanding results for key decision-makers in swine operations, worldwide. Aivlosin® is distributed by ESTEVE Spa in Italy. For further information please contact Esteve at Telef. 02.699.64.201 / e-mail: estevespa@esteve.es Aivlosin® is a registered trademark of ECO Animal Health Ltd, London, United Kingdom, and is a prescription-only medicine

ELANCO

www.elanco.com

Elanco is a global, innovation-driven company that develops and markets products to improve animal health and protein production in more than 75 countries.
Elanco, a division of Lilly, employs more than 2,500 people worldwide with offices in more than 40 countries.
Elanco is committed to protein production, companion animal health and food safety. Elanco products help the food industry produce an abundant supply of safe, nutritious and affordable food. Additionally, they enhance animal health, wellness and the human-pet bond.
Elanco Food Solutions markets food-safety products and services to the food animal industry.
Elanco's global headquarters is in Greenfield, Indiana, USA.

FATRO

www.fatro.it

FATRO is a private company, 100% Italian owned, operating in the veterinary pharmaceutical sector. It exports its products to around 80 countries, following an international expansion plan and targeting its strategies to the different local situations.
Fatro has subsidiary companies in Spain, Greece, the Czech Republic, Poland, Uruguay, Argentina and India.
FATRO has its own products which are original and unique in the veterinary sector and it invests a of high proportion of its turnover in continual innovation. Its R&D laboratories are GLP certified. In order to satisfy the European Union requirements on the development of veterinary drugs with full regard for animal health and well-being, FATRO also possesses facilities for the housing of animals in conventional and confined environments, which are also GLP certified.
Its GMP-certified plants are situated in Ozzano Emilia, Bologna, Italy and Maclodio, Brescia, Italy, the latter directed exclusively at the production of poultry vaccines. Other plants are located in Poland, the Czech Republic, Greece, Argentina and India.
Finally, Fatro has obtained Environmental Certification, as an assurance of its commitment to the environment at all stages of the production cycle.

LABORATORIOS HIPRA

www.hipra.com

Vocation of leadership. That is what has always marked the activity of Hipra: a veterinary pharmaceutical company dedicated to the research, production and marketing of products for Animal Health.
Our history spans more than half a century and do currently occupy one of the top positions amongst pharmaceutical companies producing Biologicals for the veterinary industry worldwide. Research is the basis of our knowledge and a priority at HIPRA. We have the scientific knowledge and the experience to develop high added value products. This, together with the enthusiasm and perseverance of our R&D team ensures the success of our projects.
It is the combination of our experience, advanced technology and our team that provides differential advantages to our customers.
We develop swine vaccines with the most advanced components which give solutions and benefits that, up to now, have not been covered by the other products available in the industry and which take care of unmet needs in today's swine production.
HIPRA has great potential for growth. The company has grown rapidly by establishing new subsidiaries and launching new and innovative vaccines. While remaining independent and true to its exclusive dedication to Animal Health, HIPRA's aim is to be the laboratory with the largest number of new vaccines on the market and to establish itself as the Reference in Prevention for Animal Health.

HUVEPHARMA

www.huvepharma.com

HUVEPHARMA® is a fast-growing global pharmaceutical company with a focus on developing, manufacturing and marketing human and animal health products. The highlight is placed on animal health products, such as animal health pharmaceuticals, anticoccidials, feed additives, veterinary medicated premixes, veterinary products, enzymes and enzyme complexes for feed and food application.
Huvepharma® has a marketing network of sales offices in Bulgaria, Belgium, Poland, China, Taiwan, Thailand, Russia, India, Brazil and the USA. We also partner successfully with a broad chain of dedicated distributors all over the world, whose expertise and professionalism have been proven in time. Three of our manufacturing facilities are located in Europe and one - in the USA.
We emphasize on quality and safety control, and invest in innovative formulations to meet customers' expectations and always Add performance to your business!

IDT BIOLOGIKA

www. idt-biologika.de

IDT Biologika is an innovative, privately-held company with more than 90 years of experience in researching, developing, manufacturing and marketing biologics for the global protection of animal and human health.
The company's headquarter is in Germany. In the USA, Denmark, the Netherlands, Belgium, France, and Spain, IDT operates distribution branches whose activities are focused primarily on the animal health business segment.
IDT Biologika currently has some 1,150 employees.
Founded in 1921 the company focuses on three core areas – animal health, human vaccines and pharmaceuticals.
For veterinary markets, IDT Biologika develops, manufactures and markets a comprehensive product range of animal vaccines, pharmaceuticals, dietary supplements and care products for both livestock and companion animals.
IDT is the leading provider of vaccines for the pig rearing industry against edema disease and swine influenza as well as salmonella control.
IDT is focussed on livestock, companion animals and the control of animals diseases communicable to humans (zoonoses, e.g. rabies, influenza, salmonella).
IDT provides a complete value chain from research and authorization through to manufacture and sales.
IDT Biologika is a company of the Klocke Group.

LIFE TECHNOLOGIES

www.lifetechnologies.com

Thermo Fisher Scientific Inc. is the world leader in serving science. Our mission is to enable our customers to make the world healthier, cleaner and safer. We help our customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics and increase laboratory productivity. Our four premier brands – Thermo Scientific, Life Technologies, Fisher Scientific and Unity Lab Services – offer an unmatched combination of innovative technologies, purchasing convenience and comprehensive support.
Our Life Technologies™ Animal Health portfolio offers products and services for the animal health industry, designed to help understand diseases and the well-being of livestock communities at a more fundamental level.
Our scientists are continuously improve our veterinary diagnostic reagents by working with the best professionals in the veterinary field and actively participating in numerous global research projects, scientific meetings, and congresses.
Our Range of diagnostic tools including ELISA, PCR test systems and sample prep solutions covers most economically important diseases across all major production animal species.
We believe that better diagnostics equals better animal health.

MERIAL

www.merial.com

Merial is a world-leading, innovation-driven animal health company, providing a comprehensive range of products to enhance the health, well-being and performance of a wide range of animals. Merial employs around 6.200 people and operates in more than 150 countries. Merial is a Sanofi Company.
Merial is a leader in vaccine technology, a pioneer in parasite treatment for animals and has a solid track record of best-in-class products. Its expertise is extensive in both veterinary pharmaceutical products and vaccines (biologicals) for companion and production animals.
In the swine business Merial is well known for its broad line of products, including:
Circovac®, Gripovac® 3, Progressis®, Parvoruvax® and Ivomec®.

MSD ANIMAL HEALTH

www.merck.com

Today's MSD is a global healthcare leader working to help the world be well. MSD Animal Health, known as Merck Animal Health in the United States and Canada, is the global animal health business unit of MSD. MSD Animal Health offers veterinarians, farmers, pet owners and governments one of the widest range of veterinary pharmaceuticals, vaccines and health management solutions and services. MSD Animal Health is dedicated to preserving and improving the health, well-being and performance of animals. It invests extensively in dynamic and comprehensive R&D resources and a modern, global supply chain. MSD Animal Health is present in more than 50 countries, while its products are available in some 150 markets. For more information, visit www.merck-animal-health.com.

NOVARTIS ANIMAL HEALTH

www.novartis.com

Passionately saving, prolonging and improving animal lives
Novartis Animal Health is a leader in developing new and better ways to prevent and treat diseases in pets, farm animals and farmed fish. Our innovative, high-quality medicines contribute to the quality of life, health and welfare of animals around the world.
For pets, our products are effective aids to treat some internal and external parasites, prevent heartworm and flea infestations and treat ailments such as arthritic pain and kidney, heart and allergic diseases. For farm animals, we offer therapeutic products to treat parasitic and bacterial diseases and are also continually developing new vaccines to prevent diseases in livestock and farmed fish. Specific needs of food producers in the area of farm bioprotection are met by providing innovative fly control products and services.

PIC

www.pic.com

PIC's mission is to be the leading worldwide supplier of genetic improvement to pork chain customers through innovative and outstanding genetic technology, health and services.
A subsidiary of biotechnology leader Genus plc, PIC's business is the genetic improvement of pigs. PIC is able to produce improved breeding stock by identifying desirable traits that are heritable, setting selection objectives and then running intensive breeding programs, enabling PIC to deliver significant value to its customers.

New advancements in the PIC genetic improvement program is relationship based genomic selection. By using genomic data to better estimate relatedness between animals, PIC is leading the global livestock-genetics industry in generating faster rates of genetic progress.

The implementation of relationship based genomic selection requires significant investment by PIC in terms of research, development, validation and implementation. The depth and scale of how PIC is using genomic data is creating a truly differentiated product and is focused entirely on increasing the profitability of the swine production chain for our customers.

TAMINCO

www.taminco.com

The Amine Company
Taminco (NYSE: TAM) is the world's largest integrated producer of alkylamines and derivatives, which are key building blocks in an array of widely applicable chemical products. Taminco has 7 production plants worldwide, comprising two large facilities in each of Europe and the United States, and smaller facilities in China. With our service-oriented approach, driven by passion, care and integrity and the unique Taminco Touch, we deliver premium quality products to a wide range of markets such as Agriculture, Personal & Home Care, Energy, Water Treatment, Oil and Gas, and Animal Nutrition markets.

VETOQUINOL

www.vetoquinol.com

Founded in 1933, Vétoquinol is now a leading global animal health company.
The number 10 global animal health company, the Vétoquinol Group combines sustainability, growth and independence in an increasingly competitive world market.
Committed to the protection and well-being of both animals and people, Vétoquinol creates, develops and sells veterinary drugs and non-medical products all over the world.
The company is widely reputed for its expertise in the fields of infectious diseases, pain and inflammation in livestock (cattle and pigs) and pets (dogs and cats).
For over 80 years, Vétoquinol's pursuit of growth has been underpinned by strong values of team spirit, performance and the sharing of corporate culture and know-how with customers, vets, breeders and employees alike.

ZOETIS

www.zoetis.com

Zoetis, formerly the animal health business of Pfizer, is a global animal health company dedicated to supporting its customers and their businesses in ever-better ways. Building on 60 years of experience, we deliver quality medicines and vaccines, complemented by diagnostics products and genetics test and supported by a range of services. We are working every day to better understand and address the real-world challenges faced by those who raise and care for animals in ways they find truly relevant.

Our name, Zoetis (zõ-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 centers 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

Mycofix®

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PREVENTION WORKS

Shaping the future of swine health

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SWINE PLEUROPNEUMONIA

Gain without pain!

- Cross-serotype protection against *A. pleuropneumoniae*
- Expresses Apx I, Apx II, Apx III toxoids
- Pigs gain while developing immunity
- Part of the Ceva Lung Program

Ceva LUNG PROGRAM

À LES POINTS SUR LES A

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Stellamune® Once

Advanced *Mycoplasma* control

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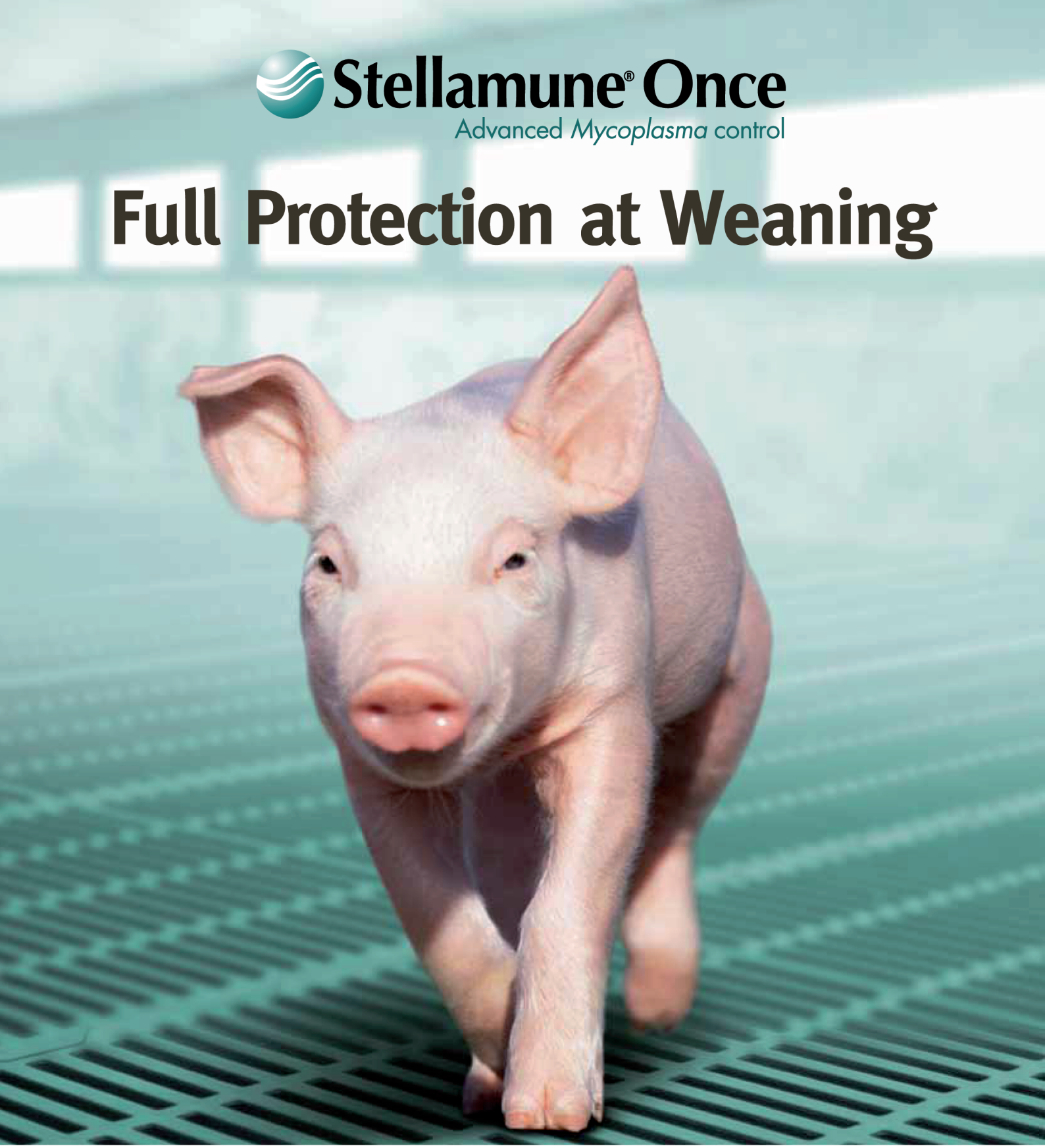

EARLY PROTECTION AGAINST MYCOPLASMA

Early vaccination from 1 week of age
Fast one shot immunity
Life long protection from weaning to slaughter

Stellamune® Once is a *Mycoplasma hyopneumoniae* vaccine used for active immunisation of piglets from one week of age to reduce lung lesions related to infections by *Mycoplasma hyopneumoniae* in fattening pigs. Each 2ml dose of vaccine contains 4.5 to 5.2 log10 Relative Potency Units of inactivated Mycoplasma hyopneumoniae. Strain NL1042, 0.025ml of Amphigen Base, and 0.075ml of Drakeol 5 (mineral oil).

Legal category: POM-V.

MA No. Vm00006/4119

ALWAYS CONSULT YOUR VET BEFORE USING.

Further information is available from: Elanco Animal Health, Lilly House, Priestley Road, Basingstoke RG24 9NL.

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Elanco

WESWISTL00027

Paracetamol

Use on the farm as you would at home...

Pracetam

- Withdrawal period: 0 days
- Proven safety for sows and piglets

Effective, Safe et Practical!

PRACETAM 20 % ORAL POWDER FOR PIG - Composition: Paracetamol 0.2 g. Excipients qs 1,0 g - Properties: Paracetamol or acetaminophen or N-acetyl-para-aminophenol is a paraminophenol derivative with analgesic and antipyretic properties. Its antipyretic effect maybe explained by its ability to inhibit brain cyclo-oxygenases. Paracetamol is only a weak inhibitor of COX-1 synthesis and, thus, no gastro-intestinal side effects and has no effect on platelet-aggregation. - Target species: Weaned pigs. - Indications for use: Symptomatic treatment of fever in the context of respiratory diseases in combination with an appropriate anti infective therapy, if necessary. - Posology: Oral route. 30 mg of paracetamol per kg body weight and per day, as long as the pigs are suffering from pyrexia for a maximum duration treatment of 5 days. The product will be orally administered continuously in the drinking water, equivalent to 1.5 g of oral powder per 10 kg body weight. The intake of medicated drinking water depends on the clinical condition of the animals. In order to obtain a correct dosage, the concentration in the drinking water must be adjusted accordingly. - Contraindications: Do not use in animals with known hypersensitivity to paracetamol and to any other ingredients of the product. Do not use in animal with severe hepatic impairment. Do not use in animal with severe renal impairment. Do not use in animal suffering from dehydration or hypovolemia. - Special warnings: Animals with reduced water intake and/or disturbed general condition have to be treated parenterally. In case of combined viral and bacterial etiology of the disease, an appropriate anti infective therapy should be given concomitantly. - Adverse reactions: In rare cases, at therapeutic doses, transient soft faeces can occur and can persist up to 8 days after the withdrawal of administration. It does not have any effect on general condition of animals, and resolve without any specific treatment. Use during pregancy, lactation or laying: Studies in laboratory animals have not detected any teratogenic nor foetotoxic effects at therapeutic doses. The administration of the product up to three times the recommended dose, during pregnancy or lactation, didn't result in adverse effects. - Special precautions to be taken by the person administering the veterinary medicinal product to animals: Wear appropriate protective clothing, gloves and a mask and goggles to protect the face and eyes. If the product comes in contact with the skin or eyes, flush immediately with a large amount of water. If symptoms persist, seek medical advice. To rule out any risk of ingestion it is recommended not to eat, or drink while using Pracetam and to wash the hands after use. In the case of ingestion of the product, consult a doctor. Do not handle the product if you are hypersensitive to the paracetamol. - Withdrawal period: Meat and offal: zero days. - Marketing authorization holder: SOGEVAL Laboratories, 200, route de Mayenne, BP 2227, 53022 Laval cedex 9, FRANCE

***Pracetam 10% premix - Mutual regocnition procedure**

Please respect your vet's guidance

ANIMAL HEALTH YOUR HEALTH FATRO

SOGEVAL Shared solutions

uniSTRAIN® PRRS

A new alternative for PRRS control

Live vaccine, Porcine Reproductive and Respiratory Syndrome (PRRS)

HIPRA

uniSTRAIN® PRRS lyophilisate and solvent for suspension for injection for pigs(breeding females). **Composition per dose:** Live attenuated Porcine reproductive and respiratory syndrome virus (PRRSV), strain VP-046 BIS $10^{3.5}$-$10^{5.5}$ $CCID_{50}$*(cell culture infectious dose)*. Phosphate buffer solution. **Indications:** For active immunisation of breeding females from farms affected with European PRRS virus to reduce reproductive disorders, incidence and duration of viraemia, transplacental virus transmission, virus tissue load and clinical signs associated with infection with strains of PRRS virus. Vaccination reduced the negative impact of PRRS virus infection on piglet performance (mortality and weight gain) within the first 28 days of life.The onset of immunity is 30 days after vaccination demonstrated by challenge.The duration of immunity is 16 weeks demonstrated by challenge. **Administration route:** The method of administration is by intramuscular route, in the neck muscles. **Dosage:** Pigs: 2 ml/animal. **Side effects & Contraindications:** Do not use in case of hypersensitivity to the active ingredient or to any of the excipients. Do not use in naïve herds in which the presence of European PRRSV has not been established through reliable diagnostic virological methods. **Withdrawal period:** Zero days. **Special Precautions:** Vaccinate healthy animals only. Vaccinated females may excrete the vaccine strain for up to nine days following vaccination by nasal secretions. In some cases, faecal excretion can also occur. The vaccine strain can spread to non-vaccinated cohabitant animals, including the foetus during pregnancy and piglets after partum without any clinical consequence. Therefore, special precautions should be taken to avoid spreading to susceptible animals, if necessary. It is advised to vaccinate all target females within a herd from the earliest recommended age onwards. Newly introduced PRRSV-naïve females (e.g. replacement females from PRRSV-negative herds) should be vaccinated prior to pregnancy. Can be used during pregnancy and lactation. **Basic vaccination programme:** A single vaccination should be administrated once in each reproductive cycle for protection during the subsequent pregnancy, according to the following vaccination scheme: Gilts: Administer 1 injection of 2 ml of the reconstituted vaccine per animal, 4 weeks before mating. Sows: Administer 1 injection of 2 ml of the reconstituted vaccine per animal, 2 weeks before mating or at 8-9 weeks of gestation (approximately 60 days after mating). **Packaging:** Vials of 10, 25 and 50 doses plus solvent. **Special precautions for storage:** Lyophilisate: store and transport refrigerated (2°-8°). Do not freeze. Protect from light. Solvent Store and transport below 20° C. Do not freeze. Protect from light. **Marketing Authorisation Holder and manufacturer:** LABORATORIOS HIPRA, S.A. Avda. la Selva, 135. 17170 Amer (Girona) SPAIN. **Legal Category and marketing authorization number:** A.I.C. n. 104476015; A.I.C. n. 104476039; A.I.C. n. 104476078; A.I.C. n. 104476080. Prescription Only Medicine. Local Representative in Italy: Hipra Italy S.R.L. Via Franciacorta n° 74, 25038 Rovato (Brescia). Italy. USE MEDICINES RESPONSIBLY.

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ECOPORC SHIGA suspension for injection for pigs. Qualitative and quantitative composition: Each dose of 1 ml contains: Active substance: Genetically modified recombinant Stx2e antigen: ≥ 3.2 x 10^6 ELISA units. Adjuvant: Aluminium hydroxide max. 3.5 mg. Excipient: Thiomersal max. 0.115 mg. **Indications:** Active immunisation of piglets from the age of 4 days, to reduce the mortality and clinical signs of oedema disease caused by Stx2e toxin produced by E.coli (STEC). Onset of immunity: 21 days after vaccination. Duration of immunity: 105 days after vaccination. **Contraindications:** Do not use in case of hypersensitivity to the active substance, to the adjuvant or to any of the excipients. **Adverse reactions:** Commonly very small local reactions such as mild swelling at the injection site (maximum of 5 mm) may be observed, but these reactions are transient and subside within a short time (up to seven days) without treatment. Clinical signs such as temporary mild behavioural disturbances can uncommonly be observed after application of ECOPORC SHIGA. Commonly a slight rise in body temperature (maximum of 1.7 °C) may occur after injection. But these reactions subside within a short time (maximum of two days) without treatment. **Withdrawal period:** Zero days. Under veterinary prescription only. **Marketing Authorisation Holder:** IDT Biologika GmbH, Am Pharmapark, 06861 Dessau-Rosslau, Germany.

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1. Cuestas F, *et al.* Proceedings of the 3rd ESPHM, Espoo, Finland, 2011, p 157. **2.** Pejsak, *et al.* Comparative Immunology, Microbiology and Infectious Diseases, 2010, 33:e1-e5. **3.** Chevalier M, *et al.* Proceedings of 22nd IPVS Congress, Jeju, Korea, 2012, vol 2, p 888. **4.** Ono, *et al.* Proceedings of the 5th APVS Congress, Pattaya, Thailand, 2011, 072. **5.** Vila, *et al.* Abstract book of the 4th ESPHM Congress, Bruges, Belgium, 2012, p 102.

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The Symposium will take place in the Congress Center of the Hilton Sorrento Palace

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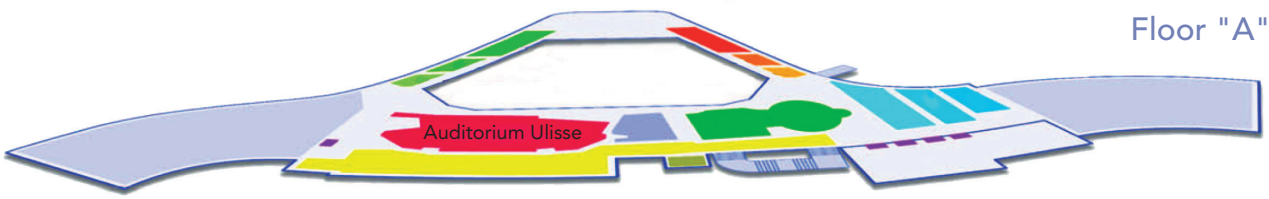

Oral Sessions - Room Ulisse

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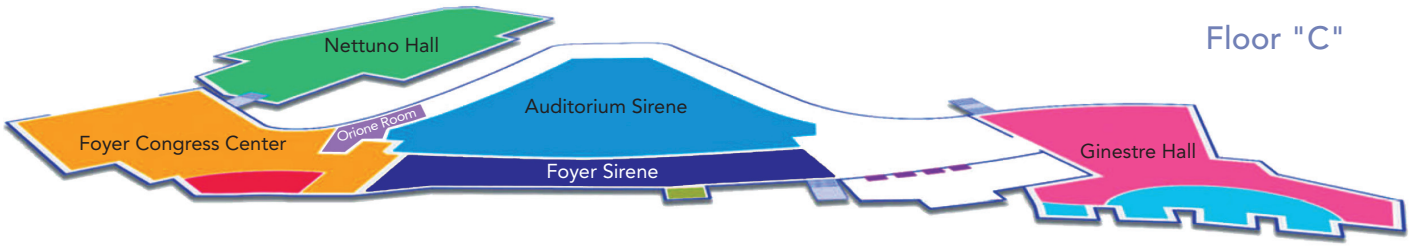


Exhibition Area - Nettuno Hall and Foyer of the Congress Center
Keynotes and Oral Sessions - Auditorium Sirene
Slide Center - Orione Room
Poster Exhibition - Foyer of the Sirene Hall and Ginestre Hall
Secretariat Desk - Foyer of the Congress Center

SCIENTIFIC PROGRAMME

Wednesday May 7th - REGISTRATION & POSTER DISPLAY 11.00-19.00

	AUDITORIUM SIRENE		ROOM ULISSE
13.00-13.10	**WELCOME & OPENING** *Paolo Martelli (Italy)*		
13.10-13.30	**Pig and pork production in Italy** *Davide Calderone (Italy)*		
13.30-14.40	**KEYNOTE ADDRESSES** *Chairperson: Joaquim Segalés (Spain)*		
13.30-14.00	Real time health monitoring *Carlos Piñeiro (Spain)*		
14.00-14.20	New technology in diagnosis-the application of high-throughput sequencing for improve diagnosis and control of infectious diseases in porcine health management *Fredrik Granberg (Sweden)*		
14.20-14.40	Genomics in swine production *Armand Sánchez Bonastre (Spain)*		
14.40-15.00	ROUND TABLE DISCUSSION		
15.00-15.30	***COFFEE BREAK / POSTER VIEWING***		
15.30-17.30	ORAL PRESENTATIONS **RESIDENTS' SESSION** *Chairpersons: Tore Framstad (Norway)* *Martine Laitat (Belgium)*	**15.30-17.30**	ORAL PRESENTATIONS **MISCELLANEOUS - WELFARE and NUTRITION(*)** *Chairpersons: Leo van Leengoed (The Netherlands)* *Heiko Nathues (Switzerland)*
15.30-15.50	Risk factors for lameness development in sows within the first days of group-housing *Pluym Liesbet, Van Nuffel Annelies, Van Weyenberg Stephanie, Maes Dominiek*	15.30-15.50	Baseline investigations of subcutaneous injection in pigs with "safety injectors" *Lahrmann Karl Heinz, Roegels Alexa, Streitparth Florian,Rintisch Ulf, Huenigen Hana*
15.50-16.10	Field study on swine influenza virus (SIV) infection in weaner pigs and sows from herds with a history of respiratory or reproductive disorders *Meiners Carolin, Loesken Svenja, Doehring Stefanie, Starick Elke, Pesch Stefan, Maas Alexander, Noe Thomas, Beer Martin, Harder Timm, Grosse Beilage Elisabeth*	15.50-16.10	Assessing calcium-phosphorus metabolism in sows in relation to duration of farrowing *Geudeke Mattheus Johannes*
16.10-16.30	Possible influence of weaning stress on efficacy of Mycoplasma hyopneumoniae vaccination against experimental challenge infection in pigs *Arsenakis Ioannis, Panzavolta Luca, Michiels Annelies, Del Pozo Sacristan Ruben, Boyen Filip, Haesebrouck Freddy, Maes Dominiek*	16.10-16.30	Identifying those biosecurity practices to be strengthen on English pig farms *Correia-Gomes Carla, Clarke Helen, Gunn George*
16.30-16.50	Ulcerative dermatitis of the mammary gland: underestimated pathology? *Houben Manon, van Leengoed Leo*	16.30-16.50 (*)	Effects of a higher crude fibre supply of pregnant sows by whole plant corn silage on health and reproductive performance *Wolf Petra*
16.50-17.10	Reducing edema disease Escherichia (EDEC) related disease and mortality in a Norwegian commercial pig herd by vaccination with ECOPORC® SHIGA *Groentvedt Carl Andreas, Skrutvold Olav, Framstad Tore*	16.50-17.10 (*)	The taste of water *Tobias Tijs, Houben Manon, van Nes Arie*
17.10-17.30	Peripartal feeding strategy and body condition offer opportunities to alter colostrum yield and composition in sows *Decaluwé Ruben, Maes Dominiek, Cools An, Wuyts Brigitte, Janssens Geert*	17.10-17.30 (*)	The effect of straw enrichment in fully-slatted pens with tail docked and undocked heavy pigs *Di Martino Guido, Scollo Annalisa, Gottardo Flaviana, Stefani Anna Lisa, Schiavon Eliana, Capello Katia, Bonfanti Lebana*
		17.35-18.35	**ANNUAL GENERAL MEETING - ECPHM** *(members only)*
18.00-19.30	***WELCOME COCKTAIL***		
	Free evening		

Thursday May 8th

AUDITORIUM SIRENE		ROOM ULISSE	
		8.00 - 8.30	ANNUAL GENERAL MEETING - EAPHM *(members only)*
8.30-9.40	**KEYNOTE ADDRESSES** *Chairperson: Peter Høgedal (Denmark)*		
8.30-9.05	Antibiotic use in pig production - where are we going? *John Elmerdahl Olsen (Denmark)*		
9.05-9.40	The physical form of diets-impact on pigs' health, performance and well being *Joseph Kamphues (Germany)*		
9.40-10.00	ROUND TABLE DISCUSSION		
10.00-10.25	***COFFEE BREAK / POSTER VIEWING***		
10.25-12.05	ORAL PRESENTATIONS **VIRAL DISEASES** *Chairpersons: Tomasz Stadejek (Poland) Maurice Pensaert (Belgium)*	**10.25-12.05**	ORAL PRESENTATIONS **HERD HEALTH MANAGEMENT** *Chairpersons: Mari Heinonen (Finland) Carlos Piñeiro (Spain)*
10.25-10.45	Reduction of porcine reproductive and respiratory syndrome virus (PRRSV) transmission in vaccinated pigs *Rose Nicolas, Renson Patricia, Andraud Mathieu, Paboeuf Frédéric, Le Potier Marie-Frédérique, Bourry Olivier*	10.25-10.45	Reducing incidence of scour in commercial pig farms with a novel plant extract - results from Europe and the United States *Sam De Snoeck, Deborah Murray*
10.45-11.05	Regional PRRSV control program in the Netherland *Houben Manon, Duinhof Tom, van Dam Bonne*	10.45-11.05	PRRS control and eradication options for breed to wean farms *Johnson Clayton*
11.05-11.25	Diagnostic performance of influenza A and subtype-specific real-time RT_PCRS for detection of swine influenza viruses in finishing herd with acute respiratory clinical signs *Van Maanen Kees, Duinhof Tom, Wiggers Ingrid, Dijkman Remco, Carreres Quijada Anne, Robben Nardy*	11.05-11.25	Factors associated with H1N1 or H1N2 influenza virus infections in fattening pigs: a study in 125 herds *Fablet Christelle, Simon Gaelle, Dorenlor Virginie, Eono Florent, Eveno Eric, Gorin Stéphane, Queguiner Stéphane, Madec Francois, Rose Nicolas*
11.25-11.45	Influenza transmission within coordinated swine production systems *James Lowe, Abbey Harding, Bryan Kaplan, Richard Webby*	11.25-11.45	Early indicators of iron deficiency in piglets at weaning *Bhattarai Sheeva, Busch Marie Erika, Friendship Bob, Martineau Guy - Pierre, Nielsen Jens Peter*
11.45-12.05	The origin and evolution of European PRRSV Type 2 strains *Stadejek Tomasz, Balka Gyula, Bálint Ádám, Duinhof Tom, Murtaugh Michael*	11.45-12.05	Investigating the benefits of anti-infective metaphylaxis in finishing pigs *James Lowe, Abbey Harding, Chelsey Ramirez, Elena Forteguerri*
12.05-13.20	***LUNCH BREAK / POSTER VIEWING***		
13.20-14.20	**KEYNOTE ADDRESSES** *Chairperson: Enric Marco (Spain)*		
13.20-13.50	Man-made diseases in swine *Leo van Leengoed (The Netherlands)*		
13.50-14.20	Save the pig tale *Anna Valros (Finland)*		
14.20-14.35	ROUND TABLE DISCUSSION		
14.35-14.55	**PRESENTATION OF THE NEW JOURNAL (PHM)** *Joaquim Segalés (Spain)*		
	EAPHM PRESENTATION *Enric Marco (Spain)*		

Thursday May 8th

14.55-16.10	ORAL PRESENTATIONS **INDUSTRIAL PARTNERS** *Chairpersons: Imre Biksi (Hungary)* *Sandro Cavirani (Italy)*	14.55-16.15	ORAL PRESENTATIONS **VETERINARY PUBLIC HEALTH** *Chairpersons: Dan Tucker (United Kingdom)* *Diana Meemken (Germany)*
14.55-15.10	Safety and efficacy of an intramuscular vaccination against Mycoplasma hyopneumoniae using needle-free injection devices *Mouzin Douglas, Wu Stephen, Escala Juan, Labarque Geoffrey* - **Elanco Animal Health**	14.55-15.15	Emerging *Trichinella britovi* infections in free ranging pigs of Greece *Boutsini S., Papatsiros V.G., Stougiou D., Marucci G., Liandris E., Athanasiou L.V., Papadoudis A., Karagiozopoulos E., Bisias A., Pozio E.*
15.10-15.25	Elimination of PRRSV type 2 and Mycoplasma hyopneumoniae by using INGELVAC® PRRS MLV and partial DEPOP *Rathkjen Poul Henning, Bisgaard Niels Peter* **Boehringer Ingelheim**	15.15-15.35	Managing the risk associated with use of antimicrobials in pigs - effect of the yellow card scheme *Alban Lis, Dahl Jan, Nielsen Elisabeth Okholm, Pedersen Ken Steen*
15.25-15.40	PEDV introduction to the US: lessons learned *Shepherd Gene, Romagosa Anna* - **PIC**	15.35-15.55	Respective roles of environment and animals in dynamic of Campylobacter infection in pig farms *Leblanc-Maridor Mily, Belloc Catherine, Chidaine Berengere, Denis Martine*
15.40-15.55	Influence of bio-active peptides from FPP* on fattening pig performance *Smulders Dennis, Kanora Alain* - **Huvepharma**	15.55-16.15	Prevalence of MRSA and ESBL-producing enterobacteria in pig holdings in the Euregio (German Part) *Brase Katja, Frenzel Julia, Friedrich Alexander, Garcia Cobos Silvia, Köck Robin, Harlizius Jürgen Lambrecht Claudia, Nienhoff Hendrik, Rossen John, Schulte-Wülwer Josef, Sicken Sandra*
15.55-16.10	Investigation of the long-term effect on overall mortality and antimicrobial intake in weaned piglets after vaccination against edema disease in Dutch field trial *Fricke Regine, Becker Andreas, Kamp Johan, Brons Nico, Bastert Olaf* - **IDT Biologika GmbH**		
16.10-16.30	***COFFEE BREAK / POSTER VIEWING***		
16.30-18.15	ORAL PRESENTATIONS **INDUSTRIAL PARTNERS** *Chairpersons: Jens Peter Nielsen (Denmark)* *Rick Janssen (The Netherlands)*	**16.35-18.15**	ORAL PRESENTATIONS **BACTERIAL DISEASES** *Chairpersons: Elisabeth Grosse Beilage (Germany)* *Giuseppe Merialdi (Italy)*
16.30-16.45	Pracetam and symptomatic medicine: a new approach of first line treatment *Anty Arnaud, Capdevielle Nathalie* - **Lab. Sogeval-Fatro**	16.35-16.55	Pigs, pork, Parkinson's disease and *Helicobacter suis*: new findings set in context *Haesebrouck Freddy, Blaecher Caroline, Smet, Annemieke, Flaho Bram, Ducatelle Richard, Pasmans Frank, Weller Clive, Charlett André, Dobbs R John, Dobbs Sylvia M*
16.45-17.00	Return on investment on fixed time insemination *Collell Miquel* - **MSD Animal Health**	16.55-17.15	New neonatal porcine diarrhoea syndrome-effects *Kongsted Hanne, Toft Nils, Stege Helle, Nielsen Jens Peter*
17.00-17.15	Individual pig care (IPC) as a tool to enhance responsible use of antibiotics *Van Looveren Filip, Dereu Andre, Maes Dominiek* - **Zoetis**	17.15-17.35	Estimating the within-herd transmission of *Mycoplasma hyopneumoniae* in closed pig herds using a stochastic compartment model *Nathues Heiko, Fournie Guillaume, Wieland Barbara, Pfeiffer Dirk, Staerk Katharina*
17.15-17.30	Relevance and detoxification of trichothecene mycotoxins in swine nutrition and regulatory perspectives *Schatzmayr Gerd, Schatzmayr Dian* - **Biomin**	17.35-17.55	Genotype characterization and antibiotic resistance of *Brachyspira hyodysenteriae* isolates in Italy between 2003 and 2012 *Bonilauri Paolo, Carra Elena, Rugna Gianluca, Luppi Andrea, Magistrali Chiara, Nigrelli Arrigo Daniele, Alborali Giovanni, Biasi Gioia, Gherpelli Yuri, Bergamini Federica, Merialdi Giuseppe*
17.30-17.45	Compliance test to PCV2 vaccination using a delayed type hypersensitivity test (DTH) *Callen Antonio, Carceles Sonia, Vidal Albert, Smits Han, Vila Thaïs, Joisel François, Fraile Lorenzo* - **Merial**	17.55-18.15	Experimental inoculation of pigs with a *Brachyspira hampsonii* isolate collected from migrating waterfowl in Spain *Aller-Morán Luis Miguel, Martinez-Lobo Francisco Javier, Álvarez Lorena, Carvajal Ana, Rubio Pedro*
17.45-18.00	Duration of the protective immunity against erysipelas conferred by a new bivalent porcine parvovirus and *E. rhusiopathiae* vaccine in sows *Fontseca Mireia, Muñoz Joana, Roca Merce, Camprodon Agusti, March Ricard, Sitja Marta* - **Laboratorios Hipra**		
18.00-18.15	Coglapix® induces serotype cross-protection against *Actinobacillus pleuropneumoniae* - Krejci Roman - **Ceva**		
20.00	***SYMPOSIUM PARTY In the Agrumeto Garden***		

Friday May 9th

	AUDITORIUM SIRENE		ROOM ULISSE
8.30-9.40	***KEYNOTE ADDRESSES*** ***Chairperson:*** *Heiko Nathues (Switzerland)*		
8.30-9.05	African swine fever *Carlos Martins (Portugal)*		
9.05-9.40	The role of international trade in the spread of pig diseases - a FAO perspective *Eran Raizman (FAO)*		
9.40-10.00	ROUND TABLE DISCUSSION		
10.00-10.30	***COFFEE BREAK / POSTER VIEWING***		
10.30-10.50	**SCIENTIFIC QUIZ** *Dominiek Maes & Giuseppe Merialdi*		
10.55-12.35	ORAL PRESENTATIONS **IMMUNOLOGY and VACCINOLOGY** *Chairpersons: Dominiek Maes (Belgium)* *Paolo Martelli (Italy)*	**10.55-12.35**	ORAL PRESENTATIONS **REPRODUCTION** *Chairpersons: Olli Peltoniemi (Finland)* *Johannes Kauffold (Germany)*
10.55-11.15	Superinfection of sows with *Cystoisospora suis* ante partum leads to a milder course of cystoisosporosis in suckling piglets *Schwarz Lukas, Hanna Lucia Worliczek, Max Winkler, Anja Joachim*	10.55-11.15	Severity of early abortions during autumn in Dutch sow herds is related to weather conditions *Geudeke Mattheus*
11.15-11.35	Clinical protection, viremia and immune response in pigs vaccinated against PCV2 at different ages with different levels of maternal immunity as derived from vaccinated gilts and sows under field conditions *Martelli Paolo, Saleri Roberta, Cavalli Valeria, Ferrari Luca, De Angelis Elena, Benetti Michele, Bonilauri Paolo, Arioli Elena, Caleffi Antonio, Ferrarini Giulia, Borghetti Paolo*	11.15-11.35	Relationship between bacteriological and chemical-analytical urine analysis from sows with reproductive disorders *Grahofer Alexander, Sipos Sabine, Fischer Louis, Entenfellner Ferdinand, Sipos Wolfgang*
11.35-11.55	Shedding of wild-type PRRSV in aerosol is reduced in growing pigs vaccinated with a modified- live PRRSV vaccine at weaning *Dee Scott, Nerem Joel, Cano Jean Paul, Wetzell Tom*	11.35-11.55	Association between number of stillborn piglets and blood hemoglobin concentration in the sow *Jensen Anna Kathrine, Nielsen Jens Peter*
11.55-12.15	Efficacy of an attenuated European subtype 1 porcine reproductive and respiratory syndrome virus (PRRSV) vaccine in pigs upon challenge with the East European subtype 3 PRRSV strain LENA *Trus Ivan, Bonckaert Caroline, van der Meulen Karen, Nauwynck Hans*	11.55-12.15	Rapid ultrasonographic examination of stillborn piglets can provide accurate diagnosis of true intra-partum death *Boulot Sylviane, Loiseau Delphine, Richard Romain*
12.15-12.35	Influence of Gamithromycin and Ketoprofen on the acute phase response in LPS-challenged pigs *Wyns Heidi, Meyer Evelyne, Plessers Elke, Watteyn Anneleen, van Bergen Thomas, Schauvliege Stijn, De Backer Patrick, Croubels Siska*	12.15-12.35	Immunoglobulin G in sow colostrum and in piglet plasma *Kielland Camilla, Rootwelt Vibeke, Bleken Elisabeth, Reksen Olav, Framstad Tore*
12.40-12.55	**7th ESPHM 2015 - Nantes - France** *Catherine Belloc (France)*		
	International Symposium on Emerging and Re-emerging Pig Diseases (ISERPD) 2015 - Kyoto - Japan *Otake Satoshi (Japan)*		
12.55-13.00	**CLOSING ADDRESS** *Paolo Martelli (Italy)*		

KEYNOTE SPEAKERS

Calderone Davide	Director at Associazione Industriali delle Carni e dei Salumi (ASSICA), the Italian Association of pig slaughterhouses and meat products, Italy
Granberg Fredrik	Department of Biomedical Sciences and Veterinary Public Health (BVF), Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden The OIE Collaborating Centre for the Biotechnology-based Diagnosis of Infectious Diseases in Veterinary Medicine, Uppsala, Sweden
Kamphues Joseph	Director of the Institute of Animal Nutrition, University of Veterinary Medicine Hannover, Foundation, Germany
Martins Carlos	Department of Animal Health Faculdade de Medicina Veterinária, Universidade de Lisboa, Portugal
Olsen Ermerdhal John	Department of Veterinary Disease Biology, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark
Piñeiro Carlos	Director PigCHAMP Pro Europa SL, Segovia, Spain
Raizman Eran	Emergency Prevention System/Animal Health Animal Health Service, Food and Agriculture Organization of the United Nations, Rome, Italy
Sánchez Armand	Department of Animal Genetics. Centre for Research in Agricultural Genomics. Universitat Autònoma de Barcelona, Spain
van Leengoed Leo	Department of Farm Animal Health, Veterinary Faculty, University of Utrecht, The Netherlands
Valros Anna	Research Centre for Animal Welfare, Department of Production Animal Medicine, University of Helsinki, Finland

PIG AND PORK PRODUCTION IN ITALY

Davide Calderone
ASSICA, Italy

Introduction

*The m*eat products industry is undoubtedly a pivotal sector of the made in Italy food, with a production of 1.2 million tonnes with a turnover of approximately € 8 billion, an assets of 2,000 companies, 31.600 employees (employed directly and indirectly), an export turnover of more than € 1.1 billion and an active trade balance amounting to € 958 million.

Strong of a wide range of local production that comprises 21 PDO and PGI 16 (27% of total PDO and PGI in Europe assigned to meat products) the sector represents an important synthesis between age-old traditions and modern systems of production, characterized by high levels of technology and an environment of absolute hygienic-sanitary rigor.

The processing of pigs in Italy that began in the Etruscan period (5th century BC) established itself in the Middle Ages when pork became one of the main economic resources in villages. In parallel, the art of transforming and preserving pork meat has developed which has generated the modern processing industry.

From its origins to nowadays, many progress have been made both technically and as regards the knowledge of scientific aspects of seasoning and cooking the meat, thus improving productions and adapting them to current lifestyles but retaining those traditional elements that have determined their success.

A long process that has always seen as main protagonists the supply chain, the link with the territory and the human element that still plays a paramount importance in many stages of processing. This is an important feature that makes the sector still relatively labor-intensive, in contrast to other food chains, which are, by their nature, more compatible with more mechanized processes.

The industry and its developments in recent years

In the Po Valley the availability of whey (derived from dairy) first and of the corn then, pushed the herd towards the production of heavy pigs, adulthood (at least 9-10 months) and high weight (160-170 kg). That is the ideal pig for the production of traditional Italian cold cuts, but it is characterized by an higher than that of intermediate pig or light one produced abroad and even in our country in a marginal extent. In fact regarding the raw material, meat products are realized for 60-65% from Italian pork and for the 35-40% by foreign raw material.

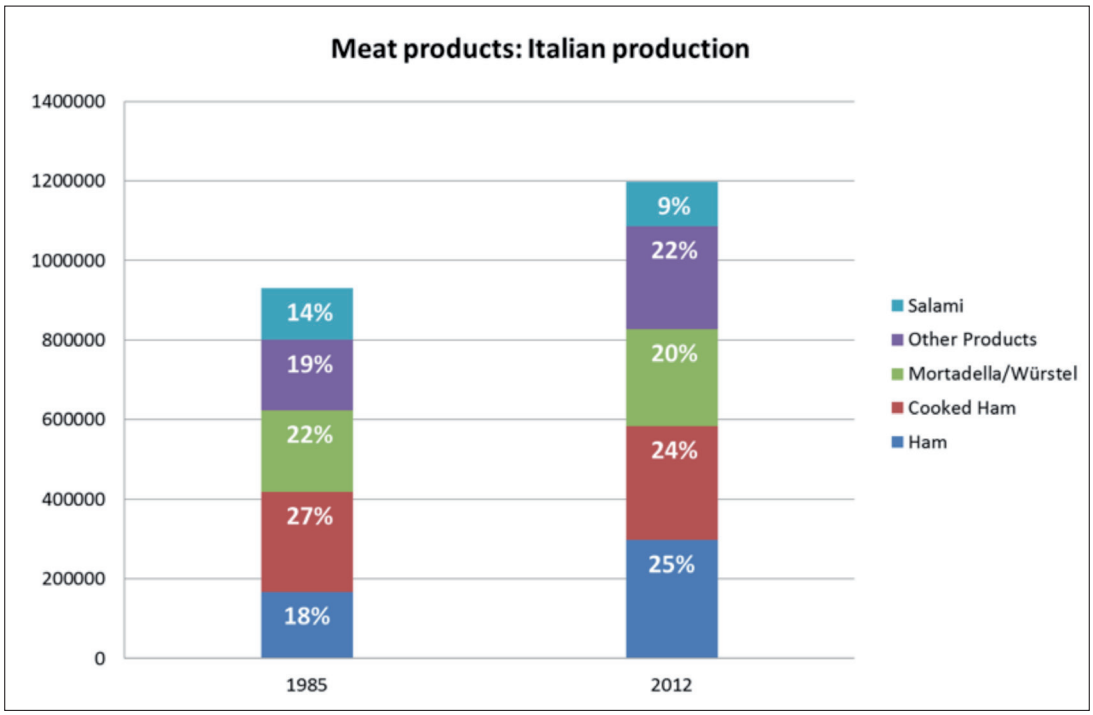
Therefore both in the case of fresh meat and animals, , the supply comes from the Community market which, thanks to the performance of northern countries, is one of the world's leading exporters of pork meat. A record from which Italy is excluded because of the presence on the territory of outbreaks of animal diseases that prevent export of pig meat to the majority of non-EU markets. For this reason the Italian charcuterie industry, is buying from highly specialized markets providing a product made within the same European regulatory framework to which also our country responds. This allows the sector to handle the possible flare-ups in prices of raw materials related to the events of a single market. A non-negligible element especially when you consider that the processing companies (mainly SMEs) - already characterized by a certain financial rigidity due to the high labor costs and those of the long curing times required by traditional hams - have considerable difficulty in transferring cost increases due to the bargaining power of the supermarkets.

The production

The production of meat products increased in the course of time and the range offered by the Italian industry has greatly expanded too. Available data show that since 1985 the production has increased from 930,000 tons to 1.2 million tons that means an increase of 28.7%. The course of meat products production has historically been determined by the dynamics of domestic demand but from the second half of the 90s the weight of the export component has increased.

In 2012, with 297.400 tons cured hams were the most meat products produced, with a share of 25%, followed by cooked ham with 286.300 thousand tons (24%), mortadella and frankfurters with 243.500 tons (20%), salami with 111.000 ton (9%) and other products with approximately 259.100 tons (22%).

A different situation from the one that occurred in 1985, when with a share of 27% cooked ham was the product most produced, followed by mortadella and frankfurters with 22%, 18% cured hams, salami 14 % and the other with 19%.



Over the past 30 years there has been a significant growth of cured hams. Growth occurred thanks both to domestic demand and exports.

It is instead slightly reduced the weight of the ham which, however, remains a firm belief in power consumption, thanks to the improvement of production techniques that have made it more compatible with modern nutritional needs of both adults and early childhood education.

A sector between tradition and innovation

The field of cold cuts is undoubtedly linked to the Italian and Mediterranean food tradition. However its continuous success, depends on the ability of firms to innovate both the product and the conservation process. Because tradition is the name, we give to the sum of innovations that have been successful.

Even safeguarding the traditional recipes in accordance with the basic technological process of meat products (conservation through salt), the analysis carried out in 2011 show - compared to previous data going back to 1993 - a decrease of fat in general and optimization of compositional quality (less saturated fat and more unsaturated fat). The salt content in Italian meats is also greatly reduced, in a percentage that goes from about 4% to over 45% depending on the product. Research in this field continues trying different salt substitutes that lead to the preservation of the products and their organoleptic properties without using sodium.

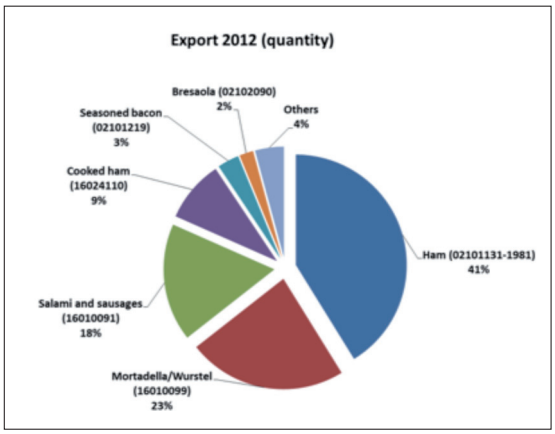
Regarding the preservation process, the leap of the sector has been achieved thanks to the development of protected environment: i.e. with the use in the packaging of pre-sliced meats of nitrogen only, or a mixture of nitrogen and carbon dioxide instead of oxygen.. An innovation that starting from the end of the 90s, has allowed the development of free service (and the opportunity to win spaces in the international retail chains where the normal sales system is self-service). In this field the ongoing research concerns many sectors: from packaging made by active materials which due to their chemical / physical nature, help reducing the possible presence of unwanted microorganisms and maintain the organoleptic qualities longer to the development of bioplastics with lower environmental impact. Another area is that of preservation technologies using high pressures that allow to lengthen the shelf -life of food and ensure a longer safety.

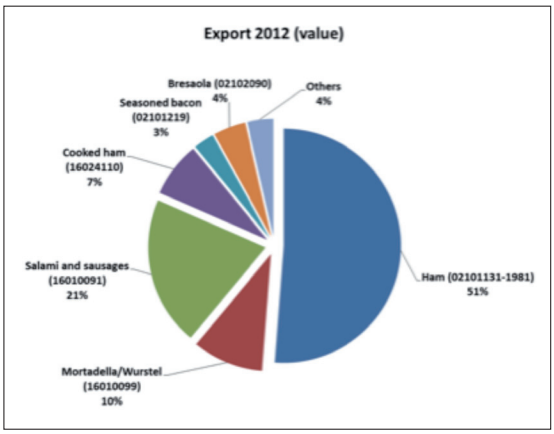
Export

In 2012 according to ASSICA elaborations on ISTAT data exports of Italian meat products have exceeded 138.300 tons (+3.7%), marking an important new record in value: EUR 1.1 billion (+7.5%).

In view of the good performance of exports, imports showed a sharp decline: -7% in quantity for approximately 40.300 tons and 3.1% in value to € 161 million. The trade balance in the sector has thus a further significant increase: +9.5% to € 958 million.

The impact of exports on turnover stood at 14%. A share that is still below that of agri-food as a whole (20%), but of considerable importance when you consider that the sector - as it will be showed in more detail later - is still penalized by tariff and non-tariff barriers from third countries.

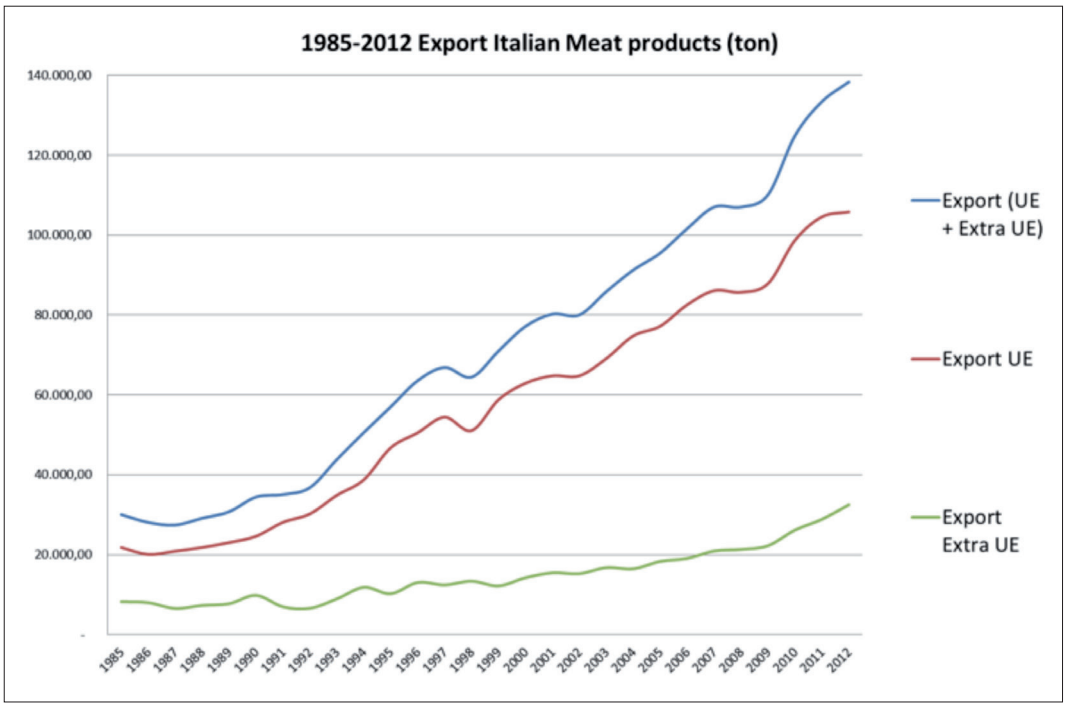




Looking at the composition of our exports, cured hams have been and are still the key driver that have historically played the role of trailblazer on most target markets. These products as "typical" and realized through long ages were able to more readily overcome both the commercial resistance both the hygienic sanitary prohibitions existing in most of the countries of destination. Cured hams - along with coppa, culatello and bacon - with 57,000 tons to approximately 573 million euro in 2012 accounted for 41% of the total exported meats in quantity and 51% in value. In second place among the most exported product categories have been placed mortadella and sausage with a share of 23% in amount to more than 32,000 tons and 10% in value of approximately 110 million Euros. Follow cured salami and sausages that have covered 17 % of exports in quantity (23,800 tons) and 21% in value (€ 230 million) then cooked ham (9% in the amount of 12,500 tons and 8% in value over 84 million euro), seasoned bacon (3% to 4,300 tons in quantity and 3 % in value of 32 million euro) and bresaola (2% to 2,800 tons in quantity and 4 % in value of 50 million euro). Other meats reached a total of about 5,800 tons (4%) to € 40 million (4%).

The data analysis from 1985 to 2012 also shows that exports of Italian meat products have made considerable progress. This is demonstrate by the fact that in the last thirty years exports have more than quadrupled going from 30,025 in 1985 to over 138,300 in 2012. During the same period the incidence of export production has increased significantly: if in 1985 - compared with a production of 930,000 tons - exports accounted for 3.2% this percentage had risen to 11,6% in 2012.

Retracing the route taken by the industry we could say that since the '90s with the acceleration of the processes of geopolitical integration, in particular the creation of the single market, the horizon of our businesses , including small-medium ones , have greatly expanded. At this stage, the creation of the single market has been an important incentive for the sector. Having to deal with a bigger and international market, the companies have started up a cultural and patrimonial growth that has led them to further expand their horizons and to try taping the demand from richer and promising countries.



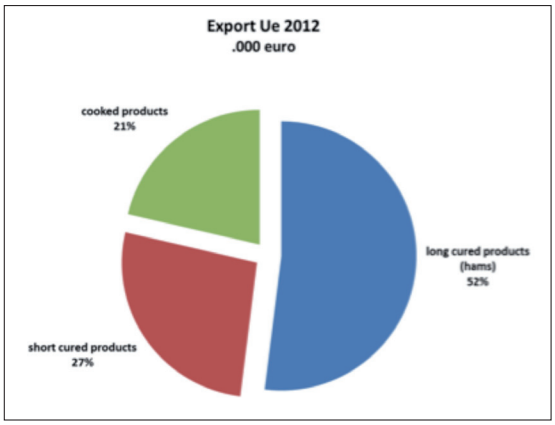
Working in countries outside the EU is not easy because it involves trade agreements - often mediated directly by the EU - and specific technical agreements for the sector that allow overcoming the existing sanitary barriers (still too many as it is possible to see below) in order to actually export.
This second step is the most critical for the field of cold cuts, because third countries often implement forms of protectionism in favor of their productions. So while the Italian manufacturing sector is conquering BRICS countries (Brazil, Russia, India, China and South Africa), the meat sector is still trying to export the whole range of products in the U.S. (despite the openings of short curing meats, in spring 2013, in fact, there are still bureaucratic problems which prevent to transform the political successes in sales volume).
This is a crucial point because Italy is not the only one that runs towards these countries and arriving early in these markets means stealing significant market share to main competitors. A goal that Italy also thanks to the evolution of production and packaging techniques (for instance the pre-sliced salami trays with modified atmosphere) is already successfully pursuing.

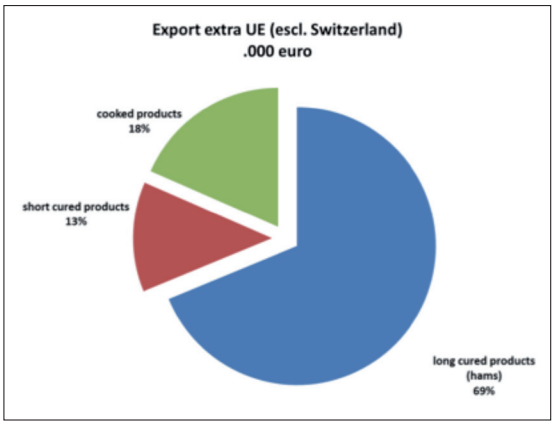
The possibilities to export in our productive chain

The competitive position analyzed above of Italian production makes it clear that the development of the sector passes through the increase of our exports to non-European markets, because the EU market is now an almost saturated domestic market.
As already seen, the export of meat products to third countries in 2012 exceeded 32,500 tons of product for a value of over 250 million euro. These numbers represent both in terms of quantity and in terms of value more than 24% of the total exports of the Italian delicatessen. In addition, there are exports of meat and offal to countries outside the EU market for a value of approximately 60 million Euros.
These are significant but still marginal numbers, despite the strong competitive position just analyzed. This is determined by the fact that for the Italian pig industry there are two major obstacles to develop export, the swine vesicular disease (SVD) and African swine fever (ASF) . Two animal diseases - that do not infect humans - and that are located in a few regions of Italy (Calabria, Campania and Sardinia)that are considered marginal in the production landscape which is historically concentrated in the Po valley.
Although the European Community - applying the principle of Veterinary regionalization - recognizes the Italian territory out of Calabria and Campania regions as free from MVS and the other out of Sardinia free from PSA, the majority of third countries adopts import bans for pork meat and pork meat products from our country.
This situation leads to the limitation of the range of charcuterie products that can be exported and the inability to export pig meat (fresh, chilled and frozen) and offal to many important third countries. Export quotas mentioned before are therefore made almost exclusively by the export of long-cured meats (even over 400 days) and cooked products, which can be imported thanks to the guarantees given by adopted technological treatments.

The restriction of exportable meat products range

As said it has been explained export of medium/short maturation products (eg, coppa, pancetta, salami) is still barred in many countries; extremely restrictive measures restricting (even for protectionist purposes) export of long cured or cooked products are applied. Argentina: provides the possibility to export Italian pork products only if they are cooked or if they have at least 400 days seasoning. However, it allows to export products having an inferior period of seasoning if the meat originates from a country recognized by Argentine authorities as free from major animal diseases (therefore excluding meat arriving from Italy).
To better understand the extent of the damage caused by the impossibility to export pork meats at early ages, it is sufficient to compare the composition of exports to European Union and those destined to countries outside the EU (excluding Switzerland that due to geographical, economic and cultural reasons - as well as the ability to export - has a profile similar to the EU countries). The pork meat products at early age weigh on our exports for 27% and amounts to more than half of raw hams exports. If we analyze the non-EU countries (excluding Switzerland), it is clear the low incidence of exports of pork meats at early age with only 13% (Figures 12.1 and 12.2).





If Italian exports to non-EU countries (excluding Switzerland) had the same composition as those to the EU, Italy would send meat products for more than 40/50 million euro as of today. That net of growth of cooked pork meats and of those of long seasoning, which would benefit from opportunities to carry out comprehensive offerings range.

As evidence, it is possible to note that since spring 2010, it is possible to export to Canada substantially the full range of Italian delicatessen (cured hams, cooked and cured meats products for at least 30 days). After about one year after the liberalization of pork-based products recorded an increase of our exports 30% of which benefited the entire range of delicacies, including products already exported to time (cured hams and cooked sausages). This growth was confirmed in 2012 (+21% in volume and 24% by value).

Pig meat exports: a missed opportunity for the supply chain

EU Pork meats and offal exports in 2012 reached 4.75 billion euros, an increase of 12% over the previous year. Italy with 71 million accounted for only 1,6% of 4.75 billion. A decidedly modest number that it is undoubtedly affected by the prohibitions imposed by important third countries to export of our products due to the presence on our territory MVS and PSA.

The enhancement of fresh meats and offal, which are now largely sold off to the industry of pet food seems to be a minor problem for the Italian market. However, an action of this kind would help to overcome what the industry is commonly referred to as the paradox of "bipedal pig": systematically about 50% of the value of Italian pork (with peaks of 70 %) is discharged on only two legs that in terms of weight represent on average only 17% of the total. A situation which, in moments of difficulty of exploitation of the PDO hams, creates a serious imbalance in the supply chain with a very long production cycle (9/11 months for the pig + 16/24 months)with cascading effects affecting progressively the ham production plants and slaughterhouses and then go back until the breeding stage.

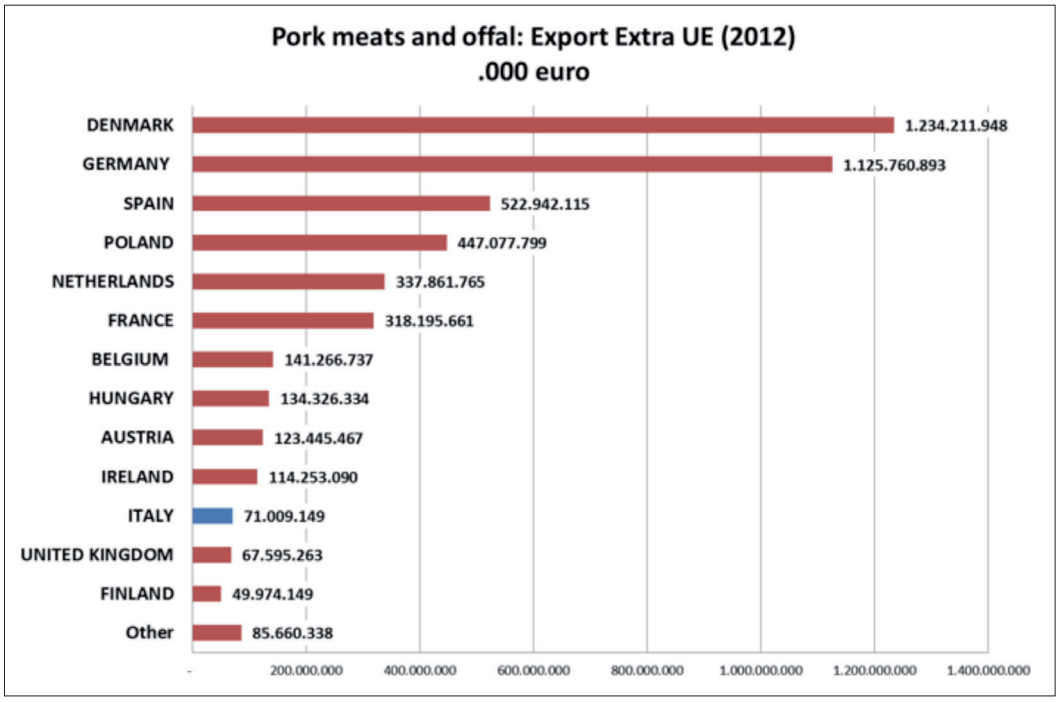
To get a measure of how our country is affected by this problem it is possible to simply think that Denmark (main European exporter to third countries) in the course in 2012 has exported products to more than 1 billion 200 million. That means a value 15 times higher to the Italian one. Germany has exported meat products to a value of 1 billion and 100 million euro, 500 million euro, Spain, Poland more than 440 million. Moreover not just the big pig producers among Italian European partners highlight performance better than ours, even countries with a pig population less than the Italian - such as Ireland and Austria - recorded in 2012 greater exports than ours (respectively 114 and 123 million euro). An analysis of the main interesting markets for European pig meat and offal exports shows how Italy is completely cut off from the most dynamic markets and more important as China, South Korea and Taiwan.

250 million of potential exports

In conclusion, the export potential lost due to the current situation can be conservatively estimated at about 250 million EUR / year of exports. A value that could be performed as early as 2014 in the face of trade liberalization. In fact these values, could reasonably achieve in a short time in the absence of sanitary barriers to trade in accordance with the following estimate: 200/210 million euro meats and offal (counting conservatively to get to an intermediate level between Belgium and France) and 40 / 50 million euro of meat products.

This amount is calculated by considering on the one hand, the progress related to new exportable products and to the overall growth in exports due to the possibility of offering the full range of Italian meat products. On the other hand the value is calculated taking into account the difficulties due to cultural barriers in Asia and to the Italian sounding phenomena in the Americas and Australia that would presumably limit the growth of our exports in a first phase.

Quickly break down these barriers is therefore essential because the time is not an independent variable. While Italian companies await the necessary measures, the European contestants and local producers are strengthening their market positions, which will be more difficult to recover in the future.



REAL TIME HEALTH MONITORING

Carlos Piñeiro
PigCHAMP Pro Europa SL, Spain

More information is available now than ever before (Google is processing more than 20 petabytes per day) but this abundance is not a guarantee of success. Having information at the right time is paramount as is the connecting of data that has no apparent relationship.

How important is information in getting a competitive advantage? A recent report published in 2011 by 'The Economist Intelligence Unit' gives some clues from a survey over 602 company executives. Most agree about the best way of getting a competitive advantage; get the best information available, interpret it easily and deliver it in formats that are easy to understand. But in fact, very few companies overcome this challenge and the usual result is that a huge amount of corporate information remains unused. In fact only 17 % of the companies use more than 75% of collected information and only 27 % think that they use information better than competitors. So the most common situation is that companies swim in unused data and information.

Factors contributing to this scenario are; bad organization, deficient information sharing processes and very restrictive security policies. In general, big companies tend to rely on internal information, whilst smaller ones rely rather on external or market information. In any case the three main attributes for the majority of executives and managers are accuracy, validity and level of detail, in this order. In a way, the third attribute 'level of detail' is surprising, but when it is considered that the decision making process is always a risky situation where circumstances change constantly it is sometimes better to take a quick decision based on the available information rather than wait to have all of the information we would like (an example of the constantly used term 'fuzzy logic').

Most of these situations can be applied to the livestock (particularly the swine) business. Many companies are running their information systems on software packages (from locally tailor-made products to highly acknowledged and well known products in the marketplace) and Excel spreadsheets in different combinations. Quite frequently the process is not agile, key performance indicators (KPI's) are not set and priorities are not defined. In other words, data (or some data) are collected, processed in the swine software package and/or Excel spreadsheets leading to working lists and some routine summary reports being generated; only when there is a problem is the influence of other factors checked (parity, cohort, season, facilities, etc.), either for sows or grow-finish pigs.

Finally, industry, as it is continuously evolving requires other KPI's not considered under a classical approach. In a general sense only (or mainly) reproduction performance in sows and performance in growers-fatteners have been recorded. A growing need is for the collection of health data including relating to either gestating (i.e. lameness problems) or lactating sows (MMA syndrome) or nursery-grow-finishing pigs. For instance, prolificacy is largely improving over the last few years affecting not only the individual weight, but also the homogeneity. In many cases litters are produced with a number of low viability piglets that will increase pre-weaning mortality. Ignoring this factor might lead to a misunderstanding of the root cause of the problem. Another example is culling due to lameness problems, which is a growing problem worsened in many cases by improperly designed group sow gestation barns. The stated cause 'lameness' is clearly insufficient, taking into account the different reasons and factors provoking this symptom. These kinds of situations, among others, must be addressed by producers and consultants properly using robust software packages.

Another issue of growing importance is the necessity of dealing with monitoring as opposed to analysis. In some situations this can even be close to real-time management. This is not surprising as many aspects of our daily lives are in this situation. On January 15th 2009 when US Airways Flight 159 ditched in the Hudson River, the first tweet announcing the incident to the world happened only three minutes later and from then, everything has become even faster, including businesses of every kind. Customers demand an immediate reaction to their questions and problems and in the global market every manager knows that success is highly dependent on prompt and fast decisions. Every day more companies are moving towards real-time management with the first ones being outside our sector. The leaders in this matter are petrol and gas companies as their income and margin are highly dependent on demand that is very fast changing.

It is very likely that the swine business today does not need such fast real-time management, but definitely monitoring the production process is becoming extremely important, in many cases more than the analysis of the information. The disciplined, methodical follow-up of defined KPI's within the production process is a valuable task leading to the early detection of risks and problems before they become worse with more serious consequences. Therefore, monitoring weekly abortions or negative pregnancy checks, born-alive and stillborn in sows, or total deaths by category in nursery-grow-finish, can alert early problems when deviations beyond the norm for that farm are found. For this approach statistical process control techniques are particularly useful with companies using it more every day. But besides these classical options, still not widely implemented, there are others arising from other sectors that can be easily adapted to our business. A typical situation is that those who have the data and those who need the information are not necessarily in the same place. But with current communication tools this should no longer be a problem. We are living through a communications 'boom' where each day coverage gets wider, more powerful and cheaper, so why not use these advantages for

the benefit of our sector? Why not start the implementation of certain aspects of real-time monitoring that was impossible just a couple of years ago?

In our consultancy business we are collecting data using the above mentioned criteria using common devices such as digital pens, smartphones for collecting sow and grow-finish reproduction and performance data. The data is directly uploaded into software that immediately generates quality information for our customers via web or under customized company dashboards. In addition to this, we also collect physical data in real-time, effortlessly with wireless (no cabling) and at very low cost, using simple commercial SIM cards. So, room temperature, water intake, humidity and power consumption can be monitored from anywhere at any time. The linkage of reproduction, production, health and physical data is generating information of huge quality. Alerts based on individual preferences are easily set. The smooth integration of these different sources of data generates a new scenario for each type of producer, from small family concerns to large integrations, since the cost is extremely affordable and the equipment is user friendly and easy to use. With this approach using good management software, the full information potential is unleashed, where normally it is underused. The consultants' and vets' work becomes easier and of considerably higher quality as more aspects of production can be controlled and understood.

Traditionally, the most important problems associated with moving to real-time company management have been described as the lack of technology and experience. The approach being proposed here will overcome these obstacles since data can be sent directly to the database from a piece of regular paper using a digital pen and physical data are continuously sent without human intervention.

Finally, some practical tips that should not be forgotten when thinking about improving the use of information in your farm or company:

1. Define which KPI's are right for you, focusing on getting the right information and indentifying what will be unnecessary. Many companies dedicate time and resources in collecting data that will be never used. So, a good start can be to review and reconsider your strategies of data collection.
2. Enlarge the use of information within the company, taking reasonable precautions, involving even the farm staff. The payback can be significant.
3. Promote delivery of information through devices that are part of peoples' lives. Market share of smartphones and tablets is growing rapidly. Use it.
4. Promote education and training on how to look at the data. Many people lack this basic ability from farm staff to managers.
5. Define the leader of information within the company and encourage his success. Someone with the responsibility of generating and delivering information in the right way for everyone can play a key role in the company. Normally this is split between different people generating confusion and inefficiencies.

Current market situation is demanding quality and cost-effectiveness and this approach can support those requirements. Transforming data into knowledge for business is becoming a must.

NEW TECHNOLOGY IN DIAGNOSIS - THE APPLICATION OF HIGH-THROUGHPUT SEQUENCING FOR IMPROVE DIAGNOSIS AND CONTROL OF INFECTIOUS DISEASES IN PORCINE HEALTH MANAGEMENT

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The emergence of new pathogens and diseases has increased in the last decades due to intensive globalisation and climatic changes, among other factors. This has resulted in a growing demand for accurate broad-range detection and identification methods. In combination with classical methods, the molecular-based techniques provide sensitive and rapid means of diagnosis (1). However, even though isolation and identification of microorganisms by culture techniques is considered to be the 'gold standard' diagnostic test, it is often problematic to grow viruses and bacteria, requiring high level of expertise, and many times impossible. Other classical methods, as well as most of the newer molecular diagnostic tests, are highly specific or are targeted towards a limited group of infectious agents. This makes it difficult, or even impossible, to identify new or unexpected pathogens as well as new variants by the conventional methods.

In contrast, high-throughput sequencing (HTS) provides an effective way to screen samples without previous knowledge of the infectious agent. HTS-based detection allows for culture-independent characterization of the entire microbial flora in a sample. It thus has the potential to detect the full spectrum of emerging new pathogens, including novel viruses and fastidious bacteria, as demonstrated and reviewed (*2-5*). Since the introduction of HTS technologies, the field has developed rapidly due to continuous improvement of existing systems and the release of completely new platforms. As a consequence, the efficiency and throughput of DNA sequencing are now increasing at a rate even faster than that projected by Moore's law for computing power (a doubling every two years) (*6-7*). This has led to dramatically reduced costs, making the technology more accessible to the average laboratory. Although different protocols have been devised for specific applications, such as virome characterization and bacterial identification by 16S rRNA sequencing, most HTS-based approaches consist of a few typical steps, including sample homogenization, target enrichment, pre-amplification, sequencing library construction, the actual sequencing and bioinformatics analysis (*8-9*).

HTS has now reached a state where it can be used as a resource-intensive but powerful tool for better diagnosis and disease control, not only within the fields of veterinary medicine but also within public health in line with the "One World, One Health" principles (3). Porcine health management incorporate both of these aspects. Not only can infectious diseases in pigs have profound impact and lead to large economic losses for the swine industry, pigs are also physiologically similar to humans making zoonotic transmission a real concern, as evidenced by, for example, cases of influenza A and hepatitis E (*10-11*). It is therefore of great interest to monitor the state of infectious diseases in pig populations, and HTS methodologies have already been employed to this end (as reviewed in (12)). In particular, HTS has been used to detect and identify various infectious agents involved in complex disease, such as postweaning multisystemic wasting syndrome (PMWS) (*13-14*), and to investigate mixed infections in, for example, enteric disease complexes by characterisation of the porcine microbiota (*15-16*). These studies highlight the importance of detailed knowledge of the commensal microbiome in drawing appropriate conclusions. Importantly for health management of pigs, HTS can also be used to distinguish wild-type strains from less virulent live vaccine strains.

Our group has established skills and facilities for high-throughput sequencing (HTS) whole genome characterization and detection of viruses, including "unknown viruses" with a high degree of divergence from previously known agents. Because of our collaboration with SciLifeLab at Uppsala University (www.scilifelab.uu.se), we also have continuous access to the latest HTS technologies. This allows us to apply more effective and affordable sequencing to improve the capacity and likelihood of detecting even low-copy-number pathogens. However, the limit of detection is still determined by the abundance of the pathogens in relation to the host background material. It is therefore important to also consider sample preparation and enrichment protocols as integrated and important steps in the overall detection scheme since they can have a dramatic effect on the outcome of HTS-based diagnostics.

Bioinformatics, the research field focusing on the study of methods for retrieving, analysing and storing biological data, is an integral part of all HTS applications. To improve the handling of the massive amounts of sequence data that are being produced, we are working closely with the SLU Global Bioinformatics Centre (sgbc.slu.se). By establishing a bioinformatics filtering, sorting and classification pipeline to streamline the analysis process, we are able to handle the large amounts of data and obtain valid results in short order.

In collaboration with veterinary practitioners and partner institutes in Sweden and around the world, in the global network of the OIE (www.oie.int), we have collected samples from a wide range of domestic and wild animals with various clinical syndromes of unknown etiology, including pigs. Among the porcine samples that we have investigated using HTS-based approaches, we have identified a broad variety of viruses, such as novel bocaviruses, Torque Teno viruses, astroviruses, kobuviruses, rotaviruses, as well as other infectious agents.

We also have collaborated with institutes to provide technology transfer as well as training for rapid preparedness deployment of the HTS-based detection methodologies.

Acknowledgements

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GENOMICS IN SWINE PRODUCTION

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The Genetic improvement in the pig has been very successful over the past using quantitative genetics approaches for the evaluation of breeding candidates based on their potential genetic value. In the last 20 years the contribution of molecular genetics in the pig breeding industry has been modest and only genes of major effects as the Halothane gene, the E.coli resistance gene or few markers affecting reproductive performance or meat quality traits has been used for selection.More recently with the first draft of the porcine genome in 2009 and now, following the publication of the genome sequence in 2012, and thanks to the development of high throughput techniques of sequencing and genotyping we entered into the potential new era of genomic selection. The use of genetic markers to select animals has already been adopted successfully by the dairy industry and quickly incorporate by the chicken and pig industries.
Genomic Selection makes use of markers scattered over the genome to infer the "genomic breeding value" of an animal. The efficiency of this approach has already been tested in these species and the prediction of the breeding values showed optimal levels of accuracy if a large population reference is used. Genomic Selection has a bright future and many new applications to optimize the use of this emerging technology can be envisaged. The information captured in genotypes can be used to hunt for specific genes or genomic regions with a large impact on traits that are measured late in life or are difficult or expensive to measure. In particular we can anticipate the characterization of markers with a significant impact on pig health and to aid selection for disease resistance and/or disease tolerance to viral disease as the promising results recently obtained for PRRS or PCV2b.

ANTIBIOTIC USE IN PIG PRODUCTION - WHERE ARE WE GOING?

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Abstract

The problem of antimicrobial resistance has caused awareness on prudent use of antimicrobials. A strategy to overcome the problem of resistance has been made through a Joint Programming Initiative on Antimicrobial Resistance (JPIAR). While basically being the foundation for a research programme, this strategy newer-the-less convincingly outlines areas which should be the focus of more attention, if we wish to turn the wheel and avoid the problem of antimicrobial resistance: New antimicrobials must be marketed, we must have better use of existing antibiotics, and we must find alternatives to antibiotics. Surveillance of both resistance and antimicrobial use must be instituted and treatment using antimicrobial substances should be based on improved diagnostics. On a more basic level, we need to understand transmission of resistance much better to avoid spread and we lack an understanding of the role of the environment for spread of resistance. This paper discussion the problem of antimicrobial resistance and the focus points of the Joint Programming initiative in relation to modern pig production.

The problem of antibiotic resistance

Antimicrobials are indispensable for modern livestock production to ensure acceptable animal welfare and to sustain economically feasible production. However, world wide antimicrobial resistance has now increased to a level where human and animal health is threatened, and coupled with a decrease in the number of new antimicrobials (Gould and Ball, 2013), this has lead WHO to warn that we may again experience bacterial infections that are not treatable with antimicrobials (WHO, 2012a). Thus, almost universally there is an agreement between scientists and health authorities to support prudent use of antimicrobials, to reduce unnecessary use of these substances, and also an agreement that flock medication of food animals should be limited and performed only for treatment of infections and not for prophylaxis and growth promotion.

In some countries with intensive pig production, pig accounts for an un-proportionally high fraction of the veterinary use of antibiotics, suggesting that pigs in the currently used production systems experience more treatment-demanding infections than other food animals or that the criteria for institution of treatment are more loose. In Demark in 2012, out of the 112 tons of antibiotic used for veterinary purposes, pigs accounted for 76 % of the use even though they only constituted 43 % of the biomass. The consumption was highest in the post-weaning period, and the most frequent antibiotic/disease combination was tetracycline for treatment of diarrhoea (DANMAP, 2012). The un-proportionally high use in pig production in Denmark is affected by treatment habits in other production systems. In the Netherlands a similar picture is not seen. Sow and piglets were estimated to receive 10 daily treatments per animal year and fattening pigs 6 daily treatments, compared to 14 for broilers and 21 for veal calves in 2012 (Anon, 2012). A detailed comparison of the veterinary use of antimicrobials in the two countries showed the same treatment intensity for sows and piglets, while fattening pigs received more antibiotics in the Netherlands than in Denmark. Use of antimicrobial in broiler and veal calf production on the other hand was much higher in the Netherlands compared to Denmark (Bondt *et al.,* 2013). Taken together, this indicates that different production systems should be targeted in different countries to obtain the best effect on prevention of antimicrobial resistance.

Patterns of antimicrobial use in veterinary medicine differ greatly between European countries, suggesting different health levels in the production systems and probably also cultural differences with respect to prescription of antimicrobial. The amount of antimicrobials used per animals produced (statistics by EMA, 2011) compared to the levels of antimicrobial resistance in indicator bacteria in selected countries (Hendriksen *et al.,* 2008) shows an overall good correlation between use of antimicrobials and level of antimicrobial resistance, a pattern that is also seen in human medicine for most drug/antibiotic combinations (Blommeart *et al.,* 2014). Since both health levels, prescription habits and total amount of antimicrobial used differ between European countries, it is likely that different actions should be taken in different countries to reduce the problem of antimicrobial resistance.

Specific attention should always be paid to drugs that are critically important to human health and attention should also be directed towards pathogens that have the highest risk to impact on human health. Currently, Extended spectrum beta-lactamase (ESBL) producing *E. coli* and Methicillin resistant *Staphylococcus aureus* (MRSA) are the most feared bacteria that are transferred from animals to man, and specific care should be taken to avoid selection for these bacteria in the production system. Among the drugs registered for veterinary use, many aminoglycosides and macrolides, 3rd and 4th generation cephalosporin, flourquinolone, and recently polymyxin are categorized by WHO as critically important for human health (WHO, 2012b). Polymyxin is new on this list. It now constitutes a last resource drug for treatment of infections caused by ESBL. Selection of ESBL can happen though the

use of 3rd and 4th generation cephalosporin, and in both Denmark and Netherlands, the pig industry has voluntarily banned the use of these drugs. Already one year after this ban, the number of ESBL in samples from Danish slaughter pigs was significantly reduced (Agersø and Aarestrup, 2013)

The simple way to obtain a reduction in antimicrobial resistance

Due to the high correlation between antibiotic use and levels of antimicrobial resistance on a population level, a suitable first line strategy is simply to reduce the amount of antimicrobials prescribed for treatment, and as mentioned to avoid prophylactic use (which is different from so-called meta-prophylaxis, where pigs are treated because they are believe to be in the incubation period). Hard evidence from follow up on the ban on growth promotion and from the voluntarily ban on use of 3rd and 4th generation cephalosporin in Denmark documents that if we abolish the use of a particular antimicrobial substance, this will lead to reduced levels of resistance to this drug (Aarestrup et al., 2001; Agersø and Aarestrup, 2013).

In countries with very detailed accounting on the use of antimicrobials, like Denmark, it is possible to stratify herds according to the amount of antimicrobials used. Since 2010, herds with a use above a set limit are warned (termed yellow card as a football metaphor), and if no reduction is observed in the following period, a red card is issued. This have direct consequences in the form of reduces degrees of freedom to use antimicrobials and the authorities are entitled to demand a reduction in the number of animals in the stables. When this system was instituted a sharp reduction of 25 % in antimicrobial consumption was observed in the pig industry, but probably this was an over-reaction caused by uncertainty among farmers, and the consumption has since increased slightly. Overall, however, a 19 % reduction has been observed (DANMAP, 2012), apparently without measurable health consequences (Alban *et al.,* 2012).

While the driver in the Danish systems has been the herd-owner's adjustment of treatment habits to avoid a yellow card, the government in the Netherlands has obtained an impressive reductions through a threat to veterinarians that they may loose the right to profit from selling drugs (which is by the way already the situation in Denmark). The authorities demanded a reduction in veterinary consumption of antimicrobials of 50 % to be reached in 2013 compared to 2009. Already in 2012, it was reported that this was apparently achieved in the pig industry (Bondt *et al.,* 2013). Together these observations suggest that there has been overuse of antimicrobials in pig industry, or that the industry (if pressed) can find alternative means to cope with diseases, such as improved prevention.

Future direction for reduction of antimicrobial resistance

To predict future direction in the use of antimicrobials is difficult, except for the fact that regulation will be even tighter and the trend will most likely be less use of antimicrobials. A useful guide could be to look at the strategy for the so-called Joint Programming Initiative on Antimicrobial Resistance (JPIAR, 2014), in which 19 countries in Europe and North America have formulated the best strategy to eliminate the resistance problem. Each of the program initiatives can be evaluated in the light of realties in modern pig production. The JPIAR strategy highlights 6 areas, where actions are to be taken (Table 1). Below, each of these points is discussed with relation to pig production in Europe. Importantly, in each of the topics, this strategy no only considers what can be done to eliminate or overcome the problem, but also how society can help industry to increase the involvement in solving of the problem.

New antibiotics, better use of antibiotics and alternatives to antibiotics

In many respects it would be desirable with new drugs that are reserved for veterinary use only and which does not affect selection for the most important human drugs. In that way, the veterinary use could be uncoupled totally from human health problems, and treatment strategies for livestock could be optimized for the effect in this system and not for minimal effect on selection of resistances that threaten human health. However, it is very likely that new antibiotics in the future will be reserved for human use only, at least until the level of resistance in the general community has reached a certain level. Alternatives to antimicrobials then becomes very important in livestock production, just as we need to have optimal use of the already available antimicrobials. The most important step in pig production in this respect is going to be improved prevention of disease, using the full pallet of possible management, breeding and vaccination tools. Unfortunately, vaccines are often more expensive than treatment. A significant reduction in antimicrobial use and improved growth rate was seen in a Danish pig herd that used vaccination against proliferative enteropathy (*Lawsonia intracellularis*) (Bak and Rathkjen, 2009), but still vaccination is not widely used. Anyway, on a global scale, the reduction in antimicrobial use in very developed production systems like the Danish one is going to be less important than the reduction than can be achieved through improvement of production systems that are not so developed: Important factors are infrastructures that allow age separation, optimized feeding and use of gut-stabilizing feed additives, improved biosecurity and so forth. Alternatives to antimicrobials for treatment are still mostly in the experimental phase. They include such different approaches as reviving of the use of bacteriophages for therapy (Eaton and Bayne-Jones, 1934), and design of helper drugs that can reduce antibiotic resistance while leaving the activity of the antimicrobial drug untouched (Christiansen and Amaral, 1997).

Better use of existing antibiotics is also an area that has been given attention in the fight against antibiotic resistance. If treatment protocols can be designed that have the same treatment efficacy, but results in less selection, then that would be a step

forward. Variation in selection outcome under the same treatment regime between individual animals and humans is big, and for that reason, treatment protocols in human medicine are often designed with the help of mathematical models. A literature search of predictions from such model studies were recently used to design a large Danish research project (MINIRESIST http://ivs.ku.dk/english/research/veterinary_clinical_microbiology/molecular_vet__bact_john_e/miniresistance/) in which prediction of better protocols for flock medication with tetracycline against presumed *L. intracellularis* infections in the post-weaning period were tested under experimental and field conditions. This project also developed good mathematical models, which will be very instrumental as first line testing of different treatment protocols with regard to the effect resistance levels (unpublished). Sadly, the results of testing of treatment protocols under field conditions showed minimal effect on the outcome on selection, especially if one looks at resistance at the time of slaughter as outcome (Table 2). This study only dealt with the use of tetracycline, for which there is already a very high level of resistance among indicator bacteria and in the gut flora in general (as measured by genetic techniques that count the number of resistance genes), and different results may be obtained with other antibiotics.

Diagnostics

Better diagnostic methods may help to reduce the misuse of antibiotics, since treatment of viral infection and other diarrhoea with no bacterial cause can be avoided. The JPIAR strategy emphasis rapid methods to distinguish bacterial disease from viral disease as the most needed method currently. Organisms that can commonly be detected in the absence of disease cause most of the problems in modern pig industry, and disease is not related to their mere presence but to the number of organisms. Quantification can now be done for most relevant pathogens using quantitative real time PCR (qPCR). Recent studies have underlined that qualitative estimates of the presence of for example *L. intraceullularis* are needed to have high predicate values as to disease (Pedersen *et al.*, 2012a) and that the most reliable results are obtained when sampling is performed on a running basis (Pedersen *et al.*, 2012b). A likely scenario for future diagnostic systems is thus a sort of continuous sampling and evaluation. For diarrhoeal diseases, sampling by sock-samples (pen or section-wide faecal sampling) followed by qPCR quantification of the relevant pathogens, bacteria as well as viral, can conveniently be used to inform the farmer of the quantitative levels of intestinal pathogens. In such systems, the responsible veterinarian should define cut off values based on epidemiological observations to guide the farmer in whether treatment should be instituted.

For treatment purposes, resistance profiles still needs to be determined in the disease causing organism, and currently there are no alternatives to traditional culture methods to ensure that a certain resistance gene or phenotype can be assigned to a certain isolate. However, bioinformatics methods are becoming very powerful. The above-mentioned sock-samples can easily be analysed for the presence of and the number of copies of different resistance genes by both qPCR and next generation sequencing (Schmidt et al., 2014; Hasman *et al.*, 2014). With the increasing power of bioinformatics, we are not far from the point where resistance genes translated in to protein-sequence can be aligned with organism based on characteristic signature single amino acid differences (Jessen *et al.*, 2013). However, for bacteria such as E. coli, which can be both commensals and pathogens that does not necessarily mean that the gene is present in the pathogenic variant.

Surveillance

The recently experienced reduction of antimicrobial consumption in Denmark and Netherlands based on careful registration of the use of antimicrobials illustrates that good quality data on consumption can be very instrumental in reducing the use of antimicrobials, if the responsible organization for risk management decide on appropriate actions. The use of consumption data in pig industry, however, is a surrogate for direct measurement of the resistance levels, since we have no good methods to determine differences in resistance levels between herds. Resistance levels in single samples of indicator bacteria vary considerably between pigs, pens and sections (Schmidt *et al.*, 2014), and over time, the risk of having a high level of resistance at herd level is mostly determined by the time that has passed since last treatment episode (Vieira *et al.*, 2009).

Transmission

The JPIAR initiative underlines the need for a better understanding of transmission of antimicrobial resistance between reservoirs and between bacteria. From the point of view of the pig industry, the most important outstanding question is the importance of the food chain in transmission of resistance to humans. There is no doubt that zoonotic bacteria are transferred through the food chain, and that levels of resistance in these bacteria is mainly determined by the veterinary use of antibiotics. The dark box is the transfer of commensal resistant bacteria. To which extend they contribute to build-up of resistance in the human gut flora is currently unknown and deserves more attention. A model study suggested that veterinary use of antibiotics was very important for build of resistance in the human compartment when new antibiotics were introduced, while the level of resistance was maintained by man to man spread of bacteria, once resistance was over a certain level (Smith *et al.*, 2002). It is important to remember that this was the result of a model study, but never the less it suggests that with old antibiotics like tetracycline and neomycin, veterinary use is of little consequences for the level of resistance in the general human population, because resistance in commensal bacteria from humans is already widespread.

Environment

Resistant bacteria from pigs end up in the slurry, and through this in the environment.

Whether this contributes to build up of resistance is unknown. From a risk assessment point of view it is normally safe to assume that a longer transmission route gives less risk of transmission. However, wild animal in close contact with human and livestock waste have been shown to carry antibiotic resistant bacteria at much higher levels than animals without this contact, also bacteria with quit alarming resistance profiles (Radhouani *et al.*, 2009; 2012), and such animals may transfer resistant bacteria between herds and to the human reservoir. For now, this part of the transmission route, as pointed out by the JPIAR strategy is very much in the dark.

Interventions

The JPIAR strategy contains one more point, which is not a strategic research area but which is considered equally important. Large scale demonstrations that there are ways out of the problem. Also in pig industry, we most improve the knowledge sharing. This is of cause difficult in a highly competitive industry, where small differences in efficacy means the difference between success and failure. However, reduction of antimicrobial resistance must in some way be above this consideration. If someone discovers the most prober way to produce with high efficacy and low level of resistance, this has to be shared for the best of mankind.

Conclusion

Antimicrobial resistance is a recognized health problem both in human medicine and livestock industry.

Ways to overcome the problem have now systematically been evaluated and prioritized, but as yet, no real break through has been obtained. In this situation, a dramatic reduction in the use of antimicrobials is the only (safe) approach to preservation of the magic bullets (antimicrobials) on which so much depends on both sides. The problem of antimicrobial resistance is a true One Health problem.

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Table 1. Priority topics in the strategic research agenda of Joint Programing Initiative on Antimicrobial Resistance.

Priority topic	Details	Most relevant for pig industry
Therapeutics	New targets, new antibiotics, improved treatment protocols, alternatives to antibiotics (including vaccines), ways to stimulate industrial development	Better use of existing antibiotics (treatment protocols) Improved prevention of disease on all levels
Diagnostics	New or improved diagnostics (virus versus bacteria), diagnostics of treatment potential, diagnostics of resistance profiles, ways to stimulate industrial development	Continuous herd surveillance of both disease status and resistance profiles of relevant pathogens
Surveillance	Standardized surveillance systems, a global genotypic surveillance program, registration of consumption on all levels	Herd level surveillance of resistance Herd and national level registration of consumption patterns
Transmission	Understanding basic mechanisms, food as a vehicle, global spread of bacteria, risk assessment of transmission factors, intervention studies	Prevention of transmission of antimicrobial resistant bacteria through the food chain. Prevention of transmission of resistant bacteria within production systems
Environment	Risk of environmental transmission, mapping of current initiative to reduce risks, quantitate risk of different environmental factors, mechanism of transmission through the environment	Waste management protocols to cut the possible environmental transmission
Interventions	Large-scale international intervention projects, cost benefit comparison of different strategies, research follow up on national and international strategies	Indirect or direct participation in follow up programs

Modified from JPIAR (2014).

Table 2. Model prediction of selection in relation to treatment protocols, and preliminary results from field-testing in Danish pig hers and experimental testing of which treatment protocols that result in the least selection for resistance.

Model prediction	Model reference	Preliminary conclusion from Danish field and experimental study[a]
Rapid onset and short duration of treatment will minimize selection of resistant bacteria	D'Agata *et al.*, 2007	Rapid onset has not been investigated. Short duration of treatment results in less resistance than long duration
High doses of antibiotics will minimize resistance development	Lipsitch and Levin, 1997	High doses of antibiotics results in more resistance in experimental set up while no statistical difference was observed under field conditions
Combined use of two drugs will minimize treatment failure and prolongs the life span of an antibiotic, but only when multiple resistances are the problem.	D´Agata *et al.*, 2008	Treatment effect of two-drug treatment has not been evaluated. No significant reduction in multiple resistance was observed in experimental treatment with combination treatment
If all individuals at risk are treated as early as possible it will avoid development of resistance problems	D´Agata *et al.*, 2008	Flock treatment did not result in less resistance than individual treatment.
To eliminate resistance, it may be advantageous not to treat all individuals	Alexander *et al.*, 2009	Groups with individual treatment develop less average resistance than groups with flock treatment but resistance in the individual animal is the same

a. Unpublished results. No statistical stratification for herd effect has yet been analysed for field studies, and conclusions are therefore only to be considered as preliminary.

THE PHYSICAL FORM OF DIETS - IMPACTS ON PIGS' HEALTH, PERFORMANCE AND WELLBEING

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Introduction

For decades it is well known that ruminants need "structure" (crude fiber/physically effective fiber) in their rations for diverse processes in the rumen, for avoiding ruminal acidosis and secondary disorders, for high performance (milk yield, milk fat, gains) and wellbeing (including chewing activity, rumination). Here the term "structure" covers two different properties of the diet, i. e. the physical form (length and size of fibrous plant materials, their hardness, volume, resistance against comminution), but also the *chemical* composition (crude fiber/NDF/ADF/ADL). But in monogastric animals like pigs there is no comparable parameter up to now, although it is known for about 50 years (MAHAN et al. 1966, MAXWELL et al. 1970) that there is a need for a "coarse diet", otherwise prevalence and intensity of gastric ulcers would increase, even resulting in pig losses and reduced performance (feed intake ↓, daily gains). Thus it is necessary to survey the "physical form" of diets for pigs including the consequences for the health of animals but also regarding performance of pigs (fattening) and welfare (including behavior). This contribution mainly summarizes results, data, findings and experiences of experimental research at the Hanoverian institute, without neglecting published research work of authors from other groups and countries.

Overview: Experimental studies in pigs related to the "physical form" of diets performed at the Institute of Animal Nutrition, University of Veterinary Medicine Hannover, Foundation

main subjects	variables/parameters/objectives	author(s)[1)]
gastric ulcer/integrity of the alimentary tract, organ weight, histology	different physical forms of diet (mash/pellets) – gastric ulcer intragastric milieu (dm, pH, Cl^-, buffering capacity) coarsely vs. finely ground diets/mucins/histology dry vs. liquid feeding of coarsely and finely ground diets	GROSSE LIESNER (2008) KÖTTENDORF (2009) BETSCHER (2010) WINTERMANN (2011)
intestinal microflora; feed digestibility, feed utilization, performance	gastrointestinal flora in young pigs fed physically different diets organ mass (stomach/pancreas), digestibility , performance (physically different diets), i. e. mash, pellets, extrudates	BULLERMANN (2012) ARLINGHAUS (2013)
Salmonella/E. coli dietary prevention, artificial infection to test hypothesis	artificial infection in pigs fed mash vs. pelleted diet field studies on farms of category III (coarsely/finely ground diets) artificial infection with Salmonella/different feed structure field study in piglet production (mash/pelleted diet) coarsely vs. finely ground diets/acids as feed additives pelleted vs. mash diets in reared piglets and E. coli mucus properties/in vitro adhesion of Salmonella influences of the physical form of diet: artificial infection with Salmonella in reared piglets/in vitro survival of Salmonella in the stomach content artificial infection with E. coli of reared piglets fed pellets vs. mash	PAPENBROCK (2004) VISSCHER (2006) NEU (2007) OFFENBERG (2007) HASSAN (2008) OELSCHLÄEGER (2011) CALLIES (2012) KOOP (2013) MÜHLEN et al. (2014)
faeces composition, consistence/quality	feeding of diets differing in their physical form/grinding intensity (sows); faeces composition/quality/dry matter, starch losses via faeces	WARZECHA 2006

[1)] most of the theses are available on the internet (http://elib.tiho-hannover.de/dissertations/dissertations.html), therefore they are not cited in the literature

1. Characterizing the physical form of diets for pigs

In modern pork production feeding complete diets became the standard, it means that cereals, protein ingredients and supplements (incl. additives) are mixed and offered. But for mixing, compacting and high utilization rates (of energy and nutrients) there is a need for grinding the main ingredients (ARLINGHAUS et al. 2013, ANSON et al. 2012). Thus, the technique and intensity of grinding are determining the particles' size in the complete diet. The most frequently used mill type is the hammer mill resulting in a relatively broad spectrum of particles' sizes (including very fine ones). Roller mills produce commonly a more coarse and homogenous spectrum of particles. When the mixing process is followed by compaction (producing pellets, crumbles, extruded diets a. s. o.) there is a further impact on particles' sizes, because – unintended and sometimes forgotten – the pelleting process acts like a secondary grinding step. Finally there is a risk for a third step of comminution during preparing/offering the complete diet in a liquid feeding system (at mixing/transport of the liquid diet; KAMPHUES et al. 2007).

Non compacted diets ("mash diets") are quantitatively characterized regarding the "structure"/mean particle size by a dry sieve analysis; pelleted diets are soaked and afterwards separated by a wet sieve analysis (WOLF et al. 2010/2012). Finally the physical form of the diet can be described in details by proportions of the different fractions of diets particles that did not pass the sieves' holes. It is also possible to characterize the "average" particle size by one numerical value (GMD, µm), or by a graphical method (the point in a curve, where 50 % of all particles are smaller or larger) or by giving the percentages of masses of different fractions (for example: > 1 mm/< 1 to 0.2 mm/< 0.2 mm). It is a pity that up to now an internationally accepted official procedure for doing sieve analysis has not been established. Finally it has to be underlined that the type of ingredients has marked effects on the particle size in a diet due to the different morphological signs of grains (barley® coarse structure; wheat® finely sized particles in spite of identical grinding technology).

2. Physical form of diets – impacts on pigs' health

For decades students of veterinary medicine are taught about "gastric ulcers" in pigs due to finely ground diets. But although this fact is well known, the prevalence of gastric ulcers in pigs (estimated at the slaughterhouse) is recently quite high (WOLF and KAMPHUES 2007; VESTERGAARD et al. 2006). Diverse experimental studies were focused on processes in pigs' stomach influenced by different physical forms of diets, primarily to understand the process of ulcer pathogenesis (MÖSSELER et al. 2012/2010, MILLET et al. 2012, GROSSE LIESNER et al. 2009, REGINA et al. 1999). For this purpose the distribution of water and dry matter (dm), but also of pH and chloride were measured in the different regions of pigs' stomach. The "structure" of the diet determines predominantly the intragastric milieu, and not the dry matter content of the ingested diet. Only in pigs fed a coarse mash diet there was a "physiological" distribution of pH values (higher values in the stomach content of the pars nonglandularis, moderate acidification in the cardia part, very low pH in the fundus region ® marked "pH gradients" within the stomach content). In pigs fed the finely ground pelleted diet the dm, pH and Cl concentrations were almost identical at all regions within the stomach content (MÖSSELER et al. 2012). Up to now these macroscopically obvious findings are not explained in details, but it seems that coarse dietary particles only allow a "forming of layers" within the stomach in which parameters of the milieu can differ so markedly.

According to SANDER and KAMPHUES (2012) who reevaluated different experimental studies on gastric ulcers in pigs, it seems that prevalence and intensity of gastric lesions (≥ erosion) increase markedly when the medium particle size is lower than 500 µm, especially in pigs fed pelleted diets. Based on feed analyses from clinical cases occurring in the field it was summarized that diets with more than 35 – 40 % (mass of the fraction < 0.2 mm) might increase risks for development of gastric ulcers in pigs.

But at the end it has to be underlined, that clinical cases of gastric ulcers (even accompanied by animal losses) sometimes occur in spite of an adequate particle size in the diet, especially due to breakdowns/accidents in the technology of feeding in large units (pigs without feed for several hours → trouble/stress). Furthermore it seems that pigs housed on straw are less or hardly affected by gastric ulcers despite of finely ground/pelleted diets.

Parts of the stomach contents from the fundus region of pigs fed the different diets were used for incubation tests with Salmonella measuring the survival/growth of the inserted bacteria (KOOP et al. 2013; see chapter 3). But it has to be emphasized that diets' physical form has further effects along the GIT (BETSCHER et al. 2011; KAMPHUES 2011, HEDEMANN et al. 2005). These were/are subjects of different experimental studies performed during the last years (overview).

At first there are significant effects of the "diet structure" on the relative weight of organs, it means on the stomach wall but also on the pancreas (ARLINGHAUS 2013). The coarser diets resulted in higher mass of the stomach wall and of the pancreas (tested in reared piglets up to 25 kg bodyweight). Furthermore the anatomical structure of the final ileum and of the caecal valve were markedly affected (CAPPAI et al. 2012), when a finely ground pelleted diet was compared to a coarsely ground mash diet (both identical ingredients and chemical composition). The microarchitecture of the mucosa was also influenced (BETSCHER et al. 2010), especially the types of mucines (covering the epithel) were altered (coarse diets: more acid mucines).

Last but not least, due to the physical form of diets, different effects were observed regarding the gastrointestinal flora. In the stomach the coarser, unpelleted diets favored the lactobacilli and further lactic acid producing bacteria, when it was compared to young pigs fed the same diet, but finely ground and pelleted (SANDER et al. 2012, BULLERMANN 2012).

In the small intestine – significantly reduced counts of E. coli were found under these circumstances. In the hindgut a coarse diet has effects like prebiotics (KAMPHUES et al. 2007), it means the higher amounts of starch that enter the large intestine promote predominantly gram-positive bacteria (resulting in higher proportions of propionic and butyric acid, but also in tendentially higher lactic acid concentrations in the caecal content). In reared piglets infected artificially with E. coli favorable effects were observed when coarse mash diets were used instead of finely ground pelleted diets (MUEHLEN et al. 2014)
Finally in recent studies (CAPPAI et al. 2014) on diets' physical form in young pigs, further effects were found – outside of the GIT, it means on the expression and distribution of neuropeptide receptors in the mandibular gland of pigs fed a coarsely ground mash diet in comparison to finely ground pelleted ones.

3. Diets' physical form and prevalence of Salmonella

For more than 20 years it is known – especially based on epidemiological studies – that the physical form of the diet has an impact on Salmonella prevalence in pork production (KAMPHUES et al. 2007; review). It was tested in experimental studies with artificial infections (PAPENBROCK et al. 2005), but also in field studies on farms affected by high Salmonella prevalence that the "structure" of the diet has predisposing (finely ground and pelleted diets) or preventing, i. e. prevalence reducing effects (VISSCHER et al. 2009/2011). On debate is up to now the mode of action. One explanation is, that – due to coarse grinding – higher amounts of starch enter the large intestine (there are no doubts on this fact) and result in a stimulated production of butyric-, propionic- and lactic-acid. These changes in SCFA production should reduce the invasion capacity of Salmonella, resulting in a forced excretion and lower translocation of these zoonotic pathogens. Maybe processes in the stomach (described above) are also contributing to the desired effects against Salmonella. The coarse structure of a diet might improve the efficacy of the barrier function due to its effects on the passage time, but also on the pH within the stomach content, especially in the fundus part (KOOP et al. 2013). Taking samples of stomach contents from the fundus region of pigs fed the different diets (coarse mash diet/fine pelleted diet) resulted in interesting differences: By incubation tests with Salmonella Derby it was found that the counts decreased in minutes when the samples of stomach contents were obtained from pigs fed the coarse diet, but increased significantly when the stomach content of pigs was used, which were fed the finely ground pelleted diet. Furthermore the favored gram-positive flora in the stomach of mash fed pigs could contribute to the barrier function and its efficacy (CALLIES et al. 2012, TAUBE et al. 2009, MIKKELSEN et al. 2004). Finally the potential role of saliva production and saliva composition in pigs depending on diets' physical form needs further experimental research (KAMPHUES et al. 2009); in comparison to ruminant nutrition the knowledge regarding saliva in pigs is quite limited, although the saliva contains constituents that could have protective effects on the epithelia at the pars nonglandularis. It seems to be worthwhile to continue investigations regarding mucus production within the stomach and the epithelial bicarbonate secretion at the pars nonglandularis published by GARNER et al. (1984).

4. Diets' physical form and performance

The primary reason for grinding the ingredients in diets for pigs is the intended high digestibility and utilization rate of energy and nutrients in pigs (ARLINGHAUS et al. 2013, WOLF et al. 2012, CANIBE et al. 2005, NIELSEN and INGVARTSEN 2000, WONDRA et al. 1995). During the last decades there was a trend in the feed industry for intensifying the grinding because of advantages for the pelleting process and the pellet stability. But more and more it is discussed here whether all ingredients need a high comminution to achieve a high digestibility rate. Headlines in the media regarding energy costs, CO_2 footprints or animal welfare resulted in a critical reevaluation of the grinding intensity in the industry, too.
Diverse digestibility/feeding trials with young pigs (20 – 25 kg bw) at our institute were focused on the digestibility rate and performance (daily gains/feed conversion ratio).

Tab. 1: Digestibility rates (%) for organic matter and crude protein in young pigs fed (ad libitum) chemically identical diets, but differing in their physical form
(bw: 20 – 25 kg; H = hammer mill; R = roller mill; ARLINGHAUS 2013)

Diet	PF	MC	PC	Extr.
- grinding - compaction	fine (H) pellet	coarse (R) mash	coarse (R) pellet	coarse (R) extrudate
particle size, % > 1.0 mm < 0.2 mm	 8.97 42.4	 45.8 27.2	 41.6 32.7	 29.3 43.0
digestibility, % - org. matter - crude protein	 85.5[a] 80.9[ab]	 85.7[a] 81.8[a]	 85.5[a] 79.0[b]	 85.0[a] 79.2[b]

In spite of marked differences in the "structure" of the different diets the total tract digestibility was not altered; also the coarse mash diet did not result in slightly reduced digestibility as expected. Three of these diets were also tested regarding the prececal digestibility rates in fattening pigs (bw ~ 60 – 65 kg). There was a trend for slightly decreased values regarding the prececal digestibility rate of crude protein (78.7 vs. 77.4 vs. 75.0) and of starch (96.5^{a}/96.2^{a}/94.8^{b}).
Recently a review (ARLINGHAUS et al. 2013) was published regarding the performance of pigs related to grinding intensity and effects of pelleting. Summarizing this review it can be concluded that the grinding intensity (nowadays established levels) can be reduced without negative effects, but there seems to be a special need for higher grinding intensity when diets contain corn and legumes. Coarse mash diets don't reduce the daily gains in fattening pigs markedly but are linked to some negative effects on FCR. Presumably spillage of feed, dust a. s. o. are potential reasons, but also the slightly elevated part of nutrients which is digested in the hind gut by microorganisms should result in altered energy utilization (starch digested and absorbed in the small intestine as glucose is better than SCFA produced on starch by microorganisms in the hind gut). There are two further aspects that should not be neglected: It seems that pelleted feeds have two advantages: It is easier to adopt young suckling piglets to feeds and feeding (besides milk) and there is an increased feed intake when its maximizing is intended (lactating sows!).

5. Diets' physical form and wellbeing

The physical form of diets has an impact on ingesting behavior. Pelleted diets enable a high speed of feed ingestion, whereas coarse mash diets result in lower dm intake per time unit. Presumably processes of chewing (with saliva flow) are stimulated and prolonged when coarse mash diets are compared with pelleted diets based on finely ground ingredients (MÖSSELER et al. 2011). As known from other species (horses/ruminants/rabbits) prolonged feed intake duration has several advantages in the GIT, but up to now such experiments are missing in pigs (KAMPHUES et al. 2009).
Findings in slaughtered animals came more and more in the focus for detecting deficiencies in the housing, management and feeding of food producing animals. Similar developments we have observed in poultry production, where the foot pad dermatitis or its scores are now used to characterize the poultry production under aspects of animal welfare.
It has to be underlined that the prevalence of marked erosions or ulcers at the pars nonglandularis of stomachs in pigs gives an information regarding the actual stage of stomach health ("tip of the iceberg"), but not on the occurrence before or on the "history" of these animals. Gastric ulcers are presumably in most cases not clinically obvious, it means during the fattening period or production cycle of sows there is a higher frequency of undetected alterations in the gastric mucosa. Under these circumstances it should be emphasized that optimizing diets' physical form is needed to prevent also the clinically inapparent alterations during the entire production process – and not only the obvious erosions and ulcers at slaughtering.
But there are further effects of special interest for feeding of sows. During pregnancy and especially in the periparturient period there are problems regarding defaecation and faeces composition (hard, firm, dry), not seldom resulting in constipation. Whenever there is a stasis within the GIT there is a risk for secondary systemic effects; it is discussed for years, that a constipation just before parturition might enhance the risk for periparturient disorders (presumably due to endotoxin absorption from the alimentary tract, → endotoxaemia). Thus diverse experimental studies (WARZECHA 2006) were performed in pregnant sows, fed chemically identical diets based on identical ingredients but prepared in different grinding intensities (grinding with a hammer mill with different sieves). Summarizing these experiments it can be stated that the coarser mash diets resulted in desired effects (higher water content; favored consistence, i. e. higher plasticity) and stimulated frequency of defaecation. The coarser "structure" of the diets was reflected by a more particular "structure" of the faeces. Under these circumstances the starch losses via faeces were also determined, the values increased significantly, but on a very low level (conventionally prepared diets: ~ 25 g starch per kg dm faeces vs. ~ 35 g starch/kg dm faeces). As intended, the coarse particles in the diet might favor the motility of the GIT and contribute to a normal GIT transit time, that is not seldom an onset to use laxative ingredients (for example wheat bran), specific fiber concentrates (lignocellulose) or chemical agents (Na_2SO_4 for example). Under these circumstances the crude fiber content of the diet should also be tested critically; in a high frequency the crude fiber supply does not meet the requirements from legislation (8 % crude fiber in the dm of diets for pregnant sows). Finally there are stimulative experiments on effects of "resistant starch" in pigs (BOLHUIS et al. 2010). A higher intake of resistant starch (not absorbed in the small intestine, but fermented in the hindgut) reduced significantly the moving activity of fattening pigs, indicating that the gut fill, the higher production of SCFA/the more continuous absorption of SCFA might result in desired effects regarding behavior. If that is true, it should be an advantage when – due to a reduced grinding intensity – higher proportions of dietary starch reach the hindgut, last but not least for ethological reasons.

6. Summary/Conclusions

- The physical form of a diet for pigs can be characterized quantitatively by "official" sieve analysis (compacted diets by standardized wet sieve analysis only).
- Ingredients, milling technology and further compaction processes influence markedly the percentages of particles of different size within a diet.
- First obvious effects of finely ground pelleted diets occur at the mucosa of the pars nonglandularis (gastric ulcers), when the proportion (mass) of particles < 0.2 mm exceeds 35 % significantly.

- Within the stomach content pH-"gradients" were observed only when coarse particles were in the diet, but not after ingestion of "fine pellets".
- There are significant effects on the anatomical development of the stomach wall and of the pancreas, i. e. their relative weight/mass (coarse diets: ↑).
- The microarchitecture of the small intestine is also influenced (coarse diet: relatively more acid mucins are covering the mucosa for example).
- Coarse mash diets (wheat/barley based) did not result in reduced digestibility rates in comparison to pelleted diets based on finely ground ingredients.
- Regarding daily gains coarse diets resulted in similar rates but the FCR might be affected negatively (feed losses, fermentation of starch in the hind gut).
- When coarse diets are fed to pigs higher amounts of starch will enter the large intestine and be fermented (butyric acid ↑), acting like prebiotics .
- Coarse mash diets (its flora/acidification) are recommended in pork production when there is a challenge due to increased Salmonella prevalence.
- Regarding the mode of action in prevention of Salmonella two mechanisms have to be underlined, i. e. the barrier function of the stomach and changes in hind gut fermentation (butyric acid ↑).
- Finally coarse mash diets give favorable effects regarding ingesting behavior, gastroenteral motility, defaecation and faeces composition (of interest in feeding sows at the end of pregnancy to prevent periparturient disorders).

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MAN-MADE DISEASES IN SWINE

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Breeding and selection made us create highly productive pigs, that can kept in confinement in high numbers. Production is mainly driven by cost reduction and farm logistics often counteract herd health. Herd sizes rapidly increase. Management skills have deviated from pig physiology and pig behavior to economics. Farm workers are trained to perform their tasks with excessive speed, but are often insufficient trained for taking care of the pigs. Little or no investment is done in proper assessment of animal handling or monitoring skills of farm workers. When routines are not carried out correctly, this will lead to structural harm to pig health and welfare: man-made diseases. Not all these disorders are easily diagnosed or related to inadequate skills of farmworkers as ignorance is often present. A compilation of some observed and diagnosed disorders is made.

Disorders or diseases caused by absence of skills to handle and treat piglets according to legal welfare regulations:

- Ear paralysis by trauma of the *Nervus auriculopalpebralis*, a branch of the facial nerve, as a result of grabbing piglets by their ears from pens for tagging or injections. The condition may improve after 6-8 weeks.
- Spinal ataxia or head tilt due to paravertebral injection in the neck of piglets. Untrained farmworkers unknown of localization of neck vertebrae may routinely put intramuscular (iron)injections to close to vertebral rami.
- Mixing of injectable drugs, like tulathromycin and iron, may result in contamination. Injectables contaminated with tulathromycin resistant *Clostridum* spp. induced gangrenous infection of the head. Maligne edema with cyanosis of the head and resulting mortality up to 20% occurred in piglets 1-2 days after iron injection.
- Retropharyngeal abscesses or abscess of the hypophyses are always of traumatic origin, and caused by (self-made) devices like pig pumps for oral medication with toltrazuril or colistine. Clinical signs may vary but were often erroneously attributed to meningitis caused *Streptococcus suis*.
- Unilateral necrosis of the distal parts of the hind-limbs was observed in weaners. The clinical features of unilateral tibial paralysis were observed in piglets from the sixth day of life on. Sensory innervation distal to the hock was frequently absent in the leg involved. Both the mechanical injury on locomotion and the gnawing by pen mates of the piglets involved were regarded as causes of the extensive necrosis of the distal parts of the hind-limbs. The primary cause of the above lesions was found to in a faulty technique used in injection in the hamstrings of the piglets.
- Ataxia and posterior paresis or paralysis exclusively of barrows due to osteomyelitis of vertebrae (between T12 and L2). Trauma is caused by fixating devices used for castration of piglets. Extreme bending of the back during fixation leads to spinal trauma that is often complicated by septic osteomyelitis.
- Outbreaks of kinky back, unrelated to genetics, but related to rough handling of piglets by fixing them by knee against pen walls. Incidence up to 10% of kinky backs, mainly in barrows, were observed, that were characterized at dissection by wedge shaped thoracic vertebrae and often multiple fractures of the 9^{th} -11^{th} rib. No new cases occurred when farm workers were closely observed.
- Teeth clipping in neonatal piglets often result in fracture of teeth, resulting in alveolitis by oral microbiota, and abscesses in the root canal. Teeth clipping practice is still widely practiced to prevent facial or udder lacerations. These signs, reflecting struggle for adequate nutrition, are counteracted by teeth clipping instead of additional care and nutrition.
- Tail docking is generally practiced, as our present porcine industry cannot handle pigs with undocked tails. Docking to close to the tail slows down wound healing and increases the risk of paravertebral abscesses.

Disorders or diseases caused by absence of knowledge of hygiene and infection management:

- Diarrhea by polluted water is quite often observed in neonatal piglets that are provided with oral rehydration solution in order to treat or prevent diarrhea. High cfu of Proteus spp or *Pseudomonas* spp, up to 10^{10} per ml were found in piglet drinking water. Water pans are usually positioned in areas with fecal contamination.
- Disinfection with caustic soda 2% of pig barns have to be followed by cleaning with water. Tender foot slats of farrowing pens will not harm sows, but any fluid in piglet nests with solid floors will cause necrosis of piglet claws.
- Rescue decks above farrowing crates, that harbor excess of piglets that cannot be nursed by sows, contain weaned piglets that lack lactogenic immunity. These piglets act as an incubator for pathogens that are endemic in newly weaned piglets.
- Serum therapy in piglets, as well oral feeding of serum products, is a major risk of spreading infections from viremic pigs. Recently, the spread of PED to Canada was clearly linked with live PED virus contaminated plasma shipment.
- Myoclonia congenita usually only affects piglets of gilts en occurs infrequently in farrowing herds. Systematic feedback of dead born piglets to pregnant gilts may result in long-lasting incidence of myoclonia in piglets of gilts. In the past a farrowing herd was infected by classical swine fever after repopulation by frozen dead born piglets, that were kept for feedback.

- Feedback of diarrhea of piglets to gilts and sows is worldwide practiced, while there is no rationale other than to keep pathogens in the breeding population. In addition, like mixing of pigs, it promotes efficient spreading of antimicrobial resistance in the population.

Disorders or diseases due to lack of overview of the herd and inability to daily monitor pig health and welfare:

- When numbers do not allow individual monitoring, the logic reaction of a farmer is sorting and grouping animals by size, weight, sex or production status. This sorting intensifies contact structures, that especially in young pigs increases transmission of infections. Mixing generally increases the incidence of various diseases, and like reported for post weaning multisystemic wasting syndrome (PMWS).
- Structural feeding of large volumes to sows and/or restriction of drinking water may lead to traction of the ligament between stomach and spleen. This results in splenic enlargement as venous return is blocked. Repeated injury of splenic ligaments results in spleen atrophy, that goes along with immunologic features resembling nonhemolytic anemia. Spleen regression coincides with complement depletion and increased incidence of pyogenic infections. Inventory studies in the past demonstrated that 1-2% of the Dutch slaughter sows has an atrofied spleen.

As herd size worldwide rapidly increases, the number of hired farm workers also increases.

Until now the pig industry has failed to assure a basic quality of farm workers with respect to knowledge of pig handling, porcine physiology and animal welfare. What is the vet's task and duty?

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SAVE THE PIG TAIL

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Tail biting is a commonly occurring and difficult behavioural problem that affects both pig welfare and production results negatively. In most European countries this has resulted in routinely performed tail docking to reduce the problem. However, tail docking does not eliminate tail biting totally, it causes pain to the pig, and most importantly, it only focuses on reducing the symptom, not the reason for tail biting. The exact ontogeny of tail biting behaviour is still unknown, but a significant mass of evidence shows that any form of increased stress or reduced welfare of the pigs can act as a risk factor for tail biting. In addition, there is recent evidence to show that individual pigs have different predisposition to develop the problem, or to become victims of tail biting. This paper will give an overview of recent developments within research on tail biting and tail docking, and measures to be taken to reduce the risk for tail biting, and thus the need for tail docking on farms.

Earlier studies have shown that there is a genetic background to tail biting, with certain pig breeds more commonly developing tail biting behaviour (Breuer et al, 2005). In addition, recent studies of gene expression indicate that there might be some underlying genetically predisposing characteristics. Interestingly, pigs that remained unbitten, and that did not develop biting behaviour appeared to have most differences in gene expression as compared to biters and victims in the same pen (Brunberg, 2011). Genes that differed between these categories included ones with an effect on leanness, social behaviour and regulation of the dopamine system. It is also well-known that there seems to be a gender-difference in the risk for becoming a tail biting victim (Valros et al, 2004), and probably also in the probability to develop tail biting behaviour.

The risk of decreased health as a result of tail biting is clear, while the effect of general health status is not an established risk factor of tail biting. More and more evidence, however, is showing that there is an increased risk of unhealthy pigs to become victims of tail biting. We have shown that lame pigs run a greater risk of being bitten and that acutely bitten pigs more often suffer from respiratory diseases than control pigs (Niemi et al, 2011, Munsterhjelm et al., 2013a).

Victims show several signs of higher stress levels than control pigs, which can certainly be due to being bitten, but maybe also a reason for being bitten (Valros et al., 2013a, Munsterhjelm et al., 2013b). Also biters show a slightly higher chronic stress level than controls (Munsterhjelm et al., 2013b), which supports the hypothesis that stress might be a cause for the biting. Even though we do not know the mechanism behind the change, it is also very interesting that tail biters have been found to have an altered serotonin metabolism in their prefrontal cortex (Valros et al., 2013b). Serotonin has been linked to several mental disorders in humans and to e.g. aggression, social behaviour and feeding in several animal species.

Feeding and feed contents is a recognized risk factor for tail biting, and in addition to deficiencies and sudden changes in feed composition being problematic, also feeding behaviour appears to be important. Our studies have shown that tail biting is very common around feeders (Palander et al 2012), and that one way to avoid becoming tail bitten in a tail-biting pen might be to reduce feeding. Data on changes in intestinal morphology of non-bitten, non-biting pigs in pens with tail biting support this assumption (Palander et al, 2013). In addition, the earlier mentioned gene expression studies (Brunberg, 2011) indicate that selection for leanness might be one factor behind tail biting and a study on a large dataset of pigs in a Finnish test station showed that tails are bitten more frequently in pigs which have a poor genetic average daily weight gain (Sinisalo et al, 2012).

The maybe most important risk factor for tail biting is lack of manipulable material. This has been shown in numerous epidemiological and experimental studies, and can thus be taken as more or less a fact. In addition to being important during the actual risk time for tail biting, we have shown that the risk for tail biting in the growing and fattening stages can be reduced by adding more manipulable material during the first weeks of the pigs life, during the lactation phase (Munsterhjelm et al., 2009, Telkänranta et al., 2014).

When considering options for preventing tail biting, it is, of course also necessary to consider economic implications. Using model simulations Niemi et al (2011) suggested that there are economic incentives to put effort in preventing further cases from occurring after the first case has been observed in the pen whereas incentives to invest in e.g. straw-based housing are farm-dependent. Moreover, preliminary results suggest that the resources would probably be used economically more efficiently by promoting enrichments use (as such or with housing type) than extra space (Niemi et al., 2012).

Tail docking causes pain to the pigs, and a highly increased risk for neuroma formation in the tail end (Herskin et al 2010). The efficiency of tail docking is not convincingly proven, and especially if only a small part of the tail is docked, studies shows it might not be very efficient. However, the bigger part of the tail is docked, the more painful the procedure is to the pig (Herskin et al 2012). Of course, also tail biting is painful so a careful risk assessment of the adverse effects of tail biting and tail docking, as well as the positive effects of improving the housing and management on pi farms is necessary before the already existing,

principal ban on tail docking in the EU can be enforced more completely. More data to support such developments is currently being collected within the ANIHWA ERA-Net funded project FareWellDock (http://farewelldock.eu/).

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AFRICAN SWINE FEVER

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African Swine Fever (ASF) is the most devastating and threatening disease of domestic pigs. It is often identified as hemorrhagic but it may in fact develop as peracute, acute, chronic and unapparent clinical forms with a broad spectrum of pathological lesions, often comparable to other diseases, namely to classical swine fever.
ASF was first described as distinct of classical swine fever by R. Eustace Montgomery in 1921 in Kenya, based on studies he developed from 1910 and 1917, on relevant aspects of the disease in domestic pigs.
The disease is caused by the nucleocytoplasmic African swine fever virus (ASFV), the only member of the Asfraviridae family, with different virulence and complex morphological structure containing a large DNA codifying for more than one hundred peptides, several of them potentially relevant to counteract with host protective mechanisms against infection. Relevant for the pathogenesis of infection, ASFV replicates, affects and causes death of porcine monocyte - macrophage cells, contributing to the establishment of complex viral-host interactions. Pig immune responses against ASFV are not fully understood. Cellular-mediated and cellular effector mechanisms have been shown to play an important role in animal protection against infection and anti-ASFV antibodies do not neutralize the virus, in naturally occurring infections although they may contribute to mitigate the disease progression. The complex aspects of the ASFV- host interactions have made it difficult to obtain a vaccine, however current research efforts open new insights for the development of efficient preventive immunogens.
Not only ASFV and its interactions with the host are complex. The virus is maintained and disseminated in nature under different and complex life cycles in different natural scenarios involving domestic and wild swine and arthropod vectors (soft ticks, genus Ornithodoros). The disease is endemic in most of the Sub-Saharan countries of Africa. Out of this continent ASF was first introduced in Portugal in 1957 and after eradication it reappeared in 1960 and disseminated during 70' and 80's to Europe (Spain, France, Italy, Belgium and The Netherlands), to the Caribbean Islands (Cuba, Dominican Republic) and Brazil. In EU member states, the disease was until recently confined to Italy (Sardinia). However, in 2007, it was introduced and spread in Armenia, Georgia, Azerbaijan and in the Russia Federation and very recently it was declared in Ukraine, Belarus, and reached Lithuania and Poland.
The occurrence of ASF causes significant socio-economic impact in affected countries, constraining pig production by livestock farmers and affecting national, regional and international trade. In the absence of a vaccine, the prevention, control and eradication of the ASF are solely based on the implementation of complex and expensive strict sanitary rules not always efficiently applied, posing a threat to pig production worldwide. Awareness of the disease by stakeholders and prompt decisions by official entities should be strongly envisaged to avoid the harmful consequences of the disease occurrence and spreading.
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THE ROLE OF INTERNATIONAL TRADE IN THE SPREAD OF PIG DISEASES - A FAO PERSPECTIVE

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In a world of increasing globalization of trade and transport, the transboundary spread of animal diseases has become a growing concern to the international community. The level of mobility, not only of people and products, but also of pathogens, leads to an interconnectivity of regions that requires adaptation from systems and services to assure the benefits of increased exchange do not get outpaced by the risks. Such movements of people, animals and their products have grown exponentially to huge proportions. As an example, the daily movement into US amount 38,000 animals (not including pets), 1.3 million passengers, 341,000 vehicles, 45,000 trucks, 2,500 aircraft and 550 vessels.

Related to international standards, the OIE and Codex Alimentarius provide countries with the tools to regulate trade of live animals and animal products empowering them to protect their citizens and the livestock sector form defined threats. These are powerful tools that can have a significant economic impact on stakeholders involved in commodity trade as markets can be blocked and hurdles to overcome trade restrictions can be high.

For the pig sector in particular, the international trade of pig products has reached enormous volumes over the past decades. These trade dimensions go hand in hand with the overall development of a highly integrated and continuously consolidating sector. The trade of live animals is mostly reflected in international transport of high value breeding stock as well as direct cross border ground transport of piglets and fattening animals within regional production clusters.

It is important to note though, that when looking at the relevant risk factors of transboundary pig disease spread, the regulated trade of pigs and pig products plays a minor role. In many parts of the world, the majority of pig producers operates in small scale and backyard production systems that only have minor or no linkages with formal pork market chains. These producers hardly ever comply with veterinary regulations, e.g. animal/farm registration, movement control, vaccination, disease reporting, etc. This translates in these systems harboring more diseases than more regulated/industrial farms. Given the often arbitrary nature of borders, it is common that both sides of the border are inhabited by the same ethnic groups, with a frequent movement of people and their products. These borders are in many cases subjected to no control and really porous, thus allowing an almost unrestricted movement of all sort of goods. Not only do live animals within those production systems get traded between countries without official tracking or health inspection, but even more importantly pork products are widely distributed due to the mobility of people sourcing products from the informal market. The volume of such informal movements can widely range from a couple of sausages in someone's luggage to several tones. The spread via pork products is particularly relevant for those agents that can persist in the meat, like African or classical swine fever.

Key constraint for the prevention of pig disease spread within these low biosecurity and low industrialized systems is the limited outreach of veterinary services. An active interaction between these stakeholders is often nonexistent or otherwise dominated by mistrust or misunderstanding of the respective realities.

Examples where the informal trade of swine and pork products have been the key driver of disease spread are found plenty, even when restricting the view to the past years. The introduction of African swine fever (ASF) into the Caucasus and its continuous spread through the Russian Federation into eastern Europe reflects quite well how little effective the bans in official trade can be once there is no interaction with a vastly present informal sector. ASF entered Georgia in 2007, presumably arriving in the Black Sea coastal port of Poti with a shipment from southeastern Africa. This represented a significant geographic leap for a virus that has a wildlife reservoir and for which infection of domestic pigs is a species jump. As is the case for many large shifts of animal viruses, this was probably the result of some form of illegal activity, in this case swill feeding of ship waste without any previous thermal treatment. As the veterinary services of Georgia were ill-prepared, ASF spread freely, affecting mainly backyard pigs along the main trade routes, and moved to Armenia, Azerbaijan. By the end of 2007, ASF had crossed to the Russian Federation and continued to spread uncontrolled. Over the past couple of years the disease has further advanced into Belarus, Lithuania and Poland. Spread is linked mainly to the movement of infected pork products, where the virus can resist for long periods. In some cases, the disease has jumped thousands of kilometers on several occasions. Even cases when the first introduction has been reported in wild boar (which are equally susceptible to ASF virus), it is often due to wild boar consuming infected meat leftovers transported over the border, rather than by the transboundary movement of the animals.

Other diseases, like the highly virulent porcine reproductive and respiratory syndrome (PRRS) in southeast Asia, did follow comparable spread patterns in the recent past underlining the necessity to prevent transboundary pig disease spread beyond the traditional approaches. PRRS was first recognized almost simultaneously in western Europe and North America in the late 1980s.

In retrospect, evidence can be found that PRRS virus was circulating in China in 1996 and in the Mekong Delta of Viet Nam since 2000, but at this early stage no severe clinical symptoms were associated with it. Following its emergence in 2006 in areas of high pig density in China, the virus has made its way around Southeast Asia and, at least for the greater Mekong region, it seems evident that the disease was following the path of the intensification of pig production as it spread and became established first in countries with a larger share of commercial production units and high animal densities (Viet Nam, Thailand and the Philippines). It later entered countries with a less developed commercial sector (Cambodia and Lao People's Democratic Republic), owing to lack of biosecurity in value chains and the absence of regulations and incentives for controlling pig diseases.

Approaches like the banning of backyard pig farming have shown little success. Given the indoor breeding of most backyard pigs, it is difficult to locate the animals. Moreover, pig breeding is often linked to traditions and ceremonies that are deep into the society, and the meat of backyard pigs is generally preferred over industrially produced pork.

Within the veterinary sector, disease awareness, surveillance, prevention and control must be adapted to the realities of the small scale producers and only then will they be perceived as a support in the livelihoods activity of the farmer rather than a burden they need to by-pass. Additional work on improved linkages of small scale producers to the regulated market chains will improve the overall disease monitoring options as well as open doors for control and prevention interventions and should therefore be an integral part of strategies towards improved swine health in production systems that can otherwise continue to threaten the pig sector as a whole. In addition, the development and modernization of the backyard pig sector is key. An improvement of the biosecurity, infrastructure, and husbandry of backyard farms has to be encouraged through training programs, the creation of producer associations, marketing strategies, etc. This will gradually change the perception of farmers and will lead to a shift to a safer production environment and better quality products.

The following abstracts for both the oral and poster presentations are printed as submitted by the Authors - They have not been subject to editorial revision

ORAL PRESENTATIONS

The pdf files of the oral presentations are available on www.eaphm.org <http://www.eaphm.org>

RESIDENTS' SESSION

Wednesday, May 7th
15.30-17.30

O1 **RISK FACTORS FOR LAMENESS DEVELOPMENT IN SOWS WITHIN THE FIRST DAYS OF GROUP-HOUSING**
Pluym L., Van Nuffel A., Van Weyenberg S., Maes D.

O2 **FIELD STUDY ON SWINE INFLUENZA VIRUS (SIV) INFECTION IN WEANER PIGS AND SOWS FROM HERDS WITH A HISTORY OF RESPIRATORY OR REPRODUCTIVE DISORDERS**
Meiners C., Loesken S., Doehring S., Starick E., Pesch S., Maas A., Noe T., Beer M., Harder T., Grosse Beilage E.

O3 **POSSIBLE INFLUENCE OF WEANING STRESS ON EFFICACY OF MYCOPLASMA HYOPNEUMONIAE VACCINATION AGAINST EXPERIMENTAL CHALLENGE INFECTION IN PIGS**
Arsenakis I., Panzavolta L., Michiels A., Del Pozo Sacristan R., Boyen F., Haesebrouck F., Maes D.

O4 **ULCERATIVE DERMATITIS OF THE MAMMARY GLAND: UNDERESTIMATED PATHOLOGY?**
Houben M., Van Leengoed L.

O5 **REDUCING EDEMA DISEASE ESCHERICHIA COLI (EDEC) RELATED DISEASE AND MORTALITY IN A NORWEGIAN COMMERCIAL PIG HERD BY VACCINATION WITH ECOPORC® SHIGA**
Groentvedt C.A., Skrutvold O., Framstad T.

O6 **PERIPARTAL FEEDING STRATEGY AND BODY CONDITION OFFER OPPORTUNITIES TO ALTER COLOSTRUM YIELD AND COMPOSITION IN SOWS**
Decaluwé R., Maes D., Cools A., Wuyts B., Janssens G.

O1 RISK FACTORS FOR LAMENESS DEVELOPMENT IN SOWS WITHIN THE FIRST DAYS OF GROUP-HOUSING

Pluym L.[1], Van Nuffel A.[2], Van Weyenberg S.[2], Maes D.[1]

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Although the recent change in sow housing was primarily driven by welfare concerns, group-housing may also present welfare issues including a higher prevalence of lameness. Lameness harms sows' well-being and can cause considerable economic loss. Knowledge on the influential factors could be useful to find measures to prevent lameness development. The aim of the present study was to determine risk factors for lameness development within the first days of group-housing, with a focus on housing conditions, management and post-mixing aggression.

A longitudinal study on 15 randomly selected herds was performed to investigate the incidence of sow lameness and possible risk factors within the first days of group-housing. Each herd was visited just before and again three to five days after sows were moved to the gestation unit (i.e. group-housing). Dimensions and quality of the housing environment of group-housing were assessed. Of each sow, locomotion, body condition, skin lesions and dirtiness were scored. Information on housing and management was obtained using a questionnaire.

In total, 810 sows were included. The median incidence of lameness in each herd was 13.1% (0 - 27.3). Sows with more than 10% of the body covered with manure showed an increased risk for lameness development (OR = 2.33, P = 0.001). An increase of space allowance from 1.8 m² to 3 m² (OR = 0.40, P = 0.03) and of the herd size from 144 to 750 sows per herd (OR = 0.71, P = 0.02) decreased the risk for lameness development. The degree of aggression, indicated by skin lesions, nor the floor characteristics influenced lameness development. These results indicate that lameness may not be increased by post-mixing aggression and sows may benefit from a higher floor area. More research is necessary to define the optimal space allowance to prevent sow lameness. Further focused studies should investigate the influential factors of the association between sow dirtiness and farm size on the one hand, and lameness development on the other hand.

NOTES

O2 FIELD STUDY ON SWINE INFLUENZA VIRUS (SIV) INFECTION IN WEANER PIGS AND SOWS FROM HERDS WITH A HISTORY OF RESPIRATORY OR REPRODUCTIVE DISORDERS

Meiners C.[1], Loesken S.[1], Doehring S.[1], Starick E.[2], Pesch S.[3], Maas A.[3], Noe T.[3], Beer M.[2], Harder T.[2], Grosse Beilage E.[1]

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The aim of this field study was to explore the occurrence of and factors associated with the detection of SIV in weaner pigs and sows from herds with a history of respiratory or reproductive disorders. Nasal swab samples from 823 sows (123 submissions) and 562 weaner pigs (80 submissions) were taken and submitted by 51 veterinary practices from all over Germany. The nasal swabs were used to detect SIV RNA by quantitative real-time RT-PCR (RTqPCR) and for isolating virus using standard methods. Herd characteristics, management and housing conditions of the pig herd as well as the course of the disease were collected by the interrogation of the herd attending veterinarian via telephone questionnaire.

SIV detection by RTqPCR succeeded in 32.2% of the nasal swabs from weaner pigs (n= 562) out of 43 submissions (53.8 %) with a history of respiratory disease. In samples from sows (n=823) the detection rate of SIV was 5.8%. Most of the positive samples originated from gilts.

The predominant subtype found in the samples from sows and weaner pigs was H1N1 (60.5%) whereas subtypes H1N2 (14%) and H3N2 (14%) were found less frequently. In addition, human pandemic H1N1 virus or reassortants thereof were found in 11.5%.

Analysing the data collected via telephone questionnaire using Chi square or Fisher's exact test, the detection of SIV in weaner pigs was associated with refusing to vaccinate piglets against PCV2. Other parameters, e.g. a suckling period of at least 28 days and a moderate cross-fostering, revealed to be negative associated with higher detection rates of SIV in weaner pigs.

In sows, SIV was significantly more frequently detected in herds with group housing of gestating sows. The vaccination of sows and suckling pigs against PRRS was significantly associated with a lower SIV detection rate.

The frequent detection of SIV in weaner pigs confirmed the relevance of this agent for the occurrence of respiratory diseases in pigs of this age group. However, the supposed association between SIV infection and reproductive disorders could not be confirmed with the sampling strategy performed in this study.

NOTES

O3 POSSIBLE INFLUENCE OF WEANING STRESS ON EFFICACY OF MYCOPLASMA HYOPNEUMONIAE VACCINATION AGAINST EXPERIMENTAL CHALLENGE INFECTION IN PIGS

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Commercial bacterins are widely used to control M. hyopneumoniae infections in pig at weaning. However, it is not known whether weaning stress has a negative effect on vaccine efficacy. The present study assessed the efficacy of a single M. hyopneumoniae vaccination (Ingelvac MycoFLEX®) three days before weaning (V1) or at weaning (V2) against experimental challenge infection. In total, 65 M. hyopneumoniae-free pigs were used. Three weeks after vaccination, the two vaccinated groups (n=20 pigs each) and a non-vaccinated control group (C) (n=20) were endotracheally inoculated with a pure culture of a virulent M. hyopneumoniae field strain (7 ml x 107 CCU/ml per pig). Five pigs were used as a negative control group (no vaccination, no challenge) to confirm the M. hyopneumoniae negative status of the pigs. All pigs were euthanized 4 weeks after challenge. Efficacy of the two different vaccination strategies was assessed at necropsy using macroscopic lung lesion scores, qPCR on broncho-alveolar lavage (BAL) fluid for quantifying M. hyopneumoniae and percentage of air in lung tissue. Percentage of air was measured objectively using computer software and correlates very well with the microscopic lung lesions (more % of air = less lesions). The average macroscopic lung lesion scores were 0.537, 0.883 and 1.038, in the groups V1, V2 and C, respectively ($P>0.05$). The average values for the qPCR results were 2.93, 2.76, and 3.22 in the groups V1, V2 and C, respectively ($P>0.05$). The average percentages of air in the lung tissue were 44.28%, 37.47% and 31.46%, in the groups V1, V2 and C, respectively ($P<0.05$ for overall and pairwise comparisons). All pigs of the negative control group remained negative using qPCR and did not have macroscopic lung lesions.

In conclusion, the vaccinated groups performed better than the non-vaccinated group. As the challenge infection caused only mild lesions, significant differences were only obtained for the microscopic lung lesions. Differences between the two vaccination groups were small and mostly statistically not significant. Further research under field conditions, including performance data, is warranted to further assess possible differences between the two vaccination strategies.

NOTES

O4 ULCERATIVE DERMATITIS OF THE MAMMARY GLAND: UNDERESTIMATED PATHOLOGY?

Houben M.[1], Van Leengoed L.[1]
[1]PorQ BV ~ Son ~ Netherlands

Ulcerative dermatitis of the mammary skin was frequently diagnosed in a 400-sow sow herd during the third and fourth week of lactation. Some sows had such severely affected teats and mammary skin, they had to be culled. Although lesions of mammary skin and teats are commonly found in lactating sows, reports are scarce. At this herd mammary skin ulcerations, vesiculae or pustulae were exclusively found in lactating sows. Incidence was found higher in gilts than in older parity sows. Skin biopsies were taken from sedated sows with additional local anesthesia. The resulted samples were examined bacteriologically and histologically. Tissue slides were cut from of formalin fixated and paraffin embedded samples, that were routinely stained (HE, PAS, Ziehl-Neelsen staining). Morphological examination showed a characteristic bacterial dermatitis and folliculitis with polymorph nuclear and lymph cellular infiltration. Focal follicular or epidermal necrotic areas were observed. Morphologically, an infection with poxvirus was excluded. PAS staining did not reveal signs of fungal or yeast infection. Ziehl-Neelsen staining did not revealed any involvement of mycobacteria. Routine bacteriological examination revealed a mixed culture of mostly Gram positive cocci and some Gram positive rods. No subcultures were made. It is unclear why gilts had more skin lesions than older parity sows. Likely, the udder skin of first parity sows is more vulnerable for trauma and laceration than that of older sows. Involvement of specific bacterial infections in the pathogenesis of the lesions, that raise immunity against renewed infections, cannot be excluded. This inventory study shows that lesions were predominantly localized at sites where trauma occurs during interaction of piglets with their dam. Whether hygienic conditions plays a role in origin of lesions is still unclear and need further study.

NOTES

O5 REDUCING EDEMA DISEASE ESCHERICHIA COLI (EDEC) RELATED DISEASE AND MORTALITY IN A NORWEGIAN COMMERCIAL PIG HERD BY VACCINATION WITH ECOPORC® SHIGA

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Introduction. Edema disease (ED) is caused by certain strains of Escherichia coli (most often E.coli O139) which produce a shiga-like toxin named Stx2e (or VT2e). The toxin is absorbed from the small intestine into circulation where it causes degenerative angiopathy in small arteries and arterioles, leading to the formation of edema in target organs.

Objective. The objective of this trial was to investigate the preventive effectiveness of a commercially available inactivated Stx2e-toxoid vaccine (Ecoporc® Shiga, IDT Biologika GmbH, Dessau-Rosslau Germany) in a herd with reoccurring increased post-weaning mortality caused by EDEC.

Material and methods. The herd was a 150 sow commercial farrow-to-feed herd, with post-weaning mortality of 5-10 % caused mainly by ED. The herd had 5.5-week batch production, and all-in all-out management of combined farrowing and nursery rooms. In the batch preceeding the vaccine trial, the post-weaning mortality due to ED was 8.9% (35 dead weaners of 392 weaned pigs). The diagnosis was based on gross pathology showing typical lesions of edema in predilection sites (subcutaneously in the palpebrae and over the frontal bones, in the mesocolon and gastric submucosa), and verified through serotyping E.coli O139 and PCR detection of genes for F18 fimbriae and Stx2e-toxin. A batch of 33 litters with 350 weaned pigs was systematically randomized by litter and included in the vaccine trial. Twenty-four litters (250 weaned pigs) were vaccinated once with 1ml Ecoporc® Shiga intramuscularly on day 4 - 7 post -partum. The remaining 9 litters (100 weaned pigs) were unvaccinated control animals.

Results. The mortality caused by ED in the unvaccinated control group was 6%. No pigs died because of ED in the group of vaccinated pigs (Fisher's exact test: p-value<0.001). One pig died in the vaccinated group the day before transfer to the finishing farm, but a field necropsy revealed a mesenteric torsion in this pig.

Discussion/conclusion. In this field trial vaccination with Ecoporc® Shiga eliminated ED related mortality in a group of 250 pigs. In the same batch of weaned pigs, the ED related mortality was 6 % among unvaccinated control animals. Edema disease was confirmed as the major cause of mortality in the case herd.

NOTES

O6 PERIPARTAL FEEDING STRATEGY AND BODY CONDITION OFFER OPPORTUNITIES TO ALTER COLOSTRUM YIELD AND COMPOSITION IN SOWS

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Previous research showed a positive association between back fat (BF) change the week prior to farrowing and colostrum yield (CY). We tested the causality of this association.

Fifty PIC sows were randomly divided into 2 dietary treatment groups at d108 of gestation. The first group (L, n=28) received 1.5 kg of feed per day, the second group (H, n=22) 3x1.5kg of feed per day until farrowing. Daily feed intake (DFI) and CY were measured. Colostrum was collected 6h after onset of farrowing and analysed for its nutrient composition. Sow serum was obtained at d108 of gestation and d1 of lactation after overnight fasting, and analysed for non-esterified fatty acids (NEFA), (iso)butyrylcarnitine (C4), creatinine, urea and 3-OH-butyrylcarnitine (3-OH-C4). Based on BF at d108, sows were divided into body condition groups with <17mm (n=15), 17-23mm (n=21), >23mm (n=14). Statistics were performed using ANOVA with dietary treatment and body condition group as fixed factors and Scheffé post-hoc test.

The week prior to farrowing, the L-group had the lowest DFI (1.5kg) and within the H-group, fat sows (3.8kg) had a lower DFI than skinny sows (4.3kg). Dietary treatment and body condition both altered CY and composition independently. The highest CY with the most beneficial composition was seen in sows in the H-group and sows in a good condition. Blood measured parameters at d108 were similar between the dietary treatment groups. At d1, the H-group mobilized less body fat (NEFA) and protein (creatinine, C4) reserves but had a higher ratio of protein (urea)/fat catabolites and less ketone bodies (3-OH-C4). We hypothesize that the citric acid cycle, as most efficient pathway for ATP production, is enhanced by protein catabolism, as the latter provides oxaloacetate to react with acetyl CoA derived from NEFA.

Both CY and composition can be influences by the sow's body condition and peripartal feeding strategy.

NOTES

MISCELLANEOUS

Wednesday, May 7th
15.30-16.30

O7 **BASELINE INVESTIGATIONS OF SUBCUTANEOUS INJECTION IN PIGS WITH "SAFETY INJECTORS"**
Lahrmann K.H., Roegels A., Streitparth F., Rintisch U., Huenigen H.

O8 **ASSESSING CALCIUM-PHOSPHORUS METABOLISM IN SOWS IN RELATION TO DURATION OF FARROWING**
Geudeke M.J.

O9 **IDENTIFYING THOSE BIOSECURITY PRACTICES TO BE STRENGTHEN ON ENGLISH PIG FARMS**
Correia-Gomes C., Clarke H., Gunn G., Rose N., Renson P., Andraud M., Paboeuf F., Le Potier M., Bourry O.

O7 BASELINE INVESTIGATIONS OF SUBCUTANEOUS INJECTION IN PIGS WITH "SAFETY INJECTORS"

Lahrmann K.H.[1], Roegels A.[1], Streitparth F.[2], Rintisch U.[1], Huenigen H.[3]

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In mass treatments single-handed subcutaneous (sc) injections (e.g. vaccinations) in the lateral neck often end up intradermal or intramuscular due to the varying inclination in association with a standard needle length or sudden animal defense, and sometimes hit the user himself. Recently developed safety injectors, however, require a rectangular attack angle in order to release the cannula and an exact penetration depth for a correct sc-placement.

Therefore, the objectives of a multidisciplinary dissertation project are determinations of the penetration depth with an ultrasonic device for pregnancy testing (7.5 MHz linear probe) or with a cutimeter for tuberkuline testing at the same location before injection with a traditional cannula (apical hole) or with a special cannula (lateral hole) and subsequent control of the grout distribution by histology resp. by computer tomography in euthanized pigs.

Results. Sonography allows measurements through dermal layers up to the muscle without forerun of the probe. Skin thickness (epidermis+subcutaneous tissue) doesn´t differ in gender, but in breed. For crossbreed LxLWxPI e.g. median skin thickness in 1-5 kg piglets (n=58), 18-26 kg growers (n=51), 75-95 kg finishers (n=24) and 180-250 kg sows (n=70) are 1.7 mm, 3.2 mm, 4.3 mm and 9.9 mm, and differ significantly.

Median skin thickness by cutimeter measurement, calculated by division of the skinfold value by two, are in piglets and growers with 1.7 mm resp. 3.2 mm identical. In older pigs cutimeter measurement failed because of stronger defense or the too thick skinfold.

Due to the close data variation of both methods within a tight weight class random skin measurement for predestination of the penetration depth is sufficient before mass treatments.

However, standard cannulas with an angular sharpened hole (3-4 mm length diameter) at the top are inappropriate for rectangular injection in consideration of the thin skin in growing pigs (1.7-4.3 mm).

Preliminary results from 168 ultrasonic supported rectangular injections in 42 pigs demonstrate, regarding formation of wheals or stain distribution in tissue samples, that cannulas with a lateral hole (1 mm diameter) seem to be superior, but this still requires confirmation by histology. However, the right grout placement of 8 injections in 4 pigs until now is confirmed by computer tomography, if the penetration length related to the lateral hole doesn´t exceed the ultrasonic skin measure.

A professional sc-injection may be also of future importance in view of recent EMA/CVMP reflections on residues in injection-site muscle.

NOTES

O8 ASSESSING CALCIUM-PHOSPHORUS METABOLISM IN SOWS IN RELATION TO DURATION OF FARROWING

Geudeke M.J.[1]

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Around farrowing the metabolism of a sow is going through profound changes. For instance the instantaneous availability of calcium and phosphorus is crucial, both for muscle contraction of the uterus and onset of milk production. One way of achieving this is to release calcium phosphate form bone tissue. A disturbance of this metabolism possibly causes a prolonged farrowing process with an increased risk for stillborn or non-viable piglets. Bone markers like osteocalcin (OC) and C-telopeptide (CTx) might provide information about the calcium metabolism. OC is a protein synthesized by osteoblasts and subsequently built in the bone matrix. A certain proportion is released into the blood and this circulating OC indicates the rate of bone formation. On the other hand, during bone regeneration type I collagen from the bone matrix is degraded into small peptide fragments like CTx. Hence CTx in blood is an indicator of bone resorption. In our laboratory, we use ELISA tests for the quantitative measurement of OC and CTx. An inventory in serum samples of pigs at different ages and in several phases of the reproductive cycle revealed divergent values for OC and CTx. In young, growing pigs OC is high (>20 µg/L) and CTx low (< 0.2 µg/L). During gestation OC is 15 µg/L and CTx is 0.4 µg/L . Around farrowing the OC level will drop and CTx rises so after parturition OC is low (<10 µg/L) and CTx is high (>1.3 µg/L). After weaning OC will gradually rise again and CTx lowers to values measured during gestation.

We also tested OC and CTx in a group of 55 primiparous sows before and after parturition and during lactation and next gestation. Many features of these sows were recorded, including duration of the farrowing process. Sows with a farrowing duration (without induction) of less than 2 hours (n = 5) were compared to sows with a farrowing duration of more than 4 hours (n = 6). In fast farrowing sows, the change of OC and CTx levels around farrowing was more pronounced than in slowly farrowing sows, suggesting that the former adapted the calcium metabolism to a higher degree than the latter. These results are in accordance with field case experiences, but due to the small number of sows in the experiment, not statistically significant. A larger scale investigation is needed to establish whether testing OC and CTx is of diagnostic value about the role of a suboptimal calcium metabolism in lengthy farrowing in sows.

NOTES

O9 IDENTIFYING THOSE BIOSECURITY PRACTICES TO BE STRENGTHEN ON ENGLISH PIG FARMS

Correia-Gomes C.[1], Clarke H.[2], Gunn G.[1]

[1]Future Farming Systems Research Group, Epidemiology Research Unit - SRUC ~ Inverness ~ United Kingdom

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Biosecurity plays a key role in protecting pig farms from the introduction of endemic and exotic diseases and can also limit spread within units. The BPEX Pig Health Improvement Project (PHIP) is an initiative created by BPEX in 2011 with the aim of improving pig health in a collaborative and sustainable way. PHIP involves stakeholders from all parts of the supply chain in disease prevention activities. A biosecurity questionnaire with 37 questions relating to the biosecurity management of pigs, fomites and people was developed by BPEX and distributed to producer PHIP members across eight regions of England. This paper describes the results from that questionnaire. These data were submitted to BPEX between September 2011 and January 2013 and consisted of 554 records. The results showed that the risk practices associated with management of fomites (e.g. vehicles, equipment, bedding material, possibility of contact with wild boars, etc.) and animals or animal products (e.g. pigs brought onto farm, semen, quarantine of newly introduced animals, etc.) were the ones identified as needing further improvement in the majority of the units regardless of region. Some regions contained units with high levels of biosecurity, especially when managing risk factors linked to people (e.g. strict implementation of visitor policy and use of farm's overalls and boots by farm staff and visitors, etc.). The worst results were for units on the Eastern England and the York and Humber regions, while units on the West Midlands showed the best results (in particular for the control of risk factors associated with pigs and fomites). Eastern England and the York and Humber regions have a higher risk of dissemination of diseases due to the higher number of pig units, and the higher density of pigs per unit when compared to other regions in England. Overall, the biosecurity questionnaire is a worthwhile tool which allows identification of units which have higher risk practices (in terms of biosecurity) and to compare these within a cluster of linked units (geographically, by pig movements, or by common routes to market). The strength of this approach is that the cluster group can identify areas where improvement as a group is possible and in this way achieve a common goal. This information is also valuable for use in epidemiological models of exotic and endemic diseases as they inform modellers of common practices on farms which contribute to the transmission of diseases.

NOTES

WELFARE AND NUTRITION

Wednesday, May 7th
16.30-17.30

O10 **EFFECTS OF A HIGHER CRUDE FIBRE SUPPLY OF PREGNANT SOWS BY WHOLE PLANT CORN SILAGE ON HEALTH AND REPRODUCTIVE PERFORMANCE**
Wolf P., Kleine S., Kamphues J.

O11 **THE TASTE OF WATER**
Tobias T., Houben M., Van Nes A.

O12 **THE EFFECT OF STRAW ENRICHMENT IN FULLY-SLATTED PENS WITH TAIL DOCKED AND UNDOCKED HEAVY PIGS**
Di Martino G., Scollo A., Gottardo F., Stefani A.L., Schiavon E., Capello K., Bonfanti L.

O10 EFFECTS OF A HIGHER CRUDE FIBRE SUPPLY OF PREGNANT SOWS BY WHOLE PLANT CORN SILAGE ON HEALTH AND REPRODUCTIVE PERFORMANCE

Wolf P.[1], Kleine S.[2], Kamphues J.[2]

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Introduction. Regarding animal welfare and feed legislation as well pregnant sows have to be fed with diets containing crude fibre (CF) contents of at least 8% (in DM) or a diet that leads to a CF ingestion of 200 g per sow and day.

Animals, Material and Methods: Therefore, 144 sows were fed either a standard complete diet (per kg DM: 49.8 g CF and 14.9 MJ ME; control group; n = 70) or a mixed diet containing whole plant corn silage (per kg DM: 80.3 g CF and13.6 MJ ME; experimental group; n = 74) via liquid feeding (2.2 kg DM/sow/d) from day 4 to day 108 of pregnancy. Afterwards all sows were fed identically a complete diet for lactating sows.

Results and findings of this field study can be summarized as follows.

1. By a corresponding proportion of whole plant corn silage in the liquid diet of the test group a CF content of 8.03 % was achieved (in the control without roughage 4.98 %).

2. With the appropriate amount of feed rationing during pregnancy (d 4 - d 108), the mean daily energy intake was at 31.5 (control group) and 29.9 MJ ME (experimental group) per sow. In this phase a BM increase of 67.5 kg BM (control group) and 67.1 kg BM (experimental group) was monitored.

3. Near to the end of gestation (d 108) the faeces of sows supplied with whole plant corn silage showed significant lower DM contents (24.5 vs. 26.4 %), higher CF contents (21.7 vs. 16.0 %), lower starch contents (1.82 vs. 3.80 %) at much coarser structure (mass of particles > 3.15: 27.5 vs. 3.31 %).

4. Using a mixed diet with corn silage during pregnancy there were significantly less sows affected (6.9 vs. 21.7 %) by periparturient disorders.

5. Neither the number of piglets born alive (control group: 11.9; experimental group: 11.7) nor the number of weaned piglets (11.1 in both groups) differed between the two feeding strategies during pregnancy, but the rate of piglets' losses (control group: 9.23 %; experimental group: 5.69 %) prior to weaning.

Conclusion: Especially under animal welfare aspects the lower energy density of the diet and the associated higher feed intake have been approved. Moreover, the higher content of corn silage also ensures the supply of sows with crude fibre, which was approved for the prevention of peripartum constipation as low in this study.

NOTES

O11 THE TASTE OF WATER

Tobias T.[1], Houben M.[1], Van Nes A.[2]

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Introduction. Many pig farmers use the drinking water system to apply medication or additives to improve pig health. The effects of additives on water palatability are often ignored because pigs are not given a choice source of drinking water. When water palatability is impaired, pigs actually may drink less, thereby also impairing feed intake.

The aim of this study was to evaluate the palatability of two water temperatures and two commercially available additives by measuring water consumption in weaned piglets.

Material and Methods. The uptake of four categories of drinking water (A = Control (11°C, pH= 7.3), B = Warm water (33°C) and two waters with a commercially available organic acid compound (C, pH=3.7) and additionally with essential oils (D, pH=3.6) was evaluated. A repeated latin square design was used in four groups of 22 weaned pigs (7 wks old) with the four water categories on four subsequent days from 13:00 - 18:00hr). In the first hour, pigs were provided with one category of water in a closed drinker, after which it was changed for another in the 2nd, 3rd and 4th hour. The order of supplied water categories differed per group and per day to prevent confounding by a learning or carry-over effect. After the hour had passed the water consumption was measured. The data were analysed with uni-variable and multivariable linear regression models. The best multivariate model was chosen after a stepwise backward selection procedure.

Results. The mean water consumption was 0.21 L/pig/hour (range 0.08-0.39). Mean water consumption did not differ between pens, but was affected by day, time of day and category of water. During the first hour on each day and on the last day more water was consumed. Water consumption was not affected by temperature, but water C was consumed more than the other three water categories ($p<0.001$) and water D was consumed more than control ($p<0.05$).

Discussion. The organic acid compounds did not adversely affect the palatability of the drinking water in this study. Whether an increase of water uptake is seen in the long run remains unclear as pigs get used to the water taste. Furthermore, water categories were not equal in sodium content which is the main driver for thirst and has certainly confounded our study results. Equalling sodium contents however would affect palatability too.

The non-invasive setup used in this trial proved possible to test water palatability preference under field conditions. Recommendations for future trial designs will be presented.

NOTES

O12 THE EFFECT OF STRAW ENRICHMENT IN FULLY-SLATTED PENS WITH TAIL DOCKED AND UNDOCKED HEAVY PIGS

Di Martino G.[1], Scollo A.[2], Gottardo F.[2], Stefani A.L.[1], Schiavon E.[1], Capello K.[1], Bonfanti L.[1]

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Limited data are actually available regarding the feasibility to fatten pigs up to 170kg for specialized production of cured meat in compliance with EU Council Directive 2008/120/EC (laying down minimum standards for the protection of pigs). The major criticisms concern the resign of routine tail docking and the supply of rooting materials, such as straw. The presence of tail may lead to tail biting, while the provision of straw is strongly opposed by farmers because of potential slurry outflow obstruction. In this study we confirmed the absence of an increased biting behaviour in older age (up to 9 months) and the possible use of straw with fully-slatted floor. Animals were fed with pelleted diet and housed in one-gender pens both at weaning age (in Site 1, between 3 and 11 weeks of age) and during fattening (in Site 2, between 12 and 40 weeks of age). As environmental enrichment, a metal chain and a rack with straw were always available in all pens. A 2×2 factorial design was adopted to test the effects of gender (females vs. barrows) and tail presence on blood measures (cortisol, haptoglobin, albumin/globulin ratio), behaviour and health measures at the abattoir (lung score and gastric score). Linear and generalized linear mixed models were used to perform the statistical analyses. Neither at weaning nor during fattening tail presence had an effect on blood measures, conflicts, ear and tail biting behaviour. However, in the last days of weaning an outbreak of tail biting was recorded in one pen of barrows. Gender had no effect at the weaning age, while during fattening females showed a lower level of serum cortisol ($P < 0.01$) and a higher level of haptoglobin ($P < 0.01$). Tail presence produced no effect on gastric ulcers and lung lesions, while females had a higher lung score than barrows. The behavioural activity of exploring the metal chain decreased throughout the fattening cycle ($P = 0.017$), while the activity of exploring straw increased ($P = 0.045$). The frequency of tail and ear biting showed a decrease ($P = 0.058$ and $P = 0.019$, respectively), while the frequency of the lying behaviour increased ($P = 0.036$). Straw consumption at weaning was 5g/pig/day. Conversely, at fattening it was 30g/pig/day. These results confirmed the feasibility to use a straw rack on slatted floor and to fatten undocked heavy pigs. The end of weaning age resulted the most critical phase due to the high stocking density, but the transfer of the pigs to the fattening unit (at a lower stocking density) was able to dramatically decrease tail biting events.

NOTES

VIRAL DISEASES

Thursday, May 8th
10.25-12.05

O13 REDUCTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) TRANSMISSION IN VACCINATED PIGS
Rose N., Renson P., Andraud M., Paboeuf F., Le Potier M., Bourry O.

O14 REGIONAL PRRSV CONTROL PROGRAM IN THE NETHERLAND
Houben M., Duinhof T., Van Dam B.

O15 DIAGNOSTIC PERFORMANCE OF INFLUENZA A AND SUBTYPE-SPECIFIC REAL-TIME RT-PCRS FOR DETECTION OF SWINE INFLUENZA VIRUSES IN FINISHING HERDS WITH ACUTE RESPIRATORY CLINICAL SIGNS
Van Maanen K., Duinhof T., Wiggers I., Dijkman R., Carreres Quijada A., Robben N.

O16 INFLUENZA TRANSMISSION WITHIN COORDINATED SWINE PRODUCTION SYSTEMS
Lowe J., Harding A., Kaplan B., Webby R.

O17 THE ORIGIN AND EVOLUTION OF EUROPEAN PRRSV TYPE 2 STRAINS
Stadejek T., Balka G., Bálint Á., Duinhof T., Murtaugh M.

O13 REDUCTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) TRANSMISSION IN VACCINATED PIGS

Rose N.[1], Renson P.[1], Andraud M.[1], Paboeuf F.[1], Le Potier M.[1], Bourry O.[1]

[1]Anses ~ Ploufragan ~ France

Because of long term shedding, PRRSv can easily persist within a population for years, and attempts to eradicate the virus often lead to disappointing results. Live modified vaccines have shown good results in reducing the clinical outcomes of the infection. To be an appropriate tool for controlling an infectious disease, a vaccine should reduce viral shedding to such an extent that the basic reproduction ratio (R0) falls below the 1 threshold. In this experimental study the impact of vaccination was assessed on PRRSv transmission and compared with the R0 estimate in non vaccinated pigs. The experiment involved 56 3-week-old SPF piglets without anti-PRRSv maternal antibodies. The transmission experiment was organized as 6 replicates of 2 inoculated in contact with 2 sentinel piglets in the vaccinated group with a similar setting in the non-vaccinated group. Vaccinated piglets received the commercial modified live vaccine Porcilis PRRS ID® (MSD) via the intradermal route at 3-weeks-old and challenged intranasally with 5.105 DCP50 of a genotype 1, subtype 1 PRRSv strain (PRRS/FR/29/24/1/2005), 31 days post-vaccination. Piglets were monitored individually (blood samples every 3 days) for 49 dpi, to measure viral load in serum using a quantitative real-time RT-PCR designed to distinguish the challenge of the vaccine strain. Transmission parameters were estimated through a Bayesian modelling framework relying on the likelihood of the observed probability of infection in contact piglets. Durations of latency and infectiousness were modelled by gamma distributions. Only one piglet was detected infected in vaccinated contact piglets whereas all piglets were infected in the non vaccinated group. The estimated transmission rate was 10-times lower in vaccinated (0.02 [95% CI 0.003-0.08]) than in non-vaccinated piglets (0.22 [0.12-0.37]). The duration of infectiousness was reduced: 12 days [9.8-14.5] versus 22.6 days [20.3-25] in vaccinated and non-vaccinated piglets respectively. Hence R0 estimate was significantly lower than one in vaccinated piglets (0.28 [0.04-0.96]) and considerably lower than R0 estimate in non-vaccinated piglets (4.97(2.71-8.36]). These results showed the theoretical ability of such a vaccine to clear out the virus from an infected population. However, further work is needed to evaluate this effect in field conditions taking into account the possibility of vaccinating passively immune animals or an important delay between vaccination and infection, and transmission enhanced by herd practices and lack of biosecurity.

NOTES

O14 REGIONAL PRRSV CONTROL PROGRAM IN THE NETHERLAND

Houben M.[1], Duinhof T.[2], Van Dam B.[3]

[1]PorQ BV ~ Son ~ Netherlands, [2]GD Animal Health Service ~ Deventer ~ Netherlands, [3]The Dutch Product Board for Livestock and ~ Zoetermeer ~ Netherlands

After the first recognition of porcine reproductive and respiratory syndrome virus (PRRSv) in 1987, PRRSv is now endemic in most pig producing countries, including the Netherlands.
The actual influence of PRRSv in the Dutch pig industry is still considerable. Clinical disease in unvaccinated and even vaccinated populations is common. PRRSv is considered to be a cause of increased antibiotic usage, because of the enhancement of secondary bacterial diseases. Both type 1 and type 2 strains are found in the Netherlands. Examinations of dead born and aborted piglets in 2009 revealed that the percentage of PRRS-virus positive litters was 13,8 % (in 444 tested litters in total). The economic impact of PRRSv outbreaks on Dutch sow farms, varied from €59 to €379 per sow in each outbreak. The average loss in a regular sow herd was €75 per sow per outbreak.
The Dutch Product Board for Livestock and Meat has started a national coordinated program on regional PRRSV control in 2011. Results of an initial desk study indicate that the control of PRRSv on farm level will finally lead to eradication. Explicit coaching and further education of workers in swine farms and swine transport is considered to be inevitable to ensure the required level of hygiene and biosecurity necessary for PRRSv control and eradication. The initial desk study recommended to start with a regional control program. The final decision to start a regional project was taken in November 2012.
At this moment (2014) the status of the national program is as follows:
A group of 48 motivated swine farmers with 72 farm-locations in the assigned region have agreed to participate in the project. PRRSv monitoring has started in the spring of 2013. Serum samples of weaners are tested by PCR. Serum samples of finishers are tested by ELISA. All farms are sampled 3 times a year.
The Dutch control program is unique because 39 of these 72 farms will be visited twice yearly by a coach to follow up the PRRSv control within the farm. During this visit the results of the monitoring and the taylor made and farm specific plan of action is evaluated and adjusted. To ensure better hygiene standards for animal transportation, a pilot project will be performed in the winter of 2013-2014 on inactivating PRRSv on transport trucks by heating and drying.

NOTES

O15 DIAGNOSTIC PERFORMANCE OF INFLUENZA A AND SUBTYPE-SPECIFIC REAL-TIME RT-PCRS FOR DETECTION OF SWINE INFLUENZA VIRUSES IN FINISHING HERDS WITH ACUTE RESPIRATORY CLINICAL SIGNS

Van Maanen K.[1], Duinhof T.[1], Wiggers I.[1], Dijkman R.[1], Carreres Quijada A.[2], Robben N.[3]

[1]GD Animal Health Service ~ Deventer ~ Netherlands, [2]Life Technologies/LSI ~ Lyon ~ France, [3]Life Technologies ~ Bleiswijk ~ Netherlands

Diagnostic performance of three different real-time influenza A PCRs and two subtype-specific real-time PCRs was evaluated for nasal swabs and oropharyngeal fluids in fattening pigs with acute respiratory disease. Eight herds were included in this study, of which 7 herds showed proof of acute SIV infection. Nasal swabs were collected from all pigs, in three or four pens per herd, and were subsequently investigated in pools. The results show a very good qualitative and quantitative agreement for pooled and individual nasal swabs between the three influenza A PCR tests evaluated, with a slightly higher sensitivity for the VetMax-Gold SIV detection kit at a cut-off of Ct<40. Internal controls indicated no problems with inhibition using nasal swabs. For the five PCR positive herds the percentage of positive pools varied between 25% and 100%, while in a subselection of individual nasal swabs the percentage of positive results varied between 20% and 100%. Also oropharyngeal fluids, collected simultaneously, showed good diagnostic performance on a pen level as compared with the results of pooled or individual nasal swabs. For the five PCR positive herds the percentage of positive oropharyngeal fluid samples varied between 50% and 100%.

SIV infections in three herds were clearly subtyped as H1N1 by PCR, as confirmed by serology. SIV infection in one herd was clearly subtyped as H3N2. Two completely PCR negative herds clearly showed serological proof of H1N1 infection. This emphasizes the short diagnostic window for virus detection (about 1 – 7 days). Six out of seven SIV positive herds showed serological proof of infection with at least 40% of the pigs seroconverting or showing a significant increase in titer. The serodiagnosis was unequivocal for 5 herds (four herds with a clear H1N1 serodiagnosis and one herd with a clear H3N2 serodiagnosis) whereas for one herd pigs seroconverted both for H1N1 and H1N2. In the latter herd pigs seroconverted equally strong for H1N1/Netherlands/1980 and for H1N1/Netherlands/2012. Haemagglutinin and neuraminidase sequence results of 4 out of 5 PCR positive herds revealed that 2 H1N1 strains were closely related to a H1N1/2012 strain isolated about eight months ago from herds that were geographically clustered.

NOTES

O16 INFLUENZA TRANSMISSION WITHIN COORDINATED SWINE PRODUCTION SYSTEMS

Lowe J.[1], Harding A.[1], Kaplan B.[2], Webby R.[2]

[1]Lowe Consulting Ltd. ~ Albers, IL ~ United States, [2]St. Jude's Children's Research Hospital ~ Memphis, TN ~ United States

Influenza viruses are a common cause of respiratory disease in swine. Multiple serotypes of influenza A (INFA) infect pig populations and often multiple-serotypes infect populations at the same time. We have demonstrated that it is routine to identify INFA in pigs without appreciable clinical disease. Little is known about the routes of transmission of InfA between pig populations; specifically what routes are the most common for the introduction of novel INFA genotypes. We report the preliminary results from four closed, multi-site swine production systems, located in the United States that were sampled monthly for a year across all phases of genetic multiplication and commercial weaned pig production. Each production system consisted of six sites. One site dedicated to the breeding and farrowing of genetic replacement animals (MF), one site dedicated to growing replacement gilts (GDU), and four sites dedicated breeding and farrowing commercial sows (BTW). In all four systems the MF farm made their own replacement gilts with only semen being introduced. In two of the systems replacement animals for the MF were raised on the MF site and in the other two systems they were raised at the GDU with the replacement females for the BTW farms. Thirty nasal swabs were collected each month from the following groups of animals: 7-8 month old gilts at MF (GMF), 21 day pigs at MF (WMF), 5-6 month old gilts at GDU (SEL), 7-8 month old gilts at BTW (GBTW), 21 day old pigs at BTW (WBTW). All samples were evaluated using qPCR. Positive samples were subjected to HA and NA typing and full genome sequencing. Results from samples collected between October 2012 and September 2013 are reported here.

INFA was detected in every month across all four systems and in 74% of the 212 sample sets (>=1 positive/30 swabs). Sample set prevalence of INFA was 60% GMF, 68% WMF, 53% SEL, 53% GBTW and 83% WBTW. Multiple HA and NA types were detected in each of the systems across time and in specific sample sets. There evidence of specific viruses moving in a system. Pending sequencing will further elucidate the role of lateral and vertical transmission of INFA in modern production systems. These data are the first that describe the prevalence and serotype of INFA in coordinated swine production systems over time. They suggest that the majority of farms are infected with INFA on a continuous basis, which agrees with our data from growing pig sites. There appears to be multiple reservoirs of INFA in breeding herds and production systems based on nearly equal prevalence across multiple ages of pigs.

NOTES

O17 THE ORIGIN AND EVOLUTION OF EUROPEAN PRRSV TYPE 2 STRAINS

Stadejek T.[1], Balka G.[2], Bálint Á.[3], Duinhof T.[4], Murtaugh M.[5]

[1]Warsaw University of Life Sciences ~ Warsaw ~ Poland, [2]Szent István University ~ Budapest ~ Hungary, [3]National Food Chain Safety Office ~ Budapest ~ Hungary, [4]GD Animal Health Service Ltd ~ Deventer ~ Netherlands, [5]University of Minnesota ~ St. Paul ~ United States

Porcine reproductive and respiratory syndrome virus (PRRSV) strains belong to two distinct genotypes Type 1 (formerly European) and Type 2 (formerly American). At present both genotypes are globally spread. The presence of PRRSV Type 2 in Europe was reported in 1995 through the introduction into Denmark of the Ingelvac PRRS Vet vaccine (now known as Ingelvac MLV, Boehringer Ingelheim). Subsequently, this genotype has been reported sporadically in other countries, including those where Ingelvac MLV has not been licensed. Additional introductions of PRRSV Type 2, not related to the vaccine, has been documented in Hungary and in Slovakia (Balka et al., 2008; Vilcek et al., 2013). The most extensive study on PRRSV Type 2 diversity in Europe was recently published by Kvisgaard et al. (2013) who described the situation in Denmark. In this study we have compared about 120 ORF5 sequences of PRRSV Type 2 originating from Europe from 1996-2013.

The majority of sequences obtained in Europe belong to lineage 5.1 of Type 2 PRRS, which includes Ingelvac MLV (Shi et al., 2010). Five Hungarian and 1 Romanian sequences belong to lineage 1, a highly virulent group of viruses that originated in eastern Canada. As expected, isolates with high sequence identity (>97%) to Ingelvac MLV were found in all countries between 1996 and 2013. In addition, we found a cluster of lineage 5.1 sequences obtained after 2006 with the pairwise similarities to Ingelvac MLV as low as 93%. Two sequences from one German farm were clustered separately with the pairwise identity to Ingelvac MLV of only 91%.

In summary, most of the Type 2 sequences in Europe are derived from Ingelvac MLV. However, the lineage 1 sequences from Hungary and Romania originated from independent introduction of Type 2 strains in Europe. The origin of the lineage 5.1 strains with pairwise identity to Ingelvac MLV <95%, and especially the German strain having only 91% identity, is difficult to establish. Maximum likelihood analysis and comparison to lineage 5.1 strains from North America are consistent with independent introduction of Type 2 strains in Europe or prolonged maintenance of locally evolving populations derived from Ingelvac MLV. Information on PRRSV Type 2 distribution in Europe and genetic diversity are still very limited; hence, the epidemiology of this genotype may be even more complex.

Acknowledgment: Boehringer Ingelheim, Ingelheim, Germany and Intervet Nederland B.V, Boxmeer, the Netherlands are thanked for their help in the collection of PRRSV sequences. The study was supported by COST Action FA0902 (EuroPRRS.net).

NOTES

HERD HEALTH MANAGEMENT

Thursday, May 8th
10.25-12.05

O18 **REDUCING INCIDENCE OF SCOUR IN COMMERCIAL PIG FARMS WITH A NOVEL PLANT EXTRACT – RESULTS FROM EUROPE AND THE UNITED STATES**
De Snoeck S., Murray D.

O19 **PRRS CONTROL AND ERADICATION OPTIONS FOR BREED TO WEAN FARMS**
Johnson C.

O20 **FACTORS ASSOCIATED WITH H1N1 OR H1N2 INFLUENZA VIRUS INFECTIONS IN FATTENING PIGS: A STUDY IN 125 HERDS**
Fablet C., Simon G., Dorenlor V., Eono F., Eveno E., Gorin S., Queguiner S., Madec F., Rose N.

O21 **EARLY INDICATORS OF IRON DEFICIENCY IN PIGLETS AT WEANING**
Bhattarai S., Busch M.E., Friendship B., Martineau G., Nielsen J.P.

O22 **INVESTIGATING THE BENEFITS OF ANTI-INFECTIVE METAPHYLAXIS IN FINISHING PIGS**
Lowe J., Lowe J., Harding A., Ramirez C., Forteguerri E.

O18 REDUCING INCIDENCE OF SCOUR IN COMMERCIAL PIG FARMS WITH A NOVEL PLANT EXTRACT - RESULTS FROM EUROPE AND THE UNITED STATES

De Snoeck S.[1], Murray D.[2]

[1] Lintjeshof ~ Netherlands, [2] Jackson MN ~ United States

With pressure by regulatory agencies to eliminate growth promotion and reduce the use of antibiotics in food animals, producers in the United States and the European Union are searching for alternatives that can promote digestive and overall health of animals without the adverse environmental or human effects with antibiotics. Grazix solution(LiveLeaf Inc.,USA), a novel extract from green tea leaves and fruit of pomegranate,has demonstrated its antimicrobial inhibition effect in vitro and the reduction of scour in E.Coli experimentally challenged pigs .The purpose of this study was to asses the potential for Grazix solution to reduce incidence and duration of scour in commercial farms in The Netherlands and the eastern United Sates. A single serving of Grazix solution was provided to individual piglets(N=22,028) at the first sign of scour prior to weaning at 20 farms in the Netherlands, with units ranging from 400 to 1000 sows, over time periods of 6 weeks to 3 months . Incidence and duration of scour , as well as mortality of piglets,were documented and compared to those (N=21,717)from the same farm with standard of care (use of available antibiotics) for a similar corresponding period .In the USA,437 litters at three sow farms(N=6000) were monitored and a single serving of the Grazix solution was administered at the first sign of scour . If scour did not resolve, a second serving was provided the following day . The incidence of scour and usage of Grazix and fecal scores during the first 72 hours were documented daily. Piglets from The Netherlands study consuming Grazix experienced 75% fewer episodes of scour and had half the rate of mortality(11%vs.21%;P<0.0001)than piglets given antibiotics.In the USA,up to 83% of the piglets(N=6000) were noted to have their scour resolved within the first 48 hours after Grazix administration, with 83% of the piglets requiring only one serving of the solution to stop scour. During the time Grazix was available, little to no use of antimicrobial agents was required to mantain gut health of piglets. These field trials demonstrate that administration of the novel plant extract Grazix reduces the need for antimicrobial agents to mantain the gut health and overall health of piglets.Grazix may be a means of meeting the regulatory agencies mandate to reduce routine antbiotics use on farm .

NOTES

O19 PRRS CONTROL AND ERADICATION OPTIONS FOR BREED TO WEAN FARMS

Johnson C.[1]

[1]*The Maschhoffs, LLC ~ Carlyle ~ United States*

Introduction of a novel porcine reproductive and respiratory syndrome virus (PRRSV) to a Breed to Wean (BTW) farm results in dramatic performance losses. Development of health management plans based on the best scientific information available is needed to optimize farms biological and economic performance. Research by Linhares et al 2013 reported on time to stability (TTS), time to baseline production (TTBP) and the value of prior immunity in BTW herds exposed to either Modified Live Virus Vaccination (MLV) or Live Virus Innoculation (LVI). A decision model comparing two key decision points; the final goal of the PRRS management plan (PRRS Control vs. PRRS Eradication), and method of BTW herd exposure (LVI vs. MLV) will be discussed. Assumptions in this analysis utilized TTS and TTBP estimates reported by Linhares et al, 2013. The model included estimates for the volume and value of weaned pigs lost during an outbreak in a 1000 sow herd. Prior immunity to PRRSv was assumed to reduce total weaned pig losses during an outbreak by almost 82% due to the shorter TTBP. The cost of immunizing the herd annually and an assumed reduction in pigs/sow/year of 1 due to immunity were factored into the model. Results indicated that if a herd is experiencing an outbreak more frequently than 1 time every 3 years, it is economically beneficial to implement a PRRS control program compared to a PRRS eradication program. The second model compared the method of exposure; LVI vs. MLV. For TTS, 36 and 30 weeks were utilized in the model for MLV and LVI exposed BTW farms, respectively. Pigs weaned with PRRSV were assumed to have a $7.00/pig reduction in value. To account for differences in TTBP (MLV exposed achieve TTBP quicker than LVI), an additional 1300 pigs/1000 sows weaned was utilized for BTW farms exposed with MLV compared to LVI. The cost of weaning PRRSV positive pigs was then determined over the weeks required to reach TTS. The net value of exposing BTW farms with MLV was $20,446 greater than that of BTW farms exposed with LVI after accounting for vaccine costs. In this system, homogenizing a BTW farm with MLV resulted in a greater value generation than exposing BTW farms with LVI in spite of the shorter TTS with LVI exposed farms. Maintaining a PRRSV antibody positive status resulted in more value than an eradication program in BTW herds that experience a novel PRRSV introduction more frequently than once every 3 years. TTS and TTBP estimates can be used in biological and economic performance models to improve the quality of decision making prior to implementing a PRRS management plan.

NOTES

O20 FACTORS ASSOCIATED WITH H1N1 OR H1N2 INFLUENZA VIRUS INFECTIONS IN FATTENING PIGS: A STUDY IN 125 HERDS

Fablet C.[1], Simon G.[1], Dorenlor V.[1], Eono F.[1], Eveno E.[1], Gorin S.[1], Queguiner S.[1], Madec F.[1], Rose N.[1]

[1]Anses ~ Ploufragan ~ France

Herd-level factors associated with European H1N1 or H1N2 swine influenza virus (SIV) infections were assessed by mean of a cross-sectional study carried out in 125 French herds. In each herd serum samples from 15 fattening pigs were tested by haemagglutination inhibition. Data related to herd characteristics, biosecurity, management and housing conditions were collected by questionnaire during the farm visit. Climatic conditions in the post-weaning and fattening rooms, where the sampled pigs were housed, were measured over 20 hours. Factors associated with H1N1 or H1N2 sero-positive status of the herd were identified by logistic regressions. For both subtypes, the odds for a herd to be SIV sero-positive increased if there were more than two pig herds in the vicinity (OR=3.2, 95% Confidence Interval (95% CI): 1.4-7.6 and OR=3.5, 95% CI: 1.5-8.1 for H1N1 and H1N2 respectively). Other factors were specifically associated with either H1N1 or H1N2 SIV infections. The odds for a herd to be H1N1 sero-positive were significantly increased by having a large number of pigs per pen in the post-weaning room (OR=3.2, 95% CI: 1.2-8.6), temperature setpoints below 25°C (OR=2.6, 95% CI: 1.1-6.4) and below 24°C (OR=2.6, 95% CI: 1.1-6.1) for the heating device in the farrowing room and the ventilation controller, respectively. Moving the pigs to the fattening facility via a room housing older pigs also significantly increased the odds of being H1N1 sero-positive (OR=3.3, 95% CI: 1.1-9.6). A H1N2 sero-positive status was associated with a brief down period in the farrowing room (OR=2.6, 95% CI: 1.1-6.3), high pig density in the post-weaning pens (OR=2.9, 95% CI: 1.2-7.0), large-sized fattening room (OR=2.5, 95% CI: 1.1-5.9), lack of all-in all-out management in the fattening room (OR=2.4, 95% CI: 1.0-5.8) and a temperature range of less than 5°C controlling ventilation in the fattening facilities (OR=3.2, 95% CI: 1.4-7.4). Factors related to external and internal biosecurity and to the control of inside climatic conditions should be considered together when implementing programmes to better control SIV infections.

NOTES

O21 EARLY INDICATORS OF IRON DEFICIENCY IN PIGLETS AT WEANING

Bhattarai S.[1], Busch M.E.[2], Friendship R.[3], Martineau G. P.[4], Nielsen J. P.[1]

[1]HERD-centre, Department of Large Animal Sciences, University of Copenhagen ~ Copenhagen ~ Denmark, [2]Pig Research Centre, Danish Agriculture & Food Council ~ Copenhagen ~ Denmark, [3]Department of Population Medicine, OVC, University of Guelph ~ Guelph ~ Canada, [4]Department of Animal Production, National veterinary School ~ Toulouse ~ France

Introduction. Iron supplementation regimes for newborn piglets are very standardized with little focus on variations in birth weight, growth rate or weaning age in individual herds. Since the requirement for iron increases with increasing body weight, the larger piglets are more prone to iron deficiency around weaning when iron stores following injections in the first days of life may have depleted. The objective of the current study was to determine if big piglets at weaning are at higher risk of iron deficiency than the smaller ones.
Materials and Methods. Five Danish herds (with minimum herd size of 1000 sows) administering injectable iron supplementation were randomly selected. Within each herd, 20 litters around weaning were selected randomly and from each litter, three piglets were selected; the biggest piglet, a random piglet and the smallest piglet. Random piglets were identified as the sixth individual when counting snouts from the pen side of the observer, while the biggest and smallest piglet was judged visually. EDTA- and non-stabilized blood was collected from each piglet and serum iron, total iron binding capacity (TIBC) and haemoglobin levels were determined.
Results. A total of 296 piglets were included in the study. The serum iron concentrations were 19.90 (13.50 SD), 25.11 (12.38 SD) and 24.56 (11.58 SD) µmol/L in big, random and small piglets, respectively. TIBC levels in big, random and small pigs were 88.64 (17.32 SD), 82.02 (18.36 SD), and 72.50 (19.42 SD) µmol/L, respectively. The haemoglobin concentrations in big, random and small piglets were 119.64 (15.5 SD), 121.50 (15.11 SD) and 121.50 (13.19 SD) g/L, respectively. Statistically, serum iron was lower in big piglets compared to random ($p=0.004$) and small piglets ($p=0.009$). TIBC was higher in big piglets compared to random ($p=0.01$) and small piglets ($p<0.0001$) and the level in random piglets was higher compared to small piglets ($p=0.0004$). No significant differences in haemoglobin levels were observed among the three types of piglets ($p=0.63$).
Discussion. The decrease in serum iron and increase in TIBC in piglets with increasing size indicates that iron is utilized faster in bigger piglets making them prone to iron deficiency. However, haemoglobin levels were not different among types of piglets, which probably explains that a fall in haemoglobin will occur later than a fall in serum iron and rise in TIBC in case of iron deficiency. The results suggest that serum iron and TIBC values may be used as potential indicator of early iron deficiency in weaning piglets.

NOTES

O22 INVESTIGATING THE BENEFITS OF ANTI-INFECTIVE METAPHYLAXIS IN FINISHING PIGS

Lowe J.[2], Lowe J.[1], Harding A.[1], Ramirez C.[2], Forteguerri E.[2]

[1]Lowe Consulting Ltd. ~ Albers, IL ~ United States, [2]Integrated Food Animal Medicine Systems, University of Illinois ~ Urbana, IL ~ United States

Pigs that die from PRDC in the late finishing period (> 15 wks post weaning) represent a significant economic loss due to high treatment costs and lost revenue. In US production systems it is common to apply anti-infective metaphylaxis (AM) to control the impact of PRDC. To date, there have been no published studies exploring the potential benefits of these strategies. In this study, the value of using AM in late finishing pigs endemically infected with PRDC but free of PRRSv was examined. A total of 732 pigs (148-199 pigs per lot; 89 -100 days post-weaning) from four AIAO Wean to Market (WTM) sources, were enrolled in the study. At each site pigs were housed together in a single pen, individually identified, and divided in to 2 cohorts based on body weight, sex, and rectal temperature. The cohorts were subjected to either control (C) or AM (Tulathromycin 2.5 mg/kg IM, Zoetis, Florham Park, NJ, USA). Pigs were monitored and re-weighed on day 21. Post treatment weight gain over the 21 day period was used as a measure of well-being and endemic disease. Data was analyzed using ANOVA with co-variation for starting weight. No difference in weight gain was observed between AM and C pigs (17.1 kg vs. 16.7 kg, p=0.34) in each individual lot, although there was a statistically significant difference in starting weight (p<0.001) and weight gain (p<0.001) between replicate lots. No interactions between treatment and WTM source were detected. There were no differences in weekly mortality between replicates prior to (0.118%) or during the study (0.12%) and no pigs enrolled in the study died. The AM treated pigs in the lowest weight quartile at enrollment, showed an improved weight gain over controls (18.5 kg vs. 16.4 kg, p=0.005) that was not present in any other starting weight quartiles. There was no interaction between treatment and replicate lot in the lowest weight quartile suggesting that the effect is consistent across sites, sources, and time. These results suggest that anti-infective metaphylaxis using antibiotics effective against major bacterial components of PRDC under routine commercial health conditions in the US, for the improvement of animal well-being or economic value, cannot be justified. The lowest weight pigs showed increased growth rates in response to AM, indicating there may be a sub-clinical disease factor to the reduced growth rates in pigs prior to 80-100 days post weaning. Using AM in the lowest weight pigs at 100 days post weaning improves economic outcomes, minimizes the use of anti-infectives, and improves animal well-being through a reduction in disease.

NOTES

INDUSTRIAL PARTNERS' SESSION

Thursday, May 8th
14.55-18.15

O23 **SAFETY AND EFFICACY OF AN INTRAMUSCULAR VACCINATION AGAINST MYCOPLASMA HYOPNEUMONIAE USING NEEDLE-FREE INJECTION DEVICES** - Elanco Animal Health
Mouzin D., Wu S., Escala J., Labarque G.

O24 **ELIMINATION OF PRRSV TYPE 2 AND MYCOPLASMA HYOPNEUMONIAE BY USING INGELVAC® PRRS MLV AND PARTIAL DEPOP** - Boehringer Ingelheim
Rathkjen P.H., Bisgaard N.P.

O25 **PEDV INTRODUCTION TO THE US: LESSONS LEARNED** - PIC
Shepherd G. , Romagosa A.

O26 **INFLUENCE OF BIO-ACTIVE PEPTIDES FROM FPP* ON FATTENING PIG PERFORMANCE** - Huvepharma
Smulders D., Kanora A.

O27 **INVESTIGATION OF THE LONG-TERM EFFECT ON OVERALL MORTALITY AND ANTIMICROBIAL INTAKE IN WEANED PIGLETS AFTER VACCINATION AGAINST EDEMA DISEASE IN A DUTCH FIELD TRIAL** - IDT Biologika GmbH
Fricke R., Becker A., Kamp J., Brons N., Bastert O.

O28 **PRACETAM AND SYMPTOMATIC MEDECINE:**
A NEW APPROACH OF FIRST LINE TREATMENT Laboratoire Sogeval ~ Fatro
Anty A., Capdevielle N.

O29 **RETURN ON INVESTMENT ON FIXED TIME INSEMINATION** - MSD Animal Health
Collell M.

O30 **INDIVIDUAL PIG CARE (IPC) AS A TOOL TO ENHANCE RESPONSIBLE USE OF ANTIBIOTICS** - Zoetis
Van Looveren F., Dereu A., Maes D.

O31 **RELEVANCE AND DETOXIFICATION OF TRICHOTHECENE MYCOTOXINS IN SWINE NUTRITION AND REGULATORY PERSPECTIVES** - Biomin
Schatzmayr G., Schatzmayr D.

O32 **COMPLIANCE TEST TO PCV2 VACCINATION USING A DELAYED TYPE HYPERSENSITIVITY TEST (DTH)** - Merial
Callen A., Carceles S., Vidal A., Smits H., Vila T., Joisel F., Fraile L.

O33 **DURATION OF THE PROTECTIVE IMMUNITY AGAINST ERYSIPELAS CONFERRED BY A NEW BIVALENT PORCINE PARVOVIRUS AND E. RHUSIOPATHIAE VACCINE IN SOWS** - Laboratorios Hipra
Fontseca M., Muñoz J., Roca M., Camprodon A., March R., Sitja M.

O34 **COGLAPIX® INDUCES SEROTYPE CROSS-PROTECTION AGAINST ACTINOBACILLUS PLEUROPNEUMONIAE** - Ceva
Krejci R., Palya V., Thevenon J., Kiss I., Tenk M.

O23 SAFETY AND EFFICACY OF AN INTRAMUSCULAR VACCINATION AGAINST MYCOPLASMA HYOPNEUMONIAE USING NEEDLE-FREE INJECTION DEVICES

Mouzin D.[1], Wu S.[1], Escala J.[2], Labarque G.[3]

[1]Elanco Animal Health ~ Greenfield ~ United States, [2]Elanco Animal Health ~ Basingstoke ~ United Kingdom, [3]Elanco Animal Health ~ Antwerpen ~ Belgium

The injection of veterinary medicinal products in pigs using a needle may cause safety issues for pigs (abscesses, iatrogenic transmission of pathogens), swine personnel (needle-stick injuries), and consumers (residual needle fragments in carcasses) (Chase et al., 2008). The efficacy of vaccines (Rosales et al., 2006; Gergen et al., 2008), antibiotics (Senn et al., 2004; Apley et al., 2007), or iron (Almond & Roberts, 2004) following an intramuscular administration using needle-free injection devices has been shown to be at least equivalent or even superior than the one following an intramuscular administration using a conventional needle. The aim of this study was to assess the safety and efficacy of an intramuscular vaccination with Stellamune® One using two needle-free injection devices. A total of 108 Mycoplasma hyopneumoniae (M.hyo)-seronegative piglets were randomly divided into 6 groups and vaccinated at 21 days of age with either Stellamune® One or sterile saline using a needle, the AcuShotTM Needle-Free Injector or the MS Pulse250. The safety was evaluated using rectal temperatures and macroscopic and microscopic investigations of the injection sites. The efficacy was evaluated using lung lesion scores and M.hyo quantities in the broncho-alveolar lavage fluid (BALF) at 28 days after an intratracheal challenge with a virulent M.hyo strain done at 14 and 15 days post-vaccination. None of the pigs displayed general and local reactions following the vaccinations. Both lung lesion scores and M.hyo quantities in BALF were significantly ($P<0.05$) lower in Stellamune® One-vaccinated pigs when compared to control pigs within device. The present results indicate that the intramuscular administration of Stellamune® One using both a conventional needle and needle-free injection devices is safe and efficacious, as demonstrated by the absence of general and local reactions following vaccination and significantly lower lung lesions and M.hyo quantities in BALF in vaccinated than in control pigs upon challenge.

NOTES

O24 ELIMINATION OF PRRSV TYPE 2 AND MYCOPLASMA HYOPNEUMONIAE BY USING INGELVAC® PRRS MLV AND PARTIAL DEPOP

Rathkjen P.H.[1], Bisgaard N.P.[2]

[1]Boehringer Ingelheim DK ~ Copenhagen ~ Denmark, [2]Danvet ~ Hobro ~ Denmark

In Denmark there is an increasing motivation to eliminate PRRSV from positive sow and nursery sites for various reasons, e.g to gain optimal price for PRRSV negative pigs and gilts. This study evaluates a combined Load, Close and Homogenize program for fast elimination of PRRSV from a multiplier herd, combined with partial depop for simultaneous elimination of Mycoplasma hyopneumoniae (M-hyo).

Case description. The case herd is a Danish high index multiplier, 900 head sow farm with full line gilt production on 1 site. Part of the SPF system, with a positive M hyo health declaration. Female Piglets are weaned to a sectionised nursery and male piglets sold at weaning. Gilts are sold in- and outside Denmark.

In March 2013, the herd became PRRS ELISA positive in monthly serology samples. A fast eradication of PRRSV and M-Hyo, by load, close and homogenize with Ingelvac® PRRS MLV (L-C-H) program was initiated in combination with partial depop of gilts from weaning to 9 months. The necessary number of gilts needed for 210 days load stayed on farm. Clinical PRRS symptoms in the farrowing unit were observed before first mass vaccination. A 2 week farrowing stop was applied before second mass vaccination.

Materials and methods. In week 21of the year, all nurseries and sections with sales gilts were emptied. 600 gilts between 6 and 9 months of age were moved to an isolated room. In week 22 all animals present on the farm were vaccinated with Ingelvac® PRRS MLV, 2 ml. followed by a second dose at week 26. Between week 22 and week 24, all sows, boars and gilts were treated with Tiamulin (Denagard® premix).

Results & Discussion. As soon as the first pigs were one week post wean, 5 weeks after second mass vaccination, 25 pigs were tested by PCR. As the pigs became 10 weeks of age, they were tested again by both PCR and antibody ELISA (IDEXX PRRS X3). When they became 16 weeks old, they were tested again by antibody ELISA for both M-hyo and PRRS.In total 12 batches has been tested by PCR 1 week post wean, and 6 batches by PCR and antibodies at 10 weeks of age. All samples have been negative so far. Diagnostic results (PCR and ELISA) showed strong evidence of lack of circulation of PRRS and M-hyo after L-C-H and partial depopulation program indicating a success in the Elimination of these two pathogens in a very short period after the outbreak.

NOTES

O25 PEDV INTRODUCTION TO THE US: LESSONS LEARNED

Shepherd G.[1], **Romagosa A.**[2]

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PEDv (of the family Coronaviridae) was first reported in the United States in April 2013. Previously it has been reported in Hungary, Germany, China, Korea, and Japan. Severe outbreaks with high mortality are typically rare in Europe, but are recently reported to be common in Asia. China has seen a large increase in outbreaks since 2010 which has been attributed to the emerging of new strains. The virus introduced into the United States is 99.4% similar to the virus that has been isolated in China. Mortality in piglets in the US that are less than four weeks of age is commonly 80-100%. PED is not an OIE reportable disease; in the US it is considered a transboundary disease. Gaps in national responsibilities, authority, and expectations for an emerging transboundary disease in the US pork industry have been identified and will be presented.

NOTES

O26 INFLUENCE OF BIO-ACTIVE PEPTIDES FROM FPP* ON FATTENING PIG PERFORMANCE

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*FPP: fermented potato protein

Introduction. Previous research demonstrated a positive effect of Lianol®, a complementary feed based on fermented potato protein, on plasma insulin-like growth factor-1 (IGF-1) levels (IPVS 2010). There is considerable circumstantial evidence that the actions of growth hormone on protein accretion in skeletal muscle and other lean tissues are mediated by IGF-1 (Florini et al., 1996). This trial investigates the effect of this new feedstuff on lean meat content and performance in fattening pigs.
Materials and Methods. This research is a summary of three consecutive well-controlled field trials performed in Belgium. The animals originate from Large White x Landrace sows and a Belgian Piétrain boar. Each trial consisted of 720 animals equally distributed between a control and a Lianol® group. The animals were housed in the same compartment. The diets were equally formulated. The diet of the Lianol® group was supplemented with 300 grams Lianol® Solapro/mT for pigs from 40kg until slaughter. The daily gain, feed conversion (FCR) and lean meat percentage on the carcass was evaluated.
Results. In the first trial the lean meat percentage increases from 59.36 to 60.56% in the control and Lianol® group respectively. In the second trial, this percentage increased from 59.62 to 60.43% in the control and Lianol® group respectively. In the third trial, no lean meat data was gathered.
As a consequence of the higher lean meat percentage, the FCR improved by 5.0%, 4.7% and 7.4% in the first, second and third trial respectively due to the supplementation of the feed with Lianol®.
Table 1. Fattening performance relative compared to the control group

	Control group	Lianol® groups	
	Trial 1	Trial 2	Trial 3
Average daily gain	100%	102.3%	104.3% 102.2%
FCR	100%	105.0%	104.7% 107.4
Lean meat percentage	100%	102.0%	101.4% /

Conclusions. The supplementation of fattening feed with Lianol® Solapro from of 40kg body weight improved lean meat percentage by about 1% and FCR by 5 to 7% in fattening pigs.

NOTES

O27 INVESTIGATION OF THE LONG-TERM EFFECT ON OVERALL MORTALITY AND ANTIMICROBIAL INTAKE IN WEANED PIGLETS AFTER VACCINATION AGAINST EDEMA DISEASE IN A DUTCH FIELD TRIAL

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Edema Disease (ED) caused by Shigatoxin Stx2e producing strains of E. coli is responsible for high mortality during nursery stage worldwide. Due to antibiotic resistances and the peracute course of the disease therapeutic and metaphylactic treatment with orally given antibiotics is mostly not satisfying. A single vaccination of piglets from an age of 4 days with 1 ml of the newly developed vaccine ECOPORC SHIGA induces neutralising antibodies against Stx2e and ensures protection from ED throughout the entire nursery period.

A longitudinal field study was conducted on a Dutch farrowing and nursery farm in order to compare the Overall Mortality and the amount of used antibiotics, expressed as Defined Daily Dose per year (DDD/y), within nursery for the time of 1 year under vaccination with ECOPORC SHIGA to the period of 1 year prior to vaccination. Prior to vaccination cases of ED had occurred in piglets at about 10 - 14 days after weaning. Pathological examinations and subsequent PCR tests confirmed the diagnosis.

In total 17977 piglets of 52 week groups were vaccinated once with 1 ml of ECOPORC SHIGA at the average age of 4 days. Overall Mortality in nursery period was evaluated as all deaths from the entirety of weaned piglets regardless the presumed cause of death. The DDD/y, recorded by a centralised registration system, was calculated monthly on farm level for the same period of time. Additionally, the amount of used colistin sulfate was recorded during the trial and the mean piglet weight evaluated from all sold pigs at the end of nursery period was compared to weight data from all sold pigs 1 year prior to the trial. No changes were made regarding feed composition or other conditions.

The Overall Mortality of 7.7 % ± 2.70 prior to vaccination with 5.9 % only due to ED was reduced significantly to a mean value of 1.4 % ± 0.62 ($p < 0.0001$). Shortly after implementation of the vaccination the use of colistin sulfate could be stopped completely. As a result the previous DDD/y of 12.6 ± 5.7 was reduced significantly to a DDD/y of 2.3 ± 2.1 ($p < 0.0001$) so that the farm could leave the yellow section of the benchmark system to be classified into the green section. With the same mean duration of 7.5 weeks in nursery the vaccinated animals showed a weight of 25.4 kg at the end of nursery period compared to the unvaccinated animals with 25.3 kg.

Vaccination with ECOPORC SHIGA is an effective tool to reduce mortality due to ED and to lower the use of antibiotics in modern pig husbandry.

NOTES

O28 PRACETAM AND SYMPTOMATIC MEDECINE: A NEW APPROACH OF FIRST LINE TREATMENT

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Objective: Paracetamol is a molecule related to NSAID because of the similarity of target in the organism even if the mode of action is clearly different. Indeed, paracetamol and NSAID belong to the group of symptomatic treatment. Their benefits are well understood in human to treat fever and pain. The use in animals tends to developed as well.
Since a few years, the main European countries are taking action against the widespread use of antibiotics as a first line treatment in animals, moreover in intensive farming. In this context, the use of molecules like paracetamol could be of interest as an alternative first line treatment instead of antibiotics.
In first line treatments, several parameters should be considered: first are animals and disease epidemiology (severity of the signs, evolution of the signs...), second is the efficacy of the molecule, third is the safety so that it can be used with no risk and with a minimal withdrawal period in any farm condition. In this approach, timing and farmer / veterinarian partnership is a key.
As far as paracetamol is concerned, safety has been demonstrated in pigs, from weaned piglets to finishing pigs, and in sows, from gestation to lactation*. The withdrawal period of 0 day confirmed this safety, as well as the central mode of action avoiding the well known COX 1 risk observed with most of NSAID (gastric ulcers, haemorrhage...).
Therefore a GCP controlled trial was conducted to assess the efficacy of paracetamol treatment in comparison to doxycycline or placebo during an acute respiratory outbreak, in order to determine if paracetamol could be prescribed as a first line treatment instead of antibiotics. The results show the interest of treating with paracetamol as it reduces both the number of treatment failure and the number of new cases. The effect on fever is significantly better with Pracetam and the ADG in both doxycycline and pracetam groups are higher than in the placebo group.
In conclusion. This trial shows the interest of changing behaviour, and the thinking of replacing a first-line treatment with antibiotics by paracetamol in a context of an acute, viral respiratory disease. Timing is a key to this change of habits, since we want to act before secondary bacterial infections occurs. Change of habits leading to a reduction of the use of antibiotics will be observed if three keys are concomitant: the will of changing with a close relation between farmers and vets, an early management of the disease, and the use of symptomatic treatment such as paracetamol.

* Data from Pracetam 20% oral solution and powder

NOTES

O29 RETURN ON INVESTMENT ON FIXED TIME INSEMINATION

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Fixed time Insemination (FTI) is a program that uses Porceptal®, a novel MSD product, doing a single insemination after weaning for sows or after estrus synchronization for gilts. Porceptal® synchronizes ovulation in sows and gilts to allow a single FTI. The active ingredient, buserelin acetate, is a synthetic gonadotropin releasing hormone (GnRH) analogue that triggers the release of luteinizing hormone (LH), thereby inducing and synchronizing ovulation. The FTI program has the same efficacy in sows as a classical breeding protocol, including multiple heat detections and Artificial Insemination (AI) breeding. Therefore, Return on Investment (ROI) needs to be demonstrated with the FTI protocol. ROI is a performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. To calculate ROI, the benefit (return) of an investment is divided by the cost of the investment; the result is expressed as a percentage or a ratio.ROI depends basically on intervention cost and extra benefits obtained by this cost. To evaluate ROI for FTI, we need to first have some reference data from production performance and also production cost. Representative data were obtained from Interpig, which represents 15 different countries. An Excel file with all this data as a reference and taking all fields related to production and cost into consideration. The following production data was considered: Fertility rate %, farrowings per sow and per year (F/S/Y), Weaning age, Gilt Non Productive Days (NPD), Born alive, Pre-wean Mort. %, Nursery Mort. %, Finishers Mort.%, Consumption/sow/year (Kg), Consumption/pig (Kg), % Annual sow replacement, and Average dose per mating. Economic data was divided into fixed cost: Vet service, Energy and water, Amortization/rent, Financial, Labor cost / hour, Environment/slurry and Maintenance and as variable cost: Feed sow cost/kg (Euros), Feed finisher cost/kg, Semen price, Gilt cost (over meat price), Drug cost per year (sow and farrowing piglet, weaning piglet and finishing pig). As incomes, Finishing pig price, and sow price. ROI from a FTI program was 1 to 4,29, thus for each euro invested € 4,29 was gained. A total reduction in NPD of 10 days, 7 in gilts and 3 in sows, was also measured. The main parameters contributing to these improvements were savings in labor and semen use. The impact of less variability from using fewer boars was not considered in this study due to the lack of real data on this. Additional research on this variable may further positively impact ROI.

NOTES

O30 INDIVIDUAL PIG CARE (IPC) AS A TOOL TO ENHANCE RESPONSIBLE USE OF ANTIBIOTICS

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Introduction. In modern pig farming, the use of antimicrobials is of vital importance in order to maintain animal health and welfare. However, the use of antibiotics is under scrutiny because of the possible selection for resistant bacteria and the spread of resistance genes. Therefore responsible antibiotic use and its monitoring are one of the greatest challenges faced by modern pig production. To achieve both of these objectives, a new management tool called Individual Pig Care or IPC was developed. The aim of this study was to evaluate if IPC can contribute to a reduction in the use of antibiotics.

Materials and methods. The study was conducted in a nursery farm. In total, 5798 pigs were included. Antibiotic use was monitored in five batches, during four successive rearing cycles. During the first two cycles (2848 animals) pigs were managed, working with the traditional method commonly used on the farm, making use of prophylactic or metaphylactic group treatment. In the following two cycles (2950 animals) the IPC protocol was applied. With IPC daily observation of individual pigs and associated quantification of symptoms resulting in eventual individual injection of piglets, was implemented instead of prophylactic and metaphylactic group treatment. To evaluate antibiotic consumption before and after IPC was introduced, the batches without IPC were compared with the batches with IPC. To quantify the antibiotic use, the treatment incidence (TI) was calculated, both based on the animal daily dose (ADD) and the used daily dose (UDD).

Results. The average TI ADD and TI UDD values were 826.8 ± 66.0 and 693.9 ± 53.3 in the group without IPC, compared to 399.5 ± 68.0 and 354.1 ± 84.3 in the group with IPC ($p<0.05$). The decrease in antibiotic use did not have a negative effect on the health status of the animals nor on production parameters such as average daily gain and mortality.

Discussion - Conclusion. Identifying and quantifying disease symptoms at an early stage resulted in a drastic reduction of the number of group treatments and hence total antibiotic consumption. This study demonstrated that it is possible to optimize health management and to reduce the consumption of antibiotics using IPC.

NOTES

O31 RELEVANCE AND DETOXIFICATION OF TRICHOTHECENE MYCOTOXINS IN SWINE NUTRITION AND REGULATORY PERSPECTIVES

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Mycotoxins are secondary fungal metabolites which occur very frequently in various concentrations in animal feeds. Trichothecenes (trichos) are produced by Fusarium species in moderate climates. Their main representative deoxynivalenol (DON; vomitoxin) is the major mycotoxin found in Europe. A global survey program including 19.000 feed and feed ingredients revealed that 56 % contained this mycotoxin and thus it can be regarded as an underestimated risk factor in the livestock industry compromising health and wellbeing of animals. The toxicity of trichos originates in the 12, 13 epoxide ring which allows them to bind to ribosomes and to interfere with protein biosynthesis. The consequences in swine, which are particularly sensitive against trichos, are manifold – they reach from immune suppression, performance decrease, impairment of vaccination response, decreased feed intake and feed refusal to vomiting. Although mycotoxin binders have been used in the feed industry to ameliorate toxic effects of mycotoxins, they have been ineffective for trichos and especially for DON, since this mycotoxin cannot be efficiently sequestered in the gastrointestinal tract (GIT) of animals. For this reason we isolated a bacterial strain (BBSH 797) from rumen fluid of a fistulated cow. This microbe has the capability to detoxify trichothecenes by the reduction of the 12, 13 epoxide ring in the GIT of animals. Recently this particular microbe was positively assessed by the European Food and Feed Safety Authority (EFSA) for its safety and efficacy and authorized by the European Commission to be used in swine feed. Biomarkers have to be used to prove the specific detoxification activity of this microbe ex vivo (pig intestinal ex vivo model) and in vivo. For the in vivo experiment 24 piglets [Landrace x Large White) x Pietrain] were selected on basis of sex and body weight and randomly assigned to 6 pens (3 groups with two replicates). Group A was the control, group B the DON only group (2 mg/Kg DON) and group C received DON (2 mg/Kg) and BBSH 797 at a concentration of 1.7 x 10^8 CFU per kg finished feed. During the experiment piglets were fed restrictively (twice a day). Blood sampling was carried out on day 1, 2, 3 and 4. While only traces of DOM-1 were recovered in the control group and group B, 8.06 ng/L and 15.76 ng/L of DOM-1 were detected in group C 1.5 h after feeding DON together with BBSH 797. This indicates that this bacterial strain is capable of detoxifying DON

NOTES

O32 COMPLIANCE TEST TO PCV2 VACCINATION USING A DELAYED TYPE HYPERSENSITIVITY TEST (DTH)

Callen A.[1], Carceles S.[1], Vidal A.[2], Smits H.[3], Vila T.[3], Joisel F.[3], Fraile L.[4]

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Introduction. DTH is an immunological reaction on which tests have been developed both in human and in veterinary diagnosis to check for tuberculosis vaccination/infection, and as a surveillance tool for tuberculosis eradication campaigns in ruminants. In recent investigations this reaction has been used to test the immunological response to swine vaccines. This paper reports a preliminary field experience with a compliance test to PCV2 vaccination based on the DTH principle.

Material and methods. Thirty pigs from a commercial PRRS-negative farm were either vaccinated with 0.5mL of reconstituted CIRCOVAC® (MERIAL) at 3 weeks of age (V, n=20) or injected with 0.5mL of the CIRCOVAC adjuvant without the antigen (NV, n=10). Three weeks later, the pigs were intradermally inoculated with the antigen solution in the lower abdomen area: half of the vaccinated pigs (n=10) were inoculated 0.1mL, the other half (n=10) received 0.2mL. Non-vaccinated pigs (n=10) were only inoculated with 0.2mL.

As negative control, all the pigs (n=30) were injected on the same day 0.2mL of saline intradermally in the area symmetric to the point of antigen suspension inoculation.

The presence of a skin reaction and its diameter was blindly evaluated by a tape measure 20h, 24h and 30h post-inoculation. Blood samples were taken regularly for PCV2 and PRRS serological status monitoring. Histological analyses were conducted in selected pigs.

Results. A significant reaction (red discolouration and oedema) was observed at the antigen inoculation point in 100% of the vaccinated animals. No reaction to the saline was observed. Skin biopsies confirmed the expected histological pictures.

Fifty percents of the non-vaccinated did not show any reaction whereas the remaining 50% displayed either a very transient skin reaction or a long-lasting reaction of very limited diameter.

The percentage of vaccinated pigs responding positively to the DTH test was significantly higher than the non-vaccinated pigs, both 20h and 24h post-inoculation ($p \leq 0.03$).

The average diameter of the reaction was similar between vaccinated groups ($p > 0.65$), but differed significantly between vaccinated and not vaccinated animals both 20h and 24h following inoculation ($p \leq 0.001$).

The serological analyses validated the conditions of the study.

Conclusion. Intradermal application of PCV2 antigen is a feasible and convenient tool to elicit a DTH response that can be useful for CIRCOVAC vaccination compliance test. Further studies are needed to standardize the method and to assess more in depth the sensitivity and specificity of this test.

NOTES

O33 DURATION OF THE PROTECTIVE IMMUNITY AGAINST ERYSIPELAS CONFERRED BY A NEW BIVALENT PORCINE PARVOVIRUS AND E. RHUSIOPATHIAE VACCINE IN SOWS

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Objective. The aim of this study was to determine the duration of the protective immunity elicited by a new inactivated Porcine Parvovirus and Erysipelothrix rhusiopathiae vaccine after challenge with pathogenic swine E. rhusiopathiae strains.

Materials and methods. Twenty-two six-month-old gilts were randomly assigned to group 1 (n=15) or group 2 (n=7). Group 1 was immunised intramuscularly with a 2ml dose following the primary vaccination scheme (two doses three weeks apart) and the revaccination scheme (booster dose on day 167). Group 2 (placebo) received PBS using the same immunisation strategy as group 1. On day 310, all animals were challenged with separate dorsal and intradermal injections (106 cfu/dose) of pathogenic E. rhusiopathiae BRP belonging to serovars 1 and 2; body temperature and the diameter of the skin erythema at the injection site were recorded until the end of the trial. Animals were sacrificed on day 317. Serum samples were obtained on days 0, 21, 30, 70, 111, 140, 167, 188, 223, 260, 300, 310. Serum antibodies to E. rhusiopathiae (IgG) were titrated using a commercially available ELISA assay. Antibody titres and temperatures were compared by means of a T-test ($p<0.05$), and skin lesions were compared using a chi-square test.

Results. Vaccinated animals showed seroconversion both after priming and boosting vaccinations, with a significant increase in antibody titres after every vaccine injection (d21 and d188). Mean antibody titres after boosting were always higher than after priming, measured in intervals of 146 days (d21 to d167), and 122 days (d188 to d310) for priming and boosting, respectively. The differences in the mean body temperature between the vaccinated and the placebo animals after challenge were statistically significant on days 311 and 313-317, rising to a peak of 40.44°C in the placebo. No increase of body temperatures was observed in the vaccinated group ($p>0.05$). On day 317, 7% and 85% of the animals displayed typical skin lesions after the challenge, regardless of the serovar injected, in the vaccinated and the placebo, respectively ($p<0.01$).

Conclusions. The humoral immunity elicited by the E. rhusiopathiae fraction of the new vaccine lasts for at least 146 days after the primary vaccination. The revaccination increased antibody titres and allowed animals to manage the experimental infection, showing no fever and only sporadic skin lesions after challenge 143 days after boosting.

NOTES

O34 COGLAPIX® INDUCES SEROTYPE CROSS-PROTECTION AGAINST ACTINOBACILLUS PLEUROPNEUMONIAE

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Introduction. Different serotypes of A. pleuropneumoniae (A.p.) are predominant in different regions and their prevalence evolves over time. Multiple serotypes can be present in the same farm , with sometimes different serotypes isolated within different age groups.

Apx toxins Apx I, Apx II and Apx III are believed to be the major factors of virulence. Apx toxins are immunogenic and can elicit protective immune response. The advantage of using a vaccine that contains all Apx I, II and III toxoids is the cross-serotype effectiveness. Several challenge trials have been conducted to assess the effectiveness of Coglapix®, a vaccine based on serotype 1 and 2 bacterins and Apx toxoids.

Materials and methods. In studies evaluating the efficacy of Coglapix® against A.p. serotypes 1, 2 or 7, sero-negative pigs were vaccinated at 7 and 10 weeks of age while non-vaccinated pigs served as controls. All animals were challenged at 16 weeks of age by intranasal route. After one week pigs were euthanized and lungs were scored according to European Pharmacopoeia methodology and sampled for bacteriology.

In another study, sero-negative pigs were vaccinated at 6 and 10 weeks of age and challenged 3 weeks later by aerosol infection with A.p. serotype 5. Lung lesions of pigs euthanized 7 days later were scored according to Hannan grid. In this study two additional bacterin vaccines (A and B) containing serotype 5 bacterin as well were included.

Results. Coglapix vaccinated pigs had lower mortality rate than the controls whatever serotype and whatever challenge method was used. Also the clinical scores were inferior in vaccinated pigs. The lung lesion scores were significantly lower in the Coglapix groups compared to the controls in all cases.

	Serotype 1		Serotype 2		Serotype 5		Serotype 7	
	Coglapix	Control	Coglapix	Control	Coglapix	Control	Coglapix	Control
Mortality (%)	0	6,7	6,7	13,3	0	10	6,7	25
Lung lesion (%)	7	31	17	42	3	24	20	50
A.p. re-isolation (%)	33	87	64	93	NA	NA	93	87

In the serotype 5 challenge, Coglapix conferred higher protection than the bacterin-based vaccines.

Conclusion. Results of the different challenge trials that demonstrated the efficacy of Coglapix® against several A.p. serotypes suggest that Coglapix® can provide cross protection against various A.p. serotypes. Such cross protection is needed in the field due to the presence of multiple serotypes.

NOTES

VETERINARY PUBLIC HEALTH

Thursday, May 8th
14.55-16.15

O35 EMERGING TRICHINELLA BRITOVI INFECTIONS IN FREE RANGING PIGS OF GREECE
Boutsini S., Papatsiros V. G., Stougiou D., Marucci G., Liandris E., Athanasiou L.V., Papadoudis A., Karagiozopoulos E., Bisias A., Pozio E.

O36 MANAGING THE RISK ASSOCIATED WITH USE OF ANTIMICROBIALS IN PIGS – EFFECT OF THE YELLOW CARD SCHEME
Alban L., Dahl J., Nielsen E.O., Pedersen K.S.

O37 RESPECTIVE ROLES OF ENVIRONMENT AND ANIMALS IN DYNAMIC OF CAMPYLOBACTER INFECTION IN PIG FARMS
Leblanc-maridor M., Belloc C., Chidaine B., Denis M.

O38 PREVALENCE OF MRSA AND ESBL-PRODUCING ENTEROBACTERIA IN PIG HOLDINGS IN THE EUREGIO (GERMAN PART)
Brase K., Frenzel J., Friedrich A., Garcia Cobos S., Köck R., Harlizius J., Lambrecht C., Nienhoff H., Rossen J., Schulte-wülwer J., Sicken S.

O35 EMERGING TRICHINELLA BRITOVI INFECTIONS IN FREE RANGING PIGS OF GREECE

Boutsini S., Papatsiros V. G.[1], Stougiou D., Marucci G., Liandris E., Athanasiou L.V., Papadoudis A., Karagiozopoulos E., Bisias A., Pozio E.

[1]Vasileios Papatsiros ~ Karditsa ~ Greece

Trichinella infections in humans and pigs have been documented in Greece since 1945 and a high prevalence of infection in pigs occurred in the 1950's. Up to 1984 only sporadic infections in humans were documented, and this zoonosis was not considered as a public health problem until 2009 when a human outbreak caused by the consumption of pork from an organic pig farm occured. In the present study, we describe the re-emergence of Trichinella spp. infections in free-ranging pigs from organic farms of 3 counties (Dramas, Evros and Kavala) in Northern-Eastern Greece during the period 2009-2012. Totally 37 out of 12,717 (0.29%) free-ranging pigs which were tested during the period in question, were positive for Trichinella spp. larvae. The etiological agent was identified as Trichinella britovi. The average larval burden was 13.7 in the masseter, 6.2 in the foreleg muscles and 7.5 in the diaphragm. The 37 positive animals originated from seven free range pig farms. The practice of organic pig production systems in Greece has grown in popularity over the last years due to the increasing interest of consumers for products considered as traditional. However, this type of pig production increases the risk for Trichinella spp. infections, since animals can acquire the infection by feeding on carcasses or the offal of hunted or dead wild animals. The awareness and education of hunters and farmers is extremely important to reduce the transmission among free ranging pigs and the risk for humans.

NOTES

O36 MANAGING THE RISK ASSOCIATED WITH USE OF ANTIMICROBIALS IN PIGS - EFFECT OF THE YELLOW CARD SCHEME

Alban L.[1], Dahl J.[1], Nielsen E.O.[1], Pedersen K.S.[1]

[1]Danish Agriculture & Food Council ~ Copenhagen ~ Denmark

Several initiatives have been put in place in Denmark to mitigate the risk of antimicrobial resistance. This experience – good as well as bad - might be of interest to other countries that are developing their risk management for antimicrobial resistance. In this presentation, the initiatives put in place in Denmark will be dealt with. A special focus will be put on the Yellow Card Scheme, which was adapted by the Danish Veterinary and Food Administration in 2010. It makes use of data recordings in VETSTAT and imposes restrictions on pig farmers, who use more antimicrobials than twice the average in an age group.

The permit limit for sows and piglets was initially set to 5.2 animal daily doses (ADD) per 100 animal days. For weaners the limit was higher; 28, reflecting that this age group is the most fragile. Finally, the limit was 8 for finishers. These limits have later been lowered and might presumably be changed in the future. The consumption - measured in ADD/100 animal days - is calculated as a 9-month moving average. In this way the farmer can follow his consumption month by month and compare it to the permit limits, by age group.

Actions related to a Yellow Card include restrictions on prescriptions as well as tightened supervision by the authorities – all at the expense of the farmer.

A 25% reduction in the use of antimicrobials in pigs was observed after the introduction of the Scheme. Interesting, use of vaccines went on the increase - in particular vaccines against PCV2. This reflected a move from treatment to prevention. An evaluation of meat inspection lesions from before and after the Yellow Card showed a minor impact on health. Data from >500 weaner herds showed a 1.6% reduction in average daily growth from 2010 to 2011, but no change in mortality or food conversion ratio.

The use of antimicrobials has been on the increase again when assessed in kg (16% increase from Jan 2011 to May 2013) and in DAPD (Defined ADD per 1,000 animal days). One explanation given by the vets is that vaccines were found less cost-effective compared to antimicrobials. Another explanation is that the maximum limits indicated by the Yellow Card Scheme gradually are becoming acceptable limits for some farmers. This will result in an increase in the national consumption, which most likely will be considered unacceptable politically, and therefore new actions are expected. These might consist of further reductions in the permit limits for the Yellow Card Scheme.

NOTES

O37 RESPECTIVE ROLES OF ENVIRONMENT AND ANIMALS IN DYNAMIC OF CAMPYLOBACTER INFECTION IN PIG FARMS

Leblanc-Maridor M.[2], Belloc C.[2], Chidaine B.[1], Denis M.[1]

[1]Anses, Unité Hygiène et Qualité des Produits Avicoles et Porcins ~ Ploufragan ~ France, [2]Oniris, INRA, LUNAM Université, UMR 1300 Biology, Epidemiology and Risk Analysis in animal health ~ Nantes ~ France

Campylobacter is considered as the most common food-borne pathogen for human and is frequently carried in the intestinal tract of wildlife and livestock animals, without clinical signs. Targeted control of food-borne pathogens usually requires the identification of contamination sources and major ways of transmission. Although pigs are known to frequently exhibit high counts of Campylobacter in their faeces, more information is needed about the dynamics of this excretion in order to control this pathogen. Even if the sow seems to play an important role in piglets' contamination, other sources could be suspected among which the environment.

The aim of this study was to describe Campylobacter contamination within a pig farm in order to understand the dynamic of infection and to investigate the respective roles of the environment and the animals. For that, this work describes (i) the Campylobacter excretion by pigs in field conditions along one production cycle (sows, piglets, weaning and finishing pigs), (ii) the presence of Campylobacter in the environment (potential role as a source of contamination?), and (iii) the coexistence of different strains in pigs and their environment.

Quantification with quantitative real-time PCRs and genetic description/genotyping of Campylobacter in faeces from 30 piglets and their corresponding sows along one production cycle was followed in two farrow-to-finish farms. At each sampling time, environmental and feed samples were also collected. Campylobacter, mainly C. coli, was highly prevalent for/among sows and their piglets. However, for a given animal, variable counts of Campylobacter in different faecal samples were observed during its lifetime. Intermittent excretion or succession of elimination/infection phases could be suggested. PFGE and PCR-RFLP genotyping methods were used in parallel for the strains isolated in this study as genetic description is a powerful tool for epidemiological studies by tracking strains.

The early contamination of the piglets by Campylobacter is probably due to their contact with their mothers as the environment has been found Campylobacter-free after cleaning and disinfection. Nevertheless after this early infection, the results show that the environment may play an important role in Campylobacter transmission between animals.

NOTES

O38 PREVALENCE OF MRSA AND ESBL-PRODUCING ENTEROBACTERIA IN PIG HOLDINGS IN THE EUREGIO (GERMAN PART)

Brase K.[1], Frenzel J.[2], Friedrich A.[2], Garcia Cobos S.[2], Köck R.[3], Harlizius J.[4], Lambrecht C.[4], Nienhoff H.[1], Rossen J.[2], Schulte-Wülwer J.[1], Sicken S.[4]

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Methods. Between February and September 2013 the prevalence of Methicillin-resistant Staphylococcus aureus (MRSA) and Extended-Spectrum Betalactamase-producing enterobacteria (ESBL-E) was investigated in 47 swine holdings in the German part of the Euregio. Additionally, samples were tested for the presence of Coagulase-negative staphylococci (CoNS) and Methicillin-susceptible Staph. Aureus (MSSA).

12 Dust samples and 12 manure samples were obtained from each pig farm. Always two dust samples and two manure samples were derived from six locations on each farm.

The dust samples were selective detected of ESBL-E, Coagulase negative staphylocooci and MRSA. The manure samples were selective detected of ESBL-E and MRSA. Presumptive ESBL, CoNS and MRSA colonies were subcultured on blood agar. Species confirmation was done by MALDI-tof®.

ESBLs, Plasmid-mediated cephalosporinases and carbapenemases were characterized.

A total of 113 E.coli and 2 Klebsiella pneumonia isolates were tested to identify possible resistance genes.

Results. 47 Pig farms were investigated. 22 farms were located in Lower Saxony, and 25 in North Rhine Westfalia. In 55% of the farms ESBL-producing enterobacteria were found. 562 manure swabs and 564 dust samples were tested. Of all manure samples tested for the presence of ESBL-E (n=282) 83 were positive for ESBL producing E.coli (29%). Of all manure samples tested for the presence of MRSA (n=280) 81 were positive (29%). Of all dust samples tested for the presence of ESBL-E (n=282) 29 were positive for ESBL- E. coli (10%) and 3 for ESBL-Klebsiella pneumonia (1%). Of all samples tested for the presence of MRSA (n=282) 71 were positive (72%). Among the E.coli isolates, there were 98% (n=111) of the isolates positive for at least one ESBL gene, being the most prevalent CTX-M-1 (41%, n=43). These results cofirm the finding of CTX-M-1 as the most prevalent ESBL gene among pig holdings.

All exept one spatype belonged to MRSA associated with the clonal complex CC398 with a predominance of types t011 (56,58%) and t034 (29,61%).

NOTES

BACTERIAL DISEASES

Thursday, May 8th
16.35-18.15

O39 PIGS, PORK, PARKINSON'S DISEASE AND HELICOBACTER SUIS: NEW FINDINGS SET IN CONTEXT
Haesebrouck F., Blaecher C., Smet A., Flahou B., Ducatelle R., Pasmans F., Weller C., Charlett A., Dobbs R.J., Dobbs S.M.

O40 NEW NEONATAL PORCINE DIARRHOEA SYNDROME - EFFECTS
Kongsted H., Toft N., Stege H., Nielsen J.P.

O41 ESTIMATING THE WITHIN-HERD TRANSMISSION OF MYCOPLASMA HYOPNEUMONIAE IN CLOSED PIG HERDS USING A STOCHASTIC COMPARTMENT MODEL
Nathues H., Fournie G., Wieland B., Pfeiffer D., Staerk K.

O42 GENOTYPE CHARACTERIZATION AND ANTIBIOTIC RESISTANCE OF BRACHYSPIRA HYODYSENTERIAE ISOLATES IN ITALY BETWEEN 2003 AND 2012
Bonilauri P., Carra E., Rugna G., Luppi A., Magistrali C., Nigrelli A.D., Alborali G., Biasi G., Gherpelli Y., Bergamini F., Merialdi G.

O43 EXPERIMENTAL INOCULATION OF PIGS WITH A BRACHYSPIRA HAMPSONII ISOLATE COLLECTED FROM MIGRATING WATERFOWL IN SPAIN
Aller-Morán L.M., Martínez-Lobo F.J., Álvarez L., Carvajal A., Rubio P.

O39 PIGS, PORK, PARKINSON'S DISEASE AND HELICOBACTER SUIS: NEW FINDINGS SET IN CONTEXT

Haesebrouck F.[4], Blaecher C.[4], Smet A.[4], Flahou B.[4], Ducatelle R.[4], Pasmans F.[4], Weller C.[1], Charlett A.[2], Dobbs R.J.[3], Dobbs S.M.[3]

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Helicobacter suis is a zoonotic bacterium often present in pigs' stomachs. This micro-organism has been shown to cause gastritis and decreased daily weight gain in pigs and it also plays a role in the development of ulcerative lesions of the pars oesophagea of the stomach. Using multilocus sequence typing (MLST), we demonstrated that a H. suis strain from the stomach of a pig veterinarian with gastric complaints was closely related to porcine strains, confirming the direct zoonotic potential of this Helicobacter species. H. suis can be present and survive in minced pork. Thus, raw or undercooked pork might constitute another source of H. suis infection. In a recent study, archived DNA-extracts from gastric biopsies of 60 human patients with idiopathic parkinsonism (IP) and 256 controls from gastroenterology services were examined for H. suis using an ureA-based species-specific qPCR. Presence of H. suis DNA was confirmed by sequencing. Overall, H. suis DNA was present in 27% of the IP-patients and in 2% of the controls. Relative frequency of H. suis compared with H. pylori was 10 times greater in IP-patients than controls. H. pylori is the usual human-associated gastric Helicobacter species. Of 16 IP-patients infected with H. suis, 11 were from 19 with proven H. pylori eradication, 3 from 17 pre-H. pylori eradication and 2 from 24 H. pylori negative patients. The significance of this remarkably high frequency of H. suis in IP-patients, which appears exaggerated following H. pylori eradication, requires further studies. We performed MLST on the DNA-extracts from the gastric biopsies, but only obtained partial allele patterns, which is most probably due to the low amount of H. suis DNA in these archived extracts. Since complete MLST sequence types were obtained for none of the H. suis strains, comparison with sequence types present in pigs is not possible although all alleles of the housekeeping genes detected here have also been demonstrated in H. suis strains from pigs. It can, therefore, not be excluded that the strains detected in the IP-patients constitute H. suis-like, human-adapted bacteria. Isolation of these micro-organisms from the stomach of the patients might answer this question. However, in practice, difficulties lie in the overall infrequency of H. suis in routine endoscopy practice, and the patchiness of colonization together with the small size of endoscopic biopsies, leaving aside that this is an extremely fastidious bacterium.

NOTES

O40 NEW NEONATAL PORCINE DIARRHOEA SYNDROME - EFFECTS

Kongsted H.[1], Toft N.[2], Stege H.[3], Nielsen J.P.[3]

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Introduction. New Neonatal Porcine Diarrhoea Syndrome (NNPDS) is a newly defined syndrome, characterized by a treatment-refractory diarrhoea during the first days of life.

The study describes clinical manifestations and necropsy findings in four herds suspected to suffer from NNPDS. Furthermore, the study evaluates the effect of NNPDS on average daily gain (ADG) and mortality.

Materials and methods. A total of 874 piglets in 86 litters from four herds were studied. Presence of diarrhoea was evaluated on fecal samples obtained by individual rectal swabing for the first five days of life. Body-weights at birth and day ten of life were recorded. All piglets dying prior to day ten of life were necropsied.

The effects of diarrhoea on ADG and mortality were evaluated using mixed models. Sow of origin was inserted as a random effect. Start day and duration of diarrhoea in individual pigs as well as high prevalence of diarrhoea in the litter of origin (≥ 50% of littermates diarrhoeic) were evaluated in the models.

Other risk factors evaluated in the models were Herd of origin, Parity of sow, Birth weight, Gender and Skin abrasions.

Result. Prevalence and severity of diarrhoea differed between herds. In the most affected herd 45% of piglets were diarrhoeic for > 1 day, whereas in the least affected herd only 11% of piglets were diarrhoeic for > 1 day. Within each of the herds, a total of 21%, 7%, 6% and 4% of piglets died. Enteritis, starvation and crushing were main diagnoses at necropsy (51%, 16% and 14% of deaths, respectively).

A negative effect on ADG of 9 g (diarrhoea for one day) and 14 g (diarrhoea for > 1day) during the first ten days of life were estimated, while no effect on ADG was found in piglest diarrhoeic at the day of birth only. Piglets from litters with high prevalence of diarrhoea had a reduced ADG of 38 g. Birth weight was the only other risk factor with a significant effect on ADG (-9g pr 100g of reduced birth weight).

No overall effect of diarrhoea on mortality was observed. Herd of origin, Birth weight (OR 1.7 by 100g reduction in birth weight) and Gender (OR 2.1 for males) all had significant effects.

Conclusion. The clinical manifestations associated with outbreaks of diarrhoea differed much in four herds suspected to suffer from NNPDS. Diarrhoea was estimated to negatively affect the ADG by 9-14 g depending on the duration of diarrhoea in the individual piglet. When the litter of origin was affected with high prevalence of diarrhoea, the ADG individual piglets were found to be affected by -38 g per day.

No overall effect of diarrhoea on mortality was demonstrated.

NOTES

O41 ESTIMATING THE WITHIN-HERD TRANSMISSION OF MYCOPLASMA HYOPNEUMONIAE IN CLOSED PIG HERDS USING A STOCHASTIC COMPARTMENT MODEL

Nathues H.[1], Fournie G.[2], Wieland B.[2], Pfeiffer D.[2], Staerk K.[2]

[1]Vetsuisse Faculty ~ Berne ~ Switzerland, [2]Royal Veterinary College ~ London ~ United Kingdom

Introduction. Mycoplasma hyopneumoniae is the causative agent of porcine enzootic pneumonia, which affects the industrialised pig production worldwide. In endemic situations, the within-herd transmission is maintained by vertical route from sows to their offspring or by horizontal route mainly between pigs in the same compartment. The objectives of the present study were to develop a mathematical model to estimate the within herd transmission of M. hyopneumoniae and to assess the impact of different risk factors.

Material & Methods. A time-discrete, stochastic compartmental model was developed considering five compartments: "susceptible", "exposed", "acute infectious", "chronic infectious" and "recovered". Transition parameters were used from the literature, from own datasets of former studies, and – if no other sources were available - from an expert poll. The model was coded in R and was run for a 500 sow herd operating in a batch-farrowing system. For each scenario, 1,000 iterations have been used to obtain a converged outcome. In the final model, the impact of five different risk factors was evaluated: "duration of suckling period", "gilt acclimatisation", "vaccination against M. hyopneumoniae", "contact between fattening pigs of different age" and "presence of co-infections". A disease severity index, defined as the proportion of infectious pig-days, was used to compare the impact of different combination of risk factors.

Results & Discussion. Overall 18 different combinations of risk factors were used. The 'disease severity index ' was lowest when gilts were in contact with living pigs during their acclimatisation, piglets suckled for 21 days and were vaccinated against M. hyopneumoniae, and fattening pigs did not have any contact with other age groups during (re-)stocking of compartments and do not suffer from co-infections. Under these conditions, pigs became acutely or chronically infectious for 0.3% of their lifetime, on average. The disease severity index is the highest when gilts did not have any contact with living animals during their acclimatisation, suckling pigs got weaned unvaccinated after 28 days, fattening pigs had contact with pigs of other age and are suffering from co-infections. Under these conditions, pigs became acutely or chronically infectious for 26.1% of their lifetime.

NOTES

O42 GENOTYPE CHARACTERIZATION AND ANTIBIOTIC RESISTANCE OF BRACHYSPIRA HYODYSENTERIAE ISOLATES IN ITALY BETWEEN 2003 AND 2012

Bonilauri P.[1], Carra E.[2], Rugna G.[2], Luppi A.[1], Magistrali C. F.[3], Nigrelli A. D.[4], Alborali G.[5], Biasi G.[1], Gherpelli Y.[1], Bergamini F.[2], Merialdi G.[6]

[1]IZSLER ~ Reggio Emilia ~ Italy, [2]IZSLER ~ Modena ~ Italy, [3]IZSUM ~ Perugua ~ Italy, [4]IZSLER ~ Mantova ~ Italy, [5]IZSLER ~ Brescia ~ Italy, [6]IZSLER ~ Bologna ~ Italy

Swine dysentery (SD) caused by Brachyspira hyodysenteriae is a major pig disease worldwide including Italy. The increased resistance to pleuromutilins recorded in many countries represents an important challenge. In this study the Multilocus Sequence Typing (MSLT) scheme was applied to 108 B. hyodysenteriae strains, isolated from 86 different farms distributed in various Regions of Italy between 2003 and 2012. In order to identify possible associations between genotypes and antibiotic resistance patterns the MIC value for pleuromutilins was determined using VetMIC™ Brachy SVA (ver. 2). For each isolates seven housekeeping genes were sequenced (adh, alp, est, gdh, glpK, pgm, thi). According to their allelic profiles isolates were assigned in 23 sequence types (STs) of which 21 were new and two (ST8 and ST52) were previously reported in PubMLST. Significant linkage disequilibrium was found ($p<0.000$) both considering number of isolates (Ia=3.0102) and number of STs (Ia=0.5017). Five Clonal complex (Cc) and three singletons were identified by BURST analysis. Based on MIC results strains were allocated in two groups: sensitive strains (MIC < 1mcg/ml for both antibiotics) and strains with reduced sensitivity (MIC > 1 mcg/ml for one or both antibiotics). The proportion of sensible strains in respect to different independent variables (clonal complex, year and region of isolation) was evaluated by generalized linear model (GLM). No statistically significant association with farms geographical localization, was observed, while Cc and year of isolation resulted significantly associated to the proportion of sensible strains ($p<0.05$). In particular strains belonging to Cc 2 or 3 resulted about 11 times more likely to be sensitive to pleuromutilins than other Cc (Odds ratio equal to 11.42; CI95% 2.98-43.71, $p<0.01$) and a significant trend in reduction of susceptibility to pleuromutilins during time from 2003 to 2012 (70% to 20% respectively) was observed (Pearson's correlation r -0.37, extension of the Wilcoxon rank-sum test for the trend, $p<0.01$). This study confirms MLST as reliable tool to investigate the diversity of B. hyodysenteriae strains. The application of this technique could lead to better understanding of the epidemiology of the infection, including sources and patterns of introduction, potentially providing support to more effective control and eradication strategies. The association among Ccs and pattern of sensitivity have to be investigated in order to clarified the molecular bases of observed profiles.

NOTES

O43 EXPERIMENTAL INOCULATION OF PIGS WITH A BRACHYSPIRA HAMPSONII ISOLATE COLLECTED FROM MIGRATING WATERFOWL IN SPAIN

Aller-Morán L.M.[1], MartÍnez-Lobo F.J.[1], Álvarez L.[1], Carvajal A.[1], Rubio P.[1]
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Experimental inoculation of pigs with a Brachyspira hampsonii isolate collected from migrating waterfowl in Spain
Brachyspira hampsonii is a new specie within Brachyspira genus that produce a dysentery-like diarrhea syndrome in pigs. The aim of this study was to investigate whether a Brachyspira hampsonii isolate obtained from birds was able to colonize pig intestine, induce clinical signs of dysentery and be transmitted between pigs.
Eleven 7 week-old pigs were randomly assigned into inoculated (n=5) and control (n=6) groups and housed in two separated rooms. After a ten days adaptation period, pigs were orally inoculated on three consecutive days (post-inoculation days PID: 0, 1 and 2) with 100 ml of a 108 UFC/mL culture of an avian isolate of B. hampsonii (inoculated group) or 100 ml of BHI broth (control group). After the last inoculation 3 pigs from control group were introduced into the inoculated pen and served as sentinel pigs. Between PID 0 and 21 all pigs were fed with a commercial diet supplemented with soy bean at 50%. The strain used as inoculum was previously isolated from fecal wild mallard samples. Diarrhea was scored and fecal swabs were collected daily and cultured. Plates were investigated by observing the presence of β-hemolysis as well spirochetes under phase-contrast microscopy. Sequencing of partial nox gene was used for the identification of Brachyspira species. On PID 50, all pigs were euthanized and an evaluation of colon and cecum lesions was performed.
All inoculated pigs and one sentinel pig shed spirochetes identified as B. hampsonii during the experimental period. Only one pig from the inoculated group showed bloody diarrhea during one day. Although diarrhea was more frequently observed in inoculated pigs than in control ones no statistical differences were found between groups. Colonization of the crypts by spirochetes was demonstrated in 2 out of 5 inoculated pigs. Although most pathological parameters were similar between groups, inflammation grade, number of plasmatic cells and depth of crypts were higher among inoculated pigs as compared with control pigs. The results of this study demonstrate the capacity of an avian B. hampsonii isolate to colonize the gross intestine of pigs. Moreover, our study successfully demonstrated the transmission of B. hampsonii isolates of avian origin from infected to sentinel pigs. According to this, migrating birds would have a relevant role in the epidemiology of B. hampsonii infection in swine as a possible source of infection for the swine population.

NOTES

IMMUNOLOGY AND VACCINOLOGY

Friday,May 9th
10.55-12.35

O44 SUPERINFECTION OF SOWS WITH CYSTOISOSPORA SUIS ANTE PARTUM LEADS TO A MILDER COURSE OF CYSTOISOSPOROSIS IN SUCKLING PIGLETS
Schwarz L., Worliczek H.L., Winkler M., Joachim A.

O45 CLINICAL PROTECTION, VIREMIA AND IMMUNE RESPONSE IN PIGS VACCINATED AGAINST PCV2 AT DIFFERENT AGES WITH DIFFERENT LEVELS OF MATERNAL IMMUNITY AS DERIVED FROM VACCINATED GILTS AND SOWS UNDER FIELD CONDITIONS
Martelli P., Saleri R., Cavalli V., Ferrari L., De Angelis E., Benetti M., Bonilauri P., Arioli E., Caleffi A., Ferrarini G., Borghetti P.

O46 SHEDDING OF WILD-TYPE PRRSV IN AEROSOL IS REDUCED IN GROWING PIGS VACCINATED WITH A MODIFIED-LIVE PRRSV VACCINE AT WEANING
Dee S., Nerem J., Cano J.P., Wetzell T.

O47 EFFICACY OF AN ATTENUATED EUROPEAN SUBTYPE 1 PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) VACCINE IN PIGS UPON CHALLENGE WITH THE EAST EUROPEAN SUBTYPE 3 PRRSV STRAIN LENA
Trus I., Bonckaert C., Van Der Meulen K., Nauwynck H.J.

O48 INFLUENCE OF GAMITHROMYCIN AND KETOPROFEN ON THE ACUTE PHASE RESPONSE IN LPS-CHALLENGED PIGS
Wyns H., Meyer E., Plessers E., Watteyn A., Van Bergen T., Schauvliege S., De Backer P., Croubels S.

O44 SUPERINFECTION OF SOWS WITH CYSTOISOSPORA SUIS ANTE PARTUM LEADS TO A MILDER COURSE OF CYSTOISOSPOROSIS IN SUCKLING PIGLETS

Schwarz L.[1], Worliczek H.L.[2], Winkler M.[2], Joachim A.[2]

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Consumption of colostrum is essential for survival of new born piglets in conventional piglet production systems. Several immunological factors, especially antibodies, are transferred via colostrum from the sow to the offspring. These antibodies provide passive protection against various pathogens. Cystoisospora suis as the causative agent of neonatal porcine coccidiosis is responsible for economic losses in pig production. Sows transmit significant amounts of C. suis-specific antibodies via milk to their piglets, especially on the first day of life. In a pilot study a correlation of higher serum IgA titres in piglets with a more solid faecal consistency could be noticed. Hence, in this study a possible role of colostral antibodies in the passive immunisation of neonatal piglets against C. suis was investigated.

To investigate the potential of oral immunisation of sows with infectious C. suis oocysts, six sows were infected on study day (SD) -14 (14 days ante partum) with 5 x 20,000 oocysts; six sows remained non-infected. For evaluation of antibody titres (IgG, IgA, IgM against sporozoites and merozoites) in blood and milk, blood samples from the sows were taken on SD -14, -1, 1 (1 day postpartum) and subsequently in weekly intervals till SD 21; milk samples were collected daily in the first lactation week and afterwards in weekly intervals until the end of the study on SD 35. Blood samples from piglets were collected on SD 1, 21 and 35.

All piglets were infected on SD 3 with 1000 oocysts. Faecal samples from piglets were collected daily from SD 7 till SD 21 to investigate faecal consistency and parasite shedding.

Piglets suckled by infected sows showed significantly reduced excretion of oocysts, more solid faeces, reduced occurrence of diarrhoea, a significantly longer prepatent period and a later onset of diarrhoea. Superinfected sows had significantly higher antibody titres in blood serum and milk compared to non-infected ones. Piglets from superinfected sows showed significantly higher IgG, IgA and IgM antibody titres after colostrum consumption. Various significant correlations between higher antibody titres and a milder course of disease were found.

In summary, a positive effect of maternal immunisation on the performance of piglets during neonatal porcine isosporosis could be observed. This benefit for the offspring highlights the potential of oral immunisation of sows against C. suis as a possible passive vaccination strategy for new born piglets against this important pathogen.

NOTES

O45 CLINICAL PROTECTION, VIREMIA AND IMMUNE RESPONSE IN PIGS VACCINATED AGAINST PCV2 AT DIFFERENT AGES WITH DIFFERENT LEVELS OF MATERNAL IMMUNITY AS DERIVED FROM VACCINATED GILTS AND SOWS UNDER FIELD CONDITIONS

Martelli P.[1], Saleri R.[1], Cavalli V.[1], Ferrari L.[1], De Angelis E.[1], Benetti M.[1], Bonilauri P.[3], Arioli E.[2], Caleffi A.[2], Ferrarini G.[1], Borghetti P.[1]

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The study aims at evaluating the clinical protection, the level of PCV2 viremia and the immune response in piglets derived from vaccinated sows and vaccinated at different weeks of age, namely 4, 6 and 8. The study has been carried out over three subsequent production cycles (replicates). At the start/enrollment, 46 gilts were considered at first mating, bled and vaccinated. At first, second and third farrowing, the dams were bled and re-vaccinated at the subsequent mating after weaning piglets. The matching piglets at each farrowing (first, second and third) were randomly allocated in 4 different groups (100 animals/group) on the basis of the vaccination timing: 4, 6 and 8 weeks of age. A fourth control group was also included. Piglets were vaccinated intramuscularly with 2 mL of one dose of a commercial PCV2a-based subunit vaccine (Porcilis® PCV - MSD Animal Health, Whitehouse Station, NJ, USA). Twenty animals per group were bled every four weeks from vaccination to slaughterhouse for the detection of PCV2 and PRRSV viremia, humoral and cell-mediated immune response (IFN-γ SC). Morbidity, mortality, body weight were recorded. In the first and second replicate, a weak natural PCV2 challenge, that did not result in PCVD, occurred at 17-20 weeks of age. All the vaccination schemes (4, 6 & 8 weeks of age) were able to induce seroconversion (no interference of MDA) but the highest titers of antibodies and IFN-γ SC were in pigs vaccinated at 6 weeks of age. In the third replicate, PCV2 natural infection occurred at 20 weeks and 100% of the control pigs showed a viral burden in their blood even higher than 107 in association with clinical signs referred to as PCVD. All vaccinated animals were protected and only few of them were viremic but the best performance either in term of immune reactivity, productivity and health status were observed in pigs vaccinated at 6 weeks of age. Overall, under the condition of this study, repeated PCV2 vaccination in sows at mating and the subsequent more homogeneous titers of antibodies at farrowing does not significantly interfere with inducing both humoral and cell-mediated immunity in their piglets after vaccination with the best performance obtained when vaccinating at 6-8 weeks of age.

NOTES

O46 SHEDDING OF WILD-TYPE PRRSV IN AEROSOL IS REDUCED IN GROWING PIGS VACCINATED WITH A MODIFIED-LIVE PRRSV VACCINE AT WEANING

Dee S.[1], Nerem J.[1], Cano J.P.[2], Wetzell T.[2]

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The objective of this study was to quantify the effect of MLV vaccine on performance and measure WTV shedding in pigs vaccinated at weaning and challenged 4 weeks later. A total of 2100 PRRS-negative weaned pigs were randomly allocated to either a non-vaccinated control (NVC) or to a MLV vaccinated group, each housed in separated rooms. Biosecurity protocols were implemented to avoid PRRSV transmission between rooms. Pigs in the MLV group were IM vaccinated with Ingelvac PRRS® MLV (Boehringer Ingelheim Vetmedica, Inc, St Joseph, MO) at 4 weeks of age. Four weeks post-vaccination 10% of the pigs in each group were IM inoculated with 1 mL of PRRS WTV RFLP pattern 1-18-2 at a concentration of 4.2x107 RNAc/mL. Infection dynamics was monitored by PCR and ELISA tests on serum and oral fluid (OF) samples collected at 3, 7, 14, 23, 29, 37,64, 93 and 118 days post-vaccination (DPV). Daily air samples were collected from each group at 8 AM using Liquid Cyclonic Collectors (Midwest MicroTek, Brookings, SD) placed in front of exhaust fans for 30 minutes and tested by PCR. The duration of shedding and magnitude and duration of viremia were analyzed with JMP 9.0. Mortality, cull rate, average daily gain (ADG) and feed conversion (FC) were recorded in each barn. Pigs in the MLV group were PRRSV PCR and ELISA negative before vaccination as the pigs in the NVC group were negative before inoculation. Mild clinical signs developed in both groups following the inoculation with WTV. There was no significant difference between groups in the duration and magnitude of viremia and seroconversion detected in serum or OF samples. MLV vaccine was not detected in the NVC group. The frequency of detection of PRRSV RNA in air samples was significantly higher ($P<0.0001$) in the NVC (21/118 days) than in the MLV group (4/118 days). The duration of detection of PRRSV RNA in air samples was shorter in the MLV group than in the NVC group (6 vs. 36 days, respectively). Mortality and culls for the NVC barn were 4.8 and 5.9% and 5.1 and 2.8% in the MLV group, respectively. Feed conversion was 2.38 and ADG was 0.712 kg/d in the NVC barn and 2.40 and 0.739 kg/d in the MLV group, respectively. The prophylactic use of PRRS MLV vaccine in growing pigs at risk of infection represents a valuable tool to reduce the risk of transmission between herds in swine-dense-areas.

NOTES

O47 EFFICACY OF AN ATTENUATED EUROPEAN SUBTYPE 1 PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) VACCINE IN PIGS UPON CHALLENGE WITH THE EAST EUROPEAN SUBTYPE 3 PRRSV STRAIN LENA

Trus I.[1], Bonckaert C.[1], Van Der Meulen K.[1], Nauwynck H. J.[1]

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The efficacy of a commercial attenuated European subtype 1 PRRSV vaccine was evaluated upon challenge with the East European subtype 3 PRRSV strain Lena (83.3% nucleotide identity). Two vaccination experiments were carried out. Four- and seven-week-old pigs were vaccinated with the modified-live vaccine. Upon vaccination, virus specific IPMA antibodies were detected in all vaccinated animals with titers ranging from 10(2.8) to 10(4.6). No virus neutralizing (VN) antibodies were detected after vaccination. Eight (exp. 1) or six (exp. 2) weeks after vaccination, pigs were challenged with 10(6) (exp. 1) resp. 10(5) (exp. 2) TCID50 of the European subtype 3 PRRSV Lena. Upon challenge, non-vaccinated animals showed fever during 5.1 (exp. 1) or 7.7 (exp. 2) days. In vaccinated pigs, the duration of fever was reduced by 1.8 (exp. 1) or 3.5 (exp. 2) days. The modified-live virus vaccine reduced the mean duration of nasal shedding and viremia. In non-vaccinated pigs, virus shedding lasted 5.8 days (exp. 1), resp. 8.3 days (exp. 2). This period was reduced to 3.6 (exp. 1) resp. 3.0 (exp. 2) days in vaccinated animals. Viremia was observed during a shorter period in vaccinated (exp. 1: 7.4 days, exp. 2: 4.8 days) than in non-vaccinated groups (exp. 1: 11.8 days, exp. 2: 12.3 days). Starting from 5 days post challenge, titers in nasal secretions and sera were significantly lower in vaccinated animals ($P < 0.05$). Virus-neutralizing antibodies were detected at low titers (≤16) after 7 days post challenge in vaccinated animals and 28 days post challenge in control animals. In conclusion, it can be stated that vaccination of pigs with an attenuated European subtype 1 vaccine provides a partial protection against a subsequent exposure to the highly virulent East European subtype 3 PRRSV strain Lena.

NOTES

O48 INFLUENCE OF GAMITHROMYCIN AND KETOPROFEN ON THE ACUTE PHASE RESPONSE IN LPS-CHALLENGED PIGS

Wyns H.[1], Meyer E.[1], Plessers E.[1], Watteyn A.[1], Van Bergen T.[2], Schauvliege S.[2], De Backer P.[1], Croubels S.[1]

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Lipopolysaccharide (LPS) has been widely applied as a model of immune challenge in pigs since it induces the immediate synthesis of pro-inflammatory cytokines such as tumor necrosis factor-α (TNF-α), interleukin-1β (IL-1β) and IL-6. These cytokines orchestrate the acute phase response by inducing fever and triggering the production of acute phase proteins such as C-reactive protein (CRP) and pig-Major Acute Phase Protein (pig-MAP). Gamithromycin is a macrolide antibiotic which has been recently developed for the treatment of bovine respiratory disease. Besides their anti-infectious properties, macrolides have frequently been reported to affect various inflammatory processes, such as the release of pro-inflammatory cytokines and mediators. Ketoprofen, on the other hand, is a non-steroidal anti-inflammatory drug which has been extensively used in veterinary medicine because of its anti-inflammatory, antipyretic and analgesic properties. The aim of the present research was to study the influence of gamithromycin and ketoprofen on the acute phase response in a standardized and reproducible LPS inflammation model in pigs.

Twenty-four 10-week-old male pigs were randomly divided in four groups. The groups received either a single bolus of respectively 12 mg/kg body weight (BW) gamithromycin (Zactran®; Merial) subcutaneously (GAM; n=6), 6 mg/kg BW ketoprofen (Ketofen 10%®, Merial) intramuscularly (KETO; n=6), the combination of both drugs (GAM-KETO, n=6) or no drugs at all (LPS, n=6). One hour after the administration of the drugs, the pigs were intravenously challenged with 15 µg/kg BW ultrapure LPS from E. coli serotype O111:B4 through the proximal lumen of a central venous catheter. Furthermore, two additional control animals received an equivalent volume of 0.9% NaCl. Rectal body temperature was measured and blood samples were collected from the distal lumen of the catheter at several time points until 72 h after LPS administration. Plasma samples were analyzed using ELISAs for porcine TNF-α, IL-1β, IL-6, CRP and pig-MAP. The concentration of prostaglandin E2 was measured using a validated high-performance liquid chromatography-tandem mass spectrometry method.

Regarding the course of the rectal body temperature, the LPS- and GAM-group undoubtedly developed fever, while the administration of ketoprofen clearly suppressed the rise in body temperature. Further analyses will elucidate the underlying mechanisms of these findings. These results and conclusions will be presented at the symposium.

NOTES

REPRODUCTION

Friday,May 9th
10.55-12.35

O49 **SEVERITY OF EARLY ABORTIONS DURING AUTUMN IN DUTCH SOW HERDS IS RELATED TO WEATHER CONDITIONS**
Geudeke M.J.

O50 **RELATIONSHIP BETWEEN BACTERIOLOGICAL AND CHEMICAL-ANALYTICAL URINE ANALYSIS FROM SOWS WITH REPRODUCTIVE DISORDERS**
Grahofer A., Sipos S., Fischer L., Entenfellner F, Sipos W.

O51 **ASSOCIATION BETWEEN NUMBER OF STILLBORN PIGLETS AND BLOOD HAEMOGLOBIN CONCENTRATION IN THE SOW**
Jensen A.K., Nielsen J.P.

O52 **RAPID ULTRASONOGRAPHIC EXAMINATION OF STILLBORN PIGLETS CAN PROVIDE ACCURATE DIAGNOSIS OF TRUE INTRA-PARTUM DEATH.**
Boulot S., Loiseau D., Richard R.

O53 **IMMUNOGLOBULIN G IN SOW COLOSTRUM AND IN PIGLET PLASMA**
Kielland C., Rootwelt V., Bleken E., Reksen O., Framstad T.

O49 SEVERITY OF EARLY ABORTIONS DURING AUTUMN IN DUTCH SOW HERDS IS RELATED TO WEATHER CONDITIONS

Geudeke M.J.[1]

[1]*GD Animal Health Service ~ Deventer ~ Netherlands*

Every autumn sow herds in the Netherlands face an increase of irregular returns to oestrus and early abortions. These autumn abortions are characterized by loss of embryos at 20 to 25 days after insemination. In most cases sows do not show any other symptoms. Within a few days after the disruption of pregnancy most sows return to oestrus at about 4 weeks after first insemination. This phenomenon is related to seasonal influences like changes in photoperiod. Some risk factors at farm level that are identified so far are poor body condition of the sows at weaning and during early gestation, high prolificacy, low feeding level in early gestation, poor indoor climate and group housing in early gestation with relatively small stable groups and limited space allowance and without individual feeding.

The GD Animal Health Service in Deventer (Netherlands) runs a monitoring program on pig health using information from phone calls from practitioners and farmers, results from post mortem investigation and reports from farm visits. By combining these data we were able to identify years in which the problem of autumn abortions in Dutch sow herds were more pronounced and years in which apparently not many sow herds experienced autumn abortions since 2002. The good years were 2007, 2010 and 2011. Bad years were 2002, 2003 and 2012. The other years were inconclusive. The fact that the problems vary a lot between different years, is probably due to differences in weather conditions, e.g. temperature. In order to identify this we examined weather statistics of the Royal Dutch Meteorological Institute (KNMI, De Bilt) like daily maximum and minimum temperature esp. during the autumn (August until October). These analyses show that in the so called bad years compared to the good years, the number of days with a maximum temperature above 25oC was higher in August (9.3 vs. 3.0) and September (2.7 vs. 1.0), the number of days with a minimum temperature below 5oC was higher in September (4.7 vs. 1.0) and October (15.7 vs. 11.3) and the number of days in which the temperature drops (day vs. night) more than 15oC was higher in August (5.0 vs. 1.3) and September (5.3 vs. 1.0). These differences were statistically significant. In conclusion, the phenomenon of autumn abortions in the Netherlands is more prominent in years with large differences and fluctuations in (outside) temperature, even though the sows are kept indoors.

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O50 RELATIONSHIP BETWEEN BACTERIOLOGICAL AND CHEMICAL-ANALYTICAL URINE ANALYSIS FROM SOWS WITH REPRODUCTIVE DISORDERS

Grahofer A.[3], Sipos S.[1], Fischer L.[2], Entenfellner F.[1], Sipos W.[3]

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Introduction. Reduced fertility in sows, often caused by urinary tract infection (UTI), plays a major role in sow mortality and their replacement, thus causing economic losses to piglet producers. The aim of this study was to analyse the prevalence of UTI in sows with reproductive failure and to compare different sample sites and methods to diagnose UTI. Moreover the bacteriological aetiology of cystitis in sows located in Lower Austria and the correlation with urine analysis data was examined.

Materials and Methods. Thirty-nine sows with reproductive disorders from 9 farms in Lower Austria were sampled. Midstream urine was examined macroscopically and physically-chemically one day before slaughter. Another urine sample was taken under sterile conditions directly out of the urinary bladder immediately after slaughter. Furthermore, swabs were taken of bladder and uterus mucosa. A bacterial investigation of all four matrices was conducted.

Results. More than three fourths (84.6%) of the sows showed a UTI. Nearly identical culture results were obtained from urine collected immediately after slaughter and from swabs of bladder mucosa. Samples obtained after slaughter most often yielded pure cultures of one bacterium, whereas midstream urine samples often led to isolation of two or more different bacterial species. The most frequently detected bacteria were Escherichia coli in 64.1% of the samples, α-hemolytic streptococci in 34.6% and Staphylococcus hyicus in 21.8%. No statistically significant correlation between the physical and chemical parameters and the bacteriological results were found.

Discussion. In this study also results with low quantity of bacterial agents (+ growth compared to ++ and +++ growth) were considered. So it was difficult to interpret culture results for midstream urine samples, likely due to environmental contamination. Therefore, any utilization of a similar strategy of interpretation in practice may lead to an overestimation of UTIs. Apart from this, pathogens not specific for UTI were found and might have led to reproductive disorders in the sow herds. It was concluded that sterile urine or swabs from the bladder of culled sows should be tested, if there are problems with the genitourinary system, i.e. presumption of UTIs as a herd problem.

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O51 ASSOCIATION BETWEEN NUMBER OF STILLBORN PIGLETS AND BLOOD HAEMOGLOBIN CONCENTRATION IN THE SOW

Jensen A.K.[1], **Nielsen J.P.**[1]

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Background. Haemoglobin (Hb) concentrations in sows tend to decrease during pregnancy. Low Hb-concentration may impair farrowing performance due to hypoxia. Moreover, inadequate oxygen transport to foetuses may increase risk of stillbirths. The objective of this study was the association between number of stillborn piglets and Hb-concentration in the sow.

Materials and methods. In a Danish 1,700 sow herd, 159 sows were studied at the time of farrowing. Blood was sampled once just before farrowing. Dead piglets collected around farrowing were examined by autopsy to confirm that they were stillborn. Statistical analysis was performed in SAS, using a linear mixed model: number of stillborn piglets = Hb-concentration in the sow + number of totalborn + parity.

Results. Blood was sampled from sows nine to one days before farrowing. The mean Hb-concentration was 114.5 g/L [113.1; 116.0]. Sow Hb-concentration was found negatively associated to number of stillbirths (parameter estimate -0.025; P=0.03).

The mean Hb-concentration was lower in sows with ≥4 stillborn piglets compared to sows with fewer stillbirths (P = 0.03).

Conclusion. Number of stillborn piglets was associated to Hb-concentration in the sow before farrowing. This indicates that number of stillborn piglets can be associated to hypoxia.

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O52 RAPID ULTRASONOGRAPHIC EXAMINATION OF STILLBORN PIGLETS CAN PROVIDE ACCURATE DIAGNOSIS OF TRUE INTRA-PARTUM DEATH

Boulot S.[1], Loiseau D.[1], Richard R.[1]

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Introduction. High perinatal mortality in modern pig farms has clear economic and ethical issues. Both stillbirths and post-partum mortality exhibit large increases, with variations according to herds. However, due to poor supervision, and few necropsies, true stillborn are often misdiagnosed at farm level. The objective of this work was to investigate possible use ultrasonography as a rapid alternative to lung floatation test.

Materials and methods. The study was performed in the IFIP experimental farm on 50 dead piglets, collected from 19 spontaneous unassisted farrowings. These neonates were found dead at birth or within the first 12 hours of life, mummies being excluded. Thoracic ultrasonographic examinations were performed in the intercostal space, parallel to the ribs, at the height of the elbow joint (5 MHz linear probe, Imago®, ECM). Subsequently, piglets were weighted, necropsied and lung floatation tests were carried on to identify main cause of death (intra-partum vs post-partum).

Results. Average litter size was 16.5 ± 1.5 live-born, and 1.5 ± 1.1 stillborn. According to lung floatation test, 58% dead piglets were true stillborn (intra-partum death) while early post-partum death was mainly attributed to crushing (75%), weakness (14%) or euthanasia (10%). In case of post-partum death, presence of air in the lungs prevented clear visualization of pulmonary tissues but generated typical reverberation artifacts on ultrasound pictures (A-Lines, B-lines, comet tails). By contrast, non-ventilated atelectasic lungs of intra-partum dead piglets clearly appeared as echogenic hepatized tissues, without any sign of reverberation artifact. Because of complete agreement with floatation test (100% accuracy), the absence of any reverberation artifact can be used for ultrasound diagnosis of intra-partum death. Birth weights (0.903 ± 0.343 kg on average) varied within a large range (0.400 to 1.730 kg), but high proportion of small piglets (36% <0.800 kg) did not impact the accuracy of the exam.

Conclusions. These preliminary results suggest that ultrasonography can provide rapid, accurate and real-time evaluation of stillborn piglets and intra-partum death. This new tool may be of great practical interest for practitioners, in farms with high perinatal mortalities.

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O53 IMMUNOGLOBULIN G IN SOW COLOSTRUM AND IN PIGLET PLASMA

Kielland C.[1], Rootwelt V.[1], Bleken E.[1], Reksen O.[1], Framstad T.[1]

[1]Norwegian School of Veterinary Science ~ Oslo ~ Norway

The level of immunoglobulin G (IgG) absorbed in piglets is dependent on several factors, most importantly the level of IgG in sow colostrum (col IgG). The concentration of col IgG varies widely across studies; one reason may be sampling a limited number of sows from a single herd. We studied how col IgG varied between herd and sow, and how the col IgG varied during farrowing. Our main aim was to investigate factors associated with IgG concentrations in piglet plasma (piglet IgG).

This study included 58 sows from 4 herds and their live piglets the day after farrowing (Day1). Two of the herds were included because of increased piglet mortality until weaning, the other two had average mortality levels. Colostrum IgG concentrations were recorded immediately after expulsion of piglet nr 1 (t1), midway of farrowing (t2), and after the last piglet was born (t3). At Day 1 (24± 2 h), each live piglet had 0.5 mL blood collected in tubes containing EDTA, and IgG concentrations were measured.

Mean col IgG concentration across all sampling was 53.9 g/L. The two herds experiencing increased piglet mortality had a mean col IgG of 38.3 g/L and 47.4g/L, whereas the two other herds had an increased mean col IgG of 67.8 g/L and 60.4 g/L. Colostrum IgG at t1, t2 and t3 for all herds, was 56.2g/L, 53.7g/L and 42.5 g/L, respectively. Mean concentration of piglet IgG was 21.7 g/L.

Multilevel linear regression analysis was performed with piglet IgG (g/L) as outcome. Significant differences in piglet IgG were found to be associated with a) herd ($P<0.001$), b) birthweight (kg), $P<0.001$, c) birth time (min), $P<0.001$, and with d) colostrum IgG at t1 (g/L), $P=0.021$. Females had a slight tendency to have increased piglet IgG concentrations ($P=0.106$).

Concentrations of col IgG varied largely between herds and sows, and the descriptive analysis indicated that decreased col IgG may be associated with increased piglet mortality until weaning. Significant factors associated with piglet IgG levels showed that a piglet with low birthweight, that was born late and which had access to reduced col IgG, had a high risk for low piglet IgG. However, this is depended of the farm, and likely due to management on that farm.

NOTES

POSTER PRESENTATIONS

The pdf files of the poster presentations are available on www.eaphm.org <http://www.eaphm.org>

P1 EFFICACY OF EARLY MYCOPLASMA HYOPNEUMONIAE VACCINATION AGAINST MIXED RESPIRATORY DISEASE IN OLDER FATTENING PIGS

Del Pozo Sacristán R.[1], Sierens A.[1], Marchioro S.B.[1], Vangroenweghe F.[2], Jourquin J.[2], Labarque G.[2], Haesebrouck F.[3], Maes D.[1]

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Mycoplasma hyopneumoniae is the causative agent of enzootic pneumonia in pigs and is one of the primary agents involved in the porcine respiratory disease complex (PRDC). This disease is worldwide distributed and leads to a significant reduction of economical profit in pig production. Control of M. hyopneumoniae infections can be accomplished by improving management and housing practices, by the use of antimicrobials and by vaccination. The major advantages of vaccination include a reduction losses due to poor growth and mortality.
Because M. hyopneumoniae infections can take place in piglets already during the first weeks of life and because vaccination is most likely effective if active immunity can be established before the exposure to the pathogen, vaccination is commonly applied in suckling piglets. As the disease course and lung lesions can be largely influenced by bacterial and viral respiratory pathogens (PRDC), it is important to investigate whether M. hyopneumoniae vaccination is also beneficial under conditions of mixed respiratory disease.
The present field study investigated the efficacy of early M. hyopneumoniae vaccination in a farrow-to-finish pig herd with respiratory disease late in the fattening period due to combined infections with M. hyopneumoniae and viral pathogens. Five-hundred-and-forty piglets were randomly divided into three groups of 180 piglets each: two groups were vaccinated (Stellamune Once) at either 7 (V1) or 21 days of age (V2), and a third group was left non-vaccinated (NV). The three treatment groups were housed in different pens within the same compartment during the nursery period, and were housed in different but identical compartments during the fattening period. The efficacy was evaluated using performance and pneumonia lesions. The average daily weight gain during the fattening period was 19 (V1) and 18 g/day (V2) higher in both vaccinated groups when compared with the NV group. However, the difference was not statistically significant ($P>0.05$). The prevalence of pneumonia was significantly lower in both vaccinated groups (V1:71.5 and V2:67.1 per cent) when compared with the NV group (80.2 per cent) ($P<0.05$). There were no significant differences between the two vaccination groups.
In conclusion, in the present herd with respiratory disease during the second half of the fattening period caused by M. hyopneumoniae and viral infections, prevalence of pneumonia lesions were significantly reduced and growth losses numerically (not statistically significant) decreased by both vaccination schedules.

P2 DYING PIGLETS WITHOUT DETECTION OF REASONABLE PATHOGENS IN AN AUSTRIAN PIGLET PRODUCING FARM - A CASE REPORT

Unterweger C.[1], Schmoll F.[2], Weissenböck H.[3], Bagó Z.[2], Fischer L.[4]

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In a closed system with 50 sows and space for 250 fattening pigs more than 40% of 6-7 weeks old piglets, which had been vaccinated against PCV2 after weaning in the fourth week of life, died within two days after the first Haemophilus (H.) parasuis vaccination with symptoms like fever (>40°C), respiratory distress and swelling of the eyelids in spite of colistin in the feed. The only finding was a suppurative bronchopneumonia in the cranial lung lobes and no signs of septicaemia were found. Mycoplasma hyorhinis, Pasteurella multocida and alpha-haemolytic streptococci were isolated from the lung alterations, PCR analysis for Mycoplasma hyopneumoniae, H. parasuis, PRRSV, SIV, hog cholera virus and PCV-2 gave negative results, as well as the bacteriological examination of gut content for Shigatoxin-producing E.coli. Two additional, eight weeks old pigs out of the next weaning group were sacrified, because further pigs had died in this group. Bronchopneumonia in the cranial lung lobes and globular plasma coacervates around cerebral vessels in combination with signs of vascular damage were demonstrated by histological examination. These pathomorphological findings were in accordance with an early stage of edema disease as well as with pulmonary mycoplasmosis. This case report highlights the importance of a pathohistological examination for the diagnostic of some specific diseases, especially in those cases, when diagnostics of the causative agents failed.

P3 INFLUENCE OF PARTICULATE MATTER (PM10) AND NH3 ON ENZOOTIC PNEUMONIA AND PRODUCTION OF FATTENING PIGS

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Among all indoor aerial pollutants, particulate matter (PM) and NH3 are most hazardous for animal health. Currently the impact of PM10 (aerodynamic diameter <10µm) and NH3 on productivity of fattening pigs and specific respiratory diseases, such as enzootic pneumonia (EP), caused by Mycoplasma hyopneumoniae (Mh) is not yet clear and has mostly been assessed under experimental conditions. The present study investigated the influence of PM10 and NH3 on productivity and prevalence of EP in fattening pigs under field conditions. In total, 1095 fattening pigs of 2 fattening rounds allocated in 4 conventional and 4 low-ammonia-emission compartments (2 replicates) were selected in a farm infected with Mh. PM10 and NH3 concentration were measured in all 8 compartments during the entire fattening period (FP) from 11 until 29 and from 19 until 29 weeks of age (½FP). Mortality was recorded during the entire FP and all pigs were weighed at 11 and 28 weeks of age to calculate Average daily gain (ADG). Nasal swabs of 10 pigs per compartment in each replicate were collected one week prior to slaughter to detect Mh with nested PCR (nPCR). The prevalence of Mycoplasma-like pneumonia lesions and pleurisy were recorded at slaughter (29 weeks).

Continuous (ADG) and yes/no outcome variables were analysed using linear regression or logistic regression respectively. First univariable analyses (UM) were performed. In case of more than one significant variable (P<0.05) multivariable models (MM) were used.

The overall values of the different parameters were: ADG 695(±116)g, mortality rate 3.83%, Prevalence of pneumonia and pleurisy 63 and 64% respectively, and nPCR-positive 28%. PM10-and NH3 concentration did not seem to affect production. The PM10 concentration was positively associated with the odds of finding pleurisy lesions odds ratio (OR) 8.8; (P<0.05) and the effect of NH3 was confounded by high PM10 concentrations in the MM. For nPCR (FP and ½FP) the UM were retained. Per unit increase in PM10 the odds of finding nPCR positive animals during the entire FP and ½FP increased with OR 328.0; (P<0.05) and OR 185.5; (P<0.05) respectively. Per unit increase in NH3 the odds of finding nPCR positive animals during the entire FP and ½FP increased as well with OR 70.4; (P<0.05) and OR 8275.0; (P<0.05) respectively.

In conclusion, one can state that PM10 and NH3 did not affect productivity, but may affect the probability of finding EP in the farm. Further research is necessary to assess the influence of PM10 and NH3 on other important respiratory pathogens in swine.

P4 ON FARM STUDY OF DIRECT AND INDIRECT TRANSMISSION OF A. PLEUROPNEUMONIAE

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Actinobacillus pleuropneumoniae (App) is endemically present in many pig farms, but only occasionally causes pleuropneumonia outbreaks. Up to now, disease control relied on control of clinical signs, by using vaccines or antimicrobials, or improving housing conditions. Alternatively, disease control could focus on limiting the increase of the number of infected pigs by reducing transmission. In previous studies it has been shown that infection of piglets in the farrowing room is clustered by litter (Tobias, submitted) and weaned piglets can transmit the bacterium in the absence of signs (Velthuis, 2002). It is however unclear how efficiently App is transmitted between pigs within the same pen and between different pens under field conditions.

The aims of this study were (i) to assess the contribution of three possible transmission routes for App in weaned piglets, (ii) to obtain the transmission rates, and (iii) to evaluate the effect of mixing litters after weaning on the prevalence of infected pigs by using a simulation model. The evaluated routes of transmission were: indirect transmission by infected piglets within the same compartment, transmission to adjacent pens, and direct within-pen transmission. A cohort study was carried out on two farms, in three cohorts. Tonsil brush samples were collected from 48 sows pre-farrowing and all of their piglets (N=542) three days before weaning and six weeks later. The samples were analysed by qPCR for the presence of App (Tobias, 2012). Litters were not mixed at weaning. All sows tested positive. Before weaning 22% of the piglets tested positive and six weeks later 46% tested positive. A grouped regression model was used to assess the contributions of the three transmission routes to the number of new infections during the six-week period. It was shown that transmission between piglets across pens did not differ between adjacent and non-adjacent pens. Next, transmission rates were obtained by fitting a stochastic transmission model to the data. It was estimated that an infectious pig can transmit the infection to 0.058 pigs per day within the same pen (95% CI: 0.047; 0.070), and to 0.0058 pigs per day in other pens of the compartment (95% CI: 0.0031; 0.0102). These estimates were used to simulate the effect of litter mixing at weaning on the prevalence of infected pigs. The results showed that the prevalence of infected piglets would have increased to 69% at ten weeks of age (instead of the observed 46%). A reduction of mixing of litters seems to contribute effectively to a reduction of transmission on farms.

P5 COMPARISON OF METHODS FOR TUBERCULOSIS DIAGNOSIS IN PIGS AT SLAUGHTERHOUSE

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Tuberculosis (TB) caused by Mycobacterium tuberculosis complex (MTC) occurs in domestic and wild animals worldwide, being M. bovis the most frequently isolated species. In countries where bovine tuberculosis is still prevalent or is re-emerging, domestic free-range pigs are frequently affected for tuberculosis-like lesions (TBL). Due to affected animals often develop subclinical infections, positive animals are usually detected during the meat inspection at slaughterhouse. On the other hand, TBL in pigs can be caused by a varied spectrum of bacteria other than MTC, and this fact probably causes both an overestimated incidence of swine TB and public health alert. The available methods for TB diagnosis include gross pathology, histopathology, Ziehl-Neelsen (ZN) staining and culture, PCR and ELISA. Although expensive and extremely time-consuming, culture is still considered the gold standard technique. In the present study, a total of 100 pigs from different farms with a previous history of condemnation for TBL, were analyzed using the above mentioned techniques to obtain an accurate and rapid diagnosis of M. bovis infection. Tissue samples from normal submandibular lymph nodes (31) or lymph nodes with TBL (69) and serum samples were collected at slaughterhouse. Taking culture as gold standard, Sensitivity (Se) and Specificity (Sp) for macroscopic inspection were 92% (CI9 84-99%) and 54% (CI95 40-68%), respectively, with a moderate concordance between both techniques (kappa value=0.46). A moderate concordance (k = 0.44) was also obtained for histopathology (Se 68%, CI95 55-81%; Sp 76%, CI95 64 -88%). Applying qPCR from tissue homogenates, a good concordance between both techniques (k = 0.68), and high values of sensibility and specificity (Se 80%, CI95 69-91%; Sp 88%, CI95 79-97%) were obtained. The values of Se and Sp obtained for ELISA were 72% (CI95 60-84) and 54% (CI95 40-68), respectively, and the concordance (k = 0.26) was lower. In view of the results postmortem inspection has a high Se detecting almost all positive animals but lack Sp causing an overestimated TB diagnosis. Although histopathology is better detecting real TB lesions, is a time-consuming technique and its concordance with culture is also moderate. ELISA would not be advisable for individual diagnosis, but it would be of interest to detect the exposure of swine herds to M. bovis. However, qPCR of tissue homogenates achieving fast, sensitive and specific results and can be advisable diagnostic tool to confirm TB in pigs after meat inspection.

P6 ZNO-ENRICHED PEAT AND ITS EFFECTS ON GROWTH PERFORMANCE AND POST WEANING ENTERIC IMBALANCE

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Various strategies have been tested to reduce E. coli infections around weaning like e.g. zinc oxide (ZnO). In feed ZnO medication (2.500-3000 ppm) shows a clear effect on the prevalence of E. coli infections in piglets. However, it is criticized because of high ZnO excretion into the environment. Microencapsulated ZnO products claim to achieve the same effects at lower concentrations. ZINCORET™ is an embedded ZnO source inside a vegetable hydrogenated lipid matrix.

The aim of this study was to evaluate ZnO-enriched peat as an alternative feed supplement around weaning. Peat, a natural feed supplement, was used as carrier of ZnO (ZnOP) and ZINCORET™ (ZIP). A total of 496 and 366 piglets (farm 1 and 2) were included in 2-week feeding trials. Post-weaning E. coli infections were a persistent herd problem at both locations. The groups were given ad libitum access to standard diets and additionally fed 375 mg ZnO as ZINCORET/ l peat, 3750 mg ZnO/ l peat or peat without additives. Control groups received standard diets. Fecal consistency was assessed daily in pens and antibiotic treatment frequency was registered. Body weight registration and blood samples were drawn from randomly selected and ear tagged piglets two days before weaning and at the end of the feeding trials. Fecal samples were microbiologically analyzed from pigs showing diarrhea. Additionally, group weight was registered on day 0 and 14. A total of 24 piglets at farm 1 were sacrified, half at day 5 of the trial and the rest after 14 days for pathological evaluation. E. coli was isolated from animals showing diarrhea at both farms. At both farm 1 and 2, ZnOP and ZIP resulted in significantly higher individual weight gain ($p<0.05$) after 14 days. ZnOP, ZIP and peat influenced the faecal score in pens equally at both farms. Serum Zn was elevated significantly by ZnOP ($p=0.0148$) and ZIP ($p=0.0018$). Antibiotic treatment was given to five piglets fed ZnOP, one fed ZIP, five fed P and four within control groups were treated. Euthanized piglets after 14 days of ZIP-feeding showed intestines containing less gas and loose fecal content compared to piglets fed ZnOP, peat or controls.

In conclusion, ZIP or ZnOP can both be added to standard diets around weaning to improve weight gain. ZIP-fed groups were given less antibiotics at both locations. Necropsy of ZIP-fed piglets at farm 1 suggests a beneficial effect of ZIP where continual bacterial challenge exists. Additionally, ZIP represents an alternative feed additive to reduce enteric disorders around weaning involving lower concentrations of ZnO.

P7 PAPULAR DERMATITIS IN PIGS CAUSED BY MIDGE BITES IN NORTHERN IRELAND

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Reports of biting midges are rare in the literature. The importance of parasitic arthropods to pig production depends of the geographical location and the production system used. The direct economic impact of biting midges on pig production has not been studied. Furthermore, it is difficult to calculate the economic losses due to reduced growth rate, reduced feed efficiency, and loss of carcass value at slaughter.
Following a long winter, weather conditions improved in the middle of May 2013 which resulted in warm and sunny days. This favoured insect proliferation. Within 4 days of this changing, the first clinical signs of dermatitis were detected during a routine farm visit. The following week, the two main slaughterhouses in Northern Ireland were voicing concerns about the number of pigs submitted with dermatitis. Sixty two producers were affected. The prevalence of dermatitis ranged from 30% to 100% of the pigs submitted. One producer had 651 kg condemned as a consequence of these skin lesions. The lesions in the live animals and the carcasses were multifocal, slightly raised and hyperaemic with 0.5 to 2 cm in diameter widespread all over the body/carcass. The affected animals showed pruritic discomfort and were rubbing the affected areas against solid surfaces. The incidence of this pathognomonic condition reduced within 3 weeks of the initial outbreak.
Insect bites were suspected and aerial traps were placed in the finishing pens of 4 different affected farms for 2 weeks. The species of insects trapped were Musca domestica, Drosophila melanogaster, wood/window-gnats (family Anisopodidae) and Culicoides obsoletus. Furthermore, live specimens of Culicoides feeding on the pigs were found and submitted to AFBI Newforge Lane (Belfast). These specimens were identified as Culicoides obsoletus. One farmer developed the same pruritic dermatitis lesions in the arm and legs.
All the affected units contained finishing pens with natural ventilation and there was no insect screen protection.
Control methods of prevention for further occurrence involve slurry treatment with insecticides in order to kill larval stages, regular slurry removal, tidying the surrounding area of the farms, application of insecticides in order to kill adult stages, and fitting insect screen netting in the pig houses. Skin blemishes from insect bites present at slaughter may lead to unnecessary trimming or even condemnation, as seen in this case. In addition, products improperly used to treat ectoparasitism may produce residues in the tissues causing contamination of pork.

P8 NEW NEONATAL PORCINE DIARRHOEA SYNDROME - A SURVEY ON PRACTICAL EXPERIENCES

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Introduction. New Neonatal Porcine Diarrhoea Syndrome (NNPDS) appears to be a significant problem in Danish herds. Basic information on its clinical appearance, prevalence and significance is lacking.
Materials and methods. In June 2013 we conducted an internet-based survey among veterinarians (63% response rate ~ 79 persons). The questionnaire was divided into two parts; the first part was on neonatal diarrhoea in general, and part 2 was on NNPDS. In the beginning of part 2, people were asked if they regarded NNPDS as a clinical entity in its own. Only persons answering "Yes" of "Maybe," were asked to complete the questionnaire.
Results. In total, 63 (80%) of the respondents totally (answered "Yes") or partly agree (answered "Maybe") that NNPDS is a clinical entity in its own. The majority of respondents have the impression that the problems started around five years ago, and a few of them specifically point out 2008 to be the first time of encountering the problem.
The main part of respondents agrees on the following clinical description of the syndrome: Diarrhoea begins within two days of birth (81% agree) and lasts for 1-4 days (92% agree). Faeces are yellow (97% agree) and of watery (59% agree) to variable (32% agree) consistency. A variable to poor effect of antibiotics is seen (60% agree). Piglets are severely affected during the clinical stage (89% agree), but often seem to recover well - only 54% of respondents regarded piglets to be severely affected during the whole suckling period. Mortality is relatively low (a 1-5%-points increase during the whole suckling period is reported by 65% of respondents).
The veterinarians were asked to agree or disagree on five different theories on the aetiology behind NNPDS. 76% of respondents believe that the syndrome is infectious of nature. 64% agree that sow-feed and feeding management is associated with NNPDS. 48% believe Clostridium perfringens type A to be involved. 13% and 24% of respondents, respectively, believe genetic factors or fungal toxins to be associated with the problem. Methods for controlling the problem include optimizing the local environment, improving hygiene and to make sure that piglets receive colostrum from their own mothers. However, many (around 50%) of the respondents regard faecal backfeeding to the sows to be the most (or only) efficient method of control.
Conclusion. Most veterinary practitioners regard NNPDS as a newly emerged diarrhoeal syndrome. The veterinarians fairly well agree on the clinical appearance of the syndrome. Most of them believe NNPDS to be infectious.

P9 SALINOMYCIN AND MADURAMICIN TOXICOSIS IN LACTATING SOWS AND PREGNANT GILTS IN ISRAEL

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Introduction. Ionophores are mainly used in poultry and turkeys feed for coccidiosis control. Unintentional sources of ionophores in animal feed may result from cross-contamination, changes in feed production or incorporation into feed for non-target animals. Toxic effects of ionophores are due to low safety margin. The organs susceptible to ionophores damages are the heart and/or skeletal muscles in all species studied. Reports on ionophores toxicosis in pigs are scarce compared to poultry and cattle.

Material and methods. March to April, 2013, high mortality cases occurred in a 1150 sows unit, affecting 98 lactating sows out of 180 (54,4% mortality) and a group of 15 pregnant gilts and sows and 2 boars out of 26 (65% mortality). The sows were fed with 3 different batches of a "lactation" feed over 8 days. The pregnant gilts, sows and boars were fed with 1 batch of a "pregnancy" feed over 5 days. The feed batches were supplied by the same feed-mill, supplier to poultry farms too. Clinical signs included partial feed refusal (final stage of intoxication), anorexia, respiratory distress, lethargy, ataxia, recumbency, sudden death. Rectal temperatures were 38,2 – 38,3 C. Suckling pigs had no signs of intoxication during the course of the event. All the feed batches were analyzed for doxycycline, chlortetracycline, oxytetracycline; for ionophores (monensin, lasalocid, salinomycin, maduramicin, semduramicin, narasin) and for pesticides. Blood samples were assayed for the CPK, ALT, ALP, AST enzymes and for the concentrations of creatinine and urea.

Results. The 3 "lactation" feed batches, revealed maduramicin and salinomycin levels between 7-25 and 2-42 ppm respectively. The "pregnancy" feed revealed maduramicin levels between 17-20 ppm. A range of pesticides (organophosphates, carbamates, pyrethroids, organochlorides) was excluded as feeds contaminant. No gross lesions were observed during post mortem examinations. In some cases, some pallor on the left ventricle was seen. Histopathology revealed degenerative changes in the skeletal muscle: swelling, loss of cross-striations of myofibrils, coagulation necrosis, fragmentation of many muscle fibers. Similar degenerative changes were seen in the myocardium. Samples from lung, liver, spleen and kidney excluded bacteriological and viral infections. Significant high CPK, ALT and AST levels but no other blood parameters deviations were found. Livers of 7 gilts revealed very high maduramicin levels ranging 0.05-1.15 ppm.

Conclusion. This is the first report for of maduramicin and salinomycin toxicosis in pigs in Israel.

P10 FOUR DIFFERENT TRICHOMONAD SPECIES IN THE INTESTINAL TRACT OF AUSTRIAN PIGS

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Introduction. Several species of trichomonads (belonging to different classes of the phylum Parabasalia) have been described in the intestinal tracts of swine. They are considered apathogenic commensals and very little effort is put onto further characterization of their taxonomic status and potential pathogenicity. Generally, the organisms are identified in fecal specimen, which does not allow any evaluation of their interaction with intestinal tissue and their level of pathogenicity. Recently, in-situ hybridization procedures have been introduced into this research field, which allow identifying and localizing these organisms in tissue samples. Here we combine classical coproscopical with molecular methods to further characterize trichomonads which were identified in pigs with diarrhea.

Materials and Methods. Samples from 25 pigs with a clinical history of diarrhea (intestinal tissue samples, intestinal contents or feces), which were diagnosed positive for trichomonads (either by coproscopy or histology) were further analysed by in-situ hybridization using a probe against a large number of representatives of the phylum Parabasalia and a second probe specific for Tritrichomonas foetus. Cases which did not react with the T. foetus probe or for which only fecal samples were available were subject to PCR amplification and sequencing of a part of the 18S rRNA gene for species identification.

Results. In 13 animals, ISH revealed a positive reaction with the T. foetus probe. The other samples contained Trichomitus batrachorum (8), Tetratrichomonas buttreyi (2), and a trichomonad with a sequence strongly similar to Hypotrichomonas acosta (2). When histologically examined, T. foetus tended to be present deeply in the crypt lumina of the colon and frequently emigrated into the adjacent Lamina propria. The other species were predominantly found in intestinal contents and attached to the superficial mucosa.

Conclusion. The large intestine of pigs may harbor several different species of the phylum Parabasalia. T. foetus seems to be most widespread and due to its ability to colonize deep layers of the mucosa it should be considered facultatively pathogenic. In addition, other - in part still uncharacterized - trichomonads are present in the porcine intestine which may also contribute to diarrhea.

P11 PATHOLOGICAL FINDINGS IN SLAUGHTERED WILD BOARS FROM THE NATIONAL PARK "GRAN SASSO E MONTI DELLA LAGA" (ITALY)

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Wild boar population residing within the National Park "Gran Sasso e Monti della Laga" has been sharply increasing and negatively impacts on some ecosystems and human activities. Thus, a "management plan", based on wild boar capture and slaughter, has been implemented. In total, 101 wild boars were investigated. At slaughterhouse, pathological findings were systematically recorded. Gross findings were then supplemented by histopathological investigations.

Parasitic bronchopneumonia was the most commonly reported lesion (92%). Hepatic "white spots", lympho-proliferative Kisselev's nodules (19%) and Cysticercus tenuicollis (15%) also frequently occurred. Echinococcus granulosus hydatid cysts were detected in 6 wild boars, within the liver (6/6), the lungs (4/6) and the spleen (1/6). Occasionally, subserosal splenic hernias (5%), hepatic trematodosis by Dicrocoelium dendriticum (2%) and congenital renal cysts (2%) were seen. Scattered renal petechiae and infarcts, most likely due to the slaughtering procedures, were observed in a high percentage of wild boars (36%). Gastric ulcers were detected only in animals housed for some days before slaughter.

Wild boar slaughtering represented an extraordinary opportunity to assess their health status. Our findings further contribute to a careful evaluation of wild animal "welfare", from capture to slaughter.

P12 ASSOCIATION BETWEEN PNEUMOCYSTIS CARINII AND BACTERIAL LUNG PATHOGENS IN PIGS

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Several respiratory diseases in swine still are of unknown etiology. They seem to be multifactorial in origin or break out due to immune suppressive concomitant circumstances. In the case of Pneumocystis carinii (P.c.) it remains unclear whether other respiratory agents could be positively influenced by the presence of this fungus. Synergistic effects with PCV2 or PRRSV have been discussed, but solid data on the association of P.c. with bacterial co-infections are not available. The aim of the present study was the evaluation of a possible association between P.c. and Pasteurella multocida (P.m.), Bordetella bronchiseptica (B.b.) and Mycoplasma hyopneumoniae (M.h.).

A total of 219 formalin-fixed paraffin-embedded lung tissue samples of pigs with respiratory symptoms of three different age classes (70 suckling piglets (S), 76 weaning piglets (W), 73 fattening pigs (F)) were analysed. The detection of P.c. was carried out by in-situ hybridization, P.m., B.b., and M.h. were detected using immunohistochemistry. H&E staining was used for assessment of histological lung lesions.

P.c. could be detected in 60% of the samples (age class specific prevalence: 73% S, 51% W, 56% F). IHC gave a positive result for P.m. in 24% (24% S, 25% W, 22% F), for B.b. in 6% (6% S, 1% W, 10% F), and for M.h. in 18% (14% S, 16% W, 25% F) of the samples. In 7 cases, the M.h. result was questionable.

Co-infections with P.c. and P.m. were present in 15 pigs (5 S, 4 W, 6 F), with P.c. and B.b. in 2 pigs (2 W), and with P.c. and M.h. in 12 pigs (3 S, 4 W, 5 F). The association of P.c. with more than one bacterial pathogen was evaluated and resulted in 2 co-infections with the three pathogens P.c., P.m. and B.b. (2 S), 13 with P.c., P.m. and M.h. (4 S, 3 W, 6 F), 1 with P.c., B.b. and M.h. (1 S), and 2 with all four pathogens (1 S, 1 W). None of the associations was statistically significant.

Histologically, the lungs infected with P.c. mainly showed a granulomatous pneumonia or an obstructive bronchitis. In contrast, the P.m., B.b. and M.h. positive lungs were associated with a fibrinous pleuropneumonia or a catarrhal-purulent bronchopneumonia.

P.c. had a higher prevalence than the other pathogens and needs to be considered as potential precursor for other respiratory diseases. Even if the associations were statistically not significant, co-infections could be observed in 47 of the 219 cases. This fact increases the impact of P.c. on multifactorial caused diseases. The association to other pathogens seemed not to be age class specific. Associations to other bacterial or viral diseases have to be illuminated.

P13 EXPLORING THE DRIVERS AND MOTIVATORS BEHIND ANTIMICROBIAL PRESCRIBING PATTERNS IN PIGS THROUGH VETERINARY AND FARMER FOCUS GROUPS

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Increasing levels of antimicrobial resistance in human and veterinary medicine have raised concerns over the issue of overprescribing and the indiscriminate use of antimicrobials. With a limited number of novel antibiotics becoming available there is a great need to maintain efficacy through promoting prudent prescribing practices. Their use in food producing animals is under scrutiny due to the treatment and prophylaxis of large numbers of animals, and the perceived risk from the zoonotic transfer of resistant pathogens from animals to humans. In the UK, the greatest amount of single species antibiotic products sold for use in farm animals are for pigs; the majority of these products are for administration through medicated feedstuffs.

Qualitative research methods have been used increasingly in human medicine to investigate prescribing behaviours. This study uses focus groups to explore the drivers and motivators behind prescribing patterns in pig production in the United Kingdom. A series of two veterinary and four farmer focus groups were completed. Groups consisted of between three and six participants and were located in three geographically distinct regions of low, moderate and high pig density. A total of nine vets and seventeen farmers attended focus groups.

Thematic analysis of transcriptions of the focus groups revealed eight common themes including 'agricultural factors', 'drug-related factors, 'disease epidemiology and outcomes', 'responsibility', 'economic factors', 'external pressures', 'vet-client relationship' and 'knowledge base'. These were considered to influence antimicrobial use. In the veterinary focus groups 'external pressures', such as pressure from clients, legislation and public perception, were considered to influence prescribing behaviour most commonly, whereas, farmers considered issues surrounding farming systems and management to be the greatest driver towards antimicrobial use.

Gaining in-depth insight and understanding into the influences behind prescribing decisions can identify behaviours associated with over or inappropriate use. Such qualitative studies have been used in human medicine to identify potential interventions and assess their efficacy on promoting prudent use. It is hoped that by understanding prescribing practices in veterinary medicine better, similar interventions may be developed to promote the judicious use of antimicrobials.

P14 HAEMOGLOBIN CONCENTRATION IN SOWS AND NEONATAL PIGLETS

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Piglets with low blood haemoglobin concentration (Hb) might have a higher risk of being stillborn due to less available oxygen carrying capacity during farrowing and Hb at birth are reduced in piglets that do not survive to weaning. The aim of this study was to compare Hb in sows 3 weeks (3wk) before and the day after farrowing (day 1) with Hb of their newborn piglets. A batch Landrace-Yorkshire sows was selected randomly from a sow pool system in Norway. Blood from 36 sows was sampled from Vena subcutanea abdominis 3wk before farrowing and at day 1. From all of their live-born 504 piglets (Landrace-Yorkshire X Duroc) blood was taken 7-36 hours (day 1) after birth from Vena jugularis. All blood was sampled using 2.5 mL syringes and 23 gauge needles. The Hb was measured immediately using HemoCue® Hb 201+ analyser. For each piglet, birth order, time of birth, birth weight, weight at day 1 and sex was recorded, and the piglets were permanently marked with birth order number. No cross-fostering was done during the study. The mean (min-max) Hbsow at 3wk before farrowing and at day 1 was 110.2 g/L (96-130) and 102.6 g/L (78-134), respectively. The mean Hbpiglet was 95.1g/L (28-146), the mean Hbmale piglet was 93.9 g/L and the mean Hbfemale piglet was 99.2 g/L. Extreme outliers (i.e. low Hb due to bleeding from the cord) were excluded and a multivariable regression model was made in JMP®10 (SAS Inst. Inc., Cary, NC). The analysis showed no association between Hbsow values 3wk before farrowing and Hbsow at day 1 (P=0.57), this may be due to different physiological/pathological/unknown changes around farrowing. The analysis neither showed association between Hbsow values 3wk before farrowing compared to Hbpiglet at day 1 (P=0.13), nor Hbsow values day 1 compared to Hbpiglet at day 1 (P=0.33). Time difference between birth and blood sampling had no association with Hbpiglet (P=0.86). The analysis showed that litter size had a negative association to Hbpiglet (estimate -0.73 g/L; P=0.0055). Female piglets had a higher Hb compared to male piglets Hb (estimate +2.7 g/L; P<0.0001). Surprisingly, no associations between Hbsow at 3wk and Hbsow at day 1 were found, and neither of them was associated with Hbpiglet at day 1. However, piglets from sows with large litters had lower Hb than piglets from sows with smaller litters and female piglets had higher Hb than male piglets.

P15 ERGONOMICS OF PIGLET VACCINATION: A TENTATIVE APPROACH

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Introduction. In modern herd management, piglet vaccination and building cleaning operations have been identified as the most harmful tasks. However, vaccination takes a major role for health management, particularly as an alternative to antibiotics. The size of herds has also increased, while the number of staff members taking care of the pigs has decreased. Consequently, an improvement in the conditions of piglet vaccination may improve worker health, injection quality and should afford the appropriate conditions for the vaccine efficacy.

Materials and methods. In 2013, 40% of the piglets in the French pig industry are vaccinated against both PCV2 and mycoplasma hyopneumoniae. Vaccine administration implies in most cases an intramuscular injection of these products. On the contrary vaccination methods vary greatly according to the number of people available, the role of each operator, the age of the piglets and the containment procedure.

Three mid-size French operations were selected for the study. Vaccination sessions in piglets aged from 21 to 35 days were monitored, described and scored according to the posture, rate, bearing, vaccination quality and environmental indicators. Postures were compared to reference indicators defined by the French Institute for occupational risk prevention. Bearings were compared to the maximal values defined in the French standardization system. An individual questionnaire was also filled in by the farmers.

Results. Vaccinations were performed in maternity or in post-weaning pens at a temperature of 24°C. The operator alone performed both vaccination and containment of piglets in most of the cases. When the procedure involved catching each piglet individually and containing animals in the arms, the operator raised from 2.6 to 3.2 times the maximal acceptable weight per hour. Truncal torsion of an angle greater than 60° and position of the arms backwards were detected as awkward postures at a rate of one every 10 seconds. Containing piglets in the post-weaning pen allowed the rate to be increased by a factor of 2, raising no weight, but did not avoid maximal articular and truncal amplitude. Vaccination quality was nevertheless satisfying in all cases.

Discussion. Postures and weight bearing during vaccination pose considerable risks. It is necessary to improve the containment procedure, e.g. by bringing the piglets to chest height. Vaccination penibility may also be reduced by the use of double-barreled syringes. Comfort may be improved by suspending the materials or vaccinating at moderate temperature.

P16 USE OF INFRARED TECHNOLOGY TO DETECT RISE IN SURFACE TEMPERATURE IN SOWS AT FARROWING

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The ears of the sow are large and well perfused. Thus they are an important part of thermoregulation via vasodilatation in sows. The aim of this study was to investigate the possibility of detecting a rise in surface temperature measured on the ear, using infrared camera and laser thermometer in sows at farrowing. Further aims of the study were to compare the two utilities with each other and with surface temperature measured in the medial corner of the eye.

The study included 37 loose housed, pregnant sows of the breed Norwegian Landrace x Yorkshire. Surface temperature was measured on the ear, using infrared camera and laser thermometer approximately every other hour 0-4 days before and up to 24 hours after farrowing. Surface temperature in the medial corner of the eye was measured with infrared camera simultaneously.

A rise in surface temperature on the ear was detected using both infrared camera and laser thermometer, and showed a sharp rise starting averagely 17 hours before expulsion of the first piglet (farrowing). The surface temperature in the medial corner of the eye started rising some hours after the rise in surface temperature measured on the ear, averagely 15 hours pre farrowing. Surface temperature on the ear varied over a much larger range compared to the medial corner of the eye. Measurements using infrared camera and laser thermometer correlated well (r = 0,89). The correlation between surface temperature in the medial corner of the eye and surface temperature on the ear (infrared camera and laser thermometer) was lower (r = 0,35 and r = 0,28 respectively), partly since the rise in surface temperature on the ear started prior to the temperature rise in the medial corner of the eye.

The results of this study indicate that infrared technology is a valuable utility to detect a rise in surface temperature near farrowing. Measuring surface temperature of the ear is an especially appropriate localization for this purpose compared to measuring temperature in the medial corner of the eye. From an economical point of view, laser thermometer is a more affordable option compared to infrared camera, the price being approximately 1 : 20.

P17 CHANGE IN PHYSIOLOGICAL PARAMETERS NEAR FARROWING

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Shortly before farrowing the sow will experience substantial changes in hormone balance, activity, respiration rate and temperature. The hormonal changes leads to an increase in activity, also known as "nesting behavior". The aim of the study was to investigate correlations between surface temperature, rectal temperature, respiration rate and activity near farrowing.

The study included 37 loose housed, pregnant sows of the breed Norwegian Landrace x Yorkshire. The number of litters, included approaching farrowing, varied from one till ten. Body condition score was registered to the range of 2,5-3,25. Surface temperature was measured on the ear, using infrared camera and laser thermometer approximately every other hour 0-4 days before and up to 24 hours after farrowing. At the same time respiration rate and level of activity was registered. Rectal temperature was measured approximately three times a day.

The level of activity started rising 21 hours before expulsion of the first piglet (farrowing) and reached a maximum level about nine hours before farrowing. The respiration rate started rising about the same time as the level of activity did, but reached its maximum level averagely four hours before farrowing. Surface temperature started rising averagely 17 hours prior to farrowing and reached its maximum levels approximately four hours before farrowing. The rectal temperature started rising some hours after the rise in surface temperature, about 13 hours pre farrowing and reached a maximum level averagely 17 hours after farrowing. No correlation was detected between the rise in surface temperature and number of litters. The narrow range of body condition score made it difficult to draw conclusions.

The results from this study indicate that increased muscle activity, resulting from a hormone initiated nesting behavior phase, leads to a rise in surface and body temperature of the sow. To get rid of excessive heat, vasodilatation of the skin and more frequent respiration occur, which leads to increased surface temperature and respiration rate. It seems like these are two of the most important thermoregulatory mechanisms in sows. Considering the difference in time of rise in surface and rectal temperature, the surface temperature of the sow rises prior to core temperature and is decreasing when rectal temperature is still rising.

P18 PREVALENCE OF MILK SPOT LESIONS IN IRELAND

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Ascaris suum infestation is the most important parasitism of pigs worldwide, having a negative effect on performance and associated high economic costs [Stewart TB et al. 2006. Diseases of Swine, p. 905]. As a part of A. suum hepatotracheal migration route, L3-larvae travel through the liver damaging it. Consequently, whitish healing foci occur in the liver that are referred to as "milk spot". Current information on milk spot prevalence in Ireland is scarce. This study aims to investigate the prevalence of liver milk spot in pigs at slaughter as an indicator of A. suum infestation in pig herds in Ireland.

A total of 12,597 finishing pigs sent to slaughter to a dedicated pig abattoir in Ireland in 2012 and 2013 were investigated. Milk spot lesions were identified in 74.4% of the herds investigated, whereas hepatic scarring occurred in 82.2 %. The average percentage of milk spot positive pigs within a batch was 11.5% (13% and 9.6 % in 2012 and 2013, respectively). No statistically significant differences were detected between years when within batch prevalence was compared (p=0.334). Similarly, within batch average prevalence of hepatic scarring was 3.9% in the 2012-2013 period (2.9% in 2012 and 5.2% in 2013 [p=0.008]).

This study confirms a high prevalence of A. suum in Irish pig farms. Since milk spots heals within 4 weeks, being just indicative of recent migration of Ascaris suum, true prevalence figures of this parasite is likely to exceed levels detected in this abattoir survey. A. suum infestation impacts pig performance, worsening average daily gain and feed conversion ratio. In this study, the prevalence within a batch exceeded 10% in 42.8% of milk spot positive batches, suggesting the need of more effective control measure to reduce the impact of this parasitosis. Together with the need of reviewing managing practices, a strategic deworming program with flubendazole based on the prepatent period of A. suum has been succesful in reducing milk spot prevalence before.

P19 SURVEY ON PIG FARMERS' CURRENT KNOWLEDGE ON IMPORTANT ASPECTS OF GOOD VACCINATION PRACTICES UNDER FIELD CONDITIONS IN THE NETHERLANDS

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Since 2007, stringent measures to reduce antibiotic reduction by 50% in food producing farm animals, including pigs, have been installed in the Netherlands. Due to this antibiotic reduction, a major increase in the use of vaccinations against most currently present swine pathogens, such as M. hyopneumoniae, PRRSv and PCV-2, has been observed. To obtain maximal results from the applied vaccination strategies, the vaccine has to be handled with care from production over storage to application to the target animals under practical field conditions. The aim of the current survey was to obtain data on the current knowledge of pig farmers on the most important principles of the Good Vaccination Practices (GVP). A Monkey Survey was designed with 8 short multiple choice questions on several aspects of vaccine storage, preparation, injection material and finally application. Fifty responses were collected during an event on intensive animal farming in Hardenberg. Only 80% of the respondents know the optimal storage temperature (2-8°C) for swine vaccines. According to 22% of the respondents, accidental freezing of vaccines during storage did not have any impact on subsequent immunization of the vaccinated animals. Only 52% of the respondents could exactly point out the optimal injection location on the neck (1 finger behind the ear, 1 finger below the neck line) for intramuscular injection in piglets, whereas only 58% responded correctly to the ideal needle specifications (length 9 mm, diameter 0.8 mm) for vaccination of piglets at the age of 7 days. When asked for the time interval to obtain room temperature for a vaccine to be suitable for injection, 76% responded 1 h was sufficient and only 18% chose the correct 5 h interval. Strategies on hygienic needle-management to omit pathogen transfer from one litter to another by needle change per litter were only known by 58% of the respondents. Five percent did only change needles when they were broken, blunt or remained into the pig following injection. Half of the respondents were working with hired farm help, which could increase the risk to make crucial mistake in relation to the basic principles of vaccination strategies. Finally, 62% of the respondents used a previous opened bottle of vaccine within 24 h, although 28% of them would use it during the next week. In conclusion, basic knowledge on GVP has still room for major improvement in order to maximize efficacy of applied vaccines under Dutch field conditions.

P20 INVESTIGATION ON WORK SAFETY: MEASURED ENVIRONMENTAL CONCENTRATION OF ISOFLURANE DURING PIGLET CASTRATION WHEN USING AN AUTOMATED ISOFLURANE ANAESTHETIC DEVICE

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In the ongoing discussion about animal welfare aspects of piglet castration the application of isoflurane for narcosis is one of the discussed alternatives for pain reduction. Isoflurane does not only lead to narcosis of the piglets, it might as well have direct effects on the operator when inhaled in high concentrations. It can cause headache, fatigue, irritation of mucous membranes, pneumonia and disorders of the liver. To estimate the potential risk of health damages for the farm workers when using an isoflurane anaesthetic device for piglet castration in three medium-sized pig farms (200 to 600 sows) the environmental isoflurane concentration (MEC) during each castrated litter was measured (infrared photometer InfraRan®; Co. ANSYCO, Karlsruhe, Germany) at three locations on several castration days. All farms were using the automated anaesthetic device PIGNAP® (75 sec. 5 Vol% isoflurane / 30% O2; Co. Agrocomp, Andwil, Switzerland). The three examined locations were A) directly next to the anaesthetic device at height of head (symbolic for the operator), B) 2 meters distance to the device also at height of head (symbolic for a second assisting person) and C) directly beneath the air outlet hood. Over all the environmental concentration during the castration of 133 litters was monitored. The overall MEC maximum measured was 23.6ppm directly next to the anaesthetic device, the overall minimum 0.0ppm under the air outlet hood. Only at location A) the MEC went sporadically above 10.0ppm, the median here was 2.4ppm. At location B) the maximum of the MEC was 6.4ppm (median: 1.4ppm) and at location C) the maximum MEC was 5.2ppm (median: 1.2ppm). As there are different limits for the predicted environmental concentration (PEC) of isoflurane in different European countries, the lowest PEC of 10.0ppm was only sporadically exceeded and only for short terms. This was still within the guidelines for work safety as the PEC of 10.0ppm allows short spell concentrations of 80.0ppm for at maximum 4 x 15 minutes within each working shift. Special situations, like the re-filling of isoflurane and replacement of piglets, were figured out as reasons for the increase of the isoflurane concentration. Although all measured data were within the recommendation some of the operators reported an increase of headache and fatigue in comparison to castration without an anaesthetic device.

P21 CLINCAL RECOVERY AND RECONSTITUTION OF SPINAL CORD MYELIN AFTER CONGENITAL TREMOR - A CASE REPORT

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Introduction: In suckling piglets, hypomyelination and demyelination are lesions commonly referred to cases of "myoclonia congenita" or congenital tremor (CT). Six varieties of CT have been described: CT type AI-V (with known causes) and type B (of unknown origin). Description of the case: On a 25 Landrace sow farrow-to-finish farm, recurrently litters with CT were born between February and September 2012. Generally, all littermates were affected showing no symptoms of concurrent disease and tremor disappeared after weaning. Necropsy of one 1-day old (0.7 kg) and one 17-days old piglet (2.6 kg) did not reveal gross lesions. Histological examination of the spinal cords of these animals displayed a reduction of white matter thickness and signs of hypomyelination, which were most severe in the descending tracts of the lumbar segments (Luxol fast blue staining). Serum samples were negative for CSFV and Pseudorabies antibodies, but positive for PRRSV-antibodies. PRRSV seemed to play a role in the pig herd, but it was not vaccinated. Pathologically there was no indication for a PCV-2 infection. In November, another piglet (16.0 kg) formerly presenting repetitive myoclonus was chosen for necropsy. No inflammatory lesions or hypomyelination could be detected.

Conclusion: Several reasons could be ruled out for congenital tremor type A. Pedigree analysis revealed that sows of all affected litters were either inseminated with semen of the same boar (spring) or were sister sows (autumn). Surviving CT piglets showed a normal myelination pattern of the spinal cord. Currently it has to remain open whether CT piglets were born with delayed myelinogenesis which was caught up in the weeks after birth or whether the original myelin deficiency was counteracted by remyelination. To prove these hypotheses further investigations are needed.

P22 ATTITUDES TO ANTIMICROBIALS AMONG SWEDISH PIG FARMERS

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The MINAPIG project aims to describe antibiotic usage in pig production and attitudes to antimicrobial usage among farmers and veterinarians in six countries (Belgium, Denmark, France, Germany, Sweden and Switzerland). This abstract presents results from a survey on Swedish farmer's attitudes.

A questionnaire was prepared consisting of 93 questions on 6 topics: general perception of challenges to pig production, antimicrobial usage, attitudes to pig production and the need of antimicrobials, beliefs regarding alternatives that can reduce the need for antimicrobials and their economical impact , the role of the veterinarian and other advisors, and finally opinions on policy measures to reduce the need for antimicrobials. Fifty-nine farrow-to-finish herds with more than 100 sows were recruited for the study. The questionnaire was sent out by mail and completed by the manager of the pigs.

The farmers were most concerned by financial and legislative issues and least by the risk of epizootic outbreaks. Antimicrobials were considered useful and effective tools with no risk for the pigs. Most farmers only applied antimicrobials to diseased pigs after consulting their veterinarian. Ninety-one per cent of the farmers only applied antimicrobials to diseased pigs. Seventy-six per cent applied antimicrobials immediately to diseased pigs whereas the rest waited 1-3 days before initiating treatment. A majority agreed that pigs are healthier when they can express their natural behavior and that technical progress in animal husbandry is important to reduce antimicrobial usage. Antimicrobial usage was perceived as a good indicator on rearing conditions in a herd and antimicrobials were not considered more cost effective than improvement in management.

In general, farmers considered prophylactic measures to be effective to reduce disease incidence. However many alternatives suggested in the questionnaire were unfamiliar to Swedish farmers. Tail docking and teeth clipping/grinding were not considered effective measures. Providing pigs with adequate feed and fresh water were not associated with high costs, while vaccination and reducing stocking density were. Farmers believed that their veterinarian could provide them with information about antimicrobials and risks, while feed advisors played a minor role. Overall, Swedish farmers are well informed about antimicrobials and consider preventive measures important in pig health management.

P23 RISK FACTORS FOR AURICULAR HEMATOMAS IN PIGLETS

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Introduction. The presence and importance of auricular hematomas in piglets is poorly described in literature. This study examined the incidence of auricular hematomas in different batches of weaned piglets. It was also investigated whether the incidence was linked with specific risk factors.

Material and methods: In total, 10657 weaned piglets raised over 5 successive batches in one herd were examined. They were weaned at 3 weeks of age and moved to either part A or B of the nursery unit where they stayed until 10 weeks. The pigs received the official ear tag during the first week of life using an automated device. Sows and barrows were housed separately. In case of occurrence of auricular hematomas or death of pigs, the farmer recorded compartment and pen number, batch number, sex, parity of the sow of the piglet and presence of an ear tag at the side of the auricular hematoma. Swabs for bacteriologic examination were taken from hematomas in three 7 week old pigs (2 swabs per pig). Blood samples were taken from 19 pigs, first at 7 and next at 10 weeks of age. Sera were examined for antibodies against PCV2 and PRRSV. Ten blood samples were also tested for antibodies against SIV (H1N1, H1N2, H3N2). Potential factors associated with the hematomas were analyzed using ANOVA, chi-square test or McNemar test.

Results. The mortality varied between 0.82% and 1.63% in the 5 successive batches. The overall incidence of auricular hematomas was 2.3%. The incidence per compartment per batch varied from 0.2% to 4.3% (P>0.05). The mean weekly incidence varied from 0.17% to 0.37%. An important peak in incidence consistently occurred 28 days after weaning.

The incidence in barrows was 2.1%, in sows 2.5% (P>0.05). The incidence in piglets from primiparous sows was 0.97% and 2.45% in piglets from older sows (P<0.001). The incidence in ears with an ear tag was 1.6% and 0.6% in the other ears (P<0.05). The relative risk for auricular hematomas was 2.3 times higher in ears with an ear tag compared to ears without a tag (RR=2.3 [1.74–2.98]). S. aureus, S. hyicus and E. coli were isolated from different swabs. Some piglets tested slightly positive for PCV2 IgM or IgG antibodies. The S/P ratios for PRRSV antibodies were all below 1.04. There was no increase in the antibody titers of SIV from 7 to 10 week of age.

Conclusions. A peak incidence in auricular hematomas was observed in pigs 28 days after weaning, when they were 7 weeks old. The overall incidence was significantly lower in piglets from primiparous sows compared to pigs of older sows and the presence of an ear tag significantly increased the risk for auricular hematomas.

P24 LAMENESS IN PIGLETS. WHICH JOINTS ARE AFFECTED?

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Lameness in suckling piglets is a major problem in farrowing enterprises. Joint swelling and lameness are the most obvious and persistent clinical signs of infectious arthritis in piglets. Infectious arthritis affecting single joints have been most commonly observed in piglets less than three weeks old. Prompt treatment with antibiotics is required to achieve a positive treatment effect in piglets that limp due to arthritis. The aim of this study was to analyse the incidence of affected joints in lame piglets. The study was carried out at the research station at Lövsta, Swedish University of Agricultural Sciences, with 110 sows. Each piglet was given an identity at birth, and weighed at birth and at five (weaning) and nine weeks of age. Medical treatments were carried out according to instructions of the herd veterinarian, and individual record of diseases and treatments were kept. All piglets born alive during two and a half years were included in the study. The occurrence of lameness and affected joints (Elbow, Carpus, Hock, Metacarpal joint, Hoof) in one or more legs were registered from birth until the age of 5 weeks. In total 415 out of 6,780 liveborn piglets were diagnosed with lameness (6.1%). Around 91% of these diagnoses took place during the first 3 weeks of life. Piglets that remained healthy were 1.3 and 1.8 kg heavier than piglets attended with lameness at 5 and 9 weeks of age, respectively.

The affected joints were distributed as follows;

Front legs; Elbows 19.3%; Carpus 9.9%; Front Metacarpal joints 6.7%; Front Hoofs 16.6%

Rear legs; Hocks 16.1%; Back Metacarpal joints 6.3%; Back Hoofs 34.5%

One clinically affected joint were observed in 380 piglets (91.5%), two joints in 31 piglets (7.5%) and three joints in 4 piglets (1%). Fascinatingly, 56.8% (n=258) of the lesions were recorded on the left side of the piglets and 43.2% (n=196) on the right side.

During the first week of life the piglets spend most of their time lying in the nest, and it is obvious that the immediate environment of the piglets plays a primary etiological role in the appearance and development of leg injuries in suckling piglets. Although most commonly observed in back hoofs, followed by elbows, front hoofs and hocks, arthritis was fairly evenly distributed between joint, which indicate a septicemial spread of the infections associated with lameness, as previously also indicated by the association to abrasions. We have no explanation for the diverging distribution between the left end the right side of the pig.

P25 AN INNOVATIVE FOOD FOR PIGLETS HALVES NEONATAL LOSSES AND INCREASES PRE-WEANING GROWTH

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Recent use of hyper-prolific sows resulted in a significant increase in litter size and also in a concomitant decrease of weight, increase of heterogeneity and perinatal mortalities of piglets. This study aims to evaluate the effect of an early distribution of an innovative food on zootechnical performances and litter homogeneity.

In a conventional French farm, litters from 35 sows are randomized at birth: 18 in the test group, 17 in the control. A total of 213 and 214 cross-bred piglets were individually identified and weaned at 21 days of age. In the test group, , each litter receives daily, in addition to suckling 200g of a food (EARLYSTART® gel) packaged under protective atmosphere, during the ten first days of life. Cross-fostering realized after inclusion within the same group are taken into account in the calculation of litter's average daily weight gain (AWDG). Animals are individually weighed at D0, D11 and D21. Amount of feed intake is measured daily for each litter and mortalities recorded. The ADWG of litters is studied by ANOVA with adjustment on litters' initial weight. The homogeneity of litters is assessed by standard deviation of weights and mortality by a Mantel-Haenszel test.

As the mortalities occurring in the first days of piglets' life represent the biggest losses in pig production, the reduction of nearly 50% of mortality in the test group (7.5%) represents a real progress (p=0.026). ADWG at D21 is significantly more important (+14.8%, p=0.044) in the test group (166.5g/j) than in the control group (141.9g/j). The amount of feed intake is variable from one litter to another in the test group (580g to 1656g in total). A possible defect or variability in milk production in this farm can explain a variability of feed intake. The relation between ADWG at weaning and feed intake per litter is significant (R^2=0.130, p=0.033). While piglets of both groups didn't receive any other feed, the increase in growth performance is only associated with the consumption of the tested feed.

In view of the results (reduction of mortality, litter's ADWG at weaning, relation between ADWG and feed intake), EARLYSTART® appears as an interesting solution for perinatal mortality of piglets. Given that the heaviest piglets at weaning being usually those with the best performances afterwards, it would be interesting to see the zootechnical performances until the end of fattening.

P26 ANTIMICROBIAL RESISTANCE OF SALMONELLA ENTERICA SEROVAR TYPHIMURIUM VAR. MONOPHASIC 4,[5],12:I:- ISOLATED FROM PIGS

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Aim of the present study was to provide preliminary data on the antimicrobial resistance of Salmonella enterica serovar Typhimurium var. monophasic (S.4,[5],12:i:-), isolated from pigs.

Eighty-six S.4,[5],12:i:- strains belonging to 2 groups were used in the present study. Forty-five strains (group I) were isolated from ileocecal lymph nodes sampled at slaughterhouse while 41 strains (group II) were obtained from samples collected from clinical pigs sent to the laboratory for diagnostic purpose. The susceptibility of S.4,[5],12:i:- strains to a panel of antimicrobials was tested using a broth microdilution technique (Sensitre TREK). Fourteen antimicrobials agents were tested: ampicillin (A), chloramphenicol (C), streptomycin (S), sulfamethoxazole (Su), tetracycline (T), gentamicin (GEN), florfenicol (FFN), kanamycin (KAN), trimethoprim (TMP), nalidixic acid (NAL), colistin (COL), cefotaxime (FOT), ceftazidime (TAZ), ciprofloxacin (CIP). Isolates were classified as resistant, susceptible or intermediate to antimicrobials in accordance with the break points proposed by the Clinical and Laboratory Standards Institute (2008). Intermediate isolates were grouped with susceptible isolates.

The S.4,[5],12:i:- isolates showed resistance to Su (100%), S (100%), A (91.9%), T (89.5%), GEN (53.5), KAN (43%), NAL (38.4%), C (36%), TMP (33.7%), FFN (33.7%), COL (20.9%), TAZ (13.9%), FOT (6.9%), CIP (5.8%). Multiple resistance was almost entirely due to the circulation of two phenotypes: the tetra-resistant profile ASSuT (54.6%, n=47) and the penta-resistant profile ACSSuT (34.9%, n=30). Additional resistances to GEN (36.2%) and FFN (83.3%) were observed in ASSuT and ACSSuT strains respectively. The resistance to the antimicrobials did not differ significantly between the two groups of S.4,[5],12:i:- isolated (group I and II) except for CIP (0% group I and 12% group II; p<0.01) and NAL (22% group I and 56% group II; p<0.01). The results of this study showed that S.4,[5],12:i:- strains isolated in Italy from pigs were frequently multi-resistant showing mainly an ASSuT profile while a lower percentage of strains had the ACSSuT profile. Noteworthy, the prevalence of S.4,[5],12:i:- with the ASSuT profile significantly increased in the last years among human isolates in Italy, suggesting a possible relationship between swine and human salmonellosis throughout the food chain, which is of interest for epidemiological, animal health and public health purposes.

P27 RESISTANCE TO TETRACYCLINE IN ESCHERICHIA COLI FROM PIGS IN ORGANIC AND CONVENTIONAL PRODUCTION IN FOUR EUROPEAN COUNTRIES

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Antimicrobial resistance is considered one of the major global threats for the future and the use of antimicrobials in animal production is contributing to the growing problem with resistant bacteria.

Within the EU there are large differences between countries as well as between farms regarding usage of antimicrobials for prevention and treatment of diseases in pigs. This is most likely due to the management of animals, veterinary services, disease burden, herd size, biosecurity and level of hygiene in herds as well as the structure of the production including how animals are moved and mixed.
Within organic animal production there is generally a more restricted usage of antimicrobials, which likely influences the level of antimicrobial resistance in these herds. The aims of the present study were to determine the occurrence of antimicrobial resistance in intestinal commensal E. coli from slaughter pigs and analyse possible differences between pigs from conventional and organic production in four EU countries.
In France, Denmark and Sweden, colon content was collected from two pigs per herd at slaughter. For each organic herd sampled, one conventional herd was selected by convenience to be sampled at the same time. In Italy, individual faecal samples were collected at farms. In total, 376 samples were collected. The samples originated from two pigs from each of 94 conventional and 94 organic pig farms in the four countries.
Samples were cultured quantitatively for E. coli resistant to tetracycline using Petrifilm plates (3MPetrifilmTM Select E. coli Count Plates) using to the same laboratory protocol in each country.
The study revealed differences in percentage of E. coli resistant to tetracycline in colon content/faeces between pigs in organic and conventional herds as well as between pigs from different countries. In conventional herds the mean percentage in the four countries ranged between 4.6 % and 58.3 % and in organic herds between 2.3 % and 40.3 %. In each country, the mean percentage resistant E. coli was higher in pigs from conventional herds than in pigs from organic herds. However, the differences were larger between countries than between production system.

P28 2013 MYCOTOXIN SURVEY IN EUROPE

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Mycotoxins are toxic secondary metabolites of fungi which are commonly found worldwide in cereal grains and animal feeds. Information on incidence and contamination levels of mycotoxins in feeds and ingredients sourced in Europe is very limited and often focused on single countries only. The aim of this study is to obtain information on the occurrence of 5 major mycotoxins in various animal feeds and feed ingredient samples from different European regions. From January to June 2013, a total of 1,781 samples sourced in Europe were analysed for the mycotoxins relevant in agriculture and animal production – aflatoxins (Afla), zearalnenone (ZEN), deoxynivalenol (DON), fumonisins (FUM) and ochratoxin A (OTA). Samples were analysed by high performance liquid chromatography (HPLC) and Enzyme-Linked Immunosorbent Assay (ELISA). ELISA was only used when it was validated for the respective commodity. More complex matrixes such as DDGS and finished feeds were analysed with HPLC.
All five major mycotoxins were highly prevalent as 83% of all samples contained at minimum one of the mycotoxins. In 52% of all animal feed and ingredient samples, more than one type of mycotoxin was found. Afla was present in 61% of all samples, ZEN in 48%, DON in 67%, FUM in 70% and OTA was detected in 63%. Similar to previous years, DON and FUM present the most prevalent groups of mycotoxins with average contamination of 404 and 609 ppb, respectively.
Survey results presented above indicate clearly that mycotoxins are of concern in animal feed. An effective mycotoxin risk management program has to be used to protect animals from the negative effects of mycotoxins.

P29 EVALUATING THE SENSITIVITY OF THE DISEASE SURVEILLANCE IN SWISS BREEDING HERDS

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The Swiss Pig Health Service (PHS) conducts a surveillance program in affiliated herds to control for different economically relevant diseases. Herds have to be free from progressive atrophic rhinitis (PAR) and swine dysentery (SD). Multiplier herds with the highest hygiene status undergo the most intensive monitoring: Herds are examined 4 times a year. Visits also include sampling and laboratory testing of nasal swabs from 10 pigs twice a year for toxigenic Pasteurella multocida, and fecal swabs for Brachyspira hyodysenteriae (twice a year, 4 and 6 pigs). Besides, 4 "mixed fattenings", where pigs from different herds are mixed and checked for clinical symptoms and at slaughter, are arranged yearly. While clearly costly and laborious, little was known about the sensitivity of the surveillance, i.e. effectiveness to detect an infection of a herd. Therefore, the sensitivity of the PAR and SD surveillance was assessed using "scenario tree modelling" (STM). Herein, the pathway necessary to lead to a certain event (here: detection of an infection in a herd) is plotted. A probability is then assigned to each step within the tree and all values are multiplied to obtain the result. Trees were created for all surveillance components (clinical surveillance by PHS and farmer, active sampling, mixed fattenings), and their component sensitivities combined into the total sensitivity of the PAR and SD surveillance at herd level over one year, using a stochastic approach with 50.000 iterations in @risk®. Data were obtained from literature and expert poll. Furthermore, the average time between infection of a herd and its detection and total costs of the surveillance were estimated. The median sensitivity of the SD surveillance in multiplier herds was 95.7 % (90 % CI 87.2-98.9) and 99.8% (98.1-99.9) for PAR. The time to detection was 3.6 months for SD and 2.2 for PAR. Total costs were 793 and 695 Euro/herd/year for SD and PAR. Results indicate that - at considerable costs - the total sensitivity for both diseases is high, while the time to detection could eventually be a risk in herds with frequent pig trade (SD). If mixed fattenings were abandoned and nasal swabs from 4 pigs at all 4 visits taken, total sensitivity for PAR would be 99.9% (97.3-99.9) at an average time to detection of 1.9 months and costs of 405 Euro/h./y. To conclude, STM is a well suitable tool to assess the effectiveness of a surveillance system. Since all components can be modified, all kinds of alternative scenarios can be easily calculated to optimize surveillance sensitivity, time to detection and/or costs.

P30 DETERMINATION OF MINIMAL INHIBITION CONCENTRATIONS OF MAJOR ANTIBIOTICS FOR STREPTOCOCCUS SUIS

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Introduction. Streptococcus suis belongs to the most frequent bacterial pathogens in pigs raised in industrial farms. It is a primary pathogen inducing disease often associated with septicemia, meningitis, pneumonia, arthritis and endocarditis which can be often fatal. Sick animals should be treated as soon as possible with antibiotics. All pigs in a group should be treated when a single pig becomes clinically ill. Amoxicillin is the antibiotic of the first choice in the treatment and control of S. suis infections1. The aim of this study was to compare the susceptibility of S. suis to amoxicillin (AMX) and other frequently used antibiotics in swine, namely ceftiofur (CEF) and marbofloxacin (MAR).
Materials and methods. A total of 94 S. suis isolates were collected from clinically ill pigs from French (Labofarm) and German Veterinary Laboratories during the years 2009 and 2010. The strains were sub-cultured twice on 5% sheep blood Colombia agar (35°C for 16 to 18 hours) prior to MIC testing. MICs were determined for each antibiotic, using the micro-dilution method of the NCCLS.
Results. All strains of S. suis isolates were 100% sensitive to all three antibiotics. However differences in the MIC 50 and MIC 90 were found between AMX, CEF and MAR (Fig 1.).

Fig 1. MIC 50 and MIC 90 of AMX, CEF and MAR for S. suis

	N° of strains	MIC 50 (µg/ml)	MIC 90 (µg/ml)
AMX	94	0,023	0,031
CEF	94	0,086	0,274
MAR	94	0,367	0,802

The distribution of particular MICs for S. suis showed 92.2% strains susceptible to 0.03 µg/ml of AMX, 50% susceptible to 0.12 µg/ml of CEF and 58% susceptible to 0.5 µg/ml of MAR.
CLSI Clinical breakpoint for AMX is < 0.25 ; > 8 µg/ml, and for CEF : < 2 ; > 8 µg/ml. There is no CLSI clinical breakpoint for MAR.
Conclusion. Amoxicillin was the most efficient antibiotic against S. suis isolates among the three major molecules examined in this study with 92% isolates being susceptible to the lowest concentration. This confirms that amoxicillin is still the optimal choice for the first line treatment and control of S. suis infections in pigs.

P31 RESUSPENDABILITY AND SYRINGEABILITY OF VETRIMOXIN® LA IN COMPARISON WITH OTHER INJECTABLE AMOXICILLIN PRODUCTS

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Introduction. Amoxicillin products with prolonged activity are considered the best option in the first line treatments of infections such as S. suis or H. parasuis already in suckling piglets. Physical properties of such products are essential for easy handling and administration even via thin needles used for small piglets. The aim of this study was to evaluate the resuspendability and syringeability of Vetrimoxin® LA (Ceva) with other long acting amoxicillin products.

Materials and methods. Vetrimoxin® LA (VLA) together with six other products was kept to settle out for 2 weeks. Each product was resuspended multiple times by shaking in 5 sec intervals. The syringeability was measured after storage of products at 20°C, 4°C and -20°C for 24 hours. Ten ml of each product was pushed through either 19G or 21G needle pressed by the constant force of 10N. Each test was conducted in five replicates. If the piston was blocked, 300 sec were added to the total time of the sample for the statistical analysis.

Results. The time to resuspend 100ml vial was the shortest for Vetrimoxin® LA and product C in all conditions. Product B was frozen at -20°C and thus not resuspendable.

Time of re-suspension (s)

Product	20°C	4°C	- 20°C
VLA	10	10	20
A	25	45	40
B	10	15	NA
C	10	10	20
D	30	25	35
E	10	20	30
F	50	25	55

Syringeability: competitor products were blocked in the syringe multiple times up to 100% (prod. A at 4°C and prod B at -20° was frozen). Vetrimoxin® LA was never blocked at 20°C and once each time at 4°C or -20°C.

Percentage of blocked syringes (%)

Product	20°C	4°C	-20°C
VLA	0	8.3	8.3
A	83.3	100	91.7
B	41.7	16.7	100
C	58.3	41.7	66.7
D	91.7	91.7	91.7
E	58.3	75.0	75.0
F	41.7	91.7	66.7

The difference was statistically significant between Vetrimoxin® LA and all other products ($p<0.002$).

The time required for injecting 10 ml volume was the shortest for Vetrimoxin® LA with the statistically significant difference from all other products (GLM $p < 0.0001$)

Mean time required for injecting 10 ml volume.

Product	20°C	4°C	-20°C
VLA	48.0	83.2	99.8
A	257.0	300.0	280.0
B	215.7	206.6	300.0
C	199.4	161.7	226.5
D	278.8	277.5	279.8
E	210.9	251.1	256.9
F	152.0	283.9	226.7

Conclusions. Time to resuspension and time to inject 10ml volume was the shortest for Vetrimoxin® LA among tested products. Also the blockage incidence was the lowest in various temperature conditions using both 19G and 21G needles. This renders Vetrimoxin® LA the easiest handled product even for small piglets.

P32 LORDOSIS IN PIGS: TESTING THE HEREDITARY HYPOTHESIS

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Lordosis and/or kyphosis, also called "dipped shoulder" or 'humpy-back" is sporadically observed in growing pigs. This condition is characterized by a thoracic and/or lumbar spinal deformity. Three major and non exclusive hypotheses formulated to explain these back deformations are nutrition, intrauterine viral infection and inherited predisposition. The objective of the present study was to test the latter and, if possible, to identify a locus (some loci) associated to the affection. Fourty-eight pigs were included in this case-control study: based on a clinical examination and/or on a measure of the degree of spinal deformity, 25 pigs classified as affected were compared to 23 pigs considered as normal. A whole genome Single Nucleotide Polymorphism (SNP) analysis was performed using a 50,000 SNP array. DNA from fourty-seven samples (tail tissue or blood) was extracted while one sample was eliminated because of its poor quality. After applying quality controls, 40 pigs and 57 838 SNPs (on a total of 62 163) remained for further analysis. One SNP (ASGA0090747) located on Sus scrofa chromosome SSC8 crossed the genome-wide significant threshold and is thus suspected to be associated with the lordosis and/or kyphosis phenotype. Further investigations are needed to confirm the present result.

P33 EFFECTIVENESS OF THE FLORFENICOL AND OF THE DOXYCYCLINE ADMINISTERED IN WATER TO PIGS INOCULATED EXPERIMENTALLY WITH ACTINOBACILLUS PLEUOPNEUMONIAE (APP) SEROTYPE 1

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Introduction. The aim of this study was to evaluate the efficacy of Florfenicol and Doxycycline administered in water, against App serotype 1 in experimentally inoculated pigs.

Materials and methods. 45 day old pigs (n=48) having a live weight of 15kgs and negative for APP were randomly assigned to one of three treatment groups: CONTROL Group (non-medicated), FLORFENICOL Group (animals medicated orally with Florfenicol at a dose of 10mg/kg body weight) and DOXYCYCLINE Group (animals medicated orally with Doxycycline at a dose of 10mg/kg body weight). Both groups were medicated by drinking water for 5 days (starting one day before challenge). Each treatment group consisted of 4 replicates of 4 pigs for a total of 16 pigs/treatment group. Pigs were infected 2 days after reception with 1.6 x 109 colony forming units (CFU) of Actinobacilluspleuropneumonioae serotype 1 (reference strain Shope 4074), which was prepared by sub-culturing of the reference strain. The animals have been observed 6 days after challenge, the ones that survived were slaughtered for necropsy.

Following challenge, every 12 hours rectal temperature and clinical signs of anorexia and cough (0: absence and 1: occurrence) were assessed and recorded for each animal in all treatment groups. Additionally, lungs in all animals were examined to determine prevalence of injury; as well as, determination of mortality.

Results. Significant differences were observed between the two treatment groups (Florfenicol group=39,3°C; Doxycycline group=39,5°C) and the control group (40,2°C) in rectal temperatures 24 hours post challenge. Differences were also observed in the other measured parameters: -a)Anorexia, Control group=36,58%; Florfenicol group=0%; Doxycycline group=4,04% - b)Cough, Control group=19,51%; Florfenicol group=1,01%; Doxycycline group=5,05 -c)Lung injury (pleutitis), Control group=81.25%; Florfenicol group=12.50%; Doxycycline group=43.75% -d)Mortality, Control group=75%; Florfenicol group=12.5%; Doxycycline group=18.75%.

Conclusion. Both Florfenicol and Doxycycline were able to significantly reduce rectal temperature at 24h post inoculation, anorexia, coughing, prevalence of lung injury and mortality in pigs challenged with Actinobacilluspleuropneumonioae.

P34 NSAIDS GIVEN ORALLY TO SOWS AFTER FARROWING

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The farrowing and the subsequent days may be a painful period for the sow - because of mechanical stretch of the birth canal, as well as post partum pains during letdown of milk - when oxytocin stimulates uterus contractions. The use of NSAIDs to reduce pain might increase the sow's willingness to feed her piglets during their first critical days, and reduce the risk of piglets being crushed. The aim of the study was to investigate whether ketoprofen given orally to sows after farrowing resulted in increased survival and average daily gain (ADG) in piglets, and reduced weight loss in sows.

This double-blinded study included a total of 49 loose housed sows of the breed Norwegian Landrace x Yorkshire, inseminated with Duroc. The sows were randomly divided in pairs by parity, body condition and weight, and placed in the ketoprofen-group or the placebo-group. Ketoprofen (Dolovet®, oral powder) 4mg/kg, after sows weight, was mixed with powdered sugar and scattered on the sows feed in average 11 hours after farrowing, and then 24 hours later. Placebo was given as powdered sugar. The piglets were weighed and counted on day one, day three, at three weeks and at weaning (in average 33,5 days). The sows were weighed on day one, at three weeks and at weaning, and daily feed intake was recorded. The feed intake was similar in the two groups. Piglets pre-weaning mortality rate, piglets ADG, and sows pre-weaning weight loss were not affected by treatment. However, in litters from primiparous sows, the piglets ADG were significantly higher in the ketoprofen-group, from day one to three weeks (P=0,001), from three weeks to weaning (P=0,015) and throughout the whole pre-weaning period (ketoprofen-group 248,3 g/day vs. placebo-group 218,5 g/day; P=0,029). The significant results in primiparous sows can be explained by their narrower pelvis - causing more pain during and after parturition. They are also more sensitive to piglets handling teats and udder. Ketoprofen might have given more restful sows making milk more available for the piglets.

The results from this study indicate that any routine pain therapy of sows after farrowing is not recommended. The use of NSAIDs should be limited to welfare indications, particularly primiparous sows that most likely have more pain during parturition and in early lactation, when the piglets also are fighting for the teats.

P35 WELFARE AND PRACTICALITY OF KETAMINE-AZAPERONE-ANESTHESIA IN SERIAL CASTRATIONS OF PIGLETS IN CONFINEMENT AND OF WEANED PIGS IN OUTDOOR HOUSING

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Introduction. The im-injection of Ketamine (K) and Azaperone (A) produces in weaned pigs hypnosis, muscle relaxation and surgical tolerance in doses of 20 (K) and 2 (A) mg/kg bodyweight. The surgical tolerance defined as the absence of movement responses and vocalization to pain stimuli is consistent with analgesia by suppression of the spinal reflex (NMDA receptor blockade). This was proved recently in castration of prepuberal boars by nociceptive flexion reflexes of the deltoid muscle elicited every minute with electrostimulation of the ulnar nerve. Compatibility was confirmed by intensive-medical monitoring, too.

The purpose of 3 subsequent field studies (2 in confinement, 1 in outdoor housing) was to evaluate for serial castration welfare (analgesia, compatibility) and practicality (handling, economy), if the mixture of both drugs is applied as a single injection in the lateral neck muscle.

Results. Study 1: 120 3-7 days old piglets were randomly selected to 6 different dose combinations and anesthetized according to the individual body weight using a 1 or 2 ml disposable syringe with 0.1 ml accuracy. The highest rate of surgical tolerant piglets (93 %) was associated with 25 (K)/2 (A) mg/kg. 7 % demonstrated only weak defense without vocalization. Hypnosis was achieved within 2-3 min. and surgical tolerance lasted 21-26 min. Side effects were hypothermia and a wake-up phase of 4 h.

Study 2: With this dosage 1213 3-8 days old piglets were anesthetized in serials of 25 individuals on the basis of the median body weight using an attach bottle mount injector with 0.1 ml accuracy. Surgical tolerance rate was 90 %. Compared to 1227 not anesthetized piglets risks for survival, health and growing performance up to weaning with day 21 failed, if castration started with day 5 of life and separation in the heated nest was assured for at least 4 h afterwards. The cost for additional working time (1 min./ litter) and drugs was 1 €/castrato on average. Study 3: 158 outdoor weaned pigs from age 6-12 weeks were anesthetized in serials of 6 individuals with 20 (K)/2 (A) mg/kg on the basis of an estimated bodyweight with rounding up to an entire ml dosage using a 30 ml Muto® syringe with 1 ml accuracy. The rate of surgical tolerance was 93 %. Death (crushing by pen mates) occurred only in 2 cases (1 %) despite separation in a hut without additional heating at outside temperatures from -25 to +35°C.

Serial castrations with this injection narcosis combine animal welfare, practicality and prevention of boar taint reliably.

P36 HOW TO DESCRIBE THE PARTICLE SIZE DISTRIBUTION IN DIETS FOR PIGS

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The offer a finely ground diet is linked with a risk for gastric ulcers or a higher prevalence of Salmonella in pigs. These aspects have to be considered in order to develop recommendations concerning an "optimal" particle size distribution. Apart from sum percent curve (mass on different sieves) an assessment can be done by estimation of GMD (geometric mean diameter) or dMEAN (discrete mean particle size, an arithmetic mean) considering largest particles on top sieve. Aim of this study was to create awareness for parameters used in literature to characterize the fineness of ground diets.

Methods. Particle size distribution in compacted diets was determined by wet sieve analysis. Results were expressed as weight by weight or sum percent curve and by official formula for GMD and dMEAN. Moreover, these original formulae were modified to account for the particle size fraction that was passing the finest sieve.

Results. Comparison of parameters used to characterize particle size of different diets

grinding /processing of the diet		fine, pelleted	coarse, pelleted	fine1), pelleted	coarse, extruded	
dry mass, %						
	> 1 mm	15.5	41.7	37.0	12.0	
	< 1 to > 0.2 mm	44.2	26.9	31.6	39.0	
	< 0.2 mm	40.4	31.6	31.4	48.9	
GMD, µm	- "official" formula		231	387	395	171
	- modified2)		319	498	508	254
dMEAN, µm	- "official" formula		802	1203	1371	
	- modified3)		520	856	972	437

1) 22% whole grains of wheat were added before pelleting; 2) fraction < 0.2 mm considered by an assumed smallest sieve of 50 µm (= fictitious sieve); 3) fraction < 0.2 mm considered by a fictitious sieve with a mesh size of 0.001 mm, coarsest sieve 3150 µm

Conclusion. The official formula for GMD should not be used for compound feeds if 20% ore more of the material pass the smallest sieve (constipation of fine sieves). Therefore, in a modified formula particles < 0.2 mm are treated as if they were on a fictitious sieve (mesh width of 50 µm; middle of particle sizes between 100 µm and 0). Official formula for dMEAN (primarily established for digesta) shows also weaknesses concerning diets with higher proportions of finely ground particles (< 0.2 mm) and should be modified by assumption of a fictitious sieve of 0.001 mm (just above 0). In general, a standardisation for describing results are necessary to develop recommendations for most favourable fineness of diets.

P37 FARMERS´ OPINIONS ON THE WELFARE QUALITY® ASSESSMENT ACCORDING TO A QUESTIONNAIRE STUDY

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Animal welfare is of considerable significance to European consumers. Welfare Quality® (WQ) was funded by the European Commission to focus on integrating animal welfare in the food quality chain by developing standards for on-farm welfare assessment, emphasizing animal based measures.The main objective of this study was to gain information about farmers´ experiences on WQ-assessment on their farm. Another aim was to investigate the possible association between farmers'opinions and their attitudes towards implementing the data of the WQ assessment in practice. A group of assessors were trained and certified by the WQ consortium. In 2010-2011 one veterinarian and five advisors familiar with pig production assessed animal welfare using the WQ tool on 124 farms representing the three herd types: fattening (n=50), integrated (n=31) and piglet producing (n=43) units. The acquired data was summarized to the farm manager right after the herd visit as a preliminary report complemented with comments by the assessor. Eventually the participants received a final, detailed report including information about the grading of their farm in national comparison. Retrospectively, a questionnaire was used to investigate farmers´ perceptions of the WQ assessment. The overall response rate reached 52%. In general, the majority of the producers judged the advisors visits (71%) and assessment protocol (81%) positively when surveying their interestingness/usefulness. Likewise they appreciated the received written feedback: 85% found the final report either interesting/useful or very much so. In addition 76% of the respondents were comfortable with the welfare measurements used, judging them to correspond well or very well to their own view of the status on the farm at the day of assessment. Between the herd types there were no significant differences in these attitudes ($p > 0.05$). WQ aims to generate knowledge on practical strategies to improve animal welfare on farm. In total 88% of the respondents was either certainly or potentially planning on changing their animal husbandry practices in response to the participation in the WQ-assessment project. Among the surveyed issues (herd visit, preliminary and final report, performance of the WQ-system on the own farm) the only significant difference in predicting the willingness to do so was found to be in how interesting/useful the preliminary report was estimated ($p<0.05$, Kruskal-Wallis test for independent samples) with a trend for the final report ($p=0.06$). This suggests that farmers appreciate interaction with, and feedback from consultants.

P38 NUTRIENT DIGESTIBILITY (TOTAL TRACT) AND GROWTH RATE IN NATURALLY LAWSONIA INTRACELLULARIS INFECTED AND VACCINATED OR NOT VACCINATED YOUNG PIGS

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Introduction. The hypothesis of this study was that in herds with signs of porcine proliferative enteropathy (PPE) due to Lawsonia intracellularis (L.i.) the reduced performance may also be caused by a decreased digestibility of nutrients and not only be a result of a reduced feed intake.
Material and methods. In 3 consecutive trials a total of 27 potentially naturally L.i. infected pigs (bw: 19.0 ± 1.50 kg; 9 pigs/group) were fed a conventional diet ad libitum (CP: 176 g, CF: 23.5 g, CL: 33.6 g, ME: 13.8 MJ/kg diet) including 0.5% Cr2O3 as a marker. Animals were alloted to 1 of 3 groups: not vaccinated, without clinical findings=VAC–CF–; with clinical findings=VAC–CF+; vaccinated, without clinical findings (Enterisol®Ileitis; as suckling piglet)=VAC+CF–. Individually housed pigs were fed the diet for 10 days (5d adaptation, 5d faeces collection) to determine apparent digestibility of the organic matter, crude protein and starch. Faecal shedding of L. i. was confirmed by qPCR. Statistics were performed by one-way ANOVA (proc GLM; significant for $p \leq 0.05$).
Results and discussion: Shedding of L. i. was seen with the numerically highest numbers of genome equivalents (GE) in group VAC–CF+ (lg GE 7.70±1.83; VAC+CF–: 6.00±2.89; VAC–CF–: 5.83±2.35). We found significant differences in the groups (order: VAC–CF–/ VAC–CF+/ VAC+CF–) according to following parameters: DM content of faeces in g/kg (245±16.8a/211±19.8b/236±18.4a), daily body weight gain in g (852±100ab/800±139b/920±60.0a)1 and total tract digestibility of crude protein (CP) in % (83.9±2.03a/80.7±2.57b/83.0±1.72a) although the hind gut is well known for its high compensatory digestive capacity. The digestibility rate of OM in % was tendentially reduced ($p=0.0537$) in group VAC–CF+ (86.9±1.81/84.8±2.19/86.4±1.46). Digestibility rate of starch (%) showed no significant differences (99.0±0.15/98.8±0.26/98.9±0.27) as well as the daily feed intake (in g; 1207±119/1165±148/1320±142)1 and the feed conversion ratio(feed:gain;1.42±0.08/1.47±0.15/ 1.43±0.12)1. 1Due to technical problems – only trial 2+3 were considered.
Conclusion. Even clinically mild cases of PIA lead to impaired digestibility of nutrients despite of compensatory hind gut digestion - at least partly. Stressful field conditions are possibly more serious with regard to the already in this short experimental study observed tendentially lower body weight gain in affected animals.

P39 EFFECT OF REPLACEMENT OF ZNO BY SANACORE-EN® ON FEED IN WEANED PIGLETS

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In the European context, animal production is characterized by a greater challenge to maintain a high health status since the ban on antimicrobial growth promoters and the more recent pressure on usage of therapeutic antimicrobials. Optimization of animal health and nutrient utilization is a key component for improving production efficiency, a responsible use of antimicrobials and for increasing food safety. ZnO has become one of the most important tools to control digestive diseases in piglets. However, beyond its contaminant effect on environment, it has been demonstrated that a continuing use of ZnO, has negative effects over feed conversion and average daily gain in piglets.

The present study aims to apply and to compare two different feed strategies, one of them with ZnO and the other with SANACORE®-EN. Sixty-eight 28 day old piglets were selected in the study, and divided into two homogenous groups. Control group (ZnO, n=34) and an experimental group (SANACORE®-EN, n=34).

Data obtained indicated that piglets fed on SANACORE®-EN, showed better results regarding feed intake, 56 gr/day higher than that of the control group ($p<0,05$), increased average daily gain in 71 gr/day ($p<0,05$), reduced the feed conversion from 1.61 to 1.40. At the end of the study the live weigh difference was 3.6 kg for SANACORE®-EN group ($p<0,05$). This group being more homogeneous statistically.

P40 SORTING WEANER PIGS BY WEIGHT - A USEFUL MANAGEMENT PRACTICE OR VAIN ENDEAVOUR?

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In commercial pig production, it is common practice to mix unfamiliar piglets in uniform weight groups after weaning assuming positive impacts on growth performance. A small variation of individual weights within a group or even within a batch indicates a high animal health status, and groups of piglets balanced by weight are also required for fattening. However, the effectiveness of sorting piglets by weight after weaning has hardly been proven scientifically. Furthermore, every change of group composition in pigs is followed by rank order fighting, and piglets appear to experience social stress sufficient to cause a reduction in growth performance. Therefore, the aim of this study was to clarify whether sorting piglets by weight after weaning affects growth performance and aggressive behaviour. We compared 16 homogeneous weight groups (7.9 +/- 0.65 kg), 16 heterogeneous weight groups (7.84 +/- 1.74 kg) and 9 entire litters that were reared completely. All groups were composed of 12 animals. Weaning age was 26 days. Piglets were kept without bedding material on partially slatted floor (0.38 m2 per animal) with ad libitum access to food. Piglets were weighed at weaning, 4 days later and after 38 days. On the fourth day, the number of scratches was determined for each individual. The number of aggressive interactions within a group was determined by video analysis for 72 h after mixing. Daily weight gain of piglets in homogeneous and heterogeneous groups did not differ significantly (426 vs 417g/day). However, rearing entire litters resulted in significantly higher daily gain (446 g/day). The coefficients of variation of weights in homogeneous and heterogeneous groups which differed significantly at weaning (6.6% vs 22.1%) were on a similar level after 38 days (12.9% vs 15.8%). Concerning the number of fights and the number of scratches we found no differences between homogeneous and heterogeneous groups (fights: 57 vs 52, injury score: 6.8 vs 6.5). We conclude that neither weight balance in a group at the end of rearing nor growth performance or aggressive interactions were affected by sorting piglets by weight at weaning. Solely, rearing of complete litters resulted in significantly better growth performance compared to mixed groups.

P41 GASTRIC ULCERS IN NURSERY PIGS

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Introduction. Gastric ulcers (ulcers) have significance for pig productivity and welfare. Prevalence and risk factors for ulcers has mainly been investigated in sows and finishing pigs. The objective of the current study was to identify risk factors for ulcers in nursery pigs.
Materials And Methods. From each of 20 herds, 16 nursery pigs were randomly selected, clinically examined, euthanized and subjected to necropsy. Internal organs were examined for gross lesions and gastric ulcers were classified as not detected, mild (hyperkeratosis/erosions) or severe (ulceration/scar-tissue). Enteropathogens and PCV2 were investigated by laboratory diagnostic methods. Association between dichotomized ulcer scores (not detected/mild versus severe), PCV2 infection, lung lesions, individual intestinal infections, different clinical signs, gender, age and feed-type were analysed by a logistic mixed model with random effects (pen and herd). Intra-class correlation coefficients (ICC) were calculated for the final model.
Results. A total of 319 pigs (6-10 weeks old) were included in the study and 84% did not have any signs of ulcers, 9.4% had mild ulcers and 6.9% had severe ulcers in the oesophageal part of the stomach. No pigs had ulcers in the glandular part of the stomach. The within herd-prevalence of pigs with severe ulcers were significantly different between herds (p>0.01; range: 0-50%). The only significant risk factor was the use of pelleted feed compared to home-mixed feed (OR=17.7; p=0.01). The ICCs were 0.56 for pigs between herds, 0.05 for pigs between pens and 0.39 for pigs with-in pens.
Discussion. Compared to previous reports for finishing pigs, the observed gastric ulcer prevalence was lower in nursery pigs. However, ulcers were a significant problem in some nursery herds, despite the absence of clinical signs. Feed-type was identified as a risk factor supporting previous results. The calculated ICCs can be interpreted as the proportion of the unexplained variation that can be assigned to differences between herds, pens and pigs. The ICCs demonstrated that in addition to feed-type, risk factors at the herd-level are the most important in relation to occurrence of ulcers. Risk factors at the pig-level (within the same pen) are nearly equally important and illustrates that within a herd some pigs develop ulcers and others do not, despite they have identical age and feed-type. PCV2 infection has previously been associated with ulcers under experimental conditions. This could not be confirmed in the current study. None of the other investigated pig-level risk factors was associated to ulcers.

P42 EFFECTS OF ORAL MELOXICAM (METACAM® 15 MG/ML ORAL SUSPENSION FOR PIGS) ON THE IMPROVEMENTOF PIGLET PERFORMANCE IN 4 SPANISH FARMS

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Introduction. Post partum disgalactia syndrome (PDS) in sows is characterised by insufficient colostrum and milk production during the first days after farrowing. PDS incurs in one of the most economic looses in the breeding herd. Meloxicam is a non-steroidal anti-inflamatory drug which has proved to be effective in the treatment of PDS. The aim of this study was to evaluate the convenience of the use of a single administration of Metacam® 15mg/ml oral suspension for pigs (Oral Metacam®), in sows under field conditions.
Material And Methods. The field trial was conducted on four farms located in Spain. Severe agalactia was not observed during or after the trial. A total of 113 sows were randomly allocated the day of farrowing (d0) to two homogeneous groups acording to parity.
One group (n=58) was given 0.4 mg/kg b.w of Oral Metacam® on d0. The other group (n=55) was not treated and was used as control.
The efficacy of the treatment was evaluated by comparing ADG, weight at weaning and mortality in a total of 1.403 piglets. The sow was considered as the experimental unit.To obtain the ADG and weight, piglets of the same sow were weighted together at d0 and at weaning (d 19) and the averages were compared. In this study the sow was considered as experimental unit.
The treatment effect was assessed through analysis of variance (ANOVA) including treatment, parity and the interaction treatment*parity. Mortality rate was analyzed using the Chi-Square-test. Significance level was p<0.05.
Results. The average, minimum and maximum values for ADG in piglets from Metacam Group was 210 (196-230) compared to 195 (184-204) in piglets from Control group. As a consequence, weight at weaning was significantly higher for Metacam group compared to the control 5,549 (5,030-5,977) vs. 5,172 (4,600-5,500) kg, respectively; (p<0,05)
Total mortality rate up to weaning comparing treated and non-treated groups was lower in the Oral Metacam®, 12,34 % vs 14,13%.
Conclusions. Metacam Oral suspension reduces the number of injections at farrowing; it is palatable and easy to administer resulting in additional benefits for sow welfare. Concerning efficacy, Oral Metacam® treatment in sows significantly increased the pre-weaning piglet ADG and the weight at weaning and reduced the piglet mortality compared to control.

P43 EFFECTS OF SINGLE AND MULTIPLE MYCOTOXIN-CONTAMINATED DIETS ON PROLIFERATION AND APOPTOSIS IN THE PORCINE INTESTINAL MUCOSA

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Mycotoxins are common food and feed contaminants, particularly of cereal grains. Most toxicological studies evaluate the effects of a single mycotoxin on humans or animals. However, most fungi can produce several types of mycotoxins, and foodstuffs are often contaminated by more than one fungal species simultaneously. Therefore, humans and animals are generally exposed to multiple mycotoxins at the same time rather than one, yet studies on their combined toxicological effects are limited.

The goal of this study was to compare the local effects of two commonly encountered trichothecene mycotoxins, deoxynivalenol (DON) and nivalenol (NIV), on the porcine intestinal mucosa at subclinical levels, which is that typically found in naturally contaminated feeds. Pigs are an ideal model for this type of study because they represent the domestic species most sensitive to contamination by mycotoxins. An understanding of mycotoxins' effects on the gastrointestinal tract is essential because these organs are the first targets encountered in intoxication.

An in-vivo feeding trial was conducted on a total of twenty-four castrated male piglets. The subjects were divided into four groups receiving separate diets: a control diet, a diet contaminated with either low-dose or high-dose DON, and a diet contaminated with DON + NIV. Following the four-week trial, segments of jejunum were removed, prepared into histological sections, and labeled separately with two immunohistochemical markers: Ki67 for proliferation, and caspase-3 for apoptosis. The amount of cellular marking was analyzed at the light microscope level and compared across the treatment groups. Preliminary results indicate treatment-based decrease in enterocytes proliferation, with significant variability in individual response.

P44 THE INCIDENCE OF PENIS INJURIES IN MALE FATTENING PIGS

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Introduction. Due to the third amendment of the German Animal Protection Act castrating piglets without anaesthesia will be prohibited as of 2019 (TierSchG, 2013). An alternative to castration is the fattening of entire male pigs. However, previous studies indicate that the effects of husbandry of boars on welfare are not automatically positive (Cronin et al. (2003), Bjorklund et al. (2006), Fredriksen et al. (2008)). In these studies, entire males seemed to be more aggressive and sexual active than their castrated littermates. Rydhmer et al. (2006) further showed an increase of skin and leg injuries in pens with fattening boars. Empirical experiences also presented problems with penis biting between penmates. However, reliable data are still missing.

The aim of the present study was to evaluate the incidence of penis injuries of boars after the whole fattening process at the slaughterhouse. Additionally, the penises of some castrated male pigs were also examined.

Materials & Methods. The study was conducted in two conventional farms in Bavaria (Germany). Altogether 171 boars and 21 castrated male pigs were included in the study. All animals were housed together in one fattening unit per farm but castrated and non-castrated male pigs were separated by pen. Size of pen, food quality and length of fattening period (16 weeks) were equivalent in each farm for boars and barrows, without movement of the pigs. At the end of the fattening period the pigs have been slaughtered with an average weight of about 120kg and their penises were collected at the slaughterhouse. Afterwards, each penis was separated from the prepuce and numbers of injuries as well as size of damages were evaluated according to a scoring system.

Results & Conclusion. Whereas the penises of the castrated male pigs were completely unharmed, 82% (n = 133) of all boars displayed scars or fresh wounds or both. 12% (n = 20) of entire male pigs exhibited more than 10 injuries on the penis. All damages had a minimum size of 0,1 cm. The majority amounted to a maximum of 0,4-0,6 cm. Therefore, it can be assumed that some boars have been bitten multiple times during fattening. According to Morton et al. (1985) it has to be presupposed that animals feel the same or similar pain as humans. Due to the high incidence of penis injuries in the present study the fattening of entire male pigs has to be discussed as a welfare problem and further research is needed to corroborate our findings.

P45 ECONOMICAL IMPACT OF A PROTEIN AND ENERGY OPTIMIZED DIET AND ITS EFFECT ON PIG PERFORMANCE AND CARCASS QUALITY

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The specific nutrients requirements of Iberian pig, together with the high cost of raw ingredients, lead to the need of optimizing the current processes of the feed compounding industry and to the adjustment in nutrient supply to match the animals' needs. In the present study, two groups of 26 Iberian pigs each were fed in field conditions one of two nutritional regimes which differed in dietary protein supply: 182 vs 204, 180 vs 128 and 148 vs 98 g/kg as fed, respectively for the Control and Balanced regimes, at the post-weaning (10-30kg BW), growing (30-45kg BW), and fattening (45-100kg BW). Slaughter took place at 165kg BW, after a period of free access to pasture. The Control regime, currently used in commercial farms, provided a surplus of protein at the latest stages of growth, whereas the Balanced regime supplied optimized protein concentrations relative to dietary energy content, according to previous studies. Within each stage of growth, the same raw ingredients were used when formulating both the Control and Balanced diets. Only when necessary, a new ingredient was included in the experimental diet to meet the basic protein and energy requirements of the animals. Production parameters (feed intake; average daily gain, ADG; feed conversion rate, FCR) were measured up to 100kg BW. After slaughter, the carcass and meat characteristics were recorded from 8 animals/group. The evolution of the price of each diet/animal/day, as well as for each ingredient used were recorded and compared between the two nutritional regimes. ADG and FCR were altered by the nutritional treatment (0.345 vs 0.372kg, $p<0.05$; and 5.32 vs 4.79, $p<0.01$, respectively), mainly due to the higher ADG (0.652 vs 0.738kg) noted in the animals on the Balanced regime in the growing-fattening period and the lower FCR found in the post-weaning (3.10 vs 2.82) period, respectively. No changes attributable to the nutritional treatment were detected in the carcass quality. Regarding the economical impact, during the post-weaning period the Balanced treatment was a 24.58% cheaper than the Control (1.59 vs 1.20€/day/animal). On the contrary, in the growing-fattening period the price of the Balanced treatment was 3.07% over the price of the Control diet (0.95 vs 0.98€/day/animal). Taking all together, the Balanced regime tested represented a 14.18% save in the cost of feeding (1.27 vs 1.09€/day/animal). Our results show that adjusting the diet to the specific requirements allow to reduce the cost of pig feeding improving the animal performance with minimal impact on carcass quality.

P46 MYOSIN HEAVY CHAIN FIBRE TYPES AND FIBRE SIZES IN INTENSIVE AND FREE-RANGE FINISHING IBERIAN PIGS: INTERACTION WITH TWO ALTERNATIVE DIETARY PROTEIN CONCENTRATION DIETS

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Free-range pig production systems have been developed as an alternative to the classical intensive systems to answer the modern concerns about animal welfare and eco-friendly production systems. Iberian pigs are classically reared in free-range systems, however, nowadays there is an increasing trends to intensive rearing systems, which leads to an early slaughter of the animals at 100Kg BW instead of the classical slaughtering weight of 150Kg BW. Furthermore, Iberian pigs have been suggested to present different dietary protein requirements from those of commercial crossbred or lean pig breeds. The aim of this study was to investigate the effects of the rearing system background (intensive, I/free-range, FR) on skeletal muscle phenotype and their interaction with two alternative dietary protein concentration (control, C/protein restriction, PR) in Iberian finishing pigs. A total of 32 piglets were assigned to four different groups: I-C, I-PR, FR-C, FR-PR. Iberian finishing pigs reared in intensive conditions had restricted movement and were slaughtered at 100Kg BW; whereas, free-range pigs were allocated in opened pens and slaughtered at 150Kg BW. Muscle samples (Longissimus dorsi, Psoas mayor) were analyzed for myosin fibre types and fibre sizes. No differences were detected in fiber types and sizes between animals fed with the two diets. The muscle Psoas mayor presented more type I and IIA fibres but less type IIB fibres when compared with Longissimus dorsi. On the contrary, type IIB fibres showed a higher size in Psoas mayor associated to a lower number of this fibre type for this muscle. The muscle effect interacted with rearing system effect regarding the composition in fibres type and size. Our results show no influence of the dietary protein concentration on muscle characteristics. Nonetheless, less favourable muscular traits for meat quality were detected in Longissimus dorsi vs Psoas mayor.

P47 EFFECT OF TWO DIETARY PROTEIN CONCENTRATIONS ON PERFORMANCE PARAMETERS, INTESTINAL MICROBIOTA AND ULTRASOUND MEASUREMENTS IN IBERIAN PIGS

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Iberian pigs require lower quantities of dietary protein than commercial crossbred pigs due to their lower potential for lean tissue deposition.

However, an excess of protein is usually found in diets for Iberian pigs, which may result in protein fermentation in the gut with disturbing effect on intestinal microbiota. Two groups of 26 Iberian pigs each were fed in field conditions one of two nutritional regimes which differed in dietary protein supply: 182 vs 204, 180 vs 128 and 148 vs 98g/kg as fed, respectively for the Control and Balanced regimes, at the post-weaning (15-30kg BW), growing (30-45kg BW), and fattening (45-100kg BW). This was to determine the effect of the dietary protein concentration upon performance parameters, intestinal microbiota and some carcass characteristics. The Control regime, currently used in commercial farms, provided a surplus of protein at the latest stages of growth, whereas the Balanced regime supplied optimized protein concentrations, according to previous studies. Within stage of growth, the same raw ingredients were used when formulating both the Control and Balanced diets to minimize likely effects derived from the nature of dietary ingredients. Performance parameters (feed intake; ADG; FCR) were recorded at different intervals and the intestinal microbiota was determined at the beginning and end of each stage of growth. At the end of the growing period (100kg BW) backfat thickness and loin depth were determined by an ultrasound device. ADG and FCR were altered by the nutritional treatment (0.345 vs 0.372kg, $p<0.05$; and 5.32 vs 4.79, $p<0.01$, respectively), mainly due to the higher ADG (0.652 vs 0.738kg) noted in the animals on the Balanced regime in the growing-fattening period and the lower FCR found in the post-weaning (3.10 vs 2.82) period. No between-treatment changes were detected at each stage of growth in the cell counts for total aerobes, total anaerobes, acid lactic bacteria, coliforms, enterobacteria, bacteroides and clostridia (8.60, 10.72, 10.89, 6.42, 6.84, 5.79 and 10.26 log10 CFU/ml on average). Ultrasound measurements showed an increase in backfat thickness of pigs on the Balanced treatment (17.11 vs 22.21mm; $p<0.05$) but no changes were observed in loin depth (4.95mm, on average). It is concluded that a restriction on the dietary protein concentration at the late stage of growth, according to the Iberian pig requirements, has a positive impact on the productive performance and promoted minor changes in microbial counts in feces with little impact on pig's health.

P48 INFLUENCE OF BIO-ACTIVE PEPTIDES FROM FPP* ON POST WEANING PERFORMANCE IN PIGLETS

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*FPP: fermented potato protein

Introduction. Previous research demonstrated a positive effect of Lianol®, a complementary feed based on fermented potato protein, on plasma insulin-like growth factor-1 (IGF-1) levels (IPVS 2010). Saleri et al. (2001) and Kraetzl et al.(1994) reported a positive interaction between IGF-1 levels and growth performance. This trial investigates the effect of this new complementary feed on piglet performance during the first 2 weeks post weaning.
Materials and Methods. 48 weaning piglets were housed in the same compartment in 12 pens of 4 piglets each. Half of the pens were attributed to the control group and the other half to the Lianol® treatment. The feed of the treated group was supplemented by 1.5 kg Lianol® Solapro per ton of feed during the trial period. All piglets were a (Large White x Landrace) x Duroc cross. The trial started at weaning; when the piglets had an average age 24 days. The trials lasted for 2 weeks. Results. The animals in the control group weigh 5.88 ± 0.2 kg and the animals in the Lianol® group weigh 5.88 ± 0.1 kg at weaning (day 24 of life). At 2 weeks post weaning, the animals in the control group reached a weight of 8.33 ± 0.3 kg whereas the Lianol® group was 8.70 ± 0.2 kg; this is an extra weight of 370 grams in the supplemented group. The average daily feed intake increase from 241.5 grams to 267.9 grams in the control and Lianol® group respectively. The FCR improved by 5 points from 1.38 in the control to 1.33 in the Lianol® treatment. No mortalities were observed in this trial.
The performance data is summarized in table 1.

Table 1. Post-weaning piglets performance

	Control group	Lianol® group
Number of piglets	24	24
Weaning weight (kg); day 24	5.88 ± 0.2	5.88 ± 0.1
Weight day 38 (kg)	8.33 ± 0.3	8.70 ± 0.2
Daily feed intake (g/d)	241.5	267.9
FCR	1.38	1.33
Mortality (%)	0	0

Conclusions. Supplementation with Lianol® Solapro during the first 2 weeks post weaning improved piglet performance. The weight at 2 weeks post weaning increases by 370 grams. The average daily feed intake was 26.4grams higher and the feed conversion improved from 1.38 in the control to 1.33 in the Lianol® group.

P49 BEHAVIOUR CHANGES ASSOCIATED WITH LAMENESS IN SOWS

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Introduction. Lameness is a common problem in sows, with a prevalence of 8.8 – 16.9 %. Lameness leads to poor welfare of sows, as it is often painful. Pain can cause behaviour changes in sows, that potentially affect their success in group housing. Lameness is also a major reason for unplanned cullings of sows. The aim of this study was to investigate the effect of lameness on the behaviour of sows.
Materials and methods. The study was conducted together with a clinical trial, which evaluated the efficacy of oral ketoprofen in treatment of non-infectious lameness in sows. The study was performed in a privately owned farm and the sows were under the normal management practice of the farm. The study animals consisted of 13 pairs of lame and healthy control sows, with one or two pairs of sows per pen. Two dose rates of oral ketoprofen (2 and 4 mg/kg) given for five days were compared to placebo treatment. Lameness was assessed with a 5-grade scoring system and behavior by scan sampling prior to and on the last day of the treatment. Statistical analyses were made with Mann-Whitney U-tests, using SPSS software. For statistical analysis ketoprofen levels were pooled, as there was no difference in treatment success between the active medication levels.
Results. Lame sows were more passive ($P=0.05$), lying more often ($P=0.02$) and standing ($P=0.05$) and exploring fixtures less ($P=0.02$) than the control sows on day 0. Also on day 5, ketoprofen-treated sows were lying more and standing less than control sows, but the results were not statistically significant. Placebo-treated sows were by the wall ($P=0.001$) and lying ($P=0.03$) more often when comparing to control sows. Placebo-treated sows showed tendencies to move, stand and explore bedding less than control sows ($0.05<P<0.1$).
Treatment of lameness was successful in six of nine ketoprofen-medicated sows and in one of four placebo sows. The behaviour of recovered sows did not differ from control sows on day 5 ($P>0.05$). Sows, which had not recovered from lameness, were lying ($P=0.009$) and positioned by the wall ($P=0.04$) more and moving ($P=0.04$) and standing ($P=0.05$) less than control sows.
Conclusion. Results indicate that lameness reduces the activity of sows. Recovery from lameness is connected to normalization of the behaviour. As treatment with oral ketoprofen dilutes the behavioural changes associated with lameness, the treatment of lame sows is recommended.

P50 DIETARY SUPPLEMENTATION OF BETA-ALANINE TO GROWING BARROWS IMPROVED PERFORMANCE

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In a small scale preliminary study, dietary supplementation of ß-alanine to growing pigs showed a numerical improvement of both average daily weight gain (ADG) and average daily feed intake (ADFI). Therefore, the present study was designed to further investigate these preliminary results in a large scale performance study. At 64.9 ± 1.4 days of age 108 barrows weighing 22.9 ± 3.7 kg, were divided into three weight blocks of 36 pigs of similar weight (L: 19.0 ± 1.2 kg, M: 22.4 ± 1.1 kg, H: 27.3 ± 1.8 kg) each. Pigs of each weight block were randomly assigned to one out of 6 pens (6 pigs/pen). Within each weight block, pens were randomly assigned to either CONTROL or B-ALA. All pigs were fed the same commercial crumbled pellet and for B-ALA the diet was supplemented with 500 ppm of synthetic ß-alanine. Body weight and feed intake was recorded weekly at pen level. Based on the total feed intake and the growth during the 37 days trial period the ADG, ADFI, and feed conversion ratio (FCR) was calculated. Data were tested for normality by means of a Kolmogorov-Smirnov test on the residuals generated by the univariated ANOVA model with both weight block (L, M, H) and diet (CONTROL, B-ALA) as fixed factors in the model. Significant differences ($P < 0.05$) were detected using a post-hoc Tukey test. No interactions of weight class × diet were observed for any of the measured variables and, therefore, the interaction term was removed from the model. Pigs of B-ALA had a significantly improved ADG (CONTROL: 785 ± 51 g/day, B-ALA: 826 ± 32 g/day, $P = 0.039$). Consequently, the average end weight was 1.5 kg higher for B-ALA (53.5 ± 4.5 kg) in comparison to CONTROL (52.0 ± 5.5 kg, $P = 0.038$). Both ADFI (CONTROL: 1.86 ± 0.09, B-ALA: 1.91 ± 0.08) and FCR (CONTROL: 2.38 ± 0.14, B-ALA: 2.31 ± 0.15) were only numerically improved by ß-alanine supplementation. As ß-alanine is part of the muscle related dipeptide carnosine, it is likely that in a catabolic state ß-alanine is released during muscle breakdown. Hence, a possible hypothesis for the improved performance results in ß-alanine supplemented pigs is that ß- alanine acts as a catabolic signal that stimulates voluntary feed intake and consequently improves growth rate.

P51 USING BY-PRODUCTS FROM FOOD INDUSTRY TO LIQUID FEED GROWING PIGS

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Two trials were conducted to evaluate performance and carcass traits of partial replacement of a cereal-soya bean based diet by "mayonnaise" (33.2% DM, 1.0% CP, 73.8% EE, 0.0% CF) or "nuts meal" (96.5% DM, 16.5% CP, 56.3% EE, 2.9% CF). In the first trial one hundred eighty pigs (28.0 ± 3.5 kg) were randomly assigned to 10 pens (18 pigs/pen). Two diets were assigned to five pens each; (i) a control diet (CTR) without "mayonnaise" and (ii) an experimental diet with a 7.75% of "mayonnaise" (MAH) on a fresh basis. Both diets were formulated with the same sort of ingredients to be isoenergetic (3.430 Kcal EM/kg), isoproteic (18.6% CP) and isoamino acidic (1.12% Total Lys). The trial lasted 4 weeks. In the second trial, the same animals were used after 4 weeks of wash-out with a cereal-soya bean control diet. This second trial started at 65.9 ± 8.9 kg of body weight. Each pen was assigned to one of two dietary treatments: (i) a control diet (CTR2) without "nuts meal" and (ii) an experimental diet with 10% of "nuts meal" (NUT). Both diets were formulated to contain 3.320 Kcal EM/kg, 17.5% CP and 0.99% Total Lys. The trial also lasted 4 weeks.

Body weight was recorded at the beginning and at the end of each trial and average daily feed intake (ADFI) was estimated by weighting feed disappearance. After the end of the second trial, pigs were slaughtered in a commercial slaughterhouse where carcass weight and lean meat percentage with AutoFom were recorded.

Supplementing the diets with both food industry by-products, did not affect ($P>0.05$) either average daily gain (ADG), ADFI or feed conversion (FC) in any trial. In trial 1, ADG was 618 and 607 g/d (SEM= 33), ADFI was 1.689 and 1.667 g/d (SEM= 126) and FC was 2.74 and 2.76 (SEM=0.239) for CTR and MAH, respectively. In trial 2, ADG was 812 and 773 g/d (SEM= 37), ADFI was 2.291 and 2.275 g/d (SEM= 237) and FC was 2.82 and 2.95 (SEM= 0.318) for CTR2 and NUT liquid diet, respectively. Dressing percentage was 75.05% vs. 75.32% (SEM= 2.75) and lean meat percentage was 61.30% vs. 61.06% (SEM= 2.65), were also unaffected by the treatment.

Although performance and carcass traits were unaffected by the inclusion of the by-products in the diets; according to the actual market prices of feed ingredients, the economic benefits due to a reduction in feed cost was about 13.1% (0.10 €/kg growth) with MAH and 9.0% (0.10 €/kg growth) with NUT.

P52 MALES/FEMALES ALL EQUAL? SEX INFLUENCE ON TEATS POSITION AND PERFORMANCES IN MATERNITY

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The sex effect (castrated, female, boar) is very well known in fattening period however, it is less described in maternity. Among the numerous interventions on piglets during their first week of life (tail and tooth cutting, vaccination, iron injection), castration is the only one that differs between female and male. In 2008, in a commercial farm in France, 808 live born piglets from 67 sows were identified at birth, weighted at day 0, 1, 2, 3, 4 and at weaning (21 days) and characterized (maturity, vitality and birth order). The castration occurred on day 5.
Results: female and male showed same characteristics at birth in terms of morphology, vitality and maturity. Males were heavier at birth and remained heavier until the fourth day of life. At weaning, there was no longer a sex effect on weight. Moreover the weight advantage of the males was only observed for piglets from the first two teats. For the other nipples, female caught up with the males and became heavier at weaning. Teats allocation did not seem linked to sex. Nevertheless, when excluding adopted piglets, sex and teat positioning were correlated (R2=-0.130; p=0.058): males tended to suckle front teats from birth to weaning. In conclusion, males were heavier at birth, suckled mainly the anterior nipples and had a better growth during the first four days of life. At weaning the equality between the males and females weight suggested that stressful events (such as castration) slow down the growth of male.

P53 FIRST EXPERIENCES WITH GILTS IN AN ALTERNATIVE FREE FARROWING PEN

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The initial placement of gilts in a new swine farm with space for 140 sows, 720 growing and 600 finishing pigs was supervised for performance and health parameters in the farrowing unit. In a three-week cycle groups of 20 Austrian Large White sows farrow in free farrowing pens with a size of 7,4 m2 each (Prodromi II). This pen is equipped with are a large, closed litter nesting, which is accessible from two openings and allows nose to nose contact between sow and her litter as well as easy, half automated catching of piglets. A cooling plate is installed to facilitate laying down of the sow and minimize piglet crushing. Although a fixation of sows within flexible, iron farrowing crates during the critical first days of the suckling period is possible within the pen, no fixation was performed on the farm. The duration of farrowing, litter sizes, diseases in sows and piglets as well as piglet losses, birth and weaning weights and production parameters were evaluated for 100 gilt farrowings. Piglets which died were necropsied to assess the exact cause of death. No manual assistance during farrowings was necessary. In the first three farrowings the average number of piglets born alive was 11,8, piglet losses until weaning were 25%, 52% of the losses were crushed. 91% of piglet crushing took place during the first three days of life. 52% of the crushed piglets were not underweighted (> 1kg body weight). In each group up to two sows crushed at least half of her piglets, while most of the other sows did not crush or crushed only one piglet. It can be concluded, that as in other farrowing systems in this system with loose farrowing the highest risk of crushing was during the first three days of life and is highly dependent on individual sows. Final conclusions will be presented at the conference.

P54 ADMINISTRATION OF ORAL METACAM® 15 MG/ML AT GILTS BEFORE FARROWING REDUCES PIGLET CRUSHING

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In 2009, D. Wischner et al. suggested that posture patterns of non crushing-sows and crushing-sows peripartum were different (Applied Animal Behaviour Science 119: 49-55). In particular, they observed that compared to primiparous non crushing-sows, primiparous crushing-sows showed more rolling movements ($p < 0.01$) postpartum. One hypothesis often formulated is that restlessness behaviour during farrowing and postpartum could be partly linked with pain experienced by the sow, especially by gilts. To check this hypothesis, we administered oral meloxicam at sows and gilts (non steroidal anti-inflammatory drug, with well-documented analgesic properties in swine) to evaluate if alleviating pain with an analgesic at farrowing could reduce piglet crushing.

This field study was carried out in seven conventional farms; 352 sows in total were included; sows were randomly allocated to a Control group C (receiving no Metacam® before farrowing; n=171 sows) or a Metacam® group M (n=181) at entry of farrowing unit, ensuring the same parity distribution in the 2 groups (number of gilts: C=32, M=34). Metacam® 15 mg/ml oral suspension (Boehringer Ingelheim Vetmedica GmbH; meloxicam: 0.4 mg/kg of body weight) was administered just before farrowing.

There were no significant differences between the 2 groups with regards to total number of piglets born (C: 14.37, M: 14.10), number of piglets born alive (C: 13.35, M: 13.10), number of piglets stillborn (C:1.01, M:0.84), number of piglets mummified and number of piglets weaned (C: 11.34, M: 11.30). Concerning number of piglets crushed, there was no significant difference between the 2 groups (C: 0.94, M: 0.77). However, if evaluating only the gilts, the difference in number of piglets crushed was statistically significant (C: 1.34, M: 0.74, $p = 0,0327$ Chi2 test).

In conclusion, alleviating pain at farrowing, especially in gilts, should probably deserve more consideration by farmers and practitioners when trying to decrease piglet mortality in the farrowing unit.

P55 PRRSV INFECTION BY SEMEN IN A PIG UNIT IN NORTHERN IRELAND

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PRRSv is enlisted as a Notifiable Disease in Northern Ireland (The Diseases of Animals -Northern Ireland- Order 1981) after it was first diagnosed in 1997. The prevalence of infection in 2011 was 36.6% of the Northern Irish pig producers.
In April 2013, the main boar stud of the island, located in the Republic of Ireland, was diagnosed with PRRSv infection. This stud was supplying semen to around 70% of producers in the whole island. There was not guarantee of freedom of PRRSv infection from the whole month of March up to the 4th of April. PRRSv negative units that purchased semen during the period of infection were visited by the vet in order to assess clinical signs, blood testing of breeding and finishing pigs, and collecting unused semen bags dated up to the 4th of April. One 100 SPF sow unit had PRRSv clinical signs of early farrowings, stillborns, agalactia, lack of appetite in sows, newborn piglet scour with poor antibiotic response and cachexia in piglets and weaners. Sows inseminated before March 2013 were negative to PRRSv (ELISA) whereas the ones inseminated from Mach 2013 were positive to PRRSv (ELISA). Six of the 23 PRRSv positive (ELISA) serum samples collected were positive (RT-PCV) to PRRSv EU nucleic acid indicating viremia in the sows. Finishing pigs were still negative to PRRSv (ELISA) two weeks after the closure of the stud farm. Three of 5 semen bags collected were positive (RT-PCV) to PRRSv EU nucleic acid. These bags were dated the month of March indicating infection in the stud farm was for a period of time before closing it down. Nucleotide sequence identification of orf7 gen in the semen and serum supplied matched 97% with the PRRSv EU reference Lelystad. This finding proved that the herd became infected by semen. Production parameters were affected with a reduction of -1.4% in Conception Rate, -1.6 pigs Live Born/Litter, +0.3 pigs Born Dead/Litter, -1.6 pigs Weaned/Litter, +7.9% Pre-Weaning Mortality, +4.6 days Non-Productive Days, -4.6 pigs Weaned/Sow/Year when comparing data 6 months before PRRSv infection with 6 months after PRRSv infection. An attenuated-live PRRSv vaccine was introduced to the breeding herd immediately after diagnosis. Clinical signs disappeared within 3 months and production parameters recovered slightly.
Semen was been described as a route of infection experimentally. This is a concern due to the widespread use of artificial insemination in pig production. Better biosecurity protocols are required to be implemented in stud farms in order to avoid the spread of PRRSv to naïve herds, as has occurred in Ireland (2013) or Switzerland (2012).

P56 DETECTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS IN ORAL FLUID AND SERUM SAMPLES

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Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) is one of the major pathogens in the swine industry worldwide and causes high economic losses. In routine diagnostics, invasive and time-consuming sampling methods such as blood or tissue sampling, are used for the detection of PRRSV by ELISA or PCR. Therefore American scientists have adapted routinely used laboratory assays for the detection of PRRSV in pen-based oral fluids samples.
The aim of this study was to evaluate the ability of the detection of anti-PRRSV antibodies and PRRSV RNA in oral fluid (OF) samples and sera.
Four Austrian swine farms were selected for the present study. Blood samples and OF samples were taken from growing pigs in the age groups between 7 and 12 weeks. Pen-based OF samples were collected by hanging a biodegradable cotton rope (Sankt Josefs Werkstatt, Algasing, Germany) in the pen for 30 minutes. OF was collected by manually wringing out the rope out manually and centrifugation of the recovered fluid at 9000 g for 10 minutes. Afterwards serum and OF samples were tested for the presence of antibodies against PRRSV by ELISA (IDEXX HerdChek® PRRS X3) and PRRSV-RNA by RT-PCR. OF was tested with an adapted ELISA protocol which included a longer incubation time. Statistical analysis was conducted using SPSS® 20.0. Agreements between results obtained from OF and serum samples for both tests were determined using Kappa test (SPSS® 20.0). Based on the prevalence found on farms, a predictable sample size was estimated.
In this study two farms had positive results for both, PRRSV specific antibodies and RNA. Based on the two positive farms, ELISA results demonstrated a significant and almost perfect agreement ($k = 0.829$; $p < 0.001$) between serum and OF samples. PCR results showed a non-significant and fair agreement ($k = 0.347$; $p = 0.75$) between serum and OF samples. In the present study a sample size of six serum or three OF samples are needed to detect at least one PRRSV antibody positive pig (seroprevalences 76-94%). A sample size of nine samples was adequate to detect PRRSV RNA in both, serum and OF samples (virus prevalences 26-40%).
These results demonstrated that pen-based OF samples are a good addition for the detection of PRRSV specific antibodies and RNA during PRRSV surveillance in swine population.

P57 PREVALENCE OF SWINE INFLUENZA IN WILD BOARS IN POLAND*

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Objective. In recent years there has been a growing interest in the role of wild boars in the epidemiology of important infectious diseases, such as swine influenza (SI). It is related, among others, with an increase of the wild boars density worldwide. In Poland, the surveillance program of pigs for SI was initiated at the end of 90s. Recently, it was expanded by testing the prevalence of antibodies against SIV, as well as detection of its genetic material in biological samples of wild boars.

Materials and methods. Serological survey. In 2011/12 and 2012/13 hunting seasons 2052 blood samples (1042 in 2011/12 and 1010 in 2012/13) were taken from wild boars hunted in 7 out of 16 districts of Poland. All samples were tested using HI test with reference SIV strains representing 4 subtypes (H1N1, H1N2, H3N2, A(H1N1)pdm-like). All necessary reference sera, virus and RBC controls were included. The sample was considered positive when the antibody titer was ≥1:20.

Molecular survey. In total 297 lung tissue of wild boars were tested by reverse transcription real time PCR (RRT-PCR) with primers specific to conservative fragment of Matrix (M) gene.

Results. The antibodies against av-like swH1N1 were detected in 5.7% and 6.2% of the sera tested in 2011/12 and 2012/13, respectively. The survey for H1N2 subtype demonstrated lack of antibodies, while the seroconversion to H3N2 antigen reached 2.3% in 2011/12 and 2.7% in 2012/13. The antibodies to A(H1N1)pdm-like were evidenced in 1.8% and 3.8% in both seasons, respectively.

In 10 (0.95%) and 5 (0.5%) tested sera collected in 2011/12 and 2012/13, respectively, mixed infections with H1N1 and H3N2 viruses were noted. In addition, mixed infection with H1N1 and A(H1N1)pdm-like were detected in 17 (1.7%) sera collected in 2013.

In molecular investigation all lung samples were negative.

Conclusion. Many pathogens are shared by wild boars and domestic pigs, therefore presented results might be useful. They clearly demonstrate that in Poland H1N1 dominated in both, pigs and wild boars. Based on it we can state that SI could be endemically present in wild boars but the scale of the problem is significantly smaller in comparison to the pig. Since up to now we do not succeed in SIV isolation from wild boars we can speculate that they are not a significant vector or reservoir of SIVs for both, pigs and human.

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P58 CONTROL OF PRRSV TYPE 1 BY MCREBEL RULES COMBINED WITH VACCINATION

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Introduction. In sow herds infected with PRRS, McRebel rules together with vaccination can control the negative effects of the virus, and PRRS negative piglets can be weaned from an infected sow unit. The aim of the present study was to use same principles in an acute outbreak of PRRS to minimize the impact of the infection.

Materials and Methods. The case herd was a 2100 sow herd in the Danish SPF system. The herd had 6 farrowing stables in a continuous system with no washing between week batches. Number of liveborn started to decrease around week 34, 2012, and prewean mortality increased after week 36. PRRS (EU, type 1) was verified by blood samples week 38. Mass vaccination of sows, gilts and boars with PRRS MLV vaccine, type 1 was done week 39. Sows vaccinated earlier than day 70 of gestation were expected to farrow with virus negative piglets after week 47.

During the following weeks, McRebel inspired procedures were implemented and adjusted. Before the outbreak, piglets were sorted according to size, with surplus piglets collected in a "trailer". Skinny piglets were switched with good piglets, and piglets were moved between litters throughout the suckling period. Rare needle change, poor equipment hygiene, walking in and out farrowing pens, nurse sows made at weaning and piglets switched from first parturition sows, increased spread of infection.

Changed procedures: Only surplus pigs were moved and should not be collected before a nursing sow was ready. Big pigs were chosen for nursing sows. Piglets were considered newborn for 48 hours, and all litters were closed at day 5. No switching of skinny pigs with good pigs and skinny pigs should be collected as soon as possible at a collecting sow. Viremic pigs were killed, and change of boots was introduced.

Results. The number of stillborn was down to 1.3 per litter in week 47 as expected. But in week 48, the number of stillborn increased to 2.2 per litter, and the problem with stillborn and weakborn piglets continued. In week 51 the original field strain, 85 % homologous to Lelystad, was isolated from abortions, despite sow vaccination. Liveborn didn't normalize until week 4, 2013. Prewean mortality was back to normal week 1.

Discussion and Conclusion. Implementation of modified McRebel procedures was necessary to control the outbreak.

The successfull implementation of the new procedures was due to a strong motivation among employees (caused by the PRRS outbreak), combined with the fact that they could see the effect right away and that the procedures were easier and saved working hours.

P59 PREDICTORS OF FETAL SURVIVAL IN PREGNANT GILTS INFECTED WITH TYPE 2 PRRSV

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We have undertaken a large-scale project investigating the genomic and phenotypic predictors of PRRS resistance in pregnant gilts. One of the objectives of this study was to determine viral and immunological predictors of fetal death.
Purebred Landrace gilts were experimentally infected with type 2 PRRSV (NVSL 97-7895, 105 TCID50 total dose) at gestation day 85 (INOC; n=114), or were sham-inoculated (CTRL; n=19). Blood, collected on 0, 2, 6, and 19 or 21 days post inoculation (dpi), provided samples for measurement of PRRSV RNA concentration, leukocyte counts, and PBMC subsets using flow cytometry. Cytokine levels were measured in serum and supernatants of PRRSV stimulated PBMC by FMIA. Gilts were euthanized 21dpi and the fetal preservation recorded. Tissues were collected from each gilt enabling measurement of PRRSV RNA concentration in lung, tonsil, tracheobroncheal and reproductive LN. Multilevel modeling was used to determine significant treatment group differences in viral load, cytokine levels and PBMC subsets. Additional analyses were performed in inoculated gilts to determine if viral load, PBMC subsets and cytokine levels that differed significantly by group were associated with fetal mortality rate.
Levels of IFN-α, CCL2 and IFN-γ in serum, and IFN-α and IL-8 in supernatants of PRRSV stimulated PBMC differed significantly over time between inoculated and control gilts. Levels of IFN-α in serum on 2 dpi were positively associated with fetal mortality rate, as were levels of IFN-α produced by PRRSV stimulated PBMC collected on 2 and 6 dpi. Fetal mortality decreased as the numbers of T helper cells (sum of Th cells over the 19 dpi or area under the curve (AUC)) increased. Interestingly, absolute numbers of T helper cells and NK cells measured on 0 dpi (pre-inoculation), may be predictors and negatively related to fetal mortality ($0.05 > P < 0.1$). Viral load in reproductive lymph node, but not in other tissues or sera, trended to be associated with fetal mortality rate ($P=0.053$).
Fetal mortality was positively related to levels of IFN-α in serum and PRRSV stimulated PBMC supernatants, and PRRSV RNA concentration in reproductive lymph node (trend). By contrast, fetal mortality was negatively related to T helper cell counts. These parameters should be further investigated to determine their potential roles in the mechanisms of fetal death.

P60 BAYESIAN ESTIMATION OF SENSITIVITY AND SPECIFICITY OF HEPATITIS E ANTIBODY ELISA TESTS IN SWINE SERA

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Serological tests for Hepatitis E (HEV) antibodies detection are usually based on enzyme linked immunosorbent assay (ELISA), although the kit validation is complicated because of the lack of a gold standard reference test. The objective of this study was to estimate the performances of two ELISA tests (one commercial and one in-house kit) for detection of HEV antibodies in pig sera samples, using latent class models in a Bayesian analysis. Blood samples of 1488 pigs from 168 commercial farms distributed in three regions in the north-eastern Italy (Lombardia, Veneto and Friuli Venezia Giulia) were collected during years 2011-2013 as a part of a project to evaluate the prevalence of HEV infection in human (especially at-risk workers) and pig populations. A 2 tests – 3 populations model was designed, allowing for both conditional independence and conditional dependence between the two tests. The three regions were included in the model as three subpopulations with different level of prevalence, given the observed differences in the distributions of raw test results and no available information about disease prevalence in the study area. Uninformative priors were used for sensitivity and specificity of both tests and for population-specific prevalences. Posterior inference was done by calculating median and 95% posterior credibility intervals of the sensitivity and specificity of the two tests and the population-specific prevalences. Additionally, posterior estimates of positive and negative predictive values of the individual tests and sensitivity and specificity of the serial and parallel reading were provided. The 1488 blood samples were distributed as follows: 616, 352 and 520 in the regions with low, intermediate and high prevalence, respectively. Posterior estimates of population-specific prevalences confirmed the different levels of seroprevalence for the three regions. Differences in the performances of the two tests were highlighted.
Depending on the purpose of the test application, the researchers can decide to privilege the test with higher sensitivity or specificity. The authors consider that for research purpose a high sensitive test has to be preferred, while a test with higher specificity would be the best choice for surveillance or monitoring programs, due to Hepatitis E high prevalence spread.

P61 EFFICACY COMPARISON IN THE FIELD BETWEEN TWO PCV2 VACCINES: INGELVAC CIRCOFLEX® AND PORCILIS® PCV

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In a farrow-to-finish farm, suffering from clinical PCV2 in the fattening period, two PCV2 vaccines were compared: Ingelvac CircoFLEX® (Boehringer Ingelheim Vetmedica GMBH) and Porcilis PCV® (Intervet International BV).
In this side by side trial, a total of 1458 piglets were included, in two successive batches (733 in batch 1, 725 in batch 2), and followed from weaning (day of inclusion, at 3 weeks of age) to slaughter.
Piglets were randomly assigned to one vaccine or the other at weaning; vaccination was made 2 days after inclusion. The piglets of the 2 treatment groups were allocated in separate pens but in the same buildings. In total, 730 piglets were vaccinated with Ingelvac CircoFLEX® (group C) and 728 piglets with Porcilis® PCV (group P). Blood samples were collected at weaning, beginning, middle and end of fattening. Individual data were collected at the slaughterhouse, so that to assess individual growth parameters from weaning to slaughter.
Serological PCV2 quantitative PCR investigations confirmed PCV2 circulation in the 2 batches.
Results demonstrated a better efficacy of Ingelvac CircoFLEX® compared to Porcilis® PCV in this farm. Indeed, piglets vaccinated with Ingelvac CircoFLEX® grew faster (ADG from weaning to slaughter (g/day): group C = 650.5 vs group P = 624.5, Δ = + 26 g, $p<0.001$), leading to heavier carcass weights (Carcass weight (kg): group C = 89.1 vs group P = 87.2, Δ = + 1.9 kg, $p<0.001$), despite a younger age at slaughter (Age at slaughter (days of age): group C = 191.7 vs group P = 194.8, Δ = - 3.1 days of age, $p < 0.001$). While the mortality rate was numerically better for group C the difference was not statistically significant (Group C = 5.9 vs Group P = 7.5, Δ = - 1.6 %, ns). Statistics: Statistica®, Chi-Square and T-Tests.

P62 STABILIZING PRRSV WITH TILMOVET

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Since its appearance, Porcine Reproductive and Respiratory Syndrome (PRRSV) has been a challenge for the worldwide swine industry. Commercial vaccines have been used to control PRRSV, but the high heterogeneity of the PRRSV isolates is likely the main obstacle for constant good results. The immunity induced by one strain may only partially cross-protect to a different strain. This is why alternative approaches are needed in cases of recurrent outbreaks. The first step in controlling the disease on herd level is creating a PRRSV stable sow herd to limit vertical transmission towards the piglets. Horizontal spreading of the virus can be controlled by strict biosecurity measures, acclimatization of replacements gilts and strategic treatment with tilmicosin. The reason why tilmicosin, the active ingredient of Tilmovet®, helps to reduce clinical signs and spreading of the virus, is mainly by concentrating in pulmonary alveolar macrophages (PAM), the main target cell for PRRSV and in this way interferes with the replication and spreading of the virus. A Belgian closed 500 sow farrowing-to-finish farm in a pig-dense area was confronted, despite a high biosecurity level (5 week batch-farrowing and all-in-all-out) with symptoms indicative for PRRSV, such as mummification, stillbirth, late-term abortions, weak-born pigs and PHS (Periparturient Hypogalactia Syndrome), despite vaccination for PRRSV (European live strain on day 60 of pregnancy). A serological survey was conducted in December 2012 and revealed high and variable antibody titers in sows, piglets and fatteners. The mean S/P ratio in the sow herd was 2.07 with a range between 0 and 4.11. The vaccination for PRSSV was stopped. All sows were treated with Tilmovet® from 7 days before until 7 days after farrowing. All gilts were treated during 21 days before insemination and the piglets for 7 days after weaning. At six and ten months after implementing the strategic Tilmovet® treatment, new bloodsamples were taken. The S/P ratios in the sow herd decreased to a mean of respectively 0.64 and 1 and ranging between 0 and 1.97. All of the tested piglets stayed serological negative for PRRSV until 15 weeks of age, indicative for a PRRSV stable sow herd. Stable S/P ratios were achieved in the sow herd and the clinical symptoms of PRRSV were controlled. This resulted in an increase of the average weaned piglets per sow from 12.71 in 2012 to 13.73 in 2013.

P63 ADVERSE EFFECTS OF PANDEMIC INFLUENZA H1N1 ON GROWTH PEFORMANCE OF NORWEGIAN PIGS - A LONGITUDINAL STUDY

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This study investigated the adverse effects of influenza A (H1N1) pdm09 (pandemic H1N1) on the growth performance of Norwegian pigs (Landrace and Durocs) by multi-level linear regression or growth-curve modelling on longitudinal data of pigs at a boar testing station from 2009 to 2012. The four performance data as outcomes were average daily weight gain (ADG), feed conversion efficiency (FCE), age reaching 100kg and feed intake. They were based on daily automated recordings of feed intake and live weight of the boars from 33kg up to 100kg. The sample size of 1955 boars from 44 breeding herds consisted of 887 seronegative boars, 874 seropositive boars and 204 PCR positive boars. The PCR positive boars were grouped into 123 early infected, 34 mid infected and 37 late infected for the study of modifying effects of age of infection on the adverse effects and how long the effects would last. Results ($P<0.05$) showed that boars infected earliest experienced more pronounced negative effects on FCE and ADG than other infected groups. These boars took 1.7 days longer to reach 100kg. They also needed 7.4kg additional feed to grow from 33kg (mean) to 100kg. Other infected boars also needed additional feed to get to 100kg, by which they compensated for the milder negative effects of the virus to reach 100kg at the same time as the seronegative boars. The effects seen in the large seropositive group of unknown age of infection were similar to the late infected group of 37 boars which indicated that most of these 874 seropositive boars were also infected late in their growth phase. Clinical picture based on observations during a clinical outbreak from Aprils-July 2011 during the period of study, recorded 137 of 2045 (7%) boars with clinical signs. They included anorexia or lethargy (45%), respiratory signs (coughing, laboured breathing or nasal discharge, 39%) and pyrexia (above 39oC, 27%). The results from this study will allow Norwegian farmers and food safety authorities to revaluate this disease to see if biosecurity measures to control or prevent the incursion of this disease in pig herds are economical.

P64 PRACTICAL FIELD TRIAL ON THE EFFECT OF INTRANASAL MODIFIED LIVE PRRSV VACCINATION IN A PRRSV-AFFECTED PIG FARM: SEROLOGY AND VIRUS LOAD

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Porcine Reproductive and Respiratory Syndrome virus (PRRSv) still remains a major concern for modern pig industry. Current vaccination strategies are based on the use of modified live and killed PRRSv vaccines via intramuscular injection in sows and piglets. Several vaccination schedules have been promoted over the years, depending on the final purpose of vaccination, namely protection of the sow from abortion during pregnancy or piglets from early PRRSv infection during the post-weaning period. The aim of the present study was to evaluate the effectiveness of an intranasal application of a modified live PRRSv vaccine, registered for intramuscular injection, to piglets shortly after weaning on the PRRSv infection kinetics under practical field conditions in PRRSv-infected farms. Piglets (n=90) were randomy assigned to a treatment group: control (C-group, no vaccination), IN (IN-group, intranasal vaccination) and IM (IM-group, intramuscular vaccination). Piglets were vaccinated intranasally using a bovine IN vaccine applicator with a modified live EU strain PRRSv vaccine at 32 days of age (6 days post-weaning). Piglets were bled just before vaccination, 2 and 5 wk after vaccination and during the fattening period (15 wk of age). Antibody titers were analysed using a commercial ELISA test (Idexx) and expressed as S/P-ratio, with the cut-off level between negative and positive at 0.40. Piglet in all groups still had maternal antibodies at the start of the vaccination trial (S/P=0.60). At 2 wk post-vaccination, no significant difference among S/P ratios of the groups could be observed. In these piglets, the % ELISA-negative blood samples did also not differ among the vaccination groups. However, at 5 wk post-vaccination, a significant increase ($P < 0.10$) in the S/P-ratio of the C-group occurred as compared to the IN- and IM-group. The same significant result ($P < 0.001$)was present for the % ELISA-negative blood samples. During the fattening period, the IN-group showed a significant lower ($P < 0.10$) S/P-ratio as compared to the C- and IM-group. The % ELISA-negative blood samples also showed a significant difference between the IN-group and both other vaccination groups. In conclusion, the intranasal application of a live modified PRRSv vaccine in early post-weaning piglets could protect these piglets from PRRSv infection present on the farm in a comparable way as observed for the conventional intramuscular injection.

P65 MANAGING CO-INFECTIONS OF PRRSV AND SWINE INFLUENZA: A FIELD EXPERIENCE

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Diseases in swine production are becoming more complex and introductions of several pathogens in pig herds at the same time demand proper management and vaccination schedules. PRRSV and Swine Influenza Virus are two important viral pathogens, which contribute to enormous economic losses in swine production.
The field experience in a 140 sow farrow-to-finish farm in Germany shows that managing multiple viral infections is a challenging task. In September 2011 a so far PRRSV negative stable sow herd showed therapy resistant fever, decrease of farrowing rate in sows and increase in mortality of piglets. Blood samples from sows in November 2011 showed an infection with PRRSV and Swine Influenza. It became clear that concurrent to Swine Influenza a PRRSV Type 2 isolate was circulating whose sequence showed 93.7% homology to Ingelvac ® PRRS MLV vaccine strain. Therefore, mass vaccination of sows for PRRSV was decided starting in December 2011. Swine Influenza vaccination was maintained in gilts and sows. In piglets vaccination schedule was changed by adding Ingelvac ® PRRS MLV to the existing vaccinations against M. hyopneumoniae and Circovirus.
Implementing a close meshed vaccination program for PRRSV and Swine Influenza combined with optimized management and biosecurity standards (related to MADEC) was successful to improve farrowing performance in sows and reduce mortality in weaned piglets. This field case example demonstrates that infections can be controlled effectively by vaccination against the dominant respiratory pathogens combined with strict management procedures.

P66 FIELD EXPERIENCES WITH THE INTRANASAL VACCINATION OF MODIFIED LIVE PRRS VIRUS VACCINES IN PIGLETS: PRODUCTION RESULTS

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Clinical outbreaks of PRRSv regularly occur on pig farms even with a strict vaccination scheme. The partial protection by the current commercial vaccines and the contacts between piglets contribute to continuing viral circulation in vaccinated herds. In the present study, we investigated the possibility to use modified live PRRSv vaccines in piglets, registered for intramuscular use, by intranasal route. The objective of the study was to investigate whether intranasal vaccination induced a better immunity and could reduce viral circulation in weaned piglets. In two initial vaccination trials, piglets were vaccinated intranasally (IN, n = 242) between 2 and 4 weeks of age, using a commercial modified live EU strain PRRSv vaccine and compared to intramuscularly vaccinated piglets (IM, n = 88) and a non-vaccinated (C) control group (n = 306). During the nursery and fattening period, the following parameters were measured: weight gain, daily growth, mortality, the use of antibiotics and clinical symptoms of secondary bacterial infections. At slaughter, all longs were scored, using the SPES (Slaughterhouse Pleurisy Evaluation System) evaluation technique. During the nursery period, the intranasally vaccinated pigs (IN) showed better growth (385 versus 311 versus 320 g/day, respectively), a lower use of antibiotics (333 versus 422,5 versus 494 average daily doses, respectively) and a lower mortality rate (0.8 versus 1.1 versus 2.6 %, respectively) compared to the intramuscularly vaccinated groups (IM) and the control groups (C). During the fattening period, the intranasal vaccinated piglets showed better growth (710 versus 679 versus 663 g/day, respectively) and a better SPES score (29.5 versus 37.0 versus 48.0% severe pleurisy lesions, respectively) at slaughter. In conclusion, the present study showed that during the nursery and fattening period, the intranasally vaccinated piglets showed better technical results (average daily weight gain, mortality), a lower use of antibiotics and a better lung score as compared to piglets intramuscularly vaccinated and the control group.

P67 VALIDATION OF GELATINE FILTERS FOR THE DETECTION OF AEROSOLIZED PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS

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Gelatine filters were validated for the detection of airborne porcine reproductive and respiratory syndrome virus (PRRSv) in an isolator with high-efficiency particulate absorption air filters. European type modified live PRRSv vaccine was nebulized using a Walther Pilot I spray head at 2 bar and a flow rate of 30 l/min. The following factors that could influence the viability of PRRSv were studied: the shear forces generated during aerosolization, the storage time of the gelatine filter after air sampling and the gelatine filter itself. The effect of shear forces on virus survival was found to be negligible as was the effect of storage of gelatine filters. The virus concentrations of the inoculum and those of the aerosolized samples collected in sterile tubes were similar, this was also the case for virus concentrations of non-stored filters and those kept at 4°C for 4 or 22 hours. Likewise, the gelatine did not influence the concentrations of PRRSv when compared to the virus stock without it. Increasing the volume of air samples (from 67 to 201 l), reducing the volume of liquid to dissolve the filters (from 50 to 10 ml) and increasing the volume of dissolved filters for virus titration (from 0.05 to 0.1 ml) reduced the detection limit of airborne PRRSv from 4.2 to 2.7 log10 TCID50 per m3 air.
Considering both, the physical and biological efficiency, but also the ease of use and low costs, gelatine filters coupled to the MD8 Airscan seem suitable to monitor airborne PRRSv based on this preliminary study: relatively low concentrations of airborne PRRSv can be detected and overnight transportation of refrigerated samples does not affect significantly virus concentrations.

P68 ADAPTATION OF THE ROUTINE DIAGNOSTIC HAEMAGGLUTINATION INHIBITION TEST FOR SWINE INFLUENZA VIRUSES TO A RECENTLY ISOLATED H1N1 FIELD STRAIN

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In the Netherlands practitioners reported clinical influenza outbreaks on farms lacking seroconversion in the HI tests against the known H1N1, H1N2 and H3N2 strains, in spite of positive PCR and Influenza A ELISA results. On one of these farms nasal swabs and paired blood samples were collected for analysis in September 2012. The virus obtained from the nasal swabs was subtyped by PCR as a H1N1 strain (H1N1(2012), the Netherlands) and sequencing results confirmed it to be an avian like H1N1 SIV strain. Subsequently this strain was propagated, inactivated, and used as HI antigen to test the paired samples collected from this farm. While these samples gave a negative result in the HI test with the originally used H1N1 antigen, the H1N1(2012) antigen resulted in clear seroconversion in 3 of 5 animals. Subsequently a selection of routine samples from the field was tested with this new H1N1(2012) antigen with many positive results, showing this H1N1 variant being present in multiple farms in the Netherlands. In a field based SIV PCR validation study, virological samples and paired serum samples were collected, and serum samples were tested in the HI test. In five farms with a virologically confirmed H1N1 infection: 25/74 and 50/74 pigs seroconverted or showed a significant increase in titer against the 'old' H1N1 strain and the H1N1(2012) strain, respectively. In two farms the difference in diagnostic performance of both antigens was very significant with 0/11 and 1/15 versus 9/11 and 6/15 pigs showing serological proof of recent infection. Using the new H1N1 strain in routine testing of 956 samples resulted in 618 samples that were positive to the H1N1(2012) variant. Of these 956 samples only 7.8% had a titer higher with the old H1N1 antigen than with the H1N1(2012) antigen, in 4% this was only one dilution step. In 421 (44%) samples the HI results were equal (or negative) for both antigens and in 247 (25.8%) samples the HI result using the 'old' H1N1 antigen was negative whereas the HI test using the H1N1(2012) antigen gave a titer of 20 or more. Since only 2.5 % of the samples scored negative in the HI test using H1N1(2012) while positive in the HI test using the 'old' H1N1 strain, and this never concerned all the samples from one farm, it was decided to remove the 'old' H1N1 antigen from the routine HI test.

P69 CASE REPORT OF A PRRSV INFECTION VIA SEMEN AND CLINICAL OUTCOME IN PRRSV VACCINATED AND UNVACCINATED HERDS

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In November 2012 a boar stud in South Germany became infected with a PRRSV (EU-Type). Before the infection was detected, infected semen was transported to different sow farms. In the following weeks a clinical outbreak of the disease could be observed in many farms. The isolated virus was a European strain with a homology of 89.4% to the reference strain (EU-type vaccine strain). This virus was detected in all described cases. The virus was never detected before in Germany. The nearest related strains are a German strain and a Spanish PRRSV strain. A significant difference regarding the clinical signs between some vaccinated and all unvaccinated sow farms could be seen. Not all vaccinated herds developed severe clinical signs, but it was remarkable that in some of the vaccinated herds the rate of abortions prior to day 110 of pregnancy rose considerably for a short time period. It was remarkable that only 1 up to 3 groups (in a three week batch system) were affected; in the following groups no problems could be seen. In some vaccinated herds only some single animals were affected by the disease and no general outbreak of the disease was seen. In the unvaccinated herds only a few sows aborted, though in many groups the rate of weak and stillborn piglets was elevated. In these herds problems with PRRSV and related diseases like Streptococcus infections could be seen for a long time period and the financial damage was very high. Until now there is no explanation for these differences between some vaccinated and unvaccinated herds. It has to be questioned if in some vaccinated herds an "Antibody-dependent enhancement" has taken place.

P70 VALIDATION OF A NEW REAL TIME PCR FOR THE DETECTION OF PRRSV ABLE TO AMPLIFY ALL SUBTYPES OF TYPE 1 STRAIN (EUROPEAN GENOTYPE)- PRELIMINARY RESULTS

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PRRSV is a major threat to European swine production and causes economic losses in the pig industry worldwide. PRRS European (EU, type 1) viruses currently present 3 subtypes: subtypes 1 (Lelystad virus-like), 2 and 3 and tentative evidence was found for potential additional subtypes. Divergent subtypes of Type 1 PRRSV have produced high rates of false-negative RT-PCR results in diagnostic tests and a validated Real Time PCR that could detect all the Type 1 strains seems to be desirable. The aim of this study was to develop a new real time PCR validated to demonstrate the inclusivity for all the type 1 PRRSV. Analytical specificity (ASp) and Inclusivity: a library of 495bp, covering entire ORF7 and 5' and 3' bordering regions of 306 Italian subtype 1 field isolates and other available subtype 1, 2, 3 and 4 strains was analyzed to check conserved sequences. Putative primers and probes, were tested on the sequence library. One forward primer 2 reverse primers and a probe were chosen as virtually able to detect all subtypes of Type 1 PRRSv strains. Analytical sensitivity (ASe): 2 strains of PRRS type 1 viral titers 10^3.1 and 10^4.7 TCID50/50µl were used to determine the limit of detection (LOD) of the method. Linearity was found (R2=0.99) across seven 10 fold dilutions in negative porcine serum. The LOD of the method is equal to 10^-3.9 TCID50/50µl corresponding to 7 copies of virus per reaction. Diagnostic sensitivity (DSe) and specificity (DSp): 292 sera coming from 8 seronegative farms were tested and no positive amplification was observed before Ct40. This confers 100% (CI95% lower limit 98.38%) of DSp. To calculate the DSe 3 types of true positive samples were collected, briefly: a) 12 reference positive Type 1 PRRSv cDNA coming from EPIZONE ring trial and 4 cDNA of Eastern Europe strains (Bor and LT3 subtype 2; Sza subtype 3; Okt subtype 4) b) 25 sera and tissues coming from 12 artificially infected animals in 2 independent experiments c) 5 strains of Type 1 Italian field strains isolated on cell culture. All of these samples test positive before Ct38, conferring 100% (CI95% lower limit 89.78%). Field application: 97 sera samples collected in two conventional farms during the probable viremic stage of the animals (between 7 and 8 week of age) were analyzed and 92 were tested positive by the method. Conclusion: this new method can be considered fit for the purpose of Type 1 PRRS strain detection. Data on reproducibility of this method have to be collected to complete the validation process.

P71 EFFICACY OF PIGLET PRRS VACCINATION TO REDUCE VIRAL TRANSMISSION IN THE NURSERY

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PRRS vaccination has been demonstrated as an effective tool to control clinical signs related to PRRSv infection in its reproductive or respiratory presentation. Nevertheless PRRS vaccination has also epidemiological properties, as some PRRS vaccines have shown its capacity to confer virological protection and to reduce viral transmission. The aim of this study was to evaluate the efficacy of temporary piglet PRRS vaccination in order to reduce viral transmission in the nursery.

The trial was undertaken in a farm of 1000 sows (site 1+2), and 1000 fatteners. The farm was PRRSv positive , but considered stable, as no clinical signs were observed in the sows and no recirculation could be detected in the nursery. A classical vaccination program was conducted, based on vaccination and revaccination of negative gilts, and herd vaccination of sows every 4 months. Porcilis® PRRS (MLV European strain, MSD AH) was administered intradermally with the IDAL device. In March 2013, an increase of respiratory disease was detected in the nurseries, as well as a clear reduction in growth. PRRS infection was confirmed by PCR positive results of blood samples and oral fluids of 6 and 8 weeks old piglets , as well as by positive ELISA (IDEXX) results. In order to ensure that PRRSv was not recirculating in sows, PCR testing of lactating piglets was also done and were confirmed negative. PRRSv was also sequencedand showed a 89,6% of homology with Lelystad virus. It was decided to vaccinate 9 batches of 14 day old piglets with Porcilis PRRS IDAL to reduce viral transmission and to improve clinical signs and mortality.

Oral fluid samples from the first non vaccinated piglets after the strategic vaccination confirmed no recirculation of PRRSv in the nursery (negative PCR). Sampling procedure was repeated over 3 months with equal results. Mortality rate was reduced by 35% in the more than 4700 piglets post-vaccination compared to the prevaccination rates ($p<0,001$) (3,8% pre-vaccination vs 3,5% during vaccination vs 2,5% post-vaccination). Additionally, a clear decrease of respiratory clinical signs was observed, as well as a recovery in growing rates and a reduction in medication costs.

Piglet PRRS vaccination is an efficacious tool for the control of clinical signs and mortality rates, and its capability of reducing viremia and viral shedding makes strategic vaccination an option to reduce viral transmission in the nursery.

P72 CHARACTERIZATION OF THE HUMORAL IMMUNE RESPONSE ELICITED BY VACCINATION WITH PORCILIS® PRRS ADMINISTERED BY DIFFERENT ROUTES

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Porcine reproductive and respiratory syndrome (PRRS), is one of the most significant pig diseases. The economic relevance of the disease has encouraged the development of different vaccines. Until very recently, the recommended administration route of all of them has been the intramuscular (IM) route. However, immunity can be conditioned by the route of administration. Particularly, intradermal (ID) administration might enhance antigenic presentation because of the abundance of specialized antigen-presenting cells in the skin. Porcilis PRRS has been licensed to be administered by the ID route using a needle-free device (IDAL®). Nonetheless, not much information is available in relation to the immune response induced by vaccination by this route.

The aim of this study was to investigate the immune response elicited by vaccination by the ID route and, specifically, the development of neutralizing antibodies (NA) after primovaccination and revaccination. For this purpose, forty 2-month old growing replacement gilts were selected and randomly divided into two groups in a commercial farm. Both groups were vaccinated when the gilts were 70 and 170-days old with Porcilis PRRS, one by the ID route and the other one by the IM route. On days 0, 28, 60 and 128 the gilts were bled and sera used to determine the presence of NA. Additionally 20 gestating sows of different parities were selected and bled the day they were blanket vaccinated (D0) by the ID route, and on days 15, 28 and 56 after vaccination. Sera were used to study the secondary humoral immune response.

Vaccination of seronegative gilts elicited a measurable humoral immune response regardless of the administration route. However, NA appeared earlier in gilts vaccinated by the ID route and on day 60 of the study the titer of NA was higher in this group compared to gilts immunized by the IM route. Nonetheless, titers of NA were similar in both groups at the end of the study. Besides, vaccination of previously vaccinated and/or exposed sows elicited a secondary humoral immune response as determined by the increase in the titer of NA after vaccination.

These results indicate that Porcilis PRRS stimulates the immune system and particularly the development of NA regardless of the route of administration.

P73 HIGHLY VIRULENT STRAIN INDUCES SUSTAINED LEVELS OF PROINFLAMMATORY CYTOKINES COMPARED TO OTHER PRRSV-1 STRAINS IN THE LUNG

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Porcine reproductive and respiratory syndrome virus (PRRSV) show high differences among and within genotypes. Recently, several highly pathogenic PRRS virus (HP-PRRSV) strains have been described. The aim of this study was to compare the expression of different cytokines in the lungs of pigs experimentally infected with different PRRSV-1 strains. Sixty-six, 5-week-old, male piglets were inoculated by intranasal route (105.0 TCID50) with three different PRRSV-1 strains: Lelystad virus strain (LV), the British field strain (215-06) and the highly pathogenic Eastern European strain (SU1-bel). Animals were clinically monitored and euthanized at days 3, 7 and 35 post infection (dpi). At the necropsy, gross lung lesions were recorded and samples from each lobe of the right lung were routinely processed for histopathological and immunohistochemical studies, by using specific antibodies against PRRSV, IL1-α, IL-6, TNF-α, IL-10 and IFN-γ. Clinical observations showed that the SU1-bel group presented the highest mean clinical scores compared with the other infected groups. Typical gross lesions and PRRSV expression was first detected at 3dpi in 215-06 and SU1-bel groups, and from 7dpi onwards in all PRRSV infected groups. Histological lesions were detected in all PRRSV infected groups from 3 dpi onwards. SU1-bel infected animals presented the highest scores for gross and microscopic lesions as well as for PRRSV expression. These animals presented a sustained high expression of proinflammatory cytokines (IL-1α, TNF-α, IL-6), whereas LV- and 215-06- inoculated animals only showed a transient enhancement in some of these cytokines. LV- and SU1-bel-infected pigs showed a correlation between PRRSV and IL-1α. IFN-γ showed no changes throughout the study whereas IL-10 was increased at 3 and 7dpi in the animals infected with the 215-06 and SU1-bel strains. A correlation was detected in all inoculated groups between IFN-γ with respect to TNF–α and IL-6, and between IL-10 with respect to IFN-γ and IL-6. Our results point out that the virulent Eastern European strain of PRRSV (SU1-bel) induces a higher and/or sustained expression of IL-1α, TNF–α and IL-6 in the lungs when compared to other PRRSV-1 strains, which is associated with the severity of gross and histopathological lesions. The correlation of IL-10 with other cytokines might play a role in the modulation of the immune response, which needs further studies.

P74 CONTROL OF PCV2 SUBCLINICAL INFECTION: ROI COMPARISON OF 2 ONE DOSE VACCINES IN A HIGH HEALTH STATUS PIG HERD.

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Although the success of commercial PCV vaccines is unquestionable, the economic impact of different vaccines in subclinically infected herds is not fully understood. The objective of this study was to determine the efficacy of two one dose vaccines to control a subclinical PCV2 infection under production conditions.

A total of 69 595 pigs, originating from 4 sow farms in the same company, were assigned to 2 different treatment groups at 3 weeks of age (weaning age): Porcilis® PCV 2 ml, and Vaccine B, 1 ml. The Porcilis® PCV and Vaccine B group included 34 989 at 6.13 kg average and 34,821 at 6.2 kg average, respectively. Genetics, feeding and handling were the same, certified ISO 9000 and 14000. Pigs were raised up to 180 days of age under normal production conditions, separated by sex and treatment in each 20 wean to finish barns with 1700 pigs, and automatic feeding and ventilation. Variables measured included Average Daily Gain (ADG), Feed Conversion (FC), mortality, culls. Thirty five pigs from each group were also bled at 5, 8, 11, 16, 20 and 25 weeks of age for PCV2 qPCR and ELISA analysis. Results were analyzed by t-test ($p \leq 0.05$) and barn was considered the experimental unit.

Although none of the parameters, except for FC, were significantly different between the 2 vaccines, pigs in the Porcilis PCV group performed better overall. The results for Porcilis® PCV and Vaccine B were: slaughter age 181,5 days and 181,7 days; body weight 129,16 kg and 129,2 kg; ADG 0,766g and 0,765g; mortality and culls animals 4,93% and 5,24%; feed consumption 317,12 kg and 323,8 kg, respectively. In contrast, feed conversion for Porcilis® PCV was 2,583 and for Vaccine B 2,64. In addition, Porcilis® PCV were never viremic and had significantly higher antibody titers between 8 to 25 weeks of age. Vaccine B pigs were viremic at 11 (2,86%), 16 (8,57%) and 20 (2,86%) weeks of age.

In conclusion, Porcilis®PCV controls the PCV2 viremia, presents a strong and durable antibody response, resulting in an improved feed conversion that allowed the Porcilis®PCV vaccinated pigs to achieve the same body weight at 181 days of age, but with 6,68 kg less feed per pig. This finding has a considerable impact on the ROI and is in line with previous studies that report the positive impact of reduced viremia on production parameters.

P75 DETECTION OF VIRAL AGENTS IN DIARRHEIC PIGS IN AUSTRIA

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Diarrhea in suckling and weaner pigs is an important disease with negative economic influence in pig farming. Bacteria are often assumed to be the primary causative agents; tests for viral infections are in general not initiated. In this study different parts of the gastrointestinal tract of 55 diarrheic suckling and weaner pigs from 19 commercial farms in Styria/Austria were submitted for viral diagnosis.
The following parts of the digestive tract including ingesta were analyzed: stomach, duodenum, jejunum, ileum, colon and rectum. The choice of diagnostics was based on the paper of Benfield et al. 1984 (AM. J. Vet. Res. 45:1998). The analysis of 318 ingesta and 265 tissue samples for virus infection was performed using electron microscopy and histology.
The occurrence of viruses was proven in 80% of the diarrheic animals.61,4% of the virus positive animals were infected with one virus type, 34,1% with two different types, 4,5% with more than two virus types. Presence of coronavirus was dominant in 45,5% of the sampled virus positive animals followed by circovirus (in 43,2%) and rotavirus (in 40,9%). Calici-like viruses were detected in 16,6% of the infected animals. Calici-like viruses belonged to the noro- and sapovirus group because Hepatitis E virus was excluded via PCR. No other virus type (e.g. entero-, toro-, adeno- and parvovirus) was detected in our samples. The predominance of corona- and rotavirus agreed with the data of Lavazza et al. 2009 (Proc. MC2009 p. 443). In the animals with coinfection the combination rota-/circovirus was dominant, followed by corona-/circovirus, calici/circovirus, rota-/coronavirus and rota-/corona-/circovirus. Virus concentration was high in colon, moderate in rectum and in small intestine.
Histology gives information on the relevance of bacteria and viruses for the acute disease process. Pathogenic bacteria were present in nearly all cases of diarrhea with virus incidence. Therefore lesions induced by viruses or pathogenic bacteria were often detected simultaneously in the same sample. Tissue lesions typical for virus infections were shortening and fusion of intestinal villi. Viral lesions dominated in infected weaner pigs whereas bacterial lesions were more often found in suckling pigs.

P76 CAN THYMIDINE KINASE GENE PREDICT THE GENOTYPES AND PATHOGENICITIES OF AFRICAN SWINE FEVER VIRUS?

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The thymidine kinase (TK) gene of African swine fever (ASF) viruses representative of 21 of the 22 presently recognised p72 genotypes was amplified and sequenced with primers binding in regions flanking this gene. Sequence analyses revealed that the p72 gene and TK gene phylogenies recovered the same three major evolutionary lineages, whilst translation of the nucleotide sequences revealed that the presence of viruses containing frameshift mutations result in premature stop codons. Truncated proteins of either 185 (East African isolates) or 188/189 (southern African isolates) amino acids were predicted to result instead of the expected full-length 196 amino acid (aa) enzyme. In addition, these stop codons were generally followed by nonsense insertions of varying lengths, resulting in a larger than expected amplification product. A possible link between truncated TK gene products and the sylvatic cycle is suggested. The TK gene did not predict any virulence gene since both highly virulent and low virulent viruses fall within the three classes resolved by the analyses.

P77 REPRODUCTIVE PROBLEMS IMPROVED WITH THE USE OF PROGRESSIS®, AN INACTIVATED PRRS VACCINE ON A RUSSIAN FARM

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Introduction. PRRSV is still regarded as the pathogen with the highest economic impact in the swine industry in the world. The impact in the US was recently estimated around $ 580 million per year. As in most parts of the world the virus is also present in Russia in most of the pig farms. The aim of the present study was to compare in a farm with poor reproduction results the efficiency of a MLV PRRS vaccine versus PROGRESSIS® (MERIAL, France), an inactivated adjuvanted PRRS vaccine.
Material and methods. On a 2.000-sow farm in Russia, reproduction performance was poor. Mortality in the pre-weaned piglets was too high. Besides that many abortions in late gestation, high amount of repeat breeders and low farrowing rate were observed. The reproductive disorders were seen as a seasonal problem. A MLV PRRS vaccine was used before in the sows without clearly improving the situation. The basic PROGRESSIS vaccination (2 ml per dose, IM) on the whole breeding herd was performed, as follows: - Gilts received 2 injections 3 weeks apart, the second 3-4 weeks before insemination. - Sows were mass vaccinated twice 3 weeks apart. Re-vaccination was done every 60-70 days of gestation. Results were evaluated on the basis of the production parameters focusing on reproduction performance, mortality and average daily weight gain (ADWG). The periods with the MLV vaccine and PROGRESSIS (KV PRRS) were compared.
Results. After implementation of PROGRESSIS on the farm the reproductive performance of the sows improved. The percentage of abortions improved from 2.33% to 1.70% and the farrowing rate from 82.2% to 85.2%. The number of piglets weaned per sow per year increased from 22.1 to 23.8. Piglet pre-weaning mortality decreased from 6.78 % to 5.52%.
Conclusion. After starting using PROGRESSIS the reproduction results on this farm clearly improved compared to the period before, during which a MLV PRRS vaccine was used. The abortion rate was reduced with 0.63%, the farrowing rate improved by 3%, the pre-weaning mortality reduced by 1.26% and as result of that the number of piglets weaned per sow per year increased by 1.7 piglet. The seasonal reproductive disorders disappeared. These results were in coherence with a stabilization of the sow herd due to the implementation of the PROGRESSIS vaccination.

P78 THE USE OF CIRCOVAC® TO REDUCE PCVD ON TWO RUSSIAN FARMS

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Introduction. Post Weaning Multisystemic Wasting Syndrome (PMWS) was first identified in Canada in the mid-90's. Since then a complex of PCV2 diseases i.e. Porcine Circovirus (associated) Diseases (PCV(A)D) have spread in all parts of the world. PMWS is characterized by a sudden wasting in weaners and later PCVD have been more often seen in the finishers and as a reproductive problem. CIRCOVAC® (MERIAL, Lyon, France) was the first PCV2 vaccine registered in the world and still now the only one registered for piglets and sows. Vaccination of sows and of piglets has comprehensively been shown to be efficient in reducing clinical and subclinical forms of PCVD. The aim of the present paper was to report field experience of PCV2 vaccination with CIRCOVAC under Russian conditions.
Material and methods. The study was performed in two Russians farms, both PRRS positive and both in the PFO region.
Farm 1 is a 700-sow operation, weaning at 25 days of age. On the whole farm sows were vaccinated since March 2012 with CIRCOVAC, 2 ml IM as follows:
- Gilts received 2 vaccinations 3 weeks apart, the second 2-3 weeks before first insemination.
- Sows received their primo-vaccination twice 3 weeks apart, second vaccination 2-3 weeks before farrowing. Re-vaccination was done every 2-3 weeks before expected farrowing.
- The smaller piglets were also vaccinated with 0.5 ml IM, at 21 days of age, at weaning.

Data included in this study were collected from March 2012 till October 2013.
Farm 2 is a 2.500-sow operation. Only all piglets were vaccinated since April 2012 once with 0.5 ml IM of CIRCOVAC at weaning, i.e. at 21 days of age. The data recorded are from in total 50.000 piglets over a period of 1 year and compared with the year before. On both farms production data were collected and evaluated, with focus on mortality, weaning weight (only recorded on farm 1) and average daily weight gain (ADWG).
Results. Farm 1: Weaning weight increased from 7.5 to 8.3 kg. ADWG increased from 397 to 426 grams per day and from 765 to 804 grams in the weaners and in the finishers, respectively; total mortality decreased from 4.0 to 3.0% in the weaners and from 2.6 to 2.3% in the finishers. Farm 2: ADWG increased from 498 to 538 grams per day and from 649 to 712 grams per day in the weaners and in the finishers, respectively; total mortality decreased from 9.4 to 6.3% in the weaners and from 5.9 to 3.2% in the finishers.
Conclusion. Vaccination with CIRCOVAC of either sows plus the smaller piglets or only all piglets brought a substantial improvement in weaning weight (farm 1), growth and mortality rate on these two farms.

P79 PSEUDORABIES VIRUS GENETIC VARIABILITY IN RECENT WILD BOAR AND ARCHIVED DOMESTIC PIG SAMPLES

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Aujeszky's disease (AD), caused by Pseudorabies virus (PRV), is still present in domestic pigs in a number of European countries, such as for example Italy, Poland, Spain, Portugal and Croatia. Other countries, including Austria, successfully eradicated AD from their domestic pig populations; however, PRV infection is also common in European wild boar, as shown by a number of studies reporting detection of PRV DNA or antibodies in wild boar, as well as occasional cases of AD in hunting dogs. The presence of PRV in wild boar poses the potential threat of disease spill-over to domestic pigs, especially in regions where the latter are kept in an extensive fashion, such as in backyard holdings, with potential contact to wild boar, or where swill-feeding is practised. Experimentally, domestic pigs are easily infected by PRV of wild boar origin, although wild boar-adapted strains are apparently of low virulence for both domestic pigs and wild boar. However, it is largely unknown if PRV transmission from wild boar to domestic pigs effectively occurs in the natural context. A potential way to answer that question is to investigate whether PRV transmission between wild boar and domestic pigs has occurred in the past: phylogenetic analysis of PRV isolated from both domestic pigs and wild boar enables to look for genetic signatures of previous PRV transmission events. To this end, we have amplified and sequenced the partial glycoprotein C (gC) coding region of PRV from both wild boar and domestic pigs of Austrian origin. PRV of wild boar origin was obtained from 2005 – 2013 from hunter-harvested wild boar as well as from hunting dogs succumbed to AD, whereas PRV of domestic pig origin was obtained from archived tissue samples originating from AD-cases in domestic pigs from 1980 – 1991. Phylogenetic analysis of a 632 bp gC fragment showed that Austrian PRV sequences from wild boar and domestic pigs formed several separate genetic lineages. Remarkable genetic stability was evident within both wild boar and domestic pig PRV lineages, with little change in nucleotide or amino acid sequence over extended periods of time. Interestingly, domestic pig PRV lineages originating from archived samples were more closely related to PRV lineages of wild boar origin than to each other. This indicates that transmission of PRV to domestic pigs and wild boar has occurred from common sources at several occasions in the past and demonstrates the necessity to vigilantly observe PRV presence in wild boar, as well as to encourage genetic typing of PRV from both wild boar and domestic pig origin.

P80 COMPARISON OF THE USE OF 3 DIFFERENT PCV2 PIGLET VACCINES IN THE FIELD UNDER RUSSIAN CONDITIONS

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Introduction. Porcine circovirus (associated) diseases (PCV(A)D) are one of the main health problem in the porcine industry. The disease in piglets has become endemic and can nowadays be seen with milder clinical signs than in the past, from severe to unapparent, from the weaning age to the finisher stage.

Several commercial PCV2 vaccines are used in piglets in the marketplace. The aim of the present paper is to report a large field trial comparing 3 different piglet vaccines against PCV2.

Material and methods. The study took place in a large Russian 15.000-sow, farrow-to-finish swine farm in one of their 5.000 sows units and involving 4.645 piglets. Piglets were assigned at random to one of three groups and vaccinated at weaning at 21-25 days of age with one of three commercial vaccines:

- Group A = 1.654 piglets, injected with 0.5 ml IM CIRCOVAC® (MERIAL, France)
- Group B = 1.506 piglets, injected with 2.0 ml IM vaccine A
- Group C = 1.485 piglets, injected with 1.0 ml IM vaccine B

All pigs were kept in the same environmental conditions. Production data were recorded with the focus on average daily weight gain (ADWG) and mortality in the different age groups for the period of March 2013 till October 2013.

Results.

ADWG in post-weaning in groups A, B and C was respectively 420, 420 and 423 grams per day.

ADWG in the finishers in groups A, B and C was respectively 680, 648 and 651 grams per day.

Post-weaning mortality in groups A, B and C was respectively 6.1%, 6.3% and 6.0%.

The finisher mortality in groups A, B and C was respectively 4.0%, 4.0% and 3.9%.

Conclusion. In conclusion, the 3 piglet vaccines used statistically demonstrated the same efficacy when looking at ADWG postweaning and mortality in postweaning and finishing. Piglets vaccinated with CIRCOVAC displayed a significant improvement in the ADWG in the finishers of respectively 32 and 29 grams per piglet per day compared to those vaccinated with the other vaccines.

This study performed under Russian conditions showed that CIRCOVAC used for piglet vaccination gives at least as good results than the two other commercial vaccines.

P81 USE OF PROGRESSIS® TO IMPROVE REPRODUCTIVE DISORDERS ON A RUSSIAN FARM

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Introduction. Porcine Reproductive and Respiratory Syndrome (PRRS) has been provoking losses in pig farms for more than 20 years all over the world. It's impact differs the situation on the farm including management, internal and external biosecurity and the presence of other pathogens. The clinical manifestations are especially influenced by the PRRSV strain present on the farm and the level of immunity of the herd. The aim of the present study was to evaluate the benefits of a whole farm PRRS vaccination program started with PROGRESSIS® (Merial, France), an inactivated, adjuvanted PRRS vaccine to reduce the deleterious effects of the virus and improve the production results.
Material and methods. A historical study was run in a 700-sow Russian pig farm experiencing poorer reproduction performance than expected, i.e. late abortions, too many repeat breeders and a low farrowing rate. These reproductive disorders were mainly seasonal. In addition, mortality in the pre-weaned piglets was high.
A vaccination program with PROGRESSIS was implemented on the whole farm (2 ml per dose, IM):
- gilts received 2 vaccinations, 3 weeks apart, the second 3-4 weeks before first insemination;
- sows were mass vaccinated also twice, 3 weeks apart. Re-vaccination was done every 60-70 days of gestation.

The results were evaluated on the basis of the production parameters focusing on reproduction performance and pre-weaning mortality.
Results. After implementation of the PROGRESSIS vaccination protocol, reproductive performance improved. The percentage of abortions declined from 1.5% to 0.8% and the farrowing rate improved from 83% to 87%. Pre-weaning mortality in the piglets went down from 9% to 6%. The number of piglets weaned per sow per year went up from 23.3 to 23.8.
Conclusion. The implementation of PROGRESSIS vaccination on this farm appeared to improve the reproduction performance with a 0.7% reduction of the abortion rate, a 4% improvement of the farrowing rate, and a 3% reduction of the pre-weaning mortality. All in all, this resulted in an increase of 0.5 piglet weaned extra per sow per year.
The PROGRESSIS vaccination protocol appeared helpfull to improve reproduction performance on this Russian farm.

P82 BOOSTER EFFECT OF SWINE INFLUENZA VIRUS INFECTION ON SEROLOGICAL RESPONSE TO GRIPOVAC®3 VACCINE IN AN ITALIAN FATTENING UNIT

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Introduction. Gripovac®3 is a trivalent vaccine containing H1N1, H1N2 and H3N2 swine influenza virus (SIV) subtypes, considered endemic in pigs in Western Europe. This study aimed to demonstrate the booster effect of a natural SIV passage on serological titers against SIV in fatteners.
Materials and methods. The study was conducted in a 1000-sow multisite farrow-to-finish system located in Italy. The piglets are vaccinated against PCV2 and Mycoplasma hyo. but no flu vaccination is implemented. The fattening units operate according all-in all-out system.
A total of 27 post-weaners was randomly selected. Thirteen pigs were vaccinated against SI with Gripovac®3 concomitantly to Aujesky's Disease (AD) vaccination (AKIPOR®6.3) scheme: twice before turn-to-fattening (70 & 91 days of age - doa) and at 180 doa during fattening (group AD+SIV). The remaining 14 pigs were vaccinated only against AD (group AD) as performed in the rest of the herd. The 27 pigs were blood sampled at 70, 125, 180 and 250 doa. Antibodies against SIV and proteins gE and gB of AD virus were titrated using respectively Haemoagglutination Inhibition Tests to Italian SIV strains and ELISA. The herd was clinically monitored from 70 doa to slaughter. Nasal swabs sampling for SIV detection were planned in case of respiratory signs.
Results. The SIV-negative status of the post-weaners was confirmed. Respiratory symptoms were detected few days following turn-to-fattening in pigs unvaccinated against SIV. Five nasal swabs resulted positive to SIV by RT-PCR and subtype H3N2 was isolated. In this context, clear seroconversion against H3N2 subtype was evidenced in each experimental group at 125 doa with higher H3N2 titres in group AD+SIV as compared to group AD at 125 doa ($p<0.001$). Antibody titers then decreased until booster injection at 180 doa. Between 180 and 225 doa the H3N2 antibody titres increased in both groups but remain higher in the AD+SIV group. No seroconversion was observed against H1N1 and H1N2 over the whole experimental period.
No antibody titre increase against AD gE protein was observed during the study whereas a clear and long-lasting seroconversion against AD gB proteins was evidenced in all the pigs both following primo-immunization and booster injection. AD titres were observed during the whole fattening period with no statistically significant difference between the groups ($p>0.05$).
Conclusion. Under the conditions of the study, a SIV passage boosted flu antibody titres, thus evidencing the serological efficacy of the vaccination program implemented.

P83 INTRODUCTION OF PRSSV VACCINATION WITH PROGRESSIS® IN AN ITALIAN HERD VACCINATING SOWS WITH CIRCOVAC®: A CASE REPORT

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Introduction. This case report illustrates the benefits of modification in herd management practices and particularly the progressive introduction of PRRSv vaccination with PROGRESSIS in addition to PCV2 vaccination (CIRCOVAC) on reproductive performance in a well-managed operation located in Italy.
Case Description. The farm was a 1200-sow farrow-to-finish operation managed under a continuous flow management system. The gilts came from a self-replacement stock housed separately from the sows until their first farrowing. The herd was Aujeszky's disease free and PRRSv positive as well as PCV2 positive. PCV2 vaccination was introduced in 2010 and PRRSv vaccination started in gilts only in 2011, then progressively in the whole herd in 2012. In the same time, feed characteristics were improved, weaning age delayed from 3 to 4 weeks of age. Sow medication at farrowing and a modification of the genetic background of the gilts were introduced mid-2013. Fertility and reproductive data was collected from 2010 to end 2013.
Results and Discussion. The modifications introduced in the reproductive cycle schedule led to a decrease of the number of parities per sow. A clear lengthening of gestation duration (114.56 to 116.01) was observed over the monitoring period as well as a definite improvement of the gestation rate (83.47% to 92.5%). Following the implementation of PRSSv vaccination in gilts, the gestation rate in gilts increased from 82.8% to 91.7% in 2012. The hot 2013 summer and a behavior change are supposed to have negatively impacted gilt gestation rate in 2013. Following sow vaccination implementation, the farrowing rate ranged between 91.2% in 2012 and 91.6% in 2013 for the whole herd. Consequently, more than a 10% improvement of the farrowing rate of the whole herd was obtained between 2010 and 2012-2013.
A clear improvement of prolificacy indexes was observed between 2010 and 2012 despite the lengthening of the reproductive cycle. The number of born alive piglets per year increased by 3.97 per dam between 2010 and 2012. At the time of writing, this index is impacted for year 2013 by the seasonal variation. The number of weaned piglets per dam and per year increased by 3.34 piglets from 2010 to 2013 (from 24.87 to 28.21).
Conclusion. This case report showed PRRSv vaccination implementation with PROGRESSIS in a herd vaccinating sows with CIRCOVAC as an effective tool to help improving fertility and prolificacy parameters in a herd with good performances and management practices under Italian conditions.

P84 REPRODUCTIVE PARAMETERS AND ECONOMICS EFFECTS OF PRRS VIRUS IN PIG FARMS OF MEXICO

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PRRS is currently the most important economically disease afecting pig production worldwide. Nieuwenhuis et al. (2012), assessed the economic efect in nine breeding herds infected with PRRS virus, estimated losses from €6,084 up to €134,292 for farm, with €62,021 average. The economic losses vary from €59 to €379 per sow, the average of economical losses per sow is €126. The study was based on information from 650 sows in production. Reproductive, productive and economic parameters were compared with analysis of variance to check statistically significant differences between means. To find out which groups are statistically different, an additional Tukey test was performed. In the breeding area: the fertility was declined by 10.37% in positive sows compared to negative sows. No statistical difference was found between treatments in the rest of the variables analyzed. In the production line and economic evaluation: An increase in the cost of production per kilogram of pork produced and sold of €.33 for the positive group compared to the reference group in 2010 was observed. The cost per sow per year showed an increase of €40 in the group of positive sows compared to the reference group in 2010. The income per sow per year showed a decrease of €42.22 in the positive group compared to reference group in 2010 and €13.19 compared to negative group, finding no statistical difference between groups. We found a reduction in the profits obtained in the group of positive sows between €9.78 and €82.21 per sows per year, compared to the treatment of negative sows, coinciding with the results of the study published by Holtkamp et al. (2012), on the economic impact caused by the PRRS virus in the U.S. reporting average losses of €84.26 per sow per year.Reproductive parameters show that fertility declined coincides with Z. Pejsak et al. (1997) and Neumann et al. (2005).

P85 NOVEL ELISAS FOR DIFFERENTIATED DETECTION OF ANTIBODIES AGAINST EITHER PRRSV EU OR US IN ORAL FLUID

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Background. In the Danish SPF system PRRSV surveillance is based upon the ability to differentiate between the American (US, Type 2) and the European (EU, Type 1) strain of PRRSV. Danish swine herds are declared either free from PRRSV or positive to either PRRSV EU or PRRSV US - or both strains. The blocking ELISAs used in this surveillance are only validated for serum. Based on the same antigens (supplied by B. Strandbygaard and A. Bøtner, National Veterinary Institute, Denmark) as in the blocking ELISAs, indirect ELISAs for PRRSV EU and US were optimized for analysis of oral fluid (OF) samples.

Materials and methods. Samples for validation were obtained from PRRSV positive and negative Danish herds in collaboration with practitioners from Odder Svinepraksis. OF pen pools were collected by hanging a rope in selected pens. For comparison, blood was drawn from all pigs in each OF-sampled pen. A total of 2551 sera and 281 OF pools were sampled, representing pigs from 15-100 kg. All sera were tested in the PRRS blocking ELISAs used in the SPF surveillance, and these results were used as a gold standard for the novel OF indirect ELISA: A PRRSV-positive pen was defined as a pen with at least 50% pigs positive in the blocking ELISA.

Results. In the novel US OF ELISA, choosing a pen specificity of 0,97, and a cut off value of 84 (calibrated OD value), the herd sensitivity with 10 pens sampled and a within herd pen prevalence of 0,2 would be 0,83. Likewise in the EU OF ELISA, with a pen specificity of 0,97 and a cut off value of 219 (calibrated OD value), herd sensitivity would be 0,78. This implies that if you take 10 rope samples, i.e. sample 10 pens, in one herd, the herd specificity will be 0,74 for both ELISAs.

As expected, a slight cross reactivity was found between the EU ELISA and the US ELISA. However, use of the abovementioned cut offs results in a reasonable specificity towards the heterologous strain in the two ELISAs. Thus, specificity to the US strain in the EU-positive herds is 74%, and specificity to EU in the US herds is 90%.

Conclusion. Based on these data we will continue developing a test system for OF, that can be used as a supplement for the serum based surveillance of PRRSV EU and US in Danish swine herds.

P86 CIRCOVAC® VACCINATION IN PIGLETS CONTROLS THE CIRCULATION OF PORCINE CIRCOVIRUS TYPE 2 (PCV2) THROUGHOUT THE WHOLE FATTENING PERIOD

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Introduction. It has been proven recently in a Danish field study that non-vaccinating farms have circulation of PCV2 in their finishing herd. The objective of this study is to assess the extent of control of viral PCV2 circulation in finishers in several Danish farms by vaccinating the piglets with CIRCOVAC® (MERIAL, France).

Materials & Methods. Eight Danish swine farms rearing pigs vaccinated the piglets once at weaning at an age of three weeks with 0.5 mL CIRCOVAC. The 8 farms in the study either started PCV2 vaccination (n=5) or changed from the use of a competitor PCV2 piglet vaccine (n=3) 6 to 14 months before. The farms started vaccinating due to Porcine Circovirus Associated Disease(s) - PCVAD(s).

The piglets were followed during their fattening period from 30 till 100 kg of body weight: On each farm, a cross sectional sampling of 4 sets of 5 blood samples was done for a total of 20 samples per farm. The 4 groups were defined by weight intervals: "30 to 35 kg", "40 to 50 kg", "60 to 70 kg" and "80 to 100 kg". The 5 serum samples from pigs in the same weight interval from the same farm were pooled and assayed for PCV2 viral load by a quantitative-PCR technique. The PCV2-qPCR was performed by DTU-Veterinærinstituttet, Fredriksberg, Denmark (www.vet.dtu.dk). Results are given in log 10's. Cut off is below 3 and then regarded as negative, 3 to 5 is low, 5 to 7 is moderate and above 7 is high level of presence of PCV2.

Results. No PCV2 DNA was identified in any of the 32 pools of serum assayed thus demonstrating the absence of PCV2 circulation in any of the 8 test sites.

Discussion. This survey indicates excellent control of the PCV2 viremia throughout the fattening period following active immunization by 0.5 mL CIRCOVAC at the age of three weeks. It confirmed that PCV2 circulation is clearly controlled following vaccination with CIRCOVAC.

P87 FIELD EXPERIENCE USE OF UNISTRAIN AFTER PERIOD OF REPRODUCTIVE PROBLEMS DESPITE VACCINATION AGAINST PRRS

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Introduction. A farm of over 1200 breeding sows in the south of the Netherlands had too many returners after insemination, starting from day 21, and abortion in all stages of pregnancy. This farm was using a MLV PRRS vaccine other than Unistrain. A PRRSV infection was suspected and diagnosed through serology and PCR. The first mass vaccination in of Unistrain in sows was performed in June 2013, the second in September 2013.

Material and Methods. Before the first use of Unistrain, extensive serology was performed to identify the way PRRSV was spreading on the farm and to decide what was the best scheme to vaccinate against PRRSV. Serology was done at Hipra laboratories on the CIVtest suis PRRS E/S and at the vet practice DAC Zuid Oost. Technical data were extracted from the farm's management system, Pigmanager. The use of antibiotics on the farm was also monitored and registered as animal dosage per average animal/year (DDD).

Results and Discussion. According to the observation of farm personnel and the vet, the sows are more quite with the vaccination then with the vaccination used before, indicating less side reaction in the sows after vaccination. It was also mentioned that piglets were less aggressive towards each other after the sow vaccination started. From the management system it was clear that the clinical situation on the farm was improved. Comparing 16 weeks before and 16 weeks after the first vaccination of Unistrain farrowing index increased from 2,31 to 2,51. Days lost per culled sow decreased 6.1 days and the farrowing rate increased 6,1%. The serology performed at the end of May showed very high titres in piglets of 10 weeks indicating a recent infection with field virus, and also very heterogeneous titres in the sows. When serology was performed again in October the titres in the piglets were all very low (average 5,9 on the CIV-test), indicating very low circulation of field PRRSV the weaned piglets on this farm after 2 vaccinations in the sows. Antibiotic use showed a decrease in the last weeks of 2013 this trend will be further analysed.

P88 SWINE INFLUENZA VIRUS SURVEILLANCE IN ITALIAN PIG FARMS: 2011-2013

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Three principal different subtypes of Influenza A virus are circulating in the Italian pig population: H1N1, H3N2, H1N2. H1N1pdm virus and various reassortant strains have also been detected. A current insight into the epidemiology of swine influenza virus (SIV) in Italian pig farms was considered appropriate because of the antigenic and genetic variability of SIV. In 2011, 2012 and 2013 year a passive virological surveillance in the Northern Italy area pig population was conducted and respectively 1039, 1186 and 1001 lung samples and nasal swabs from respiratory disease outbreaks in pig farms were collected. We tested clinical samples for influenza A virus by a real-time RT-PCR test targeting the M gene and, for virus subtyping, by Multiplex RT-PCR test. In order to perform SIV isolation, PCR positive samples were inoculated onto various substrates. Antigenic characterization was performed by HI test using optimized protocols and reagents. A total of 3206 clinical samples were tested using real- time RT-PCR. We obtained 146 (14%),133 (11,4%) and 136 (13,5%) SIV positive cases, from samples collected in 2011, 2012, 2013 respectively. Virological examination performed on the PCR positive samples led to the isolation respectively of 83, 66, and 70 SIVs. Subtype H1N1 was isolated at stable rate during the considered period: 46,9%, 51,5% and 47,1%. H1N1pdm SIV rate raised in 2013 (10%) compared to results obtained in 2011 (4,8%) and 2012 (3%). In 2013 it was recorded a lower circulation rate of H1N2 subtype (7,14%) compared to 2011 and 2012 (26,5% and 28,7%) while, in the same year, H3N2 subtype was isolated with higher rate (28,5%) compared to 2011 (18%) and to 2012 (13,6%). In 6 clinical samples (2,6%) it was possible to reveal, by Multiplex RT-PCR test, that two different SIV subtypes were present contemporary in the same sample. Moreover the Multiplex RT-PCR detected also the circulation of 1% of H1N1 reassortant strains (human-like HA), 3,1% of H1N2 reassortant strains (avian–like HA). Only a H1N1pdm reassortant strain was identified in the period. The study highlights that H3N2 SIV subtype seems to circulate more frequently in Italian pig farms recently and that 10% reassortment cases occurred among the SIV lineages. Moreover 2,6% rate of SIV mixed infection was recorded. These data are indicative to persist in SIV surveillance and even to master the studies in genetic characterization of SIVs to trace the genetic changes of SIVs in a so evolving epidemiological picture.

P89 PCVD IMPROVED AFTER PIGLET VACCINATION WITH CIRCOVAC® ON A RUSSIAN FARM

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Introduction. Porcine circovirus diseases (PCVD) are one of the scourge that have plagued in the porcine industry since mid-90's. The signs of the disease in piglets may be from serious (Postweaning Multi-systemic Wasting Disease, PMWS or PCVD-SD) to mild (sub-clinical infection or PCVD-SI), from the weaning age to the finisher stage. Several commercial PCV2 vaccines have been successfully used in piglets in the marketplace. The aim of the present paper is to report the effects of the use of 2 different piglet vaccines against PCV2 on performance compared to non-vaccinated controls, in a large and up to date Russian pig farm.
Material and methods. The study was run in a Russian1.500–sow operation where weaner mortality rate and average daily weight gain (ADWG) in both weaners and finishers were found below expectations. Of one weekly batch production, 3-week-old piglets were randomly assigned at weaning to 3 groups and vaccinated as follows:
- Group A = 1.250 piglets, Circovac 0.5 ml IM,
- Group B = 1.250 piglets, vaccine B 2.0 ml IM,
- Group C = 1.000 piglets, no vaccination.

ADWG, mortality rate and age at slaughter data were collected for a 7-month period of time and compared (February 2012 till August 2012).
Results. In the post-weaning section, ADWG was 405, 385 and 360 g/day in groups A, B and C, respectively. In the finisher barn, ADWG was 800, 730 and 700 g/day in groups A, B and C, respectively.
Mortality in post-weaning was 3.5%, 4.4% and 6.5%, respectively. Mortality in the finishers was 2.5%, 2.8% and 3.5% in groups A, B and C, respectively. Age at slaughter was reached for groups A, B and C at 190, 197 and at 210 days of age, respectively.
Conclusion. The production data of the piglets vaccinated with CIRCOVAC improved significantly. The ADWG increased in the weaners of CIRCOVAC vaccinated group by 20 and 45 g/day compared to the other groups, respectively and by 70 and 100 g/day in the finishers. Piglets from the CIRCOVAC group reached slaughter weight respectively 7 days and 20 days earlier than the group vaccinated with the other commercial vaccine or the control group . Also the mortality rate was lower in the CIRCOVAC group. This study on a large modern Russian farm, showed that CIRCOVAC vaccination improved pig performance compared to non-vaccinated pigs and also pigs vaccinated with a other commercial vaccine.

P90 PRRSV AND H1N1 DETECTION IN INDIVIDUAL BLOOD SAMPLES, NASAL SWABS AND PEN ORAL FLUIDS IN LONGITUDINAL STUDY IN POST WEANING PIGS

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Oral fluids have recently been used as a surveillance tool for Porcine reproductive and respiratory syndrome virus (PRRSv), Swine Influenza virus (SIV) and Porcine circovirus-2 (PCV-2) using reverse transcription polymerase chain reaction (RT-PCR). Methods to collect samples and analysis is most important to detect viruses. The sampling of oral fluids through cotton rope, where animals chew on the material and deposit oral fluid, represents an easy method to collect samples in pig pen. The aim of this study was to estimate and compare the detection of PRRSv and SIV with different sampling approaches through individual blood, nasal swab and oral fluid. The study was carried out in farrow to growing herd in North Italy with endemic PRRSv and H1N1 infection in the post-weaning site. Pigs were sampled in a longitudinal study of 5 groups of 15 pigs from 25 to 85 days of age. Three sampling were included in the protocol: 25 days of life when/during? weaning (T1), at 55 days (T2) and at 85 days of life (T3). Samples were tested by RT-PCR.
The analyses of PRRSv showed that the infection was detected earlier in blood samples compared to nasal swabs and oral fluid with a great variability among the three sampling times. The overall prevalence in blood samples was 66, 85 and 93% at T1, T2 and T3 respectively. In contrast, virus was detected later in oral fluid reaching comparable values to blood samples in T2 and T3 with overall prevalence of 20, 86 and 86%. Nasal swabs showed the lowest levels of infected animal with prevalence of 9, 22 and 25%.
H1N1 was mostly detected in oral fluid with overall prevalence values of 13, 40 and 20% while in nasal swabs virus was detected in 0, 4 and 6% of the samples respectively.
Surveillance of H1N1 and PRRSV in post-weaning pigs by oral fluids has allowed to know and monitor the health status of different batches of pigs for fattening before transfer.
Oral fluid sampling is a promising approach for increasing the efficiency and cost effectiveness of virus surveillance in swine herds even if the infection status of the barn is considered variable. It is easy to performed, doesn't stress to animals, it is a rapid testing method and shows reliable diagnostic performance.

P91 ORAL FLUIDS DETECTION OF PRRS ANTIBODIES: FIELD RESULTS

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Oral fluids (OF) collection with a cotton rope can be used to detect PCV2, SIV and PRRSV. It is an easy, fast and welfare ready sampling method. This method is used for monitoring circulation of pathogens in swine populations. In France, a test kit is now available for detection of PRRS antibodies in OF. However, no field data is available yet. We decided to compare OF PRRS antibodies detection with PRRS antibody detection in sera, in field conditions.

9 farms were investigated. 2 farms were free of PRRS, 5 had a low circulation and 2 had a high circulation. Pigs were sampled between 10 to 22 weeks of age. For each pen of 10 to 25 pigs included 10 individual blood samples were compared to 1 cotton rope.

OF and blood samples were sent to the ANILAB laboratory at 4°C. All sera were analyzed individually with ELISA semi-quantitative IDEXX PRRS X3 Ab Test. OF were analyzed with ELISA kit IDEXX PRRS OF Ab Test. ELISA results were considered positive if E/P>0.4.

Results. OF positive and sera positive : 9 pens ; OF negative and sera positive : 0 pen ; OF negative and sera negative : 5 pens ; OF positive and sera negative : 3 pens.

All pens with at least one serum positive (in 10 tested) had a OF positive. This result is in agreement with technical specification of the IDEXX OF Ab test. Sensitivity is given to be about 85% when prevalence is above 12%.

3 pens (of 25 pigs each) with all sera negative gave result not in agreement with positive OF result. In some cases, OF was just higher the positive threshold. It means that it might be useful to establish a doubtful range of E/P in OF. We can also hypothesize that positive pigs where not blooded. According to IDEXX, serum in feed can cross react with the OF test and give false positive.

Finally, we have noticed that high sero prevalence (0.8) was correlated with a high E/P in OF (R2=0,81). OF could be a convenient tool to estimate prevalence in a pig heard. This point needs more data to conclude.

Our field results are in agreement with IDEXX PRRS OF Ab test and confirm that this method will be a relevant method to simplify PRRS monitoring.

P92 EFFICACY COMPARISON OF LIVE AUJESZKY'S DISEASE VACCINES IN PIGS

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Introduction. Aujeszky's disease (AD) is major pig disease that is responsible for devastating economic losses to pig husbandry. Efficiency of vaccination against AD is evaluated by humoral immune response to AD virus (ADV) and by resistance to challenge infection on the bases of clinical protection and reduction of challenge virus shedding.

The aim of our study was to compare the efficacy of Auphyl Plus (a live attenuated vaccine containing an oil-in-water emulsion adjuvant) with other live AD vaccines most frequently used in the field.

Materials and methods. Six weeks old piglets were vaccinated and then boosted three weeks later with one of four commercial vaccines (Vaccine "A" = Auphyl Plus, Ceva; vaccine "B", "C" and "D" were from different manufacturers). Three weeks after booster vaccination the pigs were challenged with 4 ml of the NIA-3 virulent ADV strain at a dose of 7.7 log10 TCID50/ml via the intranasal route in the left nostrils. Humoral immune-responses were measured by virus neutralization assay using standard micro-neutralization method on MDBK cells (against 100-300 TCID50 ADV).

Animals were observed for 7 days after the challenge for clinical signs. Swabs were taken on D2, D5, and D7 from the left nostrils of the challenged animals for the measurement of challenge virus shedding. Serological results, body weight gain and virus shedding data were analysed by ANOVA. Differences were considered significant at $p<0.05$.

Results

Auphyl Plus induced significantly higher humoral immune-response than the other vaccines.

Mean titres of VN antibodies o day 49

Vaccine	Log 2 Titers D 49
Auphyl Plus®	8,67
Vaccine B	4,22
Vaccine C	4,67
Vaccine D	5,67

All vaccines provided good clinical protection against ADV challenge, but there was no statistically significant difference among the vaccinated groups regarding this parameter.

Shedding of challenge virus was best controlled Auphyl Plus, then by vaccine "C", which differed significantly from the two other vaccines and from the non-vaccinated controls.

Virus shedding after ADV challenge as measured by virus isolation.

Vaccine	log10 TCDI50/0.1 ml		
	D2	D5	D7
Auphyl Plus®	3,11	3,45	0,43
Vaccine B	4,8	4,93	0,45
Vaccine C	3,54	3,33	0,34
Vaccine D	4,7	4,53	0,24
Control	5,18	6,03	2,94

Conclusion. Auphyl® Plus induced significantly higher humoral immune-response than other vaccines and the best control of challenge virus shedding (lowest shedding of all vaccines on D2).

P93 PORCINE CIRCOVIRUS TYPE 2 (PCV2) ANTIBODY DYNAMICS IN ANIMALS WITH DIFFERENT ANTIBODY TITRES AT PCV2 VACCINATION

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The aim of this study was to assess porcine circovirus type 2 (PCV2) antibody dynamics in animals with different antibody values (coming from vaccinated [V] and non-vaccinated [NV] sows) at the moment of PCV2 vaccination. At 2 and 4 weeks pre-farrowing, V sows received 2 ml of Circovac® whereas NV sows were injected with 2 ml of PBS. At 3 weeks of age, 256 piglets coming from these sows (116 [45%] and 140 came from V and NV sows, respectively) were ear-tagged, bled and vaccinated with 1 ml of Ingelvac® Circoflex. Blood samples from these animals were additionally taken at 7, 12, 18 and 24 weeks of age. Serum samples were processed by a commercial PCV2 ELISA and PCR. ELISA results are expressed as mean S/P ratios ± standard deviation. Descriptive as well as cluster statistical analyses were done with SPSS v.20.0 system and MeV 4.0 software. An overall decrease of PCV2 antibodies from 3 (0.68±0.41) to 24 (0.41±0.26) weeks of age was observed. Moreover, only 8.6% (22/256) of tested samples were PCV2 PCR positive throughout the study. The cluster analysis provided us three different PCV2 antibody profiles. Profile 1 (n= 99; 86 [86.8%] and 13 [13.2%] piglets from V and NV sows, respectively): animals that showed high mean S/P ratios at the vaccination time (1.09±0.28) followed by a progressive decrease of PCV2 antibodies over time (0.32±0.15 at 24 weeks of age). Profile 2 (n=55; 14 [25.4%] and 41 [74.5%] piglets from V and NV sows, respectively): animals with low S/P ratios (0.42±0.23) at 3 weeks of age followed by a progressive increase of S/P ratios until the end of the study (0.75±0.29 at 24 weeks of age). Profile 3 (n= 102, 16 [15.7%] and 86 [84.3%] piglets from V and NV sows, respectively), animals with low S/P ratios from the moment of vaccination (0.41±0.18) onwards (0.31±0.13 at 24 weeks of age). At 3 weeks of age, mean S/P ratios of profile 1 was significantly higher ($p<0.05$) than those from profiles 2 and 3, respectively. On the contrary, from that moment onwards, profile 2 mean S/P ratios were significantly higher ($p<0.05$) than the ones observed in the other two profiles. Results of the present study showed that animals with different PCV2 antibody titres at the moment of vaccination display different antibody dynamics and a variable evidence of immune response due to vaccination. In this particular study, the PCV2 infectious pressure was too low to assess the efficacy of the vaccine.
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P94 PRODUCTION IMPACT OF PORCINE EPIDERMIC DIARRHEA VIRUS IN UNITED STATES

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Clinical signs of Porcine Epidemic Diarrhea virus (PEDV) are characterized by acute vomiting, anorexia, and watery diarrhea, with high mortality in pigs less than 10 days old. PED virus is highly contagious disease and diarrhea can be observed in all age groups of pigs. Pensaert (2006) summarized the clinical impact and stated that outbreaks in sow farms "may show much variation in morbidity and mortality". We analyzed production records from 18 farrow to wean farms that were infected with PED and acutely affected. Productivity was summarized as number of pigs weaned per week. Productivity for 26 weeks before the outbreak was compared to that achieved after the outbreak. It took approximately 5.9 weeks (95% CI 4.2 – 7.6) to return to the productivity achieved before the outbreak. The average number of pigs not weaned was 1,688 / 1,000 sows (95% CI 1,077 – 2,299).
These pigs not weaned were primarily composed of pigs that died in the suckling phase due to diarrhea and dehydration. It may also have been contributed to by an increase in reproductive failure including decrease born alive and increased abortions particularly in gilts (Olanratmanee et al.). Specifically, they reported:

- Pregnant females infected with PEDV during the first 30 days of gestation had a 12.6% decrease of farrow rate (91.1% vs. 78.5%, P=0.003),
- Decrease born alive by 2.2 (10.7 vs. 8.5 piglets/litter, $P < 0.001$) in gilts' litters if infected during the first 30 days of gestation, and
- Impact of PEDV infection on subsequent reproductive performance was more severe in the pregnant gilts than the pregnant sows.

Diarrhea in growing pigs may also have an impact on growth performance although this has not been quantified. Moon et al reported that three week old pigs replace villous absorptive cells in the small intestine about three times more rapidly than do newborn pigs (Moon et al). The implication is that the older the pig, the less the clinical impact.

P95 USE OF MOLECULAR TYPING (MLST) AND SEROLOGY TO STUDY THE EPIDEMIOLOGY OF BRACHYSPIRA HYODYSENTERIAE INFECTION IN A LARGE SCALE HERD

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Introduction. A successful control program for Swine dysentery (SD), especially in large-scale herds, relies on the accurate understanding of the intra-farm epidemiology. The aim of the study was to attempt the identification of the infection's sources and the transmission patterns of B. hyodysenteriae in an Italian pig farm affected by SD by using a molecular typing method (MLST) and serology.
Materials and methods. The study was conducted in a herd based on 5 units. Grand-parent sows are reared in unit A from which gilts are moved to farrow-to-finish units (B and C). A portion of growers are moved from units B and C to be fattened in units D and E. Occasionally growers are purchased from an outer farm, declared free of SD, and fattened in unit E. Recurrent episodes of SD are observed in the farm, but units A and D have no history of SD in the last 2 years. Fecal samples were collected from pigs suffering from clinical signs of SD in a period of 18 months. Blood samples from at least 40 pigs were collected from each unit. Fecal samples were cultivated for B. hyodysenteriae and the isolates were submitted to MLST. Two hundred blood samples were tested with the PrioCHECK® Brachyspira Ab porcine ELISA (Prionics AG, Switzerland) for the detection of B. hyodysenteriae antibodies based on a novel recombinant antigen.
Results. A total of 18 faecal samples from different 3 units were examined and 13 B. hyodysenteriae strains were isolated. The MLST results showed the circulation of isolates belonging to the same sequence type (ST 77). ELISA serology showed positivity in all the units, A and D included. A group of pigs purchased from the outer farm was tested twice and remained seronegative.
Discussion and conclusion. The MLST showed that the source of infection was unique and probably endogenous. The ELISA test showed that B. hyodysenteriae antibodies were present in all groups including those with no recent history of clinical SD. Based on the case history and the serologic results it is possible to hypothesize that grandparent sows (unit A), even though not affected by clinical SD, are the probable source of B. hyodysenteriae spreading. MLST can be of great usefulness in studying the epidemiology of B. hyodysenteriae infection in large scale multisite herds and serology can allow to check the SD status of pigs purchased from a supplier farm detecting subclinically infected animals. The combined use of both techniques could be of great help for the correct implementation of control strategies.

P96 EFFECTS OF MANAGEMENT STRATEGIES ON ABORTION EPISODES AND PRRSV CIRCULATION IN AN ENDEMICALLY INFECTED BREEDING FARM

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This field study describes the dynamics of PRRSv circulation in an endemically infected breeding farm, before, during and after a significant management change, aimed to decrease the abortions in late gestation stages.
The farm was a farrow-to-nursery of more than 700 productive sows, located in a high density swine area of northern Italy. The farm (A) was part of a group, of a same owner, constituted by another farrow-to-nursery facility (B) and a quarantine unit, both placed at more than 5 Km. The history of PRRSv presence in the farms was documented by an archive of sequences collected since 2008.
The study covers the period from the beginning of 2011 to September 2013. The reorganization, which began at the end of 2011, was completed in the second half of 2012. The purpose of the change was to better separate animals of different age, immune condition, parity and care necessities, a measure known to be useful for improving both production performance and PRRS control. In practice: sows were segregated from gilts (sows in farm A and gilts in B), reducing in the meantime the number of the latter, and weaned pigs were decreased in farm A by transferring them to farm B. Periodic blood samplings were performed (>600 samples) for serological and virological analyses. About 95% of sows, in farm A, were found PRRS seropositive (mean S/P±SD 2.2±0.98), but none were demonstrated viremic by Real-Time PCR. In contrast, 59% of blood samples collected from sows at time of abortion, during outbreaks, were PCR positive. PRRSv isolates were sequenced (orf5 and orf7) in order to acquire epidemiological information. Production and reproductive data, recorded by the farm software, were evaluated together with laboratory results on PRRSv circulation. The proportion of abortions over farrowings, either in farm A or in the whole group, was significantly ($P<0.01$) reduced after the introduction of the new management system, while the ratio remained almost the same in farm B. No significant change could be reported for other production and reproductive parameters.
These results have been achieved despite 2, of the 4 abortion peaks recorded, occurred after the beginning of reorganization. Sequence analysis revealed that all abortion outbreaks were related to the entry of new PRRSv strains, suggesting the presence of breaks in the biosecurity system. The study demonstrates the effectiveness of the new management strategies in reducing abortions, but at the same time highlights, once again, how a strict biosecurity is an unavoidable requirement for PRRSv control.

P97 PREVALENCE OF VAGINAL DISCHARGE IN DANISH SOW HERDS

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Introduction. Vaginal discharge (VD) is often observed in sows suffering from the Mastitis, Metritis and Agalactia (MMA) complex. In a study in 31 US sows herds the overall prevalence of MMA was 6.9%, and all sows with MMA presented VD. MMA is known to decrease the milk production of the sow, and may also increase reproductions problems in the following reproduction cycle. Treatment of VD and other urogenital diseases is among the most common causes of antibiotic, usage for sows in Denmark. However, the actual occurrence of VD in Danish sow herds is unknown and therefore the aim of this study was to examine lactating sows and estimate the prevalence.
Materials and Methods. The study design was cross-sectional. The herds were recruited from northern Denmark, they had to have more than 20 sows per farrowing group and keep 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. The sows were examined after the following criteria.
Score 0: No discharge
Score 1: Discharge, white to yellow
Score 2: Discharge, brownish
If the discharge where judged to be lochial discharge, the sow were getting score 0. Statistical analysis of differences in discharge between the two groups of sows was performed using Chi-sq test.
Results. During May 2011 to Marts 2013, 33 herds were visited. In total, 1310 sows were examined, 652 sows in grp1 and 658 in grp2. The average lactation time 2 days in grp1 was and 26 days in grp2.
In grp1 24.7±3.28% of the sows had score 1 and 2.95±1.16% of the sows had score 2. The within-herd prevalence ranged from 10% to 52.6% for score 1 and from 0 to 15% for score 2.
In grp2 0.77±0.52% of the sows had score 1. The within-herd prevalence ranged from 0 to 5%. No cases of score 2 discharge was observed in grp2. The VD scores were significantly different between the two groups, $p < 0,001$.
Discussion. The study showed a higher prevalence of VD just after farrowing, compared with later in lactation, with a large variation in within-herd prevalence. The prevalence of brownish discharge was lover than that of white to yellow discharge. Other studies have showed an association between vaginal discharge and MMA. The relationship between VD and the health/productivity of the sow is under investigation.
Conclusion. In summary, the prevalence of VD in this study was 27,7% just after farrowing and 0,8% before weaning.

P98 EVALUATION OF PIG PERFORMANCE AND LUNG LESIONS SCORE IN THE SLAUGHTERHOUSE OF PIGS VACCINATED WITH M+PAC OR COMPETITOR VACCINE

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The main objective of the present study was the evaluation of the possible impact on production of Enzootic Pneumonia caused by M. Hyopneumoniae, by correlating the different degrees of lung lesions with ADG, weight and lesions a slaughter. This study assessed the efficacy of M+Pac administered as a single dose to 3 week old piglets, compared to Vaccine B and non-vaccinated animals, in a commercial farm. All study piglets were previously vaccinated with Porcilis PCV. A total of 1497 piglets from 3 subsequent batches started the trial. At 3 weeks of age, they were individually weighed, and distributed along 3 treatments according to weighing order: Control: intramuscular (IM), 2 ml of physiological saline; M+Pac: IM, 2 ml; Vaccine B: IM, 1 ml. Average body weight (BW) at start was (mean ± CI 95%) 5.95 ± 0.06 kg. In addition, 500 piglets, non-vaccinated nor monitored, were used to increase the infection pressure. At weaning, piglets were moved to the wean-to-finish facilities, where they were allocated in groups of approximately 30 pigs each. Pigs finished the trial with an average body weight of (mean ± CI 95%) 89.7 ± 0.63 kg. ADG was not different between treatments during the experimental period: M+PAC 564 (73SD)g, Vaccine B 561 (74SD), Control 563 (75SD)g. Vaccination also did not affect mortality during the fattening phase. Lung lesions were evaluated for each individual animal: lung lesion score (0 to 5), and severity: Average score=sum of each lesion level multiplied by number of lungs in which it was found/Total No. of lungs was used. Lung lesion severity was significantly different between treatments ($P<0.05$): M+PAC 0,48, Vaccine B 0,62, Control 0,59. M+Pac pigs had fewer lesions and had a higher percentage of pigs with score 0 (64% vs 58,5% Vaccine B and 57,3% Control); in contrast, there were no differences ($P>0.1$) between Vaccine B and Control. Average score was low in all groups due to low infection pressure , but, despite, a vaccine effect was found. Lung lesion scores were correlated with ADG, with a decreasing ADG in pigs with lesion score 2 or higher. M+PAC had 9,2% lungs with score lesion ≥ 2, Vaccine B 14,5% and Control 13,2%. When using M+Pac, incidence of lung lesions at slaughter is lower than with vaccine B or no vaccine. The effect of lung lesions on ADG suggests a benefit of implementing more vaccination programs against M. Hyopneumoniae.

P99 BENCHMARKING EXTERNAL AND INTERNAL RISKS FOR PRRS WITH THE USE OF PADRAP - PRODUCTION ANIMAL DISEASE RISK ASSESSMENT PROGRAM - IN AN EUROPEAN FARM

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Production Animal Disease Risk Assessment Program (PADRAP) is an epidemiologically-based initiative to help producers and veterinarians manage disease risks. It is a set of web-based risk assessment surveys used to evaluate and benchmark internal and external risk factors. It was originally created in the USA in 2002 and in 2006 was adopted by the American Association of Swine Veterinarians (AASV) in collaboration with Iowa State University College of Veterinary Medicine. This tool can be applied to evaluate current biosecurity protocols and/or develop new ones to avoid risk; to demonstrate improvement in biosecurity over time; as an aid in the decision to initiate a project to eliminate PRRSv from a site, and as a tool for regional elimination or control projects. Two surveys are defined, one for breeding herds and one for growing/finishing sites. Reporting structure allows benchmarking the internal and external risk scores with all other farms of the same category for which surveys had been completed on PADRAP. Benchmarking to specific subgroups is available on request to the program administrators. Additionally different presentations of the individual risk scores are available. Developed for US production sites, this survey was now used for the evaluation of a swine farm in Poland with the objective to evaluate the level of biosecurity and identify potential improvement to minimize risk. Some questions reflecting management practices or farm structures from the USA where recognized during the implementation. However, risk score reports clearly offered possible starting points for measures to minimize the external and internal risk. The benchmarking results expressed by a risk quadrant report with internal and external risk was useful adding European farms only. Simulation scoring demonstrated benefits of management changes and it could be aligned with the disease situation after the change. Finally PADRAP can be used for benchmarking risk scores from sites in a specific system or region.

P100 SIKAVA - NATIONAL HEALTH CARE AND WELFARE PROGRAM FOR SWINE IN FINLAND 2012

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Introduction. Sikava national health care and welfare program started in order to guide veterinarians to focus in heard health and to gather health data at heard level. Today this voluntary system covers 90% of swine farms and 97% of pork production in Finland. This abstract aims to describe the program and the data from year 2012.

Materials and methods. A veterinarian visits each farm 4-6 times year and fills in special documentation form. In 2012 veterinarians made 7136 visits into 1845 holdings. The documentation form consists of 158 different parameters for breeding units and 60 parameters for finishing units. During the visit veterinarian evaluates the environment, presence and symptoms of diseases, mortality at farm level in different animal groups and some welfare indicators e.g. amount of enrichment material, tail biting and shoulder sores in sows.

Environmental conditions are rated into three different categories; good, satisfactory and poor.

Symptoms for different diseases are classified into 4 different categories; no cases (0%), some cases (in 1-5% of animals in group), several (in 6-19% of animals in group) and many cases (over 20% of animals in group).

Shoulder sores were evaluated in sows weaned 0-7 days before the visit. They were marked according to Welfare Quality® - system into three categories: no lesions, mild lesion or severe lesion.

Results. The veterinarians estimated the environment of the pigs to be good in majority of the farms. For example the weaners had good air quality in 87% of the visits, satisfactory in 13% and poor in less than 1% of the visits. The pen hygiene in finishers was good in 76%, satisfactory in 24% and poor in less than 1% of the visits. The animal density in weaners was good in 90%, satisfactory in 10% and poor in less than 1% of the visits.

The veterinarians reported swine dysentery at three farms, sarcoptic mange at four farms and salmonella at two farms. Enzootic pneumonia or atrophic rhinitis was not diagnosed at all.

Diarrhea was recorded among weaners into level "many" in less than 1%, "several" animals in the group was seen in 3%, "some" in 44% and "no" diarrhea in 53% of visits.

Shoulder sores were counted from 54300 sows, of which 47788 (88%) had no lesions in shoulder, 5790 (11%) had a mild lesion and 744 (1%) a serious lesion.

Conclusions. Sikava system is widely used and well accepted in veterinary work at swine farms. These results are used in the development of swine heard health and pre-harvest food safety.

P101 ONLINE REGISTER WITH HEALTH CLASSIFICATION - AN EFFICIENT TOOL TO CONTROL SWINE DISEASES

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Introduction. Sikava is a voluntary national health and welfare register for swine farms in Finland.
Purpose of this register is to manage contagious diseases, to improve welfare and health in addition to ensure food safety. The register was founded 2003 by slaughterhouse companies. It is run by The Association for Animal Disease Prevention ETT ra. The register works in Internet and it's website address is www.sikava.fi. Nine largest slaughterhouse companies in Finland are the members of Sikava. The system covers now 90% of the swine farms and 97% of the production in Finland. The system classifies farms into three different categories. A farm starts at the basic level and after it has fulfilled certain criteria, it can be accepted to the national level. For the farms selling gilts and boars to other farms there is a special level with stricter health and biosecurity criteria.
Materials and methods. For controlling diseases regular veterinary visits to farms are required. Every farm at national level is visited 4-6 times a year and a special documentation form is filled every time. This document is either saved into register at website by veterinarian or sent to Sikava`s office to be saved.
A farm at national level has to be free of five diseases: enzootic pneumonia (Mycoplasma hyopneumoniae), swine dysentery (Brachyspira hyodysenteriae), salmonella (all serotypes), atrophic rhinitis (toxic Pasteurella multocida) and sarcoptic mange (Sarcoptes scabies suis). In the case of an outbreak at farm, the disease has to be eradicated.
Results. Number of veterinarian visits was in 2003 982, 2004 8289, 2005 10852, 2006 11687, 2007 10904, 2008 10105, 2009 9155, 2010 8734, 2011 7407 and 2012 7136.
Number of farms with enzootic pneumonia was in 2003 42, 2004 145, 2005 32, 2006 16, 2007 9, 2008 7, 2009 4, 2010 2, 2011 2 and 2012 0.
Number of farms with swine dysentery was in 2003 0, 2004 10, 2005 3, 2006 2, 2007 7, 2008 6, 2009 5, 2010 7, 2011 0 and 2012 3.
Number of farms with salmonella was 2003-2006 0, 2007 1, 2008 0, 2009 11, 2010 1, 2011 2 and 2012 2.
Number of farms with atrophic rhinitis has been 2003-2012 zero all the time.
Number of farms with mange was 2003 0, 2004 16, 2005 14, 2006 11, 2007 4, 2008 8, 2009 4, 2010 2, 2011 2 and 2012 4.
Conclusions. National health classification system can be used successfully to monitor and eradicate contagious diseases, when all parts in primary production (producers, slaughterhouses and veterinarians) are working together. A common register is a tool to administer this work.

P102 THE USE OF ORAL FLUID (OF) FOR THE ASSESSMENT OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME (PRRS) STATUS IN UK PIGS

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Oral fluid (OF) has been established as a simple-to-use and economically viable diagnostic sample for routine surveillance of a number of endemic pathogens in the US. OF is collected by providing cotton ropes to pig populations for chewing, during which OF is deposited onto the ropes for subsequent collection and testing. Many pigs in a pen engage in rope chewing, providing the capacity to screen large numbers of animals at a fixed cost. The current Gold Standard diagnostic medium for UK pig disease monitoring is blood serum collected via individual snare capture and jugular venepuncture by a vet. The non-invasive nature of OF collection removes the requirement for the vet, enabling farm staff to collect samples themselves for shipment to the diagnostic facility. Porcine Reproductive and Respiratory Syndrome virus (PRRSv) is an economically significant pathogen which also has significant impacts on welfare. 120 pen-based OF samples and matching bloods from a sample of pigs per pen in accordance with a standard diagnostic protocol have been collected from a total of 18 pig farms across the North of England, in order to validate the use of OF against blood serum for anti-PRRSv antibody testing. A commercially available ELISA kit (IDEXX Laboratories, Westbrook ME) designed for use with porcine OF has been used to test the field pen-based OF's according to the manufacturer's protocol. The corresponding serum samples were tested individually using a commercially available serum antibody assay (IDEXX Laboratories, Westbrook ME) according to the manufacturer's protocol. Comparison of the OF and serum data revealed sensitivity and specificity estimates of 94% and 70% at the pen-level. Furthermore, a behavioural study showed that an OF sample is representative of approximately 40% of the total pen population for large group sizes (n>50) in straw-based accommodation, which is substantially more than current blood sampling protocols for disease surveillance where less than 10% of the population are represented. These data collectively support the use of OF as an alternative to blood serum for the determination of PRRS status in UK pigs, providing a means by which farmers can initiate the diagnostic investigation process themselves.

P103 PREVALENCE OF DIFFERENT RESPIRATORY PATHOGENS DURING POST-WEANING AND FATTENING PERIOD IN BELGIAN AND DUTCH PIG HERDS USING A TRACHEO-BRONCHIAL SWAB TECHNIQUE

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Besides Mycoplasma hyopneumoniae (M.hyo), many other viruses and bacteria can be concurrently present during respiratory problems in pigs, provoking the disease complex known as Porcine Respiratory Disease Complex (PRDC). Recently, a new sampling technique [1] has been developed and validated for the detection of M.hyo in pigs using PCR, namely the tracheo-bronchial swab (TBS) technique. With this technique, pathogens present at the level of the trachea-bronchial junction can be recovered and analyzed through PCR. 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. Three hundred and four pig farms were sampled using the TBS technique. In every herd, at least 30 coughing piglets were sampled in at least two age groups (3-5 and 6-11 weeks of age). TBS were collected as described previously and analyzed using mPCR and/or dPCR (IVD GmbH, Hannover, Germany). A multiplex (m) [PRRSV, SIV, Mhyo, PCMV and PCV2] assay were used to detect the different pathogens in the TBS. PCR results were reported as negative/positive for the presence of Mhyo, SIV, PCMV and PCV2. For PRRSV, strain type EU/US or both was also reported. In piglets of 3-5 weeks of age, the most prevalent pathogens were SIV (25.3%), PCMV (19.5%), PRRSV-EU (12.7%) and Mhyo (6.4%), whereas in piglets of 6-11 weeks of age, PCMV (25.0%), PRRSV-EU (24.9%), SIV (16.3%) and Mhyo (9.6%) were the most prevalent pathogens. Combined infections between PRRSV and SIV, Mhyo or PCV-2 did also occur at a prevalence level of 4.2%, 6.5% and 6.9%, respectively. The prevalence of triple infections were as following: PRRSV-Mhyo-SIV 0.6%, PRRSV-PCV-2-SIV 1.0% and PRRSV-Mhyo-PCV-2 2.3%. The present study clearly shows that different viral pathogens responsible for PRDC may already be present during the post-weaning period. It is clear that in several herds, Mhyo is already present in piglets at weaning, further increasing in the second part of the nursery period. The prevalence of co-infection and triple infections of PRRSV with SIV, Mhyo or PCV-2 also may occur, but their prevalence is rather low as compared to double infections. In conclusion, many other respiratory pathogens, besides Mhyo, are present during the post-weaning and fattening period, which may complicate the clinical picture of respiratory disease.

P104 STUDY OF PROTECTIVE FACTORS ON HISTORICALLY-LOW SALMONELLA SEROPREVALENCE PIG FARMS

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The prevalence of Salmonella in the UK in both breeding and slaughter pigs is amongst the highest in Europe. Future regulatory targets are therefore likely to be difficult to achieve at farm level. There is an urgent need to investigate in detail the effectiveness of control measures in the field, to define the best and most cost-effective methods, their benefit in terms of reduction of public health risk and other pathogens of economic importance in pig production.

This case-control study focuses on a detailed investigation of the protective factors that operates on historically low Salmonella seroprevalence pig farms (<10% positive meat juice ELISA samples), known as 'Platinum farms'. Farms with a persistently low prevalence over a period of 4 years were selected.

Between July 2013 and April 2014, we will have carried out intensive veterinary microbiological investigations on 20 Platinum farms to identify factors that may account for their low seroprevalence status and to map out the distribution of the various Salmonella serovars that may be present on farm. Each study farms will be linked to two randomly selected control farms. The controls will be selected from the same geographical region as the Platinum farm and will be of the same management type (e.g. indoor breeder-finisher). Information on farm management and structure as well as the farmer's perceptions of Salmonella control will be collected using two structured questionnaires. About 250 pooled-pen faecal and environmental samples (e.g. wildlife, farm effluents, feed) plus individual samples will be collected from each farm using a structured sampling protocol. The sampling frame will provide strong confidence in the estimated within-farm pen prevalence (detecting prevalence <1%). Additionally, meat juice samples, lymph nodes and rectal swabs, pre or post scalding/steaming, will be collected at the abattoir from selected farms' pigs. The abattoir sampling frame is based on 60 individual faeces samples from the slaughtered pigs. The abattoir results will be analysed to determine which samples provide the best proxy for on-farm prevalence.

Preliminary results have shown that potentially 4 Platinum farms have lost their status, probably due to the introduction of monophasic S. Typhimurium strains; these will be replaced with other Platinum farms. To date, the on-farm Salmonella prevalence of 13 Platinum farms varied between 0-12 % while the prevalence of 11 control farms varied between 6-50 %. Future analyses will aim to identify some protective practices most commonly implemented on platinum farms.

P105 IMPACT OF VACCINATION WITH A MODIFIED LIVE PRRS VACCINE IN A CONTINUOUS FLOW WEAN TO FINISH UNIT IN THE UK

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Porcine Reproductive and Respiratory Syndrome virus (PRRSv) is responsible for major economic losses in most pig producing countries. A continuous flow finishing unit with 10,000 pigs with persistent respiratory disease in the finishing period was chosen for this study. PRRSv circulation and challenge was determined by serology to occur between 5 to 9 weeks after entry in to the unit. The objective of this study was to assess the economical and zootechnical benefits of piglet vaccination with Porcilis PRRS in this unit.

For this study, 387 pigs were individually ear tagged and weighed at 7 weeks of age, 260 pigs were intradermally vaccinated with Porcilis® PRRS using the IDAL® gun, 127 piglets were left unvaccinated as a control group. Pigs were blood sampled at the time of vaccination, at the grower stage and before slaughter. 17 weeks after vaccination, the pigs were individually weighed to assess performance improvements that may have arisen from vaccination.

At the time of inclusion in the study, the vaccinated pigs weighed on average 12.3 kg and the control pigs 12.4 kg. The average finishing weight for the pigs vaccinated with Porcilis PRRS was 90.4 kg whilst the non vaccinated control pigs weighed on average 88.4 kg. Mortality was equal between both groups, at 9%.

The value of interventions should always be considered when implementing any changes in the Health or management practices in pig farming. In this case, the vaccination of piglets with Porcilis PRRS after serological confirmation of PRRS circulation resulted in an extra 2 kg of live body weight at slaughter, the similarly high mortality between both groups was probably due to the fact that the pigs had a confirmed outbreak of Salmonella typhimurium and were medicated for a considerable period of time after that. The extra 2 kg of live bodyweight at slaughter in the pigs vaccinated with Porcilis PRRS results in an extra £ 2.6 per pig and a ROI of 2.7. This demonstrates that when PRRS circulation and involvement in disease on farm is confirmed by seroconversion in the feeding herd, piglet vaccination is cost effective and produces a good ROI.

P106 BODY CONDITION IN DANISH SOW IN THE LACTATIONS PERIOD

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Introduction. The body condition (BC) is important for the health of the lactating sow. High BC in late pregnancy increases the risk of Mastitis, Metritis and Agalactia (MMA), decrease feed intake in the lactation period, and may thereby causing a potential reduction in milk production. Low BC increases the risk of shoulder ulcer during lactation.

The aim of this study was to estimate the BC in lactating sows, in a sample of Danish sow herds.

Materials and Methods. The study design was cross-sectional. The herds were recruited from northern Denmark; the herds had to have more than 20 sows per farrowing group and keep reliable productivity recordings. Organic and outdoor herds were excluded. In each herd, 20 sows one to four days after farrowing (grp1) and 20 sows close to weaning (grp2) were randomly selected and clinically examined once by the same person. The sows were examined using a standard BC scale with score1:Very thin. Ribs are distinct and clearly visible; 2:Thin. Ribs can be felt by a light press of hand; 3:Medium. Ribs can be felt by a hard press of hand and; 4:Fat. Ribs are completely hidden and cannot be felt. Statistical analysis of differences in BC between the two groups of sows was performed using Chi-sq test.

Results. During May 2011 to Marts 2013, 33 herds were visited. In total, 1310 sows were examined, 652 sows in grp1 and 658 in grp2. The average lactation time in grp1 was 2 days and in grp2 26 days

In grp1 sows BC score1 was observed in 1.7±0.85%, score2 in 41.6±3.8%, score3 in 45.8±3.9% of the sows and score4 and 11.0±2.3% of the animals.

In grp2 sows BC score1 was observed in 4.4±1.45%, score2 in 57.8±3.9%, score3 in 33.6±3.6% and score4 in 4.1±3.4% of the animals. The BC score distribution were significantly different between the two groups of sows, $p < 0.001$.

Discussion. The Danish Pig Research Center recommends a BC score of 3 in sows. In grp1 45.8% of the sows had BC score3 while this was reduced to 33.6% in grp2. In both groups, sows with BC scores below 3 were more prevalent than sows having BC score higher than 3. This imply that Danish sows may have increased risk for development of shoulder ulcers due to low BC score. Only 11% of the sows were categorized as BC score4 at farrowing, which indicate that relatively few sows are at increased risk of MMA in relation to obesity. The study show that there is a decrease in the BC during the lactation period. This indicates that milkproduction and reproductive performance may be compromised due to low feed intake during lactation. The association between the BC and the health and productivity is under further investigation.

P107 AREA REGIONAL CONTROL CONCEPTS ARE APPLIED TO PED IN THE US

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Area Regional Control (ARC) Projects have been initiated in many pork producing areas in the US. Many producers in swine dense regions have been combating infections with the Porcine Reproductive and Respiratory Syndrome virus (PRRSV) in their swine herds routinely. Their frustration with continued re-infection spawned this collective initiative to better understand and control the spread of PRRSv through open communication, cooperation, and coordination of efforts to combat PRRSv in their area. A variety of tools and techniques are employed to achieve success in an ARC project. Project coordination is established, typically through assignment of a dedicated project coordinator. Methods of communication are determined. This may involve the use of a password protected sharing site, an e-mail distribution list or list serv and in some more remote areas, even fax messages to participants as well as information or educational meetings. Information confidentiality agreements among project participants are also often made. Once an area is defined, site lists within the area are generated with Geographical Information Systems (GIS) coordinates included. Maps of the area are then routinely generated to assist in the visualization of the disease status in an area and then updated periodically and shared among participants. Disease management strategies are shared and discussed, including bio- exclusion, bio-containment and elimination at both the site and area level. Finally, viral sequence management tools are employed and continue to be further developed to help producers and veterinarians better understand how viruses in the area are changing and give clues as to how new outbreaks might be spreading. These tools have provided a framework for producer groups to use in their efforts to combat the spread of PRRSv and now, following the May 2013 announcement of PEDv in the US, this framework is being applied to PEDv. With a platform for information sharing already in place and a sense of accomplishment in using a coordinated approach, many ARC projects have seamlessly begun to include PEDv in their site status reports, maps and other communications. They believe that these tools will help them understand and control the spread of PEDv just as they have helped with PRRSv. The ARC concept, tools and techniques are transferable and applicable to PRRSv, PEDv and other area disease concerns.

P108 STUDY ON THE RELATIONSHIP BETWEEN SEROPREVALENCE OF ASCARIS SUUM IN FATTENERS, FARM MANAGEMENT FACTORS AND PRODUCTION PARAMETERS

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Ascaris suum is currently the only helminth that is still highly prevalent in intensive pig production systems, resulting in significant economic losses. However, due to the subclinical nature of the disease, ascariasis often remains undiagnosed, creating a lack of information regarding the worm-status of a farm, which ultimately makes it difficult to evaluate the applied deworming programs. The first aim of this study was to investigate the effect of a strict deworming strategy on the production parameters of 20 commercial fattening farms. The selected fattening farms are monitored for a period of 6 consecutive rounds. The first of these 6 fattening rounds, during which no intervention took place in the deworming strategy normally applied on the farm, serves as a historical control. From the 2nd fattening round onwards, a strict deworming protocol was applied via the water supply with treatments at week 0, week 6 and week 12 of the fattening period (2.5 mg fenbendazole per kg body weight per day, equivalent to 0.0125 ml Panacur AquaSol per pig, administered over 2 consecutive days). In this way, the effect of an improved worm control on the production efficiency of infected farms can be investigated in time. The results obtained so far already indicated a significant drop in seroprevalence after one round of treatment. Whether this decrease is associated with increased production is currently being investigated. The second aim of this study was to assess the prevalence of A. suum infections in fatteners throughout Europe, based on serology, and to investigate potential associations with growth, feed conversion and applied deworming programmes. In total, 471 farms were analysed in Belgium, The Netherlands, France, Poland, Denmark and Germany. Of these farms, 54% tested serological positive. At this moment, serological results are being compared with different farm-specific management data and possible interactions are being investigated. With this study we hope to 1) gain a better insight in the prevalence of this parasite in European porc production facilities, 2) increase our understanding of the impact of ascariasis on farm productivity, 3) identify risk-factors associated with Ascaris infections and finally 4) evaluate currently applied control strategies.

P109 BIOSECURITY PRACTICES AS RISK FACTORS FOR PRRS AND MYCOPLASMA HYOPNEUMONIAE HERD INFECTION

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PRRS virus and Mycoplasma hyopneumoniae are major respiratory pathogens in all major pig producing areas. Due to their economical consequences in infected herds, there is an interest to eliminate these pathogens, even though remaining free of them is a challenge.
Thirty-eight farrow-to-finish herds belonging to the same producer organization and served by a single veterinary practice were included in the study. All herds had been depopulated and repopulated with PRRS and Mycoplasma hyopneumoniae free gilts from six months to ten years earlier, depending on the herd. Among these herds, 32 had remained free of both pathogens whereas six had been re-infected by either PRRS virus of Mycoplasma hyopneumoniae. All participating herds were visited by the same investigator. Biosecurity practices were described and a risk-based scoring system was established through elicitation of expert opinion. For each biosecurity item (such as batch management or cleaning-disinfection) a weight was given depending on risk of infection through different transmission routes. Three scores were finally established: one related to global biosecurity, and two related to external and internal biosecurity respectively.
Global biosecurity scores of re-infected herds were significantly lower than those of herds that had remained negative (Wilcoxon test, p=0.02). The items that most discriminated negative and newly infected herds were (i) manure management and (ii) combination of health status of neighboring herds and pig density in the area. When they were asked their perception of the depopulation-repopulation project, farmers expressed positive opinions. Even when the herd had lost the pathogen-free status, the global improvement of health due to the depopulation was considered as beneficial comparatively to the costs of the project.

P110 FINANCIAL IMPACT ON PIG PRODUCTION: II. RESPIRATORY DISEASES

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Diseases cause ill-thrift in pigs and contribute to economical losses due to decreased productivity. We tried to estimate the cost of diseases within Swedish pig production by using production data from 2010 and market prices from week 38 of that year. Standard production costs per day were estimated to 0.33 €, 0.67 € and 0.89 € for weaners, fatteners and sows, respectively. Mortality costs were calculated to 40 € per suckling piglet, 4 € per weaner, 84 € per fattener and 447 € per sow.
A slaughter weight of 85 kg (119 kg live weight) corresponded to an income of 110 € per pig. With a mean slaughter age at 170 days, the net income corresponded to 29 € per pig. Each sow produced 22 pigs that reached market weight, which corresponded to an annual total income of 2,240 € per year (corresponding to a net income of 638 €). The price for growers sold at 30 kg bw corresponded to 51€ with a net income of 16 €.
This report focuses on respiratory diseases. Actinobacillosis (APP), enzootic pneumonia and swine influenza were identified as the major respiratory pathogens. Calculations of costs for respiratory disease included mortality, reduction in growth rate, condemnations at slaughter and carcass trimming. The cost for trimming carcasses for pleurisy was 0.8 €/pig and costs for condemnations were 0,3 €/kg. Treatment costs and working time were not included in the calculations.
In herds with chronic APP the total cost corresponded to 69 € if pleurisy registrations at slaughter were in mean11% and age at market weight increased with 3 days. Mortality was not considered to be affected and not included in the calculations. Slaughter condemnations were minor and associated costs set to 1€. The cost could be considerably higher in herds suffering from outbreaks of acute APP. If mortality reached 10%, registrations for pleurisy were 50% and 15% of entire carcasses were condemned, the cost would be 650 € per sow. Subclinical manifestations of enzootic pneumonia would in mean prolong the time until slaughter with 2 days which would imply a cost of 29 € per sow. In more severely affected herds, costs could arise to 103 € with a delay in the time to slaughter by 7 days.
Costs for an acute influenza outbreak could be as high as 287 € per sow if mortality reached 5% and an additional 14 days were required to reach market weight. The cost for subclinical influenza could amount to 77 € per sow.
These calculations highlighted costs associated with endemic respiratory disease and could be used in discussions on implementations on preventive measures to reduce disease prevalence within a herd.

P111 FINANCIAL IMPACT ON PIG PRODUCTION: III. GASTROINTESTINAL DISORDERS

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Diseases cause ill-thrift in pigs and contribute to economical losses due to decreased productivity. We tried to estimate the cost of diseases within Swedish pig production by using production data from 2010 and market prices from week 38 of that year. Standard production costs per day were estimated to 0.33 €, 0.67 € and 0.89 € for weaners, fatteners and sows, respectively. Mortality costs were calculated to 40 € per suckling piglet, 4 € per weaner, 84 € per fattener and 447 € per sow.
A slaughter weight of 85 kg (119 kg live weight) corresponded to an income of 110 € per pig. With a mean slaughter age at 170 days, the net income corresponded to 29 € per pig. Each sow produced 22 pigs that reached market weight, which corresponded to an annual total income of 2,240 € per year (corresponding to a net income of 638 €). The price for growers sold at 30 kg bw corresponded to 51 € with a net income of 16 €.
This report focuses on gastrointestinal (GI) diseases. Neonatal diarrhea, postweaning diarrhea (PWD), proliferative enteropathy (PE) and swine dysentery (SD) were identified as the major disease complexes. Calculations of costs for GI diseases included mortality and reduction in growth rate. Treatment costs and working time were not included in the calculations.
Two scenarios of neonatal diarrhea with 20% and 10% mortality and an increased age at 30 kg with 10 and 6 days, respectively, were used for calculations. In the more severe case, the cost per sow was 274 € and in the milder case, the corresponding cost was 127 €.
In the case of severe PWD with a mortality of 25% and a prolonged rearing time of 14 days, the cost was calculated to 314 € per sow. In milder cases of PWD, the cost was calculated to 40 € if the mortality was 5% and an additional 5 days were required to reach 30 kg.
The cost for subclinical PE in growers was 35 € per sow if the mortality was 1% and age at 30 kg increased with 3.5 days. For chronic PE in growers, the cost could amount to 89 € if mortality was 5% and 6 extra days were required. In the case of acute hemorrhagic enteritis in fatteners, the cost reached 329 € if mortality was 10% and an additional 11 days were needed to reach market weight.
Mild SD in fatteners with 1% mortality and 3 days extra to reach market weight cost 62 € per sow. More severe SD with 3% mortality and 5 extra rearing days to slaughter corresponded to a cost of 133 €. These calculations highlighted costs associated with endemic GI-diseases and could be used in discussions on implementations on preventive measures to reduce disease prevalence within a herd.

P112 HERD HEALTH SCORE AND COST CALCULATOR TOOLS FOR PIG HERDS IN THE UK

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Pig health is central to ensuring a sustainable UK national pig herd that contributes fully to food security. The industry believes optimum pig health will be achieved by minimising the impact of endemic diseases on herd productivity. To do so, farmers must have access to suitable measures of their own farm performance on a regular basis. The objective of this study was to develop a UK relevant herd health score (HHS) coupled to a herd disease cost calculator (HCC) for pig breeding and finishing herds. A systematic literature review of the current state of knowledge on the measurement and monitoring of herd health was completed and identified two existing HHS approaches. Interactive workshops were held with pig veterinarians and an online survey was conducted to decide which components should be included in the HHS. Based on these outputs, two HHS, one for breeding and one for finishing herds, were developed. Parameters included in the HHS for breeding herds were: 1. Number of pigs weaned/sow, 2. Number of pigs born alive/sow, 3. Percentage of returns, 4. Diseases with impact on sow reproductive health and piglet production and 5. Antimicrobial usage. Parameters included in the finishing herd HHS were: 1. Post-weaning mortality, 2. Average live weight gains (ALWG), 3. Diseases with impact on pig production, 4. Antimicrobial usage, 5. Percentage of pigs showing clinical signs of respiratory disease, 6. Abattoir lesion prevalence and 7. Tail biting impact. A HCC model for Enzootic Pneumonia (EP) in finishing herds and a separate model for Porcine Reproductive and Respiratory Syndrome (PRRS) in breeding herds were developed. Annual gross margin (AGM)/pig and AGM/sow were estimated using a stochastic approach. The selected performance indicators affected by EP in the finishing HCC model included mortality rate, ALWG and feed conversion ratio. For breeding herds, numbers of piglets born alive and pre and post-weaning mortality rates were affected by PRRS. The AGM of a healthy sow was estimated by the model to be £143.40 (standard deviation (SD):90.42) whereas the AGM of an infected sow with PRRS virus was estimated to be £17.32 (SD:64.49) (i.e. £160.73/sow was the cost of the disease). The AGM of a healthy finishing pig was estimated by the model to be £18.54 (SD:21.10) whereas the AGM of severely infected finishing pigs was estimated at £9.73 (SD:14.83) (i.e. £8.80/pig was the cost of the disease). The HHS and HCC may assist in the monitoring of health status of pig farms and guide response by highlighting financial risk of poor prevention, control and management of the modelled diseases.

P113 BENEFITS OF PROGRESSIS® VACCINATION IN PRRS CONTROL, A FIELD EXPERIENCE

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Introduction. This paper reports the field case of a protocol applied on a farm since 2008 to control PRRSV circulation and its consequences.
Case description. The farm is a 450-sow farm, PRRSV-positive and Aujeszky's disease virus negative, one-week batch system located in Brescia, one of the highest pig density areas in Italy. Piglets are sold at 35 kg bodyweight.
Farm management is as follows: PRRSV-negative replacement gilts enter at 60-80 kg bodyweight in a specific facility, 500m apart from the other farm buildings. The gilts are kept in groups of 50 in an isolation facility. After 2-3 weeks, they are injected with post-weaning piglet serum monitored once a year for PRRS virus RNA presence. During the first two weeks following this primo-infection, the infected gilts receive medicated feed. Two to 3 months later, gilts are sampled and presence of antibodies and PRRSV are checked. If the PCR test is positive for one or more of the groups of five, the gilts remain in the isolation facility for at least another 3 weeks and are then re-tested. When only if the entire group is completely PCR negative and gilts display ELISA antibodies in S/P ratio between 1 and 3.5, they are moved to the pre-insemination facility. During the quarantine period, gilts are vaccinated against Parvovirosis, Aujeszky's disease, Progressive Atrophic Rhinitis and receive an ivermectin injection.
As soon as the gilts are moved to the pre-insemination area, they receive one or two PROGRESSIS® injections as booster, depending on their weight, and CIRCOVAC® twice. The protocol includes a complete PROGRESSIS vaccination every three months of all sows present on the farm, as a booster to maintain a homogeneous immunity level in the group.
Results and discussion. The abortion level of the farm has remained consistently low since 2008 (1.52% on average over 5 consecutive years), and the number of piglets weaned per sow per year is high for Italian standards: between 29.3 and 30.5. A total of 8 farms (5000 sows) are using the same PRRSV management process in my practice. Biosecurity rules are essential to prevent the introduction of new PRRSV strains in the farms. The farms must have isolation facilities for "infection" and "cooling", at least 500m from the sows buildings, and must comply with the recommendations and biosecurity rules of this program. Even though the costs of tests, of labour, of blood sampling, the workload of testing and vaccination that may affect farmer motivation, we are convinced and have confirmed that this protocol is a good solution to limit the damages from PRRSV infection in pig farms.

P114 EFFECT OF TREATMENT STRATEGY WITH OXYTETRACYCLINE ON FAECAL SHEDDING OF LAWSONIA INTRACELLULARIS IN THREE DANISH PIG HERDS

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Introduction. The intracellular, gram negative bacteria Lawsonia intracellularis (LI) is a common cause of enteritis in pigs. A large fraction of antimicrobials consumed in Danish swine production is used for treatment of enteritis in weaners. The purpose of this study was to compare the efficacy of batch medication by room with oxytetracycline to pen-wise or individual pig medication.
Materials and methods. A clinical field trial was conducted in three Danish pig herds with a history of LI-induced diarrhoea in weaners. One of five treatment strategies was randomly selected for treatment when a diarrhoea outbreak occurred in a batch of pigs. The treatment strategies were: 1-3) Batch medication by room by oral medication in drinking water with 20, 10 or 5 mg oxytetracycline per kg pig for five days. 4) Oral water medication of affected pens only with 10 mg oxytetracycline per kg for five days. 5) Single animal treatment by intramuscular injection of individual pigs with diarrhoea with 10 mg oxytetracycline per kg for five days. Each treatment strategy was repeated in three rooms in each herd. Faeces was sampled from 15 randomly selected pigs in each batch before treatment was initiated and again two days after end of treatment. LI was determined by qPCR, and the result was dichotomized into two levels: Low shedders: < 100000 and High shedders: ≥100000 bacteria/gram faeces.
Preliminary results. LI qPCR results were obtained from 685 pigs. Before treatment the proportion of highly LI shedding pigs was 39 %, 12 % and 38 % for Herd 1, 2 and 3 respectively. After treatment the proportion of highly LI shedding pigs differed significantly between treatment strategies in all three herds: Generally batch medication by room with 10 or 20 mg per kg through drinking water, resulted in a major reduction in the proportion of "High shedders". Pen-wise or individual pig treatment, however, resulted in a less pronounced reduction of highly shedding pigs.
Conclusion. The preliminary results in this trial suggests that choice of treatment strategy (batch vs. pen vs. individual pig) has a profound effect on faecal shedding of Lawsonia intracellularis in the room and thereby recovery of diseased pigs. The overall preliminary conclusion in this study is that oral batch medication by room with oxytetracycline for five days is more efficacious than either pen-wise or individual pig treatment of animals with diarrhoea only.

P115 FINANCIAL IMPACT OF DISEASE ON PIG PRODUCTION: V. LAMENESS

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Diseases cause ill-thrift in pigs, and contribute to economical losses due to decreased productivity. We tried to estimate the cost of diseases within Swedish pig production by using production data from 2010 and market prices from week 38 of that year. Standard production costs per day were estimated to 0.33 €, 0.67 € and 0.89 € for weaners, fatteners and sows, respectively. Mortality costs were defined as 40 € per suckling piglet, 43 € per weaner, 84 € per fattener and 447 € per sow.

A slaughter weight of 85 kg (119 kg live weight) corresponded to an income of 110 € per pig. With a mean slaughter age at 170 days, the net income corresponded to 29 € per pig. Each sow produced 22 pigs that reached market weight, which corresponded to an annual total income of 2,240 € per year (corresponding to a net income of 638 €). The price for growers sold at 30 kg bw corresponded to 51 € with a net income of 16 €.

Around 10% of the piglets are treated for lameness during the first three weeks of life. Mortality is generally low, but the growth of affected pig will be retarded. With a mortality of 3% due to arthritis and a prolonged rearing with one day for weaners and one day for fatteners, the losses corresponded to 47 € per sow in production. In herds severely affected by arthritis in suckling piglets, the losses increased to 215 € per sow. This corresponded to a mortality rate of 10% associated to arthritis, a prolonged rearing with four days for weaners and four days for fatteners, and partial condemnations in 5% of the pigs at slaughter. It should be emphasized that condemnations of entire carcasses were not included in the calculations.

Losses due to lameness during the fattening period were negligible (<1 € per sow) at a low incidence (no mortality, no decreased growth, 0.2% partial condemnations at slaughter). However, at a national level (1% mortality, prolonged rearing with one day, 0.9% partial condemnations at slaughter), the losses increased to 34 € per sow. In severe outbreaks, with a mortality rate of 5%, a prolonged rearing period with four days and partial condemnation of 5%, the losses were substantial, corresponding to 157 € per sow. Condemnations of entire carcasses were not included in the calculations.

In sows, 10% of the culling was caused by lameness. With a mean recruitment rate of 50% at a cost of 380 € each, the costs for culling lame sows corresponded to 15 € per sow and year. In addition, losses due to an increased mortality of suckling piglets could be substantial, since they correspond to 40 € per piglet.

P116 FINANCIAL IMPACT OF DISEASE ON PIG PRODUCTION: IV. REPRODUCTIVE DISORDERS

Zoric M.[1], Sjölund M.[1], Wallgren P.[1]

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Diseases cause ill-thrift in pigs, and contribute to economical losses due to decreased productivity. We tried to estimate the cost of diseases within Swedish pig production by using production data from 2010 and market prices from week 38 of that year. Standard production costs per day were estimated to 0.33 €, 0.67 € and 0.89 € for weaners, fatteners and sows, respectively. Mortality costs were defined as 40 € per suckling piglet, 43 € per weaner, 84 € per fattener and 447 € per sow.

A slaughter weight of 85 kg (119 kg live weight) corresponded to an income of 110 € per pig. With a mean slaughter age at 170 days, the net income corresponded to 29 € per pig. Each sow produced 22 pigs that reached market weight, which corresponded to an annual total income of 2,240 € per year (corresponding to a net income of 638 €). The price for growers sold at 30 kg bw corresponded to 51 € with a net income of 16 €.

This report focuses on expenses for reproductive disorders. The cost for each repeat breeder was defined as 30 €, and each abortion as 332 €. The incidence of repeat breeders was 8.3% at a national level, corresponding to a cost of 5 € per sow in production. Despite the large cost for each abortion, the cost per sow in production was only 5 € due to the low incidence of abortions (1.5% per year).

Pre-term culling of sows is also associated with high costs, and the most common cause for culling sows was reproductive failure (27%). Other frequent causes for culling sows were udder related problems (18%) and lameness (9%). Altogether, 70% of the sows were culled without the farmer making an active decision. Indeed, only 19% of the sows were culled due to age, and 10% due to a low productivity. Apart from rendering an estimated cost of 380 € for each replacement sow, this indicated that strategies for improving breeding stock quality were actually only applied to a limited extent by the farmer.

The MMA-syndrome also deserves attention. In herds with minor problems caused by MMA (1% sow mortality, 2% increase in piglet mortality and one extra day to reach 30 kg bw), the losses corresponded to 31 € per sow, whereas the cost was ten times larger (308 €) in herds with severe problems (20% sow mortality, 20% increase in piglet mortality and 4 extra days to reach 30 kg bw).

P117 COMPARATIVE CLINICAL STUDY OF PORCILIS® M HYO ID ONCE, AN INTRADERMAL MYCOPLASMA HYOPNEUMONIAE (M. H.) VACCINE, VERSUS SUVAXYN® M.HYO MONO

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A comparative, blinded and randomised trial was conducted to study two vaccines for the prevention of respiratory infections due to M.h. in pigs. Overall, 2348 piglets, from 7 farrowing batches in 3 farms were included in the study. The animals were randomised at 21 days of age in three groups:
- Porcilis® M Hyo ID once (Porcilis), 941 pigs intradermal, using IDAL injector
- Suvaxyn® M.Hyo Mono (Suvaxyn), 937 pigs, intramuscular
- Diluvac® (Control), 470 pigs intramuscular

Animals were individually weighed at inclusion and end of fattening period. Six piglets per group and batch were tested at the same age for M.h antibodies. Mortality and treatments were recorded. At slaughter, pneumonia lesions were scored from 0 to 28 (Madec and Kobisch). Main criteria for comparison between groups were Average Daily Weight Gain (ADWG), lung lesion score (LLS), percent of pneumonia (LLS>0). Secondary criteria were rates of severe lung lesion (LLS>5), pleuritis, scar lesions in lungs, mortality, treatments and M. h. seroconversion. ADWG was analyzed by ANOVA, LLS by Kruskall-Wallis and percentages by Pearson Chi-square.

Seroconversion rate and lung lesion scores of the control pigs suggest a low M.h infection, which may explain the lack of significant differences between vaccinated and control groups, for ADWG, percent of pneumonia, scar lesions, pleuritis and mortality. However, a significant difference ($p < 0.05$) was demonstrated for LLS of pneumonic lungs (with scores > 0) between Porcilis and Control (3.6 vs 5.0, p=0.002) and Suvaxyn and Control (3.9 vs 5.0, p=0.025). The percent of animals that seroconverted was significantly higher in the vaccine groups (54 to 61%) than in the control (31.7%). Between Porcilis and Suvaxyn groups, no difference was demonstrated for main and secondary criteria.

Despite the low M.h infection, Porcilis pigs did have reduced severity of lung lesions at slaughter with significant differences vs Control group for LLS (score ≥ 0): 1.8 vs 2.6, p=0.038, and rate of severe lesion (LLS> 5/28): 10% vs 18%, p=0.008, and respiratory treatment rate: 4.4 % vs 7.0 %, p=0.034.

Although none of the parameters were different between the two vaccines, intradermal has several benefits over intramuscular vaccination, including no needle breakage or carcass damage, greater safety and lower vaccine volume.

P118 COMPARATIVE CLINICAL STUDY OF PORCILIS® M HYO ID ONCE, AN INTRADERMAL MYCOPLASMA HYOPNEUMONIAE (M. H.) VACCINE, VERSUS STELLAMUNE® MONO

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A comparative, controlled and randomised trial was conducted to study two vaccines for the prevention of respiratory infections due to M.h. in pigs. Overall, 2882 piglets, originating from 2 batches in 4 French farms each were included in the study. The animals were randomised at 21 days of age in two groups co-mingled in each pen, identified by a specific tattoo:
- PORCILIS® M Hyo ID ONCE (Porcilis), 1414 pigs, intradermal, using IDAL injector
- STELLAMUNE® Mono Injection (Stellamune), 1468 pigs, intramuscular

At the start of the study, main respiratory disease status was investigated via serological examination of ten fatteners from each farm. Samples were all positive for M.h.; and for Influenza and Actinobacillus pleuropneumoniae with exception of one farm, and negative for PRRS except for one farm. At slaughter, pneumonia lesions were scored from 0 to 4 per lung lobe (Madec and Kobisch), but azygos lobe was not scored. A total of 520 lungs were scored in Porcilis group, and 543 in Stellamune group. Main criteria for comparison between groups were Average Daily Weight Gain (ADWG) calculated from birth to slaughter, and lung lesion score (LLS). Secondary criteria were rates of lungs free of pneumonia (score = 0), low lesions (score ≤2), severe lesion (score >5), scar lesions in lungs, and pleuritis. Statistical unit was the piglet. ADWG was analysed by ANOVA with 3 factors (group, sex and batch), LLS by Kruskall-Wallis and percentages by Mantel-Haenszel adjusted for batch (and if insufficient number of animals, Fischer test was performed). No significant difference was found between Porcilis and Stellamune groups for all main and secondary criteria. Respectively for Porcilis and Stellamune group, mean ADWG was 606g versus 609g, mean LLS 1,5 versus 1,3 and rate of lungs free of pneumonia 64,6% versus 61,1%. As lung lesions were very low, LLS of pneumonic lungs only was also compared. No significant differences were measured in any farm, but the mean LLS scores for all Porcilis and Stellamune pigs were at the limit of significance with 3,4 and 3,1, respectively (p=0,047). Although ADWG and lung lesion scores were not different between treatments, Porcilis M Hyo ID Once provides several advantages, incl. safer due to lack of needle, and more animal and farmer friendly.

P119 COMPARATIVE CLINICAL STUDY OF PORCILIS® M HYO ID ONCE, AN INTRADERMAL MYCOPLASMA HYOPNEUMONIAE (M. H.) VACCINE, VERSUS INGELVAC® M. HYO

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A comparative, controlled and randomised trial was conducted to study two vaccines for the prevention of respiratory infections due to M.h. in pigs. Overall, 2593 piglets, originating from 2 batches in 5 French farms each were included in the study. The animals were randomised at 21 days of age in two groups co-mingled in each pen, identified by a specific tattoo:
- PORCILIS® M Hyo ID ONCE (Porcilis), 1282 pigs, intradermal, using IDAL device
- INGELVAC® M. Hyo (Ingelvac), 1311 pigs, intramuscular

At the start of the study, main respiratory disease status was investigated via serological examination of ten fatteners from each farm. Samples were positive for M.h. except for one farm (batch effect or low seroprevalence), positive for Influenza except for one farm, positive for Actinobacillus pleuropneumoniae except for one farm, negative for PRRS except for one farm. At slaughter, pneumonia lesions were scored from 0 to 4 (Madec and Kobisch), but azygos lobe was not scored. A total of 725 lungs were scored in Porcilis group, and 680 in Ingelvac group. Main criteria for comparison between groups were Average Daily Weight Gain (ADWG) calculated from birth to slaughter, and lung lesion score (LLS). Secondary criteria were rates of lungs free of pneumonia (score = 0), low lesions (score ≤2), severe lesion (score >5), scar lesions in lungs, and pleuritis. Statistical unit was the piglet. ADWG was analysed by ANOVA with 3 factors (group, sex and batch), LLS by Kruskall-Wallis and percentages by Mantel-Haenszel adjusted for batch (and if insufficient number of animals Fischer test was performed). No significant difference was found between Porcilis and Ingelvac groups for ADWG, LLS, also LLS on pneumonic lungs only (score >0), rates of score = 0, scar, and pleuritis.

Significantly fewer pigs in Porcilis group had LLS of >5, and more pigs had LLS of ≤2. This was mainly due to the results in Porcilis pigs from one farm, where the mean LLS was higher: respectively 2,7 and 3,7 for Porcilis and Ingelvac group. In contrast, LLS in other farms ranged between 0,2 to 1,2. Since the end of the study, pigs in all five farms are vaccinated with Porcilis Mhyo ID Once and the farmers appreciate the intradermal route for its safety and reduction of labor.

P120 REAL-TIME PCR DIAGNOSTIC PACKAGE FOR DIAGNOSIS OF PORCINE RESPIRATORY DISEASE

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Introduction. Several viruses, mycoplasmas and bacteria are involved in respiratory disease in pigs. Most of them can be detected by PCR but conventional bacteriological examination is preferable for most bacterial infections, because of the broad spectrum of potential species and the need for detection of antimicrobial resistance. A PCR diagnostic package for detection of the common respiratory pathogens swine influenza virus (SIV), porcine reproductive and respiratory syndrome virus (PRRSV), porcine cirocovirus type 2 (PCV2) and Mycoplasma hyopneumoniae (Mhyo) was developed at the National Veterinary Institute (NVI). Here we present a summary of the results of samples tested since the launch in 2007.

Materials and Methods. Lung tissue samples were submitted to NVI from veterinary practitioners as 3x3x3 cm pieces of lung tissue from 3 individual pigs with respiratory disease. RNA was extracted with RNeasy Mini Kit (QIAGEN) and DNA was extracted with QIAamp DNA Mini Kit (QIAGEN). RNA was used for test for SIV and PRRSV and DNA was used in the Mhyo and PCV2 tests. Testing was performed with separate real-time PCR assays for SIV, Mhyo and PCV2, respectively. SIV and Mhyo results were reported as detected/not detected. PCV2 results were quantitative, expressed as copies of PCV2 pr. 500 ng DNA extracted. Detection of PRRSv (EU/US) was an option in the package, but only chosen in few submissions (data not included).

Results. In the period from late 2007 until October 2013 NVI received 1052 submissions with 2709 samples of lung tissue. The number of submissions with at least one sample positive for SIV was 333 (32%) and for Mhyo 218 (21%). For PCV2 the number of submissions with >107copies of PCV2 per 500 ng extracted DNA was 126 (12%). The prevalence of positive samples varied during the period for SIV (23-52%) and PCV2 (6-15%), but was quite stable for M. hyo (19-23%).

Discussion. SIV was the pathogen most often detected, indicating that swine influenza is a major cause of respiratory disease in Danish pig herds. The proportion of SIV positive submissions increased simultaneously with launch of the diagnostic package, from around 20 % positives before to around 30 % positives after launch. This may reflect a more safe diagnosis at the herd level due to a higher number of samples per submission/herd, compared to single sample submissions, which earlier on was often chosen by the customers in order to cut down the expenses to laboratory diagnostics.

P121 RETURN ON INVESTMENT AFTER DEPOPULATION AND REPOPULATION IN A SPECIFIC PATHOGEN FREE PROGRAMM: 10 YEARS OF EXPERIENCE IN FRANCE

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The cap50 co-operative and the Cristal group have over the past 10 years introduced a depopulating & repopulating procedure at 40 rearing establishments, the programme's aim being to reduce pig-production costs by improving hygiene in relation to respiratory-tract microbes and obtain technically better results.

The programme began in 2002, with the first rearing group being introduced by hysterectomy, enabling subsequent population by a second batch, in turn being reared to prepare for gilts to be retained when the rearing premises were depopulated. All the depopulation and repopulation rearing batches result from that rearing batch.

Materials. Before each depopulation movement, an appraisal of internal and external biosecurity is carried out with the veterinarian and the technical staff responsible. While the facilities are empty and when the piglets are weaned, the sows are culled and the piglets sent for fattening at another site. At the same time, the multiplier begins the reproduction process with the gilts, forming the next batch(es) of breeding sows. These will be delivered together, after a period of 6 to 9 weeks during which the receiving facilities are emptied, disinfected and left empty before restocking.

Results. The resulting improvements in technical and business management (TBM) performance can be calculated by comparing the mean TBM value over the two years preceding the depopulation with the mean value for the two years following repopulation. The improvements found were 0.21 in the consumption index, 72 grams in growth, a reduction of € 28/sow (the mean is € 76 per sow after the depopulation) in veterinary costs, and increased productivity of 2.5 pigs/sow/year. The calculation method advocated by IFIP (the French Pork and Pig Institute) shows the mean saving to be 18 eurocents per kilogram of pigmeat produced.

Concluding points. Organising these arrangements were supplemented by including public-health considerations, with a clear reduction in the use of antibiotics. The use of antibiotics in pig rearing, the rearing establishments' programmes do not include a policy of antibiotic metaphylaxis in medicated feed.

P122 IMPACT OF THE NIPPLE POSITION ON THE PERFORMANCE OF PIGLETS MATERNITY: INTERACTION WITH ADOPTION

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In a hyperprolificacy context, heterogeneity within the litter increasingly justify the early piglets' adoption practice. Best rules for a successful adoption are still being discussed today. During the first days of life, each piglet will gradually set up on one unique teat. The objectives of this study are: 1) to describe the kinetics of this teat assignment; 2) to characterize piglets (initial weight, sex, maturity, vitality) depending on the teat chosen and their subsequent consequences on piglets performances in maternity (growth, mortality); 3) to evaluate the impact of adoption on teat hierarchies and performances.

In this study, 808 live piglets were studied in a commercial French farm. Piglets from posterior teat were significantly lighter and less vigorous ($P<0.05$). 30% of piglets were adopted. Adopted piglets were less vigorous (1.70 vs. 1.85; $P<0.05$) at birth and birth later than non adopted piglets (8.72 vs. 7,27; $P<0.05$). Adopted came from significantly bigger litters than non-adopted (16.4 vs. 14.1; $P<0.05$) and from older parity sows (5.2 vs 4.3; $P<0.05$). They were also lighter at birth (1.31kg vs. 1.50kg; $P<0.05$) and at day 3 (1.62 vs 1.89; $P<0.05$), but they milked the same teat than non-adopted.

P123 EVALUATION OF THE SPECIFICITY OF AN ELISA FOR DETECTION OF PRRSV ANTIBODIES IN ORAL FLUID OF PIGS

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Objective. Monitoring of PRRSV, especially in unsuspected herds, requires a continuous testing of representative samples. Therefore, the repeated sampling of individual animals, for instance in boar studs, is necessary. For practicability and animal welfare reasons other methods than repeated blood sampling from the same animal are required. One possibility is the testing of oral fluid samples. ELISAs adapted for this sample matrix should have the same specificity and sensitivity as ELISAs for serum. Especially in PRRSV unsuspected farms a test system with a high specificity is required to avoid false positive results. Aim of the study was therefore to evaluate the specificity of an ELISA for detection of PRRSV antibodies in oral fluid of pigs.
Material and methods. Serum and individual oral fluid samples of 149 boars from PRRSV negative boar studs in Austria and Germany were collected. Serum was tested for PRRSV antibodies with the HerdCheck PRRS X3 ELISA (IDEXX, Ludwigsburg, Germany). PRRSV antibodies in oral fluid samples were evaluated in double detection with the IDEXX PRRS OF ELISA (IDEXX, Ludwigsburg, Germany). Specificity of the IDEXX PRRS OF in comparison to the results in serum was calculated and the repeatability of the results in oral fluid by paired testing was evaluated.
Results. All serum samples were tested negative for PRRSV antibodies. First testing of PRRSV antibodies in the corresponding oral fluid resulted in 6 positive and 143 negative samples. At second testing, we found 7 positive and 142 negative results. 4 oral fluid samples were positive in both measures, the other positive results did not correspond. The S/P values of the positive samples ranged from 0.40 to 0.95, whereat the cut-off of the test was 0.4. Because of these results, a specificity of 96.0% (first testing) and 95.3% (second testing) was determined. The repeatability between the two measures was 96.6%.
Conclusions. For monitoring of PRRSV unsuspected pig herds such as boar studs, test systems with high specificity are required. False positive results lead to confusion and can cause a lot of extra costs. Testing of PRRSV antibodies in oral fluid will only be preferred to serum if the results are comparable or better. The calculated specificity of 96% and the repeatability of 96.6 % in negative pigs are lower than in serum ELISA. Further validation of the ELISA with oral fluid samples of more pigs as well as further evaluation of how to collect and use oral fluid as sample matrix are necessary.

P124 COMPARISON OF DIFFERENT COMMERCIAL ELISAS FOR DETECTION OF PRRSV ANTIBODIES IN SERUM

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Objective. The porcine reproductive and respiratory syndrome is a disease that causes high economic losses. For monitoring of unsuspected herds, tests with a high specificity are required. Positive animals, on the other hand, may not be overlooked. Different commercial ELISAs are available for detection of PRRSV antibodies (Ab) in serum. To interpret the findings, the ELISAs should give comparable test results regarding sensitivity and specificity. Aim of the study was to compare different commercial ELISAs for detection of PRRSV Ab in serum of pigs.
Material and methods. Serum of 31 pigs from monitored PRRSV negative farms, 80 serum samples of pigs from 16 supposed negative farms in Austria and Germany as well as 92 residual blood samples from Austrian wild boars were collected. All samples were tested for PRRSV Ab with the HerdCheck PRRS X3 (IDEXX) = ELISA a, the Ingezim PRRS 2.0 (Ingenasa) = ELISA b and the Priocheck PRRS Ab porcine (Prionics) = ELISA c.
Results. All 31 serum samples of the monitored negative farms were tested negative for PRRSV Ab in all three ELISAs. Specificity for all ELISAs was 100% in this part of the study. In the assumed negative farms, five pigs per farm at one time point were tested. In ELISA a, all samples were negative. With ELISA b, 8 positive samples out of three farms were found. ELISA c detected 14 positive samples out of 8 farms, whereat 5 positive samples of 3 farms were the same as detected with ELISA b. In 6 of the positive samples of ELISA b and c, ELISA a produced S/P values between 0.23 and 0.32 (cut-off 0.40). Out of the 92 wild boars, 2 were found PRRSV Ab positive with ELISA a and 3 with ELISA b and c, whereat one sample was corresponding.
Conclusions. In samples of regularly monitored PRRSV unsuspected farms, all three of the tested ELISAs showed a specificity of 100%. In farms that were tested at only one time point with few samples, the result was not that clear. Although ELISA a produced 100% negative results, it cannot be concluded, that the farms were PRRSV negative. Therefore, positive PRRSV Ab results in ELISA b and c cannot be declared as false positive and speak rather of a high sensitivity of those ELISAs. The high specificity of all ELISAs in wild boars supports this theory. Further evaluation of a greater amount of samples of negative or unsuspected farms is necessary to define the specificity of the newly developed ELISAs.

P125 USE OF PCR AS A TOOL FOR MONITORING IN AN INTEGRATED SYSTEM

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Introduction. Porcine Reproductive and Respiratory Syndrome virus (PRRSV) is a highly infectious disease that is endemic in pigs throughout Europe. In Europe PCR is used in control eradication programs or to confirm a diagnosis. In areas where PRRS is endemic, the major strategy is to control and minimize the number of outbreaks. New outbreaks in those herds will cause more economic damage and are difficult to treat. The use of an adaptation or quarantine area for new incoming animals is a well known procedure on farms. PCR tests can support this management method in checking if the animals have been infected and that the shedding of the virus has stopped before movement. Sampling can be done by oral fluids and/ or blood sampling. The goal of the experiment is to prove that PCR tests can provide information for the managers on farms with easier sampling methods on pen level, compared to individual samples (blood samples).

Materials & methods. 8 pens with 10 gilts per pen were regularly sampled during 3 months. Pens were also divided in different number of animals infected per pen. Blood samples were taken from each animal and per pen one oral fluid sample was collected.

The LSI MagVet™ Universal Isolation Kit was used for RNA purification. RNA is analyzed with LSI VetMAX™ PRRSV EU/NA Kit on ABI 7500 according manufacturer instruction. The test results of oral fluids and blood samples have been compared for each sampling moment.

Results. The LSI VetMAX™ PRRSV EU/NA Real-Time PCR Kit shows an excellent correlation in the detection of the virus. At pen level in oral fluids samples compared to animal level in blood/serum samples: +/-1CT between blood and serum results and 1+/-0.5CT between oral fluid and blood/serum results.

The presence of PRRSV RNA was identified in an early infectious stage: from 7 days dpi up to 7 weeks and 8 weeks on blood/serum.

Discussion & conclusions . This field study demonstrates an excellent correlation between the CT obtained with blood/serum and oral fluids. Thus, oral fluids samples are a good tool to gain information about the PRRS status on pen level. Based on epidemiology and prevalence of the virus in the herd, oral fluids samples are able to provide the same if not better information, due to ease of use, as randomly taken blood samples on herd level. Oral fluids samples are a good tool for screening or to check animals before movement by PCR. It should be used as an early warning system for monitoring on pen level, to estimate the circulation of different porcine pathogens (PRRSv, PCV2 and SIV).

P126 CLINICAL EFFICIENCY OF VETRIMOXIN® LA IN THE CONTROL OF EARLY MORTALITY IN SUCKLING PIGLETS

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Introduction. Suckling piglets are exposed to infections within first hours of life. The first contaminations with Streptococcus suis can occur already during parturition. The clinical signs of S. suis infection develop mostly at the age of 10-21 days, but in some occasions even earlier, particularly in males due to previous castration. Prophylactic use of efficient antibiotics can reduce the incidence of the disease and decrease the losses due to mortality or crushing of weak, sick piglets. The aim of this study was to evaluate the efficacy of prophylactic treatment with Vetrimoxin® LA (amoxicillin inj., Ceva) in the in the farms with endemic S. suis infections in suckling piglets.

Materials and methods. Sows were randomly assigned into two treatment groups according to their parity. Piglets of the group 1 (G1) were treated within the first 24 hours after parturition with 0.5 ml Vetrimoxin® LA. Non-treated piglets of the second group (G2) served as the control. In total 372 piglets were included in the G1 and 327 piglets in the G2. All piglets were weighed at 1 day and 18 days of life and mortality was recorded daily per pen.

Results. The majority of deaths occurred within first 3 days of life. Vetrimoxin® LA treated piglets had lower mortality particularly on day 3 and 4 of age. In total the mortality in the Vetrimoxin® LA treated group reached 9.68% while the mortality in the control group was 14.98%. (Chi² test $p<0.05$).

Cumulative mortality between days 1-18 of age.

	Vetrimoxin® LA	Control
N° at 1D	372	327
N° at 18D	336	278
Mortality %	9,68 %	14,98 %

There was no difference in the calculated average daily gain. The weight variation was lower in the Vetrimoxin® LA group, even if the difference was not statistically significant.

Conclusions. Vetrimoxin LA® administered to suckling piglets 24 hours after birth decreased significantly the mortality in the pre-weaning period from almost 15% to 9.7%. The cumulative mortality includes the sudden deaths, crushing and deaths after the acute disease. Early prophylactic treatment decreased the mortality due to the infection itself and in addition to that, healthy and more vital piglets might have had better chance to evade crushing. The average weight gain was not improved in the treated group, which indicates that the growth rate was not severely affected by those infections which were controlled by amoxicillin.

P127 VACCINATION WITH ENTERISOL® ILEITIS IN 23 FRENCH PIG FARMS IMPROVES TECHNICAL PARAMETERS WHILE REDUCING THE TOTAL AMOUNT OF ANTIBIOTICS USED

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During the last 5 years, PCV2 vaccination has allowed French pig farms to decrease their overall veterinary expenses, while improving their technical and economical performance (Lewandowski et al, ESPHM, 2012); however, in many farms, despite this PCV2 vaccination, some antibiotics are still used to control Lawsonia intracellularis infection; At the veterinary clinic Selas de la Hunaudaye it was decided to follow the principle of "prevention is better than cure" and to implement Enterisol® Ileitis vaccination in 23 candidate farms where PCV2 was under control in order to reduce antibiotic use due to Lawsonia intracellularis and to measure the effect of ileitis vaccination on performance and economic parameters. 23 pigs farms (including 19 farrow to finish farms, 3 wean to finish farms, and 1 finishing farm) were included into this before-after study and from October 2010 untill June 2013, technical and economical data was collectted for more than 141000 pigs (76122 non vaccinated pigs vs 65762 vaccinated pigs). The period before and after implementation vaccination (BV vs AV) with Enterisol® Ileitis was compared for performance and economical parameters (statistic analysis using ANCOVA, 2 factors: farm and vaccination). After implementation of ileitis vaccination a reduction of 32 % in antibiotic costs (BV: 1.71 vs AV: 1.15 €/pig, $p<0.01$) was achieved (while the price for antibiotics was stable over the 2 periods).; At the same time, the ADG 8-115(BV: 688 g/day vs AV: 700 g/day, $p<0.01$) and FCR 8-115 (BV: 2.60 vs AV: 2.54, $p<0.01$) was improved, leading to a total gain per pig due to the vaccination of 2.90 €.

Results indicate that Enterisol® Ileitis is a very effective alternative to antibiotics for the contrl of Lawsonia intracellularis infectionis. This field study shows that ileitis vaccination can allow farms to improve their technical performance while taking into account the necessity to decrease antibiotic use in the field, in full consideration of both Animal and Human health.

P128 DIARRHOEA AND RETARDED GROWTH AFTER PLACEMENT IN A FATTENING FARM - A CASE REPORT

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In a fattening farm with 470 places, diarrhoea and growth retardation occurred 1 week after placement of new growers. Five pigs died. An in-feed medication was implemented for 2 weeks. Before this case the farm had consistently only one source of pigs. These pigs were not vaccinated neither against porcine circovirus type 2 (PCV2) nor Lawsonia intracellularis (LI) and no medication had been necessary. Average daily weight gain (ADWG) was at about 875g. Pigs were slaughtered in average after 92 days. No clinical signs were observed. One or 2 death losses per year were recorded.

During a visit of a veterinarian, 25% of the grower pigs showed signs of diarrhoea, some of the older pigs retarded growth. Room temperature was at 15°C. Hygienic conditions of feed and feeding system were fine. Water analysis showed in the spring/ pipe sample 0/190 CFU/mL of aerobe germs, 29.2/29.1 mg/L of NO3 and no enterococae nor Escherichia coli (EC) per 100 mL. One affected pig was necropsied. The diagnosis was EC diarrhoea, bacteriology of gut material revealed +++ not typable haemolytic EC.

Rectal faecal swabs of 6 pigs were analysed in pools of 2 by PCR for presence of LI, Brachyspira hyodysenteriae (BH) and EC. All 3 pools were PCR negative for LI and BH, but positive for EC F4. Faecal samples from another 6 pigs were tested in 3 pools by culture and PCR for presence of Brachyspira spp. Neither B. pilosicoli nor BH were detected, but in 2 of 3 pools Brachyspira spp. were detected. Blood samples of 10 growers and 10 finishers with diarrhoea or reduced growth were tested by qPCR for PCV2 in pools of 5. Ten blood samples from finisher pigs were also tested by an LI ELISA. Both pooled samples were positive for PCV2 whereas the pools of growers were negative. All 10 samples from finishers were seropositive for LI.

The water system was cleaned and the room temperature in the lying area increased. Vaccination against LI and PCV2 at 3 weeks of age was implemented on the breeding farm. The medication was maintained until the first vaccinated pigs were placed. No clinical signs have been observed since then. ADWG has now reached 900g.

Conclusion. EC, PCV2 and LI were assumed to be major pathogens. The role of Brachyspira spp. remains unclear. Management and housing factors had most likely also an impact on disease outbreak. Through the implementation of vaccination and improvements in housing it was possible to control the disease and to stop the use of antibiotics.

P129 TEAM SOW LIFE

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The objective of this study was to create well-being among sows through well-functioning personnel.
This paper gives you the facts from six large sow units (with a total of 6.777 year sows and 37 employees), all of which wanted to reduce sow mortality, and the owners were willing to work with the wellbeing of the staff to ensure that sows are living longer and employees remain in the job for a longer period of time.
Through intensive production and management the teams managed to reduce sow mortality by 2.9 per cent in average. In the same period sow mortality was reduced by 0.7 percent on national level in DK.
Areas of action and goals were adapted to the needs of each farm. The six farms received a lot of advice and guidance and spent many meeting hours to put new procedures in place.
All teams began with job satisfaction analysis among all employees. This along with an organizational chart and DiSC profiles of all employees formed basis for a personal interview with each employee about development and performance. The interviews clarified whether the right people had the right tasks and responsibilities, and helped to ensure that the cooperative structure was appropriate.
To change the duties of the employee can be easy to do and can provide quick and immediate pleasure and relief for the employee. And claw trimming can provide immediate improved welfare and well-being for a sow. But improvements at herd level for example that sows are living longer, and employees remain in the job for a longer period of time, takes a year or more to get reliable figures on. This means that working with the well-being of humans and sows requires a focused effort and constant motivation over a long period of time.

P130 EVALUATION OF LUNG LESIONS AT SLAUGHTER IN IRELAND

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Abattoir inspections are a useful tool for monitoring herd health and a source of data for epidemiological studies. In Ireland, pneumonia has been identified recently as the most common cause of death in pigs submitted for laboratorial diagnosis. As a result, detailed information on lung lesions at slaughter is desirable to monitor associated diseases. This study aims to investigate the prevalence of lung lesions in pigs at slaughter.
A total of 12,597 finishing pigs sent to slaughter to a dedicated pig abattoir in Ireland in 2012 and 2013 were investigated. Enzootic-pneumonia (EP)-like lesions (Scale from 0 to 55), viral-like pneumonia (presence or absence), pleuropneumonic (PP) lesions (presence or absence), lung abscesses (presence or absence), pyaemic lung lesions (presence or absence) and pleurisy (mild: adhesions between lung lobes only; severe: adhesions involving the visceral pleura and the parietal pleura; 0 for absence) were assessed individually in the processing line.
The prevalence of positive batches in 2012-2013 was: 82.6% for EP-like lesions, 46% for viral pneumonia, 42.6% for PP lesions, 69.5% for abscesses, 4.3% for pyaemia, 91.3% for mild pleurisy and 84.3% for severe pleurisy. The mean value of pathological lung lesions detected in 2012 and 2013, respectively, was: EP-like lesions (1.090 and 1.367, $p=0.289$), viral pneumonia (2.592 and 0.530, $p<0.001$), PP lesions (1.265 and 0.603, $p=0.052$), abscesses (2.492 and 2.175, $p=0.577$), pyaemia (0.034 and 0.198, $p=0.356$), pleurisy mild (12.54 and 14.55, $p=0.288$) and pleurisy severe (8.074 and 4.371, $p<0.001$).
Respiratory disease in finishing pigs is prevalent among Irish pig farms. In this study, more than 80% of the batches analyzed were positive for EP-like lesions and more than 90% presented pleurisy lesions. While the mean value for EP-like lesions indicated a stable situation in 2012-2013, it is noteworthy that 28.4% of affected batches presented an average EP-like lesion score >2. Conversely, the high level of pleurisy detected in this survey indicates, overall, the need for better control measures in farm.
This abattoir survey identified a high prevalence of respiratory disease among commercial Irish pig farms. EP-like lesions and pleurisy were the most prevalent lung lesions. Overall, these findings suggest the need for improved control measures on farm and for continued monitoring programmes.

P131 MEASUREMENT OF CORTISOL IN SALIVA OF GROWING PIGS AFTER TWO DEFINED STRESSORS

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Introduction. Absence of "stress" is one of the basic fundaments of animal welfare, which becomes of increasing interest in public discussion. In organism, a multitude of hormones, e.g. glucocorticoids and catecholamines are involved to overcome stressful situations. The aim of the present study was to measure saliva cortisol as a potential indicator of growing pigs´ adrenocortical activity after two defined stressors: regrouping and castration.

Materials and Methods. In total, 360 saliva samples were collected individually from 10 weaned non-castrated piglets 3 times a day (7am/3pm/10pm) over a 12-day study period. Pigs were housed separately in two groups (5 animals each) and acclimatization time (for handling and chewing on cotton buds (Salivette®, Sarstedt, Germany)) was three days. Samples of study days (SD) 1+2 and 6+7 were used to determine mean basal cortisol concentrations (mCC). At SD3 all pigs were regrouped (6am); castration was conducted under anesthesia at SD8 (9am) using a NSAID for pain management. After saliva collection, samples were frozen immediately at -20°C until further investigation using a competitive cortisol enzyme immunoassay (EIA).

Results. After centrifugation, in 16 of the samples there was not enough saliva for analysis. Notably missing results occurred mostly at 7am (SD1-12: n=7) and after castration (SD8 3pm: n=3, SD8 10pm: n=1). Baseline salivary cortisol concentrations showed a diurnal rhythm (mCCmax at 7am, mCCmin at 10pm) with no obvious effect of the two stressors ($p \geq 0.081$). Mean basal CC were 3.8 ng/ml (SD1+2 7am) and 1.9 ng/ml (SD6+7 3pm). The highest CC was reached after castration at SD8 3pm (149. 8 ng/ml (mCC 39.9 ng/ml, $p=0.057$)). Regrouping resulted in increased mCC for the following 24h (6.6 ng/ml SD 3 7am; 5.7 ng/ml, SD 4 7am) ($p=0.061$). Median calculations yielded highest CC at SD3 3pm (5.7 ng/ml) and SD8 3pm (19.8 ng/ml) and lowest CC at SD5 10pm (0.61 ng/ml), respectively.

Discussion. Glucocorticoids and their metabolites are regarded as a potential "stress indicator" in the assessment of animal welfare. Therefore, a non-invasive stress-free and easily repeatable sampling method is hardly required. Cortisol is known being measurable in various body fluids and excreta for different species. Using Salivette® (Sarstedt, Germany) for pigs´ saliva sampling, plenty amount of recoverable saliva can be obtained. Biological validation of EIA was successful providing an EIA as a useful tool to determine swine saliva cortisol concentration for detecting stressors like "regrouping" and "castration".

P132 AN EFFECTIVE WORMING SCHEDULE FOR SOWS USING FLUBENDAZOLE IN THE PREVENTION OF PRE-WEANING ASCARIS SUUM

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Insights on the impact of migrating Ascaris larvae on the immune response against Mycoplasma hyopneumoniae have increased the awareness about controlling early Ascaris infestations. Correct worming of sows can prevent Ascaris egg contamination of the farrowing houses. A previous study with fenbendazole, even at very high dose (9 mg/kg spread over 3 days), did not stop egg shedding completely. The objective of this study was to investigate the use of flubendazole to completely stop Ascaris egg excretion in sows before moving them to the farrowing house.

Individual fresh feces samples were collected from sows within a week before treatment. Positive sows were randomized into a treated group (T) (n=11) and a non-treated control group (C) (n=9). T received 1 mg/kg/day flubendazole (Solubenol®) for 5 consecutive days, starting on day 18 before expected farrowing date (EFD). Fresh feces samples were collected daily from the first day of treatment until the day before movement to the farrowing house (day 6 before EFD), on day 5 before EFD and on farrowing and weaning day. Fecal egg counts were performed blinded and were expressed as Eggs Per Gram using the McMasters technique. The individual fecal egg counts were listed together with the descriptive statistics and a frequency table (positive/negative samples) over time for each group. On the individual area under the curve values, the two-by-two Wilcoxon Mann-Whitney U test was used for statistical comparisons between groups. To test the change over time (before and after treatment), a paired statistical test, Wilcoxon Signed Rank, was performed between the individual area under the curve values.

For C, there was no statistical difference between the fecal egg counts before/during the treatment period (day 18-14) and the post-treatment period (day 13-6). For T, there was a significant drop in fecal egg counts between the treatment period and post-treatment period ($p = 0.008$). There was no difference in fecal egg counts between C and T during the treatment period ($p = 0.351$), but during the post-treatment period the fecal egg counts in T were significantly lower than the ones of C ($p = 0.007$). The third day after the last treatment day all sows from T were completely negative and remained negative until weaning. Thus we recommend starting the treatment with Solubenol® at least 8 days before the sows are moved to the farrowing house to prevent contamination via the sow.

P133 PREVALENCE OF NEMATODES IN LOOSE HOUSED INDUSTRIALIZED SOWS FROM A PIG PRACTICE IN FUNEN, DENMARK

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Background. With new legislation in Europe, sows have to be group housed . The close contact with faeces from other gilts and sows is speculated to be a source of nematode spread within a farm. Ascaris suum is known to be widespread among sows in Denmark, whereas other nematodes are rare. A former study in 83 industrial farms with group housed indoor sows, from Denmark, showed a farm prevalence of 75 % of Ascaris suum and a prevalence of 15 % of Oesophagostemum spp. when examing faeces from 5 gilts and 5 sows by Baermann flotation1.

Material & Method. In a specialized pig practice in Funen, 20 industrialized farms with loose housed sows were included in a survey. Treatments with antiparasitics had not been made for the last 3 months. Faeces from 5 gilts and 5 sows close to farrowing in each farm were collected , cooled and shipped to laboratory. Flotation by Baermann was done at the Pig Research Center, Laboratory for swine diseases. Results were reported from individual animals as eggs found per g faeces. A farm was considered positive for a certain nematode if one or more samples were positive.

Results. Sixteen (16) out 20 farms = 80 % were positive for Ascaris suum and 5 out of 20 farms = 25 % were positive for Oesophagostemum spp. Two of the Oesophagostemum positive farms had only one or two positive samples (out of 10) with only low numbers of eggs shed, whereas the other 3 farms had 5-10 of 10 animals shedding with a high number of eggs. In one farm, only the gilts shed, indicating a localized infection in the gilt pool. For Ascaris, 4 of the 16 infected farms shed relatively high number of eggs in a high frequency of sows and gilts. In the remaining 12, Ascaris positive farms only few sows or gilts shed and in low numbers. Only one sample was positive for Trichuris suis and one for Eimeria spp.

Conclusion. Oesophagostemum spp. seems to be relatively common and, when present, tend to be present in the farm often in the majority of animals and in high numbers. Ascaris suum is present in the majority of farms. Other namatodes are absent or insignificant.

Implications. As Oesophagostemum and Ascaris infections in high levels can have a negative impact on productivity, it's important to know the farm status in order to be able to control the infection by relevant management and/or treatment procedures. In farms that do not have a routine deworming program, a surveillance program should be standard.

1: Haugegaard, J.: Vet Parasitol. 2010

P134 INVESTIGATIONS ON INFRARED HEATING PLATES FOR SUCKLING PIGS IN COMPARISON TO CONVENTIONAL WARM WATER HEATING PLATES

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In a conventionally managed piglet-producing farm, innovative infrared heating plates (IR) as a floor heating system in the farrowing pens were investigated in comparison to usual warm water heating plates (WW). Therefore, a total of 187 sows with their litters were divided into four groups (group 1/2: IR with/without an extra cover plate, group 3/4: WW with/without an extra cover plate). Data were collected during a summer and a winter period with regard to heat supply and energy consumption, lying behavior of sows and piglets, weight gain, medication and piglet losses. For health aspects umbilical regression as well as wound healing after castration and tail docking were evaluated by a score system. Weight gains of piglets of the 4 groups showed no significant differences. In addition to the routine medication of all piglets, some piglets also had to be medicated due to arthritis, biting injuries and diarrhea. The frequency of therapy did not differ between the 4 groups. The lying behavior of the piglets of all groups was similar. In winter, the length of the observation time when more than 50% of the piglets in a litter lay in the creep area was twice as high as in summer in all 4 groups. With increasing age, the time piglets spent in the creep area, decreased in all groups. During parturition significantly more sows in the IR groups directed their mammary glands to the heating plates (IR 88.6% versus WW 58.3%), making it easier for the piglets to find the way from the mammary gland to the creep area. The wounds after castration (7th day of life) were controlled at day 14 and before weaning (d 21). The tails were docked on the 1st day of life (summer), and at the 7th day of life (winter), respectively, and the wound healing was examined 7 and 14 days later. A significantly better wound healing was verified for both the IR groups. Overall, the tails healed worse after docking on d 7 in comparison to tails, which were docked on the 1st day of life. A statistically better umbilical regression could also be recorded for piglets lying on IR heating plates. These positive effects of the infrared radiation on wound healing and umbilical regression can be explained by better blood circulation and higher partial pressure of oxygen in the wound area as well as by reduced pain and a stimulation of the immune system.

The IR heating plates showed an about 25% (summer) to 50% (winter) lower energy consumption than the WW heating plates.

P135 AN ASSESSMENT OF THE ECONOMIC IMPACT OF PRRS OUTBREAKS IN EIGHT SOW HERDS IN DENMARK

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Introduction. PRRS is currently endemic in most pig-producing regions of the world. The economic losses due to PRRS are reported to be high, although figures for Denmark are not available. Therefore, an investigation was conducted to assess the duration and economic impact of PRRS outbreaks in Danish sow herds.
Material and Methods. Veterinarians were asked to report sow herds with acute clinical PRRS outbreaks. The herds had to be previously PRRS negative for the PRRS strain causing the PRRS outbreak. This was determined by serological examination. Production data had to be available electronically and were periodized on a weekly basis after the sows' first weaning period. The pre-outbreak period was set at six months before the PRRS outbreak. The start date of the outbreak was based on observations of clinical signs, results of serological tests and weekly visual inspections of the production data graphs. The end of the outbreak was defined as the point at which production levels returned to the same level as in the pre-outbreak period. The economic losses for the production of weaned piglets were estimated by calculating the gross margins in the pre-outbreak period and during the outbreak. The losses were assessed using the opportunity cost method. The costs of diagnostics, increased work and medicine were not included.
Results. It was difficult to identify herds with acute clinical PRRS outbreaks. Only eight herds were included. Seven herds were previously PRRS-free, and, of these, three were infected with PRRS type 1 and four with PRRS type 2. One herd had previously been infected with PRRS type 1 and had experienced an acute outbreak after introduction of PRRS type 2. The duration of the PRRS outbreak varied from 10-90 weeks, but it normally took 30-35 weeks before production levels returned to the pre-outbreak level. The losses were assessed to vary between 4 and 151 euros/sow during the outbreak, with a median of 44 euros/. There was a tendency towards increased losses if the outbreak was caused by PRRS type 2 compared with PRRS type 1.
Discussion. It was very difficult to find herds with an acute clinical PRRS outbreak in Denmark. A very short period with clinical signs is typically seen before management changes are implemented and the PRRS is stabilized with or without the use of PRRS vaccines, resulting in minimal economic losses. Another explanation for the small number of clinical outbreaks could be that the PRRS strains circulating in Denmark might be less aggressive than strains circulating in other countries.

P136 AREA ELIMINATION OF PRRSV TYPE 2 USING INGELVAC® PRRS MLV IN A LOAD, CLOSE AND HOMOGENIZE MODEL. A PILOT PROJECT AT HORNE PENINSULA, DENMARK

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In Denmark there is an increasing motivation to eliminate PRRSV from positive sow, nursery and finisher sites to optimize production results. In areas with dense pig population, and a high number of farms with circulating PRRSV, a whole herd approach, simultaneously applied on all farms, is necessary to control and eliminate PRRSV from the whole area. This study evaluates a PRRSV elimination project in Horne peninsula, covering 4 sow farms, 2 wean to finish (W-F) farms and 6 finisher farms. A detailed and coordinated elimination plan was implemented for each herd in Horne peninsula.
Case description. This case describes elimination of PRRSV from 2 of the sow sites with a common gilt source. PRRSV type 2 was circulating in farrowing and nursery units, diagnosed by PCR on blood samples. Piglets were weaned to a sectionized nursery on one of the sow sites, or to one of 2 W-F sites.
Materials and methods. The first mass vaccination was in week 22 (July 2013) and all sows, gilts, boars, and piglets in the farrowing room and the nursery were vaccinated with Ingelvac® PRRS MLV. During the following 3 weeks, piglets were vaccinated at 7 days old. The second mass vaccination was done 4 weeks after 1st mass vaccination. For the next 10 weeks, piglets were vaccinated at weaning,(in the nursery). After the piglet vaccination was stopped, the nursery in the sow unit was depopulated as well as the nursery spaces in the W-F site. Piglets were weaned and placed in different sites to enable empty barns in the right order. Pigs present on the finisher sites were PRRSV vaccinated. PRRSV testing by PCR started 5 weeks after second mass vaccination, one week post weaning.
Results & Discussion. All batches in the nursery on the sow site, and 2 batches on the W-F site have currently been tested by PCR and ELISA (IDEXX PRRS 3X). All PCR samples were PCR negative up to date and ELISA results has been negative after 9-10 wks of age.
Results show strong evidence of lack of circulation of PRRS in sow and nursery sites after Load Close and Homogenize and partial depopulation of nursery sites indicating a successful elimination of PRRSV in Horne peninsula. At the same time the 2 case sow herds reached 35 weaned pigs/sow/year for first time ever recorded.

P137 USE OF A BACTERIAL COMPLEX ON THE SURFACES OF FARROWING AND POST-WEANING ROOMS: IMPACT ON DIGESTIVE HEALTH AND GROWTH PERFORMANCE OF PIGLETS

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Suckling and weaning are difficult periods for piglets; they are more prone to infections e.g. diarrhea and arthritis. Therefore, room hygiene and the management of biofilm are essential, however, they are not always easy to control. The use of a bacterial complex (Lactic acid bacteria and Bacillus; Cobiotex®) was studied in farrowing and post-weaning units. Two farrowing rooms and two post-weaning rooms with the same configuration were used in an experimental farm, one treated and the second as control. The complex was applied on the surfaces of the rooms after cleaning, disinfecting and drying and it was repeated regularly (each week) during the life cycle of the animals. The piglets' performances during lactation and after weaning were measured and the health criteria were estimated: mortality, digestive health by scoring the consistency of faeces, arthritis and observations of clinical signs.

Results in farrowing stage. The percentage of weaned piglets did not differ between the 2 groups. The percentage of arthritis, although lower in the treated room was not significantly different. Fecal scores were significantly lower in the treated group at 4 days: 17% of the treated group piglets with diarrhea against 41% in the control group. This difference is not confirmed at 21 days, perhaps due to the very low prevalence of diarrhea at this stage in the two groups (less than 2%). Weight gain per litter in the treated room was higher (100 g / day) than in the control room, but this difference was not significant.

Results in post-weaning stage. The percentages of mortality between the two groups were not significantly different. Fecal scores 7 days after weaning showed significantly less diarrhea in piglets of the room treated: 56% of piglets had "normal" faeces against 45% in the control room. Fecal scores 14, 21 and 28 days after weaning were not significantly different. During the first fourteen days post weaning, the average daily gain and feed conversion ratio were significantly improved. They were not different for the period from 14 to 35 days after weaning.

Conclusion. The bacterial complex, after its spraying in the whole surface of a livestock building, promoted optimal digestive health (assessed by fecal score) during the suckling and post-weaning periods. The post-weaning growth performances during the first age (ADG and FCR) were significantly improved.

P138 INDIVIDUAL PIG CARE (IPC) MANAGEMENT PROGRAM IMPROVES HEALTH STATUS IN NURSERY PIGS IN A LOW-HEALTH STATUS FARM

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The individual pig care (IPC) is a management program based in daily individual observation of the pigs, early detection of husbandry and health problems and prompt and accurate reaction to them, enabled by a fast and effective data collection and processing. The objective of the present study was to assess the benefits of the IPC program in a low-health status Spanish herd in nursery pigs based on health status. The experiment was conducted in the nursery barn of a farrow-to-finish commercial farm. Every week a batch of about 150 piglets (28 days of age) is weaned. The farm was PRRS positive, with high incidence of polyarthritis and digestive disorders in the nursery phase, causing high mortality and percentage of wasted pigs. Traditionally, in mass medication was used in this phase (Zn oxide, colistin and amoxicillin), and only few antibiotic interventions were applied individually by injection. Percentage of mortality was registered in batches of piglets weaned from August 2012 to October 2013. At August 2013 the individual pig care (IPC) program was applied. According to the IPC guidelines, sick pigs were scored and symptoms were quantified according to the severity (A-mild signs of disease; B-medium; C-serious and D-very serious or dying) and type of disease (digestive, respiratory, lameness, nervous, biting or other). Clinical signs and mortality were monitored in each batch from weaning (28 days of age) to 60 days of age (about 20 kg BW). The effect of IPC was assessed analyzing the evolution of the percentage of mortality using the statistical process control of the Minitab software (v 16).

Percentage of mortality was 4.89 % in the period August 2012 to August 2013, with peaks in some batches higher than 6.0%. After the IPC implementation, percentage of mortality was significantly reduced (1.59% mean value; 1.93%, 2.20% and 0.63% in August, September and October 2013, respectively). In addition, injectable antibiotics were the first option after the IPC application to treat clinical signs instead of mass medications. Consequently, total amount of antibiotic used in the farm was drastically reduced.

These preliminary results confirm that the early detection of symptoms through IPC resulted in optimal recovery of pigs reared in poor health status conditions, which led to reduced mortality. Registration and monitoring of heatlh indicators and antimicrobials used under the IPC protocol promoted a more judicious use of medication.

P139 REAL TIME RECORDING FOR PIG FARMS ADOPTING BATCH PRODUCTION

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Pig farm records can be difficult to interpret as commonly there is no unity presented between the various parameters. Records are also summarised and averaged into calendar events, such as months (which have a variable time period) and which have no correlation to the timing of events on the farm. Farms of different sizes and production systems can be difficult to compare. The printouts often do not present the records in a time flow format – for example if the records start on a Monday but the weaning day is a Thursday, the animals bred are not the same animals which farrow.
Batch production allows for a farm's records to be synchronised. Batch production starts at weaning and a new the batch starts at the next weaning event. If this is accepted it will lead to a revolution in our ability to monitor farms in real time. The same batch of animals can be monitored in real time over the entire pig production cycle from gilt selection to slaughtering the finished pigs. Batch production allows for farms to be planned and realistic targets and goals to be set. Records then can be used to determine if these targets and goals are in fact achieved.
Having results presented relating to a batch allows for events such as: failure to reach breeding targets; the impact of the number of gilts in a batch; the effects of over and under stocking to be easily visualised. Farms of different batch sizes can be easily compared using their ability to reach their set targets. A major cause of poor performance and disease outbreaks are associated with variation between batches. Having farms with set batch targets has reduced the impact of variation on pig production. It creates more honesty within the system as the records are more transparent. Cost control between batches becomes possible and an area where money is lost becomes clearly apparent. The records can be used to enhance the welfare of the animals within the farm by ensuring that their individual environmental requirements are met. With reduced variation between batches health and medication requirements become easier to monitor.
Running farms using records based on the batch, has improved animal welfare; increased kg output and reduced the cost of production.

P140 COMPATIBILITY OF PRACETAM 40% ORAL SOLUTION WITH WATER SOLUBLE ANTIBIOTICS

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Objective. Paracetamol is sometime used combined with antibiotics when treating a respiratory disease. An experimental study has been performed in order to assess the compatibility of PRACETAM®40% oral solution with water soluble antibiotics both in concentrated water for a use in a 5% dosing pump (mother solution of the dosing pump) or non concentrated water (water tank), considering both stability and solubility.
Materials and Methods. Seven molecules were tested with Pracetam 40% oral solution: tiamulin, doxycycline, amoxicillin, TMP-Sulfadiazine, tylosin, oxytetracyclin, and colistin.
All antibiotic products were chosen to be fully soluble when use alone in water. For each combination tested, three solutions were made: one with Pracetam 40% oral solution alone, one with the water soluble antibiotic alone, and one combining both Pracetam and the oral antibiotic. Solution is prepared with tap water.
Solutions were prepared, both concentrated (dosing pump use) or non concentrated (water tank use), and were stocked in ambient condition (T°= 20-25°C). Each molecule was dosed at T0 and 24 hours later in order to control stability and the aspect of the solutions was visually controlled at time T0, T+18h and T+24h in order to assess solubility.
All dosages were performed three times in order to confirm repetability of the results.
Results. All molecules except TMP-sulfadiazine combination are fully soluble with Pracetam 40% oral solution, both in water tank or in concentrated solution. In term of stability, no differences are observed when Pracetam 40% is combined with the tested antibiotics.
Conclusion. The results give evidence that the administration of PRACETAM®40% oral solution is possible, without any risk of stability or solubility, with all the tested antibiotics except TMP-Sulfadiazine combination, provided the given antibiotic product is soluble when used alone in water. This confirms the possibility, in the field conditions, to combine, if necessary, Pracetam 40% oral solution and some antibiotics. When mixing products in a dosing pump it is recommended not to set the proportioner below 5%.

P141 ANTIBODY REACTION IN IMMUNOLOGICALLY NAÏVE REPLACEMENT GILTS VACCINATED WITH AN ATTENUATED PRRSV LIVE VACCINE

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The aim of this study was to assess the immunological reaction in gilts vaccinated with a commercially available attenuated porcine respiratory and reproductive syndrome virus (PRRSV) vaccine (Porcilis® PRRS). In a recent case of a classical PRRS outbreak in a sow herd which had been regularly vaccinated on a four month interval, the question aroused, whether the replacement gilts were successfully vaccinated against PRRS. For further investigation, blood samples from eight replacement gilts, originated from a PRRSV-free multiplier herd were collected five weeks after their vaccination for antibody response (ELISA). The sampled gilts were housed in the quarantine facilities of the particular farm. The ELISA test (HerdChek® PRRSV X3, IDEXX Laboratories AG, Berne, Switzerland) revealed a positive result for one of the gilts but negative results for all the others (OD values 0.007 to 0.057). These serological findings resulted in a discussion about the number of pigs that can be expected to be seropositive after vaccinating immunologically naïve gilts. In order to clarify this question a group of 28 PRRSV negative gilts from the same multiplier herd were vaccinated. At post-vaccination days 0, 2, 4, 8 and 15 blood samples were collected for detection of vaccine virus (RT-PCR) and antibody response (ELISA). At day 4 post-vaccination in 100% of the gilts the vaccine virus was detected (RT-PCR). The first samples classified positive in the ELISA were detected 8 days after the vaccination. On day 15 post-vaccination all animals showed a positive serological result. Thus the vaccination with an attenuated PRRSV vaccine provides a pronounced antibody reaction under field conditions. In case of a negative serological reaction in recently vaccinated pigs all steps from the manufacturing process through to the implementation of the vaccine have to be critically evaluated. Likewise correct laboratory studies and the assessment of diagnostic results need to be scrutinized.

P142 USING THE INDIVIDUAL PIG CARE (IPC) PROGRAM TO MONITOR AND EVALUATE HEALTH STATUS IN PIGS FROM INTENSIVELY IMMUNIZED GILTS

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The aim of this study was to evaluate the effect of intensive immunization of gilts by monitoring health status of their progeny. The experiment was conducted in a farrow-to-finish commercial farm in Italy. A total of 24 sows (16 gilts and 8 multiparous sows) were used and managed as follows: 8 gilts (GILT) and 8 multiparous sows (SOW) under usual vaccination program (Aujeszky, PRRS, Erysipela, Parvovirus); and 8 gilts (H-GILT) were more intensively immunized by adding Circovirus and colibacillosis vaccines.

After weaning (21 days of age), 216 pigs were distributed in 18 pens of 12 pigs each (6 pens and 72 pigs per treatment). Health status of pigs was evaluated using the individual pig care (IPC) program, which is based in daily keen observation of the pigs, early detection of health problems and prompt and accurate reaction to them, based on fast electronic data collection and processing. According to the IPC guidelines, sick pigs were scored and symptoms were quantified according to the severity (A-mild signs of disease; B-medium; C-serious and D-very serious or dying) and type of disease (digestive, respiratory, lameness, nervous, biting or other). Clinical signs and mortality were monitored from weaning (21 days of age) to slaughter at 270 days of age (about 160 kg BW). Data were analysed as binary variables using the glimmix procedure of SAS (v 9.2).

The total percentage of mortality was lower ($P<0.01$) in the SOW group (4.8%) than in both gilt groups (20.0%). Total number of injectable treatments applied per pig was lower ($P<0.05$) in SOW (1.54) and in H-GILT (1.73) groups than in GILT group (2.55).

Main causes of disease were digestive disorders immediately after weaning, meningitis at the end of the nursery period and respiratory disorders in the fattening period (at about 120 days of age). After the digestive and respiratory disorders, a high number of pigs were treated due to 'other' or non-specific clinical signs. The SOW group showed a lower incidence of digestive disorders than both gilt groups. Respiratory disorders mainly affected the GILT group, significantly more than the SOW and H-GILT groups. Meningitis affected equally all three groups.

We conclude that an intensive immunization of gilts decreased the incidence of disease, especially in the fattening period, in a low-health status farm. The IPC program provides accurate clinical data information obtained in real-time.

P143 INFLUENCE OF THE COMPOUND ACIDIFIER ON THE FECAL RESISTANT E.COLI NUMBERS AND GROWTH PERFORMANCE OF WEANING PIGS

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The control of antibiotic resistance has become a health priority worldwide and much effort is needed to find solutions to this complex issue. Reducing the use of antimicrobial drugs is one way to control antibiotic resistance and other ways should be investigated. Reducing fecal antibiotic resistant bacteria in swine with the help of antimicrobial feed additives leads to a reduced resistant bacterial load in the environment, which lowers the transmission of the resistance genes to other environmental bacteria.

Antibiotic resistant strains of E.coli are ubiquitous in both human and animal isolates. E.coli is the indicator for multi resistance problems not only in animals but also in humans and the environment. The experiment was conducted to study the effects of the addition of the mixture (ACP) of organic acids, cinnamaldehyde and permeabilizer in diets based on corn-soybean meal on the growth performance and fecal content of E.coli resistance to Ampicillin and multi-resistance to Tetracycline, Streptomycine and Sulfomathoxazole. Sixty weaning pigs [(Landrace x Large White) x Pietrain] were assigned to two treatments with three replicate pens per treatment and ten pigs per pen. The negative control group diet contained no feed additives, whereas the trial group was fed ACP. The duration of the trial was 42 days. Fecal samples of four pigs in one pen were pooled into sampling bottles and three samples per group from three pens were collected at the end of the trial. Results showed that there was no significant difference in performance parameters between two groups at the end of the trial. However, body weight, average daily gain and feed intake were numerically higher in the trial group and feed conversion ratio was lower in the trial group compared with the control group. The total E.coli counts in the fecal samples of the group fed ACP was 1 log below the control group. The count of resistant E. coli to Ampicillin in the trial group was 1 log below the control group. The count of multi-resistant E.coli to Tetracyline, Streptomycine and Sulfomethoxazole in the trial group was nearly 2 logs below the control group. ACP contributes to the reduction of antibiotic resistant E.coli in the feces of pigs.

P144 PREWEANING MORTALITY IN 6 DANISH HERDS

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Introduction. Mortality reduces profitability and welfare of piglets. Preweaning mortality is the major contributor to pig mortality. In Denmark the average mortality for 2012 in the suckling period, in the nursery and in the grower-finisher barn was 13.7%, 2.9%, and 3.6%, respectively. The causes of death in the suckling period are dependent on the age of the piglet. The objective of this study was to examine mortality in different age groups of suckling piglets.

Material and Methods. In 6 herds with an average preweaning mortality of 15%, approximately 1000 live born piglets per herd were ear tagged. All live born piglets from sows in the same farrowing group were included. Pigs that died in the farrowing section were stored in a freezer before shipment to the laboratory for pathological examination. For each piglet ear tag number and day of death was recorded. Based on the pathological findings the most likely cause of death was established for each piglet. The causes of death where reduced to the following eight categories: not viable, sepsis, hernia, trauma, arthritis, starvation, enteric disease, and miscellaneous. Piglets categorized as not viable were either weak born, immature or had a birth weight < 700 gram.

The suckling period was divided into 3 periods. Period 1 was from day 1-4, period 2 from day 5-11, and period 3 from day 12 to weaning. For each period major overall causes of death was identified. The results are shown as an average percentage across all herds and an interval (min-max) that shows the variation between herds.

Results. A total of 992 piglets from the 6 herds were subjected to pathological examination. Each herd had between 161-172 piglets examined. In period one, two and three 595 (60% (41-69%)), 219 (22% (16-31%)), and 178 (18% (8-30%)) of the ear tagged piglets died, respectively.

In period 1 the three major causes of death were trauma (44% (34-68%)), not viable (25% (17-34%)), and starvation (17% (5-28%)). Between day 5-11 (period 2) most pigs died either of trauma (30% (8-46%)), starvation (26% (8-44%)), or enteric disease (14% (0-23%)). In the last period from day 12 the main causes of death were sepsis (29% (15-59%)), miscellaneous (19% (8-31%)), hernia (17% (0-27%)), and trauma (11% (4-23%)).

Discussion. The results from this study indicate a considerable variation between herds in mortality in the three time periods and in the major causes of death within each time period. To target the right advice for preventing preweaning mortality in the individual herd pathological examination of a lager number of piglets could be a good staring point.

P145 ERADICATION OF SWINE DYSENTERY USING MEDICATED PARTIAL DEPOPULATION

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Swine dysentery caused by Brachyspira hyodysenteriae (BH) is one of the most costly diseases in the swine industry. To achieve the elimination of the disease in a group of swine farms, the following protocol was used: 1- Diagnosis of causal agent in farms with clinical dysentery, through fecal sample PCR and bacteriology with isolation of BH and antibiogram (University of Leon, Spain). 2- Positive BH (BH+) farms are mapped and biosecurity plan for animal transport is settled (compulsory disinfection of all transport trucks coming from BH+ farms and from slaughterhouse). 3- Intensive Rodent control plan is set on BH+ farms (including cleaning of a 2 meter area all around the buildings, paved with gravel and Calcium Cyanamid – Death zone). 4- Stop the entrance of new gilts during the eradication protocol. 5- Start depopulation of the fattening buildings with rigorous cleaning and disinfection of all compartments including manure pits and cement slats, feeders and drinkers (alkaline detergent plus sodium hydroxide 10% solution). Leave empty to dry for 7 days. 6- Piglets from the nursery are moved to an offsite fattening to allow cleaning and disinfection as in #4. Start weaning piglets to an offsite nursery. 7- Medication of sow feed with the antibiotic which had the lowest MIC in the antibiogram (Tilvalosin; doses used were 4,25 mg/ kg/ day, during 21 days - Aivlosin 42,5 mg/g Premix, Gestation feed with 10 kg/ ton feed and Lactation feed with 5 kg/ ton feed). Send sows with diarrhea to slaughter. 8- Sows from Gestation barn are transferred to the clean fattening barn to allow cleaning and disinfection of gestation site (all troughs, drinkers and manure pits are emptied, washed and disinfected as in #4). 9- Farrowing rooms are kept in an all-in all-out management with cleaning and disinfection between batches, including manure pits. 10- Suckling piglets are treated with injectable Tiamulin 10 mg/ kg, on day 3 of life, 10, 17 and weaning day. Keep this protocol during 6 complete batches. 11- Repopulate nursery with weaned piglets (that were injected with Tiamulin during lactation). Medicate pre-starter and starter feed with Tilvalosin 4,25 mg/ kg/ day (Aivlosin 42,5 mg/g Premix, pre-satrter 4 kg/ ton feed, starter 2 kg/ ton feed) for 6 weeks. 12- Move sows back to the clean gestation barn.
After 21 days without medication, pooled fecal samples were collected from sows and tested for BH by PCR. All samples were negative.
As a conclusion, we can eradicate BH from swine farms while keeping sows in production.

P146 FINANCIAL IMPACT OF DISEASE ON PIG POPULATION: I. SUB-OPTIMAL PRODUCTION

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Diseases cause ill-thrift in pigs, and contribute to economical losses due to decreased productivity. We tried to estimate the cost of diseases within the Swedish pig production by using production data from 2010 and market prices from week 38 of that year. Standard production costs per day were estimated to 0.33 €, 0.67 € and 0.89 € for weaners, fatteners and sows, respectively. Mortality costs were defined as 40 € per suckling piglet, 43 € per weaner, 84 € per fattener and 447 € per sow.
A slaughter weight of 85 kg (119 kg live weight) corresponded to an income of 110 € per pig. With a mean slaughter age at 170 days, the net income corresponded to 29 € per pig. Each sow produced 22 pigs that reached market weight, which corresponded to an annual total income of 2,240 € per year (corresponding to a net income of 638 €). The price for growers sold at 30kg bw corresponded to 51 € with a net income of 16 €.
This report focus on losses due to sub-optimal productivity compared to the genetic capacity for growth of the pigs. This was achieved by comparing the national mean production with that of a high performing SPF herd. In the SPF herd, the annual production per sow was 25.1 pigs that reached market weight. The 3.1extra pigs slaughtered per sow increased the total income per sow with 341 € per year. Further, the SPF pigs reached market weight at the age of 141 days, compared to 171 days for the conventional pigs, resulting in a net income per pig produced of 51 € in the SPF herd, compared to 29 € for conventional pigs slaughtered at a mean age of 171 days. Thus, the net income per sow and year was 1515 € in the SPF herd, compared to 638 € for the average herd.
Further, the use of antimicrobials was minimal in the SPF herd, corresponding to a total treatment of 3.6±2.1 kg pig per sow and year. The reduced antimicrobial usage reduced costs and labor, and also contributed to a minimized selective pressure for development of antimicrobial resistance. The general health status of the pigs in Sweden is high, and the growth performance is good.
Despite this, the results obtained demonstrated the big impact of sub-clinical diseases of unknown origin, as well as a large potential for improvements of the conventional pig production. With a population level of three million pigs slaughtered per year, the net income for the farmers would increase with 66 million € if the mean growth rate increased from the average level to that of the SPF pigs.

P147 FINANCIAL IMPACT OF DISEASE ON PIG POPULATION: VI. MISCELLANEOUS

Wallgren P.[1], Zoric M.[1], Sjölund M.[1]

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Diseases cause ill-thrift in pigs, and contribute to economical losses due to decreased productivity. We tried to estimate the cost of diseases within the Swedish pig production by using production data from 2010 and market prices from week 38 of that year. Standard production costs per day were estimated to 0.33 €, 0.67 € and 0.89 € for weaners, fatteners and sows, respectively. Mortality costs were defined as 40 € per suckling piglet, 43 € per weaner, 84 € per fattener and 447 € per sow.

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This report on losses due to miscellaneous conditions mainly focuses on diseases associated with Porcine Circovirus type 2 (PCV2). When PCV2 was introduced into a naïve herd, no obvious signs of disease were recorded with exception of exudative epidermitis diagnosed in newborn piglets in one farrowing batch. However, the incidence of repeat breeders increased from 5% to 6.5 % and the incidence of abortions increased from zero to 18%, corresponding to an economical loss of 202 € per sow the year when PCV2 was introduced. By next year, the sows had gained immunity towards the virus and the reproduction on returned to normal. Similar effects are likely to be seen in naïve herds if infected with other "mild" or "low pathogenic" viruses that affect the reproductive tract.

The consequences of another PCV2-associated disease, PMWS, have been lower in Sweden compared to many other countries, possibly due to the general high health status. The post weaning mortality in affected herds increased from the national mean of 2% to around 8% at the time of diagnosis at herd level (7.4 ±3.2% during the first three years). In addition, the time to reach market weight increased with 5 to 10 days in the affected herds, which corresponded to losses ranging from 110 € to 247 € per sow in production.

Still, other infections may lead to far larger economical consequences, like for instance PRRS which is exotic to Sweden. However, in 2007 PRRS was detected in a few herds within a national control program. The losses in affected herds corresponded to 20 € per pig produced, which would have corresponded to 443 € per sow and year if the infection had not been eradicated.

P148 STABILIZATION OF A NAÏVE SOW FARM AFTER PRRSV TYPE 2 INFECTION USING INGELVAC® PRRS MLV IN A LOAD, CLOSE AND HOMOGENIZE MODEL IN A 2 SITE PRODUCTION SYSTEM

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When a sow unit breaks with PRRS, immediate mass vaccination of the breeding herd with MLV has shown being helpful reducing the severity and duration of clinical problems. . This study evaluates the Load-Close-Homogenize model to reach PRRSv stability in a 2 site production farm, acutely infected with PRRSV type 2.

Case description. The case herd is a 1384 head SPF sow farm. All piglets are weaned to an offsite 8 room nursery. At 30 kg, the pigs are exported to Germany. Furthermore there is a small offsite finisher unit. All pigs are vaccinated with FLEXcombo and Enterisol Ileitis. February 2013 the sow herd got infected with PRRSV type 2.

Materials and methods. The small finisher site was emptied, cleaned and disinfected, and were filled with replacement gilts necessary for the next 200 days (load). At week 12-2013, the farm was closed to new introduction of gilts and all animals present in the sow site and gilts in the offsite finisher barn were vaccinated with Ingelvac® PRRS MLV, (homogenize). The following 12 weeks, 7 - 10 days old piglets were vaccinated. The whole herd vaccination was repeated four weeks after initial mass vaccination, in week 16.

Results & Discussion. Oral fluid testing of PRRSV by PCR in weaned non-vaccinated piglets in July and august indicated that piglets were negative. September 2013 blood samples were taken from 5 pigs from each section in the nursery, and also 20 samples from pigs at the buffer section (>8 wks & older). Piglets up to 7 wks of age were PCR negative, confirming PRRSV negative status. But, pigs at 8 wks of age and older were PCR positive, indicating PRRSV circulation in the buffer, and among the oldest pigs in the nursery. Immediately all buffer and pigs older than 7 weeks were removed. Testing 4 weeks later show a few viremic pigs in the room with the oldest pigs (11 woa) , again confirming weaning of PRRSV negative piglets, but still some circulation in the oldest nursery piglets. The 2 oldest groups were removed, and retesting will be done after 4 weeks.

The results (PCR) show strong evidence of lack of circulation of PRRSv in sow site after L-C-H weaning negative piglets but the nursery site required more time than expected to reach PRRSV negative status, probably because the mixing of pigs in the buffer section.

P149 INTENSIVE IMMUNIZATION OF GILTS IMPROVES HEALTH STATUS OF THEIR PROGENIES

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The aim of this study was to evaluate the effect of intensive immunization of gilts on productive performance 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) from two consecutive batches (24 sows per batch) were used and managed as follows: 16 gilts (GILT) under usual vaccination program (Aujeszky, PRRS, Erysipela, Parvovirus); 16 gilts (H-GILT) were more intensively immunized adding Circovirus and colibacillosis vaccines; and mature sows (SOW), parities 3-6, under usual vaccination program. After weaning (21 days of age), pigs were distributed in 36 pens of 12 pigs each (12 pens per treatment). Pigs were weighed at birth, weaning, end of nursery phase (63 days of age) and every two months until slaughtering at 270 days of age (about 160 kg BW). At slaughtering, lung pneumonia lesions and presence of pleuritis were individually evaluated. Data were analysed by GLM models of SAS.

No differences were found between treatments at birth weight (1.5 kg). At weaning and at the end of nursery phase, the SOW group had significantly higher body weight (BW) than the other two groups, while no differences were found between both gilts groups. At the end of the fattening period, no differences were observed in BW between groups, but unexpectedly final BW was numerically higher in GILT (166.4 kg) than in SOW (163.0 kg) and in H-GILT (161.0 kg) groups. Percentage of mortality was higher ($P<0.05$) in the GILT group (39.2%) than in H-GILT (21.8%) and in SOW (18.3%) groups. Mortality was especially higher in the growing-fattening period, due to a respiratory disease outbreak. Higher mortality in GILT group caused higher space allowance at the end of the fattening period in this group, which could be associated with higher final BW. Presence of lung lesions, pneumonia and/or pleuritis, was higher ($P<0.05$) in GILT (83.5% lungs affected) than in H-GILT (65.1) and in SOW (68.2%) groups.

We conclude that intensive immunization of gilts decreased mortality and the presence of lung lesions at the slaughtering, although did not affect productive performance. We can conclude that, in a low-health status farm, intensive immunization of gilts improves health status of their progenies.

P150 SIMULATOR TO ASSESS THE ECONOMIC IMPACT OF DIFFERENCES IN PIG FARM TECHNICAL PERFORMANCES

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In field conditions, many decisions have to be evaluated, aiming to solve dysfunctions or improve technical efficiency. Evolution of technical performance has a financial impact, but is very complex to estimate, especially when reproduction is involved. A simulator has been developed to assess the economic impact of changes in reproductive performance and/or in growth performance in the post-weaning and/or the fattening stages, between two stable situations.

In the case of reproductive parameters, the simulator starts from the hypothesis of the full use of the farrowing unit with in each batch the same number of farrowing sows. The simulator takes in account culling and replacement of sows and the economic impact of the potential change in the number of present sows. In the case of post-weaning and fattening, the simulator considers full occupancy of rooms. If productivity increases beyond a threshold or ADG is too low, the simulator proposes to sell a batch of pigs.This simulator does not take into account any changes in structural costs.

Input data are technical-economic data for breeding herds and wean-to-finish phase (French technical and economic databases GTTT and GTE). Descriptive data of the farm as the numbers of rooms and average economic parameters (prices of the feed and selling prices of pigs) are also considered.

The simulator estimates some parameters to perform the economic simulation: the number of present sows (calculated with numbers of required replacement gilts and culled sows, determined from the conception rate, the number of accepted return to estrus and other reproduction criteria), number of pigs produced, consumed quantity of feed and breeders replacement costs determined from reproductive performance, mortality rates and the prices of feed and pork.

The simulator displays the gross margin difference between the two stable situations, using different units according to the type of operation and the criteria set in by the user. The margin per farm, per sow per year or per kilogramme produced in € are calculated. To explain the overall result, the results from intermediate calculations are also available. This simulator is a quick and easy tool to use, to provide a first estimate of the economic impact of changes in technical performance. The simulator is available as a web tool and can be used online (www.ifip.asso.fr).

P151 AUJESZKY'S DISEASE MANAGEMENT IN THE VENETO REGION: AN EXAMPLE OF PUBLIC-PRIVATE HEALTHCARE PARTNERSHIP

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Aujeszky's disease can result in trade restrictions for products from regions where it is endemic, so eradication programs are underway or have been successful in many countries. The Veneto Region (northeastern Italy) has undertaken an eradication plan since November 2012 with the involvement of veterinary practitioners as approved veterinarians (AVs), veterinary services (VSs) as competent authority and IZSVenezie as official laboratory. These stakeholders have been linked together by a computer system designed to simplify the information flow, collect uniform and updated data making it accessible and usable at different levels and provide a system for controlling the activities performed at the farms. The information system was based on the Regional Data Bank (RDB), which stores data on farmers, herds, animals movements, together with the health status of each holding. This software has been updated and specific functions have been integrated in order to support the activity of both VSs and AVs and to automate the capture of the analysis' data from the laboratory.
The nomination of the AV chosen by the farmer is notified to the VS who records the AV in the RDB and links him/her univocally to the farm. The AV receives an access to the RDB, restricted to the farms to which he/she is officially linked. The AV checks the correct recording of the animals movements in the RDB, performs vaccinations and records them in the RDB, takes the blood samples that are analyzed by IZSVenezie and recorded in the laboratory management system by validating the correctness of the farm and the AV in the RDB. All results are automatically transmitted and linked to the farm of origin in the RDB. After verifying compliance with the requirements concerning the animals traceability, the vaccination schemes, the analysis performed in the RDB, the VSs confer the health status to the holding and record it in the RDB. In November 2013, the AVs connected to the RDB are 105, linked to 363 herds out of a total of 590. They recorded 1,468 vaccination interventions corresponding to 813,939 administered doses of vaccine. No. 21,346 samples were analyzed and transmitted to the RDB. Only 118 analyses were not validated by the data processing system and had to be recorded manually. This information system, modeled after the surveillance network system laid down in Directive 64/432/EC is now producing real time reports to monitor the trend of the eradication plan, collect epidemiological information and meet the health authorities' data requirements at regional, central and EU level.

P152 MRSA ON BELGIAN MIXED SPECIES FARMS

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After the recognition of hospital-associated MRSA (HA-MRSA) and community-associated MRSA, recently a new lineage of MRSA was found in livestock, mainly in pigs (LA-MRSA). It was hypothesized that the presence of different livestock species could contribute to a higher prevalence of LA-MRSA on a farm.
The aim of the study was to gain insights into the prevalence of MRSA on Belgian mixed farms and to compare the antibacterial resistance pattern of MRSA. Between January 2009 and January 2013, 2 mixed poultry-pig farms and 3 mixed cattle-pig farms were sampled 3 times for pigs and cattle and 6 times for poultry. On each sampling round, nose swabs of pigs (n=10) and cattle (n=10) were taken, whereas swabs of nose shells and cloaca from poultry (n=10). Swabs were pooled per two and after enrichment in 7.5% salt-enriched broth , this broth was inoculated on a chromogenic medium (chrom-ID®MRSA, Biomerieux). DNAse test and Staphytect Plus (Oxoid) were used for identification of S. aureus. For MRSA confirmation, disc diffusion with oxacillin 1 µg and cefoxitin 30µg (Neosensitabs, Rosco) was performed. Positive samples were subsequently tested for 16 antimicrobials by disk diffusion: chloramphenicol*, ciprofloxacin*, erythromycin*, fucidin, gentamycin*, kanamycin*, lincomycin*, linezolid, muperocin, quinupristin/dalfopristin, rifampicin, sulphonamides, tetracyclin*, tobramycin*, trimethoprim* and tylosin*(Neo-sensitabs, Rosco). All the results were interpreted according to the manufacturer guidelines. In pigs, 64% of the pooled samples were found MRSA positive, whereas for cattle and poultry this was 12% and 10%, respectively. On the mixed poultry-pig farms, 83% of the samples of pigs were positive compared to 51% on mixed cattle-pig farms. MRSA was found in pigs during each sampling round. On all farms MRSA was isolated from broilers or cattle, however, MRSA was only found in poultry during sampling round 1 and 2 and in cattle during sampling round 1 and 3. Overall, resistance was found against 10 (*) of the 16 tested antibiotics. In only one sample resistance was reported against an antibiotic used on the farm (trimethoprim in pigs). These results indicate that LA-MRSA was present on each farm and in each animal species. The prevalence seems higher in pigs compared to poultry and cattle. The prevalence seems also higher in pigs housed in pig-poultry farms comparing to the prevalence in pigs in pig-cattle farms. There was no link between the resistance pattern and the use of antibiotics on the farms.

P153 ONE HEALTH COLLABORATION NETWORK IN A HIGHLY POPULATED AREA

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The province of Northern Brabant in the Netherlands has a high density of livestock and humans. In 2007 the first side effects of this close encounter showed up: a large Q fever outbreak. Zoonoses like LA-MRSA, Q fever, and salmonella are prevalent in livestock. These zoonoses might pose a risk for occupationally exposed persons, but also for general public who are living nearby or visiting farms. In the Q fever outbreak we found out that medical doctors and veterinarians did not collaborate as much as needed and that they did not know their overlapping world.

We started a One Health collaboration network in the province with veterinarians, public health and environmental officers, general practitioners and clinicians. The objective of the network is to transmit knowledge of zoonoses, to initiate and stimulate research and to advice the local and national government. We started with a small group of professionals in 2010 and this group expanded to 23 persons with different expertise. This core group meets three times a year.

Many projects and studies are initialized, like a seroprevalence study on several zoonoses, risk assessment of agricultural daycare and communication about LA-MRSA in hospitals. Next to the core group meetings we provide information for a wider audience. We organized excursions to veal, poultry, dairy cows, dairy goats and pig farms. We made an online platform for professionals to exchange (scientific) information on zoonoses. Every year a conference is organized within a (zoonotic) theme. We have regular contact with local and national government to keep this topic on the agenda.

The network provides possibilities for collaboration between the human, animal and environmental interface. With the One Health approach in the network we are influencing policy and provide up to date zoonoses information to professionals.

P154 SPREADING OF AN EXPERIMENTAL SALMONELLA INFECTION IN GROUPS OF PIGS NATURALLY LAWSONIA INTRACELLULARIS INFECTED AND EITHER PREVIOUSLY VACCINATED OR TREATED WITH ANTIBIOTICS

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Introduction. An infection with Lawsonia intracellularis (L.i.) in growing pigs can usually be controlled either by prophylactic vaccination or antibiotic treatment (a.t.). By an a.t., however, the intestinal flora (eubiosis/activity/composition) is affected. This study aimed to investigate whether there is a difference in a following experimental Salmonella (S.) infection in pigs vaccinated in contrast to pigs treated previously with antibiotics.

Material and methods. In 3 consecutive trials in total 72 potentially naturally L.i. infected pigs were housed in two groups (3x2x12) and fed a conventional meal diet ad libitum (low Cu content: 27.2 mg/kg DM). Pigs of group VAC+AB- were vaccinated against L.i. as piglet (EnterisolÒIleitis; n-male=18, n-female=18). Group VAC-AB+ (PCR L.i. pos.; n-male=24, n-female=12) was treated with tylosin (10 mg/kg bw) for 5 days at the start of the trials. Two days after the a.t. an experimental oral infection with S. Derby (1.04x108/pig) was done in two pigs per group in each trial. These pigs ("seeders") were housed individually (2d) until infection was confirmed. After coming back to their original groups ("contact pigs") a four week follow-up investigation started (12 rectum swaps/pig, cultural S. detection in faeces). Statistical analyses for S. positive (pos.) pigs were performed by Chi-Quadrat-Test (significant for p £ 0.05).

Results and discussion. No significant differences were found according to performance data between the groups (order: VAC+AB–// VAC–AB+), both in terms of the body weight (in kg) at start/end of the trials (23.2±2.38/56.2±4.80 // 23.1±1.85/56.5±4.05), the daily feed intake (in kg; 1.76//1.80; on group basis), the daily body weight gain (kg; 0.789±0.09//0.798±0.07) and the feed conversion ratio on group basis (feed:gain; 2.23//2.25)1.

Experimental S. infection of seeders (n=6/group) was successful. After returning to the group S. detection in faeces was more frequently in group VAC-AB+ (16/72 samples S. pos. – 22.2 %) than in group VAC+AB- (9/72 samples S. pos. – 12.5 %). There were significant differences between the number of S. pos. contact pigs (VAC+AB- = 1 of 30 pigs S. pos. resp. 1/360 pos. samples // VAC-AB+ = 13 of 30 pigs S. pos. resp. 20/360 pos. samples).

Conclusion. After a single L.i. effective a.t. the gastrointestinal flora seems to be more prone for S. infection. In practice, the risk for a higher S. prevalence within the fattening period could be slightly higher in terms of a repeated a.t..

P155 CASE REPORT: INNOVATIVE DIAGNOSTIC APPROACH AND SUBSEQUENT ADAPATED VACCINATION STRATEGIES TO REDUCE THE ANTIBIOTIC USE IN POST-WEANING PIGLETS UNDER BELGIAN FIELD CONDITIONS

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For several months, a closed pig farm (n = 500 sows) with 2-site production (sow-piglet/fattening pigs) had continuous coughing in its post-weaning facilities, characterized by increased mortality (> 6%), a major increase in antibiotic consumption (colistin, doxycyclin, amoxicyclin, tylosin) and decreased growth and runt pigs at the end of the production cycle. Moreover, acute coughing occurred following introduction of their SPF gilts into the main sow group. Piglets were not vaccinated at all, whereas gilts were vaccinated for PRRSv (EU strain), parvovirus and Erysipelothrix rhusiopathiae. Overall, antibiotic use during the post-weaning period (4 – 13 wk of age) was extremely high with a treatment incidence (TI) of 1800, meaning that 1800 piglets were treated every day per 1000 piglets present. Diagnostic approach consisted of trachea-bronchial swab sampling in piglets at 6-10-14 wks of age and coughing gilts following introduction. TBS swabs were analyzed using multiplex PCR analysis (IVD GmbH, Hannover, Germany). Piglets were positive for M. hyo at 6-10 wks of age and during the entire post-weaning period for PCV-2. Additionally, PRRSV-EU was detected and slight circulation of SIV was present during the post-weaning period. Coughing gilts were positive for M. hyo, PCV-2 and SIV. Subsequent veterinary advice on vaccination schedules results in the application of a one-shot M. hyo vaccine (Stellamune One, Elanco) at 1 wk of age and a PCV-2 vaccine at 17 d of age. Gitls were additionally vaccinated for M. hyo, PCV-2 and SIV during the quarantine-adaptation period. To check for improvement following the introduction of the corrective measures, 2 additional samplings were performed 1 and 2 years after the initial problems occurred. Gilts did not suffer from coughing following the extended vaccination schedule. In piglets, no early M. hyo infection could be observed and PCV-2 circulation decreased significantly. The clinical picture and piglet performance were significantly improved. Moreover, due to the intensive vaccination schedule, the TI during the post-weaning period decreased with 84% from 1800 to 300. Antibiotics were only used during the first 10 d after weaning for treatment of post-weaning diarrhea. In conclusion, detection of the etiologic agents through an extended diagnostic approach, followed by correct veterinary advice results in a significant reduction in antibiotic use.

P156 PREVALENCE OF CAMPYLOBACTER SPP., SALMONELLA SPP. AND LISTERIA MONOCYTOGENES IN TWO FREE-RANGE PIG SLAUGHTERHOUSES

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Zoonotic agents, such as Campylobacter spp., Salmonella spp. and Listeria monocytogenes are considered high-risk zoonotic pathogens by the European Food Safety Agency (EFSA) and have a significant public health impact. The aim of this study was to determine the prevalence of these pathogens along the free-range pig production chain of two slaughterhouses from Spain. Five farms from each slaughterhouse were selected based on their high Salmonella spp. seroprevalence in previous studies. A total of 150 animals (fifteen animals/farm) were traced to collect a total of five samples/animal, that were analysed using specific ISO methodologies for the detection of the above mentioned pathogens. The prevalence for each pathogen in faeces, abrasive sponges at the pre-scalding point, ileocolic lymph nodes, tonsils and meat samples (a pool from ham, loin and shoulder) were as follow: Campylobacter spp. (58%, ND, 5%, 1% and 8%); Salmonella spp. (11%, 13%, 8%, 30% and 2%); Listeria monocytogenes (0%, 1%, 3%, 39% and 2%). In faeces, Campylobacter spp. was the most prevalent agent, followed by Salmonella spp.; whereas Listeria monocytogenes was not detected. Contrary, Listeria monocytogenes was the most prevalent agent in samples collected from the tonsils, followed by Salmonella spp., which suggests a high circulation of these pathogens at pre-slaughter level and point to a potential environmental cross-contamination. The prevalence of the examined agents was similar in both slaughterhouses, but for meat samples (0% vs 16% for Campylobacter spp.; 0% vs 4% for Salmonella spp. and Listeria monocytogenes), that were only observed in one slaughterhouse, where some controls measures, such as sealing off the rectum is not performed. Our results highlight a low risk of infection posed by Campylobacter spp., Salmonella spp. and Listeria monocytogenes in meat from free-range pigs, and point out the necessity of making compulsory strict control measures along the slaughterline in order to assure a lower pork contamination by these pathogens.

P157 DETECTION OF HEPATITIS E VIRUS GENOTYPE 3 BY RT-QPCR IN LIVER, FAECES AND SERUM SAMPLES OF AUSTRIAN FATTENED PIGS FROM THE SLAUGHTERHOUSE

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Hepatitis E Virus (HEV) may cause faecal-orally transmitted hepatitis in humans and even leads to death in pregnant women. HEV, a member of the family Hepeviridae, consists of at least 4 distinct genotypes (GT) affecting humans, as well as many animal species including pigs, where GT 3 and 4 were detected. HEV infects swine without causing clinical signs, thus being a potential risk of contaminating water supplies or food. In domestic pigs, the presence of HEV GT 3 genomic RNA in clinical samples has been already reported from many developed Asian, North-American and European countries, including Austria; this indicates a very wide distribution of HEV in domestic pigs. The objective of this study was to look for HEV GT 3 by RT-qPCR in slaughtered Austrian fatteners, which were all about 6 months old. Therefore, liver, faeces and serum samples from 16 pigs per farm from 72 different farms were taken at an Austrian slaughterhouse. All liver and faeces samples from a total of 1152 animals were tested by HEV GT 3 specific RT-qPCR. Serum samples of those pigs which were positive in faeces or liver were also investigated by RT-qPCR.

Sixty-four out of the 1152 investigated animals (5.6 %) were positive for HEV-3 RNA in liver or faeces; 31 pigs were exclusively positive in faeces (2.7 %) and 26 pigs were only positive in the liver (2.3 %). In the remaining 8 positive pigs (0.7 %), HEV-3 RNA was detected in both, liver and faeces. In 30 of the 72 tested farms (41.7 %) a minimum of one pig was detected as positive in liver or faeces. Concerning the 64 serum samples tested by RT-qPCR, 5 pigs were also positive for HEV RNA in serum. These pigs derived from 4 different farms (5.6 %).

HEV infection among the investigated Austrian swine farms was shown. Our study demonstrated successful HEV RNA detection by RT-qPCR in 3 different matrices. It was not only possible to detect HEV RNA in liver and faeces, but also in serum of 5 different animals. Since viral genome was detected in 5.6 % of fattened pigs, the theoretical possibility of HEV entering the food chain exists; however, to assess the risk of food-borne HEV transmission to humans, it remains to be shown whether the virus is still competent for replication.

P158 PORPHYRIA IN PIGS - MODERN ART OF PHOTOGRAPHY OR USEFUL DIAGNOSTIC TOOL FOR PATHOLOGISTS?

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Porphyrias are inherited (primary porphyria) or acquired (secundary porphyria) metabolic disorders of heme synthesis. They can be subclassified according to the affected organ system as erythropoietic or hepatic porphyrias. In animals, only inherited porphyrias in swine, cattle and cat have been described.

Porcine hematoporphyria was first recognized in New Zealand, 1944. It is most frequently inherited as a simple autosomal dominant trait, however, a recessive mode of inheritance was also described. Except for single severe cases there is no clinically evidence of this condition, the majority of the cases will be diagnosed after slaughtering. Typical pathomorphological feature is a brown-redish discoloration of teeth, bones, (tendons, skin) caused by porphyrin-deposits, which could be easily demonstrated because of their red autofluorescence on exposure to ultraviolet light.

In this presentation, 2 fattening pigs with porphyria are described. Both animal carcasses, originated from the same holding, were conspicuous during meat inspection, therefore they were confiscated and sent successively for pathomorphological investigation to our institute. Morphologically, typical discoloration of bone structures could be detected and, using ultraviolet light, pathognomonic red autofluorescence of the affected bones could be demonstrated and photographed. Histologically, no relevant alterations in bones were found.

The presented cases and impressive photographes show that the use of ultraviolet light is a simple, cheep and rapid diagnostic tool for pathologists to demonstrate and document selected relevant alterations in animals (e.g. porphyria and cerebrocortical necrosis).

P159 EFFICACY OF HYDROALCOHOLIC DISINFECTION ON SALMONELLA PREVALENCE IN A PIG SLAUGHTERHOUSE

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Salmonella spp. is considered one of the most important zoonotic pathogens by the European Food Safety Agency (EFSA). In foods, it is frequently found in eggs and raw meat from pigs, turkeys and chickens. The surveillance of Salmonella in animals and foods is essential for advising on possible control and prevalence reduction measurements. This communication summarises the main results of two studies to evaluate the effect of hydroalcoholic disinfection on Salmonella prevalence and serotypes isolated from animals in a free range pig slaughterhouse from Spain. The first study was carried out in 2010 and a total of 8 farms were sampled (10 animals/farm). In the second study 5 farms were sampled during 2013 (15 animals/farm). In this second study a hydroalcoholic disinfection protocol was applied on cutting surfaces at quartering in spray at approximate intervals of 4 hours. Samples were analysed using specific ISO methodologies for the detection of Salmonella spp. and furthermore serotyped by means of agglutination techniques using commercially available antisera (Biorad). The samples were collected during the same season in 2010 and 2013. A marked decrease in the global prevalence of Salmonella spp. was evidenced between 2010 and 2013, from 19.00% to 10.40%. In 2010 the prevalence of Salmonella in faeces, abrasive sponges at the pre-scalding point, ileocolic lymph nodes, tonsils and meat samples (a pool with ham, loin and shoulder) was 21.25%, 36.25%, 16.25%, 17.50% and 3.75%, respectively, while in 2013 the prevalence was 14.67%, 2.67%, 5.33%, 29.33% and 0% respectively. Our results show a marked decrease in Salmonella prevalence between 2010 and 2013 at each sampled stage, but for the tonsils samples which presented a relatively higher prevalence. This finding, together with the still high prevalence of Salmonella spp. in faeces suggest a high circulation of Salmonella and indicate a potential environmental cross-contamination. Nonetheless, the hydroalcoholic disinfection protocol implemented in our study was successful in eliminating Salmonella spp. circulation at quartering. Furthermore, a shift in Salmonella serotypes was detected to a higher prevalence of S. Hessarek, S. Typhimurium and monophasic S. Thyphimurium (mST). Although inter-annual variability must be taken into account, our results highlight that disinfection protocols with hydroalcoholic products may represent a useful control measure to minimize Salmonella circulation from pork.

P160 HOW THE FRENCH PIG FARMERS' ATTITUDES AND PERCEPTIONS ARE RELATED TO THEIR ANTIMICROBIAL USAGE?

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As the development of antimicrobial resistance is a serious threat for animal and public health, most countries are working toward reducing their antimicrobial usage. In France, the Ecoantibio Plan 2017 aims to reduce the animal antimicrobial consumption by 25% between 2012 and 2017. This effort requires the farmers' willingness to participate. The objective of the study was to explore pig farmers' attitudes and perceptions about antimicrobials, and how these are related to their antimicrobial usage. This study was part of the MINAPIG Consortium activities.

We conducted a cross sectional study in 60 randomly sampled French farrow-to-finish herds. Farmers were sent an 8-page questionnaire on various psychosocial factors related to antimicrobial usage, all assessed on 6-point rating scales. It aimed to explore i) the farmers' worries about antimicrobial usage and resistance, ii) their perceived benefits, needs and risks of antimicrobial usage, and iii) a self-evaluation of their antimicrobial usage. During a visit, the interviewer collected this questionnaire and data on the farmer's antimicrobial usage by indication (preventive or curative). Farmers were then allocated into two groups of low or high users based on the total number of systematic preventive treatments they were administering at their farm (respectively 0 to 2 and 3 to 5 treatments). We expected this number to be a simple indicator related to the farmers' own decisions to treat or not. We compared the two groups on various psychosocial factors.

In total, 56 farmers (93%) completed the psychosocial questionnaire. The comparisons between low (34 farmers) and high (22 farmers) antimicrobial users showed that: i) low users had higher worries about antimicrobial resistance ($p=0.03$) and tended to perceive less benefits from antimicrobial usage ($p=0.06$), ii) low users attributed the amount of antibiotic consumption more strongly to the husbandry conditions at a farm ($p<0.01$) and iii) high users self-evaluated their antimicrobial usage compared to other French pig farmers as being higher than the low users ($p=0.04$). There was no significant difference in the perceived needs and risks of antimicrobials between the two groups. Based on these results, we suggest that increasing farmers' awareness about antimicrobial resistance and its relation to pig farming as well as showing them the benefits of other measures to prevent and cure diseases in pigs could be an effective way to reduce antimicrobial usage in the pig industry.

P161 CURRENT AND FUTURE TRAINING NEEDS IN ECONOMICS APPLIED TO ANIMAL HEALTH: RESULTS OF A WORLDWIDE SURVEY

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Economics applied to animal health is concerned with "making rational choices/decisions in the allocation of scarce resources". Today there is an increasing demand for disease impact assessment, improvement of the allocation of resources for disease surveillance and control and discussions on who should meet animal health costs. Thus, economics applied to animal health is essential for animal health professionals to take decisions on disease management. This motivated the creation of NEAT, a consortium that promotes "Networking to enhance the use of Economics in Animal Health, Research and Policy Making in Europe and beyond". It is a cadre of animal health professionals with expertise and an interest in economics, all 60 partners of the project having strong links through training, research and consultancies to the animal health services and livestock sectors of member states. As part of the NEAT project a survey was conducted to get an overview of the status quo of Economics applied to Animal Health teaching activities and methods and to assess the needs and expectations of end users for the future. A total of 264 persons responded from 32 different countries, giving a response rate of 39%. A majority of answers were given by educational institutions (101 answers) followed by private organizations and public bodies (86 and 77 answers, respectively). Training in economics appeared to be not consistently offered, even among the educational institutions, and information about the existence of training opportunities in this field to be scarce. Thus, significant gaps exist in veterinary curricula. Among the 3 groups enquired, educational and public institutions were more concerned with decisions and impacts of animal health (intervention decisions, economic impacts) while veterinary organizations and industry bodies were more focused on general management aspects of economics. The same trend was seen when respondents identified the current needs for expertise of their organization. An increasing need for teaching provided as e-learning or distance learning was observed. The results also suggested that public organisations anticipate an increasing in demand towards training in microeconomic and agro-food related topics in the future. It appeared that in the future each group - especially public and private organisations - will attribute a higher importance to the topics which currently are outside of their core interest.

P162 LAST GENERATION CEPHALOSPORINES : USE CUT BY 3 BETWEEN 2009 AND 2012 BY FRENCH PIG VETS

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End of 2010, the french vets have been sensitized to the rise of human-problematic bacterial strains in human medecin. A report of the French Food Agency focused on Staphylococcus Aureus resistant to meticilline, and extended-spectrum beta-lactamase-producing enterobacteriaceae. Last generation cephalosporines were identified as the first target because of there strategic role in human health, even if all classes of antibiotics are eligible.

The french pig practitioners represented by there technical organisations (AFMVP, AVPO, SNGTV), agreed not to wait for a regulation, and made a consensus to volontarily limit and frame the prescription of cephalosporines, specially those of 3rd and 4th generation (C3G/C4G). A total of 89 vets returned a consensus engagement form. This represents 60,1% of the praticioners.

At the same time, the dispenses of 33 practices housing 110 vets (92 full-time equivalent practitioners) were collected for the period from 2009 to 2012. This corresponds to the dispenses of 74,3% of the french pig vets.

As a whole, the dispenses of C3G/C4G per pig vet had a 71% drop between 2009 and 2012. The biggest step down are 46% between 2010 and 2011 followed by 45% between 2011 and 2012. In terms of corporal weight, this represents a 73% cut in the C3G/C4G dispenses between 2009 and 2012. During this period, the ceftiofur based proprietary drug dispenses had a 73% drop between 2009 and 2012 (respectively 1,2 and 0,3 kg of activ principle per full-time equivalent practitioner). Regarding cefquinome based proprietary drug dispenses, they fell from 61% between (69 and 41 g of activ principle per full-time equivalent practitioner respectively in 2009 and 2012). This represents a 40% fall of the live weight treated. The response and collection rates are high for a voluntary process. The reported fall of C3G/C4G dispenses between 2009 and 2012 is consistent with the 73,3% decrease of live weight treated and the 62,1% decrease of pig exposure reported by the French Agency for Veterinary Medicinal Products between 2010 and 2012. This represents a two third cut in the exposure of pigs to last generation cephalosporines. This is the result of a clear engagement in response to clear arguments, messages from technical associations, and discussions with the other pig professionals.

P163 MONITORING THE QUALITY OF MEDICATED FEED IN FRANCE - RESULTS OF ASSAYS PERFORMED ON FOODS CONTAINING TYLAN 20 PREMIX BETWEEN 2010 AND 2013

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Medicated feed is a kind of feed in which approved manufacturers have incorporated a veterinary medicine (a premix) according to a veterinary prescription. The oral administration of veterinary medicinal product via the feed is one of the routes of administration of drugs to animals. This treatment modality is used for both pets and animals production. The medicated feed is used to treat animals without constraint and so it contributes to animal welfare. Another advantage of the medicated feed is the good treatment adherence. This assumes that the medicated premix is dosed accurately, in accordance with the veterinary prescription. In France, feed mills need to be licensed by the French Veterinary Medicine Agency if they incorporate medicated premix in feedstuffs. To be licensed, they must demonstrate that their mixing device enables to incorporate active ingredients evenly: homogeneity tests are conducted annually in accordance with the guide to Good Manufacturing Practice for medicated feeds. Cross-contamination tests are also conducted annually to ensure control of risk of contamination of non-supplemented feed by medicated feed. In addition, an analytical control is performed periodically on medicated feed to ensure that the content of active ingredient is consistent with the expected content. The annual number of control depends on the medicated feed tonnage produced annually: at least one dosage per quarter up to a dosage per month. The dosage of the tylosin (TYLAN®) is routinely performed using an HPLC technique which is reliable. All assays were performed in the same laboratory (LDG, Laboratorio de Diagnostico General, Barcelona). A total of 673 samples from 29 different feed mills were analyzed: 98% of the results were in line with expectations. When the results were not consistent, corrective actions have been implemented to improve the manufacturing process. The average recovery rate of tylosin (TYLAN ND) was 102% and the median was 104%. Depending on the feed mill, average recovery rate did range from 93% to 110%. These results confirm that the prescription of medicated feed is a reliable solution for animals.

P164 USE OF PULMOTIL® PREMIX (TILMICOSIN PHOSPHATE) IN NURSERY PIGS AS AN AID TO CONTROL RESPIRATORY DISEASE AND ITS ECONOMIC IMPACT THROUGHOUT THE FINISHING PERIOD

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Swine respiratory disease has a great economic impact in pig production worldwide, affecting typically finishing pigs. This study aims to evaluate the use of Pulmotil® Premix in nursery pigs to minimize respiratory disorders and their associated cost throughout the finishing period.

This study was conducted in a 500-sow farrow to finish farm between May and September 2012. The herd has a recent history of respiratory disease in fattening pigs involving M. hyopneumoniae, A. pleuropneumoniae, and P. multocida. Pigs in one batch of production were randomly allocated to each experimental group. Pigs in the Pulmotil group (n= 142) were treated with tilmicosin phosphate (Pulmotil® Premix, Elanco AH) at 400 mg/kg feed for 2 weeks at the start of the nursery period. Pigs in the control group (n=137) did not received any medication at that time.

Average daily weight gain (ADWG) improved significantly in the Pulmotil group compared to the control group, with pigs gaining 22 g/d more during the nursery period ($p<0.05$) and 27 g/d more during the growing period ($p<0.05$). From wean to finish, pigs in the Pulmotil group gained 20 g/d more than pigs in the control group ($p<0.05$).

Weight variation, as measured by coefficient of variation, was consistently lower in the Pulmotil group when compared to the control group. Mortality rate in the Pulmotil group was 1.40% whereas in the control group it increased up to 3.64%. In addition, the use of Pulmotil® Premix for respiratory disease produced heavier pigs throughout the finishing period, as evidenced by the higher percentage of light pigs in the control group at each weighing time. Based on market conditions at the time of the study (1,70€/kg deadweight) and a 75% of carcass yield, pigs treated with Pulmotil® Premix had an extra revenue of 3.2 €, with a return of investment after treatment >5.

In summary, the use of Pulmotil® Premix at the start of the nursery period minimized respiratory disorders and associated mortality. As a result, ADWG was significantly improved, group variability was reduced and fewer light pigs were produced.

P165 LAWSONIA INTRACELLULARIS FAECAL SHEDDING PREVALENCE IN FARMS IN THE UNITED KINGDOM AND IRELAND

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Lawsonia intracellularis is the aetiological agent of porcine proliferative enteropathy or ileitis. Three forms of the disease have been described: acute, chronic and subclinical ileitis; the latest characterized by impaired growth and worsened performance. This study aims to investigate the prevalence of faecal shedding of Lawsonia intracellularis in fattening pigs.

640 pigs between 6 and 19 weeks of age were sampled in 24 pig farms across UK and Ireland in 2012. Ten pigs were sampled per group of age investigated (n=64). A minimum of 2 and a maximum of 4 groups of age were sampled per farm. Faecal samples were analysed using Lawsonia FIRSTtest, an ELISA-based test for detection of L. intracellularis in faeces.

L. intracellularis was detected in 48.13% of faecal samples. The prevalence of farms with at least one pig shedding L. intracellularis in faeces was 95.83%. Our results are in agreement with previous serological studies in which 94% of farms were positive. The prevalence of farms where at least 40% of the pigs within a batch were shedding L. intracellularis was 87.5%. Prevalence of groups shedding L. intracellularis increased slightly from 6-8 to 9-11 week old group, peaking at 12-14 weeks (93% of positive groups). After that, it decreased progressively, with 50 % of the groups above 17 weeks being positive. This distribution pattern suggests that for most of the farms transmission rate achieves a maximum during the growing period, being consistent with a grower infection pattern. On the other hand, the initial high prevalence for the 6-8 week group could indicate predominantly farms with a nursery infection pattern.

In field studies, a span of 2-8 weeks between shedding and seroconversion has been reported for L. intracellularis, making it difficult to rely merely on serological diagnostic tools to determine the time of infection. In this study, the use of Lawsonia FIRSTtest in cohorts of pigs enabled to identify when shedding started. Knowing the time of infection is essential to implement comprehensive control measures in farm and minimize the impact of ileitis. That is particularly important in cases of subclinical ileitis in which diarrhoea may not be present but average daily gain and feed conversion ratio are severely affected.

In summary, L. intracellularis is still highly prevalent in pig farms in UK and Ireland. The use of Lawsonia FIRSTtest allows the implementation of control measures based on the time of infection.

P166 COMPARATIVE STUDY OF TREATMENT FOR POST-WEANING COLIBACILLOSIS IN PIGLETS WITH AMOXICILLIN PLUS CLAVULANIC ACID VIA DRINKING WATER VERSUS OTHER ANTIBIOTIC PRODUCTS

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The aim of the present experiment was to compare the treatment efficacy of Strenzen (amoxicillin & clavulanic acid) 62.5% with other commonly used antibiotics for the treatment for post-weaning diarrhoea caused by Escherichia coli.
The experiment was carried out in 72 pens with 6 piglets each (432 piglets in total). Piglets were weaned at 28 days of age. Day 0 was defined as the day after appearing first signs of diarrhoea. The experimental design was completely randomised with 4 treatments: T1, Amoxicillin and colistin; T2, colistin; T3, Strenzen; and T4, non-medicated control group. Treatments 1, 2 and 3 were administered via drinking water on day 0 to 4. All 4 treatments also received individual medication by injection (enrofloxacin) if required. All 4 treatments were replicated 18 times and 6 pigs housed together formed the experimental unit.
The primary variable for determining effectiveness was the evolution in time (treatment x time effect) of disease. The mortality related to colibacillosis and the productive performance (average daily gain, average daily feed intake, feed conversion ratio) in prestarter (day 0 to 10), starter (day 10 to 30) and total nursery periods were also evaluated. Presence of disease and zootechnical performance were analysed by GLM models (SAS). Presence of pathogenic E. coli and sensitiveness to the experimental products were proven in an outbreak of diarrhoea 4 days after weaning. The percentage of mortality was high (5.1%), with no significant differences between treatments and productive performance was poor. All treatments demonstrated efficacy and most of the pigs were cured at day 6.
Among treatments, T3 and T4 showed less signs of disease on days 3 to 6, evidencing a faster recovery. Strenzen group required lower amount of individual antibiotic interventions and showed the highest productive performance in prestarter phase, while no differences were observed in starter and total nursery periods. ADG improvements in T3 vs. other groups was directly correlated with the lower diarrhoea incidence.
We conclude that all antibiotics were efficient to treat post-weaning colibacillosis. Strenzen and the individual intervention groups showed overall better results of productive performance and disease recovery, resulting in 49 to 167 kg piglet more and in 2 to 14 eurocent/kg piglet production cost cheaper than costs in the colistin and colistin + amoxicillin groups.

P167 SENSITIVITY PROFILES OF BRACHYSPIRA HYODYSENTERIAE STRAINS BASED ON PLEUROMUTILIN SUSCEPTIBILITY TESTING IN EUROPE

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Introduction. The aim of the comparative survey was to evaluate the susceptibility of Brachyspira hyodysenteriae isolates against tiamulin and valnemulin based on thirteen MIC studies published between 2008 and 2013.
Material and Methods:1050 B.hyodysenteriae isolates from clinical submissions of faecal samples from pigs generated from 2000 to 2013 were tested in different countries (B, CH, D, DK, E, I, Pol, S, UK). Broth micro dilution and agar dilution were used for the tests. Antimicrobials tested were tiamulin and valnemulin (Novartis AG, Switzerland). Criteria proposed by Duinhof (1), Karlsson (3), Ronne & Szancer (4) were used for MIC interpretation.
Results. Country-specific differences in the sensitivity profiles of the Brachyspira strains were found. The majority of the countries (CH, D, DK, I, Pol, S) show high susceptibilities to tiamulin and valnemulin. The MIC50 (0.063-1.0) and MIC90 (0.063-2.0) values for tiamulin and MIC50 (0.031-0.5) and MIC90 (0.031-4.0) values for valnemulin indicate minor differences between both antibiotics. Trends of an increase of Pleuromutilin MICs over a time period of several years were not found. Data from Belgium (tiamulin MIC50 0.25-8.0, MIC90 2.0-8.0; valnemulin MIC50 0.03-8.0, MIC90 0.5-8.0) show higher MICs. This is also the case for tiamulin in one study from Spain (2) and from UK (5). In average, the tiamulin value for MIC50 was 0.76µg/ml and 3.7µg/ml for MIC90. No tiamulin resistance was found in five European countries (CH, D, I, Pol, S). The mean resistance rate in the remaining countries is about 12%. In summary, the average MIC50 (0.73 µg/ml) and MIC90 (3.36 µg/ml) values for valnemulin were lower than for tiamulin. The resistance rate on valnemulin was not determined in most studies.
Discussion. Results of the comparative European survey reveal sensitivity to both Pleuromutilin antibiotics, which are commonly used for SD treatment in Europe. Country-specific differences in the sensitivity profiles of B.hyodysenteriae isolates must be considered and highlight the importance of monitoring programs to detect changes in the susceptibility of those field isolates. The findings correspond to the clinical effects of both antibiotics seen in field cases of swine dysentery all over Europe.
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P168 MONTECARLO APPROACHES TO PREDICT THE TREATMENT EFFICACY OF RESPIRATORY DISEASE WITH CEFTIOFUR IN PIGS

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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. Ceftiofur is an antimicrobial widely used in swine medicine that has been described as time-dependent according to the previous classification. 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 ceftiofur efficacy on Actinobacillus pleuropneumoniae (APP) and Pasteurella multocida (PM). T>MIC 40% of the dose interval is the PK/PD parameter to be associated with antibacterial efficacy according to the literature for ceftiofur. For this analysis, Montecarlo simulations were performed using the pharmacokinetic data calculated for EFICUR® (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 T>MIC 40% of the dose interval as a threshold values, were 100% for APP and PM. In conclusion, it is highly probable that the antimicrobial treatment with EFICUR® of pig respiratory disease due to APP and PM would be efficacious under field conditions.

P169 PHARMACOKINETICS OF A FLORFENICOL DRINKING WATER CONCENTRATE IN PIGS

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Florfenicol is currently one of the most popular antibiotics in veterinary medicine for treating a wide variety of infectious disease due to its wide range of action and high sensitivity against most common pathogens in swine production. SELECTAN® ORAL is a 23 mg florfenicol (FFC)/ml drinking water concentrate approved in several countries in Europe for the prevention and treatment of respiratory infections associated with Actinobacillus pleuropneumoniae and Pasteurella multocida in swine. The aim of this study was to evaluate the pharmacokinetic (PK) profile of SELECTAN® ORAL given orally by drinking water at the dose rate of 10 mg FFC/kg b.w./day every 24 hours during 5 consecutive days in pigs. Ten healthy pigs (5 females and 5 males) weighing around 20 kg were used in the study. At 120 hours after starting the treatment, the medicated drinking water was changed to non-medicated drinking water. Blood samples were collected from each animal as follows: Day 0: 0 (before treatment starts), 2, 4, 6, 8, 12 hours after oral administration; Day 1: 24, 36 hours after oral administration; Day 2: 48, 60 hours after oral administration; Day 3: 72, 84 hours after oral administration; Day 4: 96, 108 hours after oral administration; Day 5: 120, 124, 128 and 132 hours after oral administration; Day 6: 144 and 156 hours after oral administration; Day 7: 168 and 180 hours after oral administration. The plasma concentration of florfenicol was determined by HPLC using a previously validated method to determine florfenicol in pig plasma (Validation N°: V-0614). The main pharmacokinetic parameters were calculated using the non compartmental approach by means of the WinNonlin Professional programme ver.5.3. In order to compare the results along the 5 consecutive days, the values of plasma concentration of florfenicol were normalized by daily dose received. The repeated oral administration of florfenicol by drinking water to pigs resulted in similar PK concentration vs time patterns for all the animals. Judging by the Cmax/AUC ratio (0.0555± 0.0064 hr-1) a relatively rapid absorption rate occurred. When SELECTAN® ORAL is administered through medicated drinking water at a dose of 10 mg FFC/kg b.w./day, FFC concentrations in plasma are maintained above 1 µg/ml, so well above the targeted MIC value for the indicated swine pathogens, during the full five day treatment period. This leads to significant serum levels over time to deliver desired efficacy.

P170 COMPARISON OF TREATMENT EFFICIENCY OF STRENZEN (AMOXICILLIN AND CLAVULANIC ACID) WITH AMOXICILLIN AND COLISTIN FOR THE CONTROL OF E. COLI POST-WEANING DIARRHOEA AND S. SUIS INFECTION

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Introduction. Post-weaning diarrhoea caused by enteropathogenic E.coli strains and S.suis infections belong to the most important infections during the nursery period. Antimicrobial therapy is often the only effective approach of controlling those infections.
Objective. Comparison of treatment efficacy of various antibiotics used against post-weaning diarrhoea caused by enteropathogenic E.coli strains, as well as polyarthritis/meningitis caused by pathogenic isolates of S. suis serotype 2.
Materials and Methods. The experiment was carried out with 4 groups (3 treatment groups and 1 control group) each with 432 animals (6-8kg) selected at random. Treatment period: 5 days via water: first group with Strenzen (amoxicillin clavulanic acid) 25 mg/kg bw, second group with amoxicillin (20 mg/kg bw), third group with colistin (120mil IU: 6mg/100 kg). Control group was left without medication. Microbiological examination confirmed presence of pathogenic E.coli strain at weaning and of S.suis strain serotype 2. Individual medication by injection (Amoxicillin) was recorded for all groups. Selected parameters were monitored on Days 0, 14 and 42 (trial end): total body weight, average daily gain, mortality, evaluation of non-standard pigs and number of treated piglets by injection.
Results. Strenzen-treated pigs outperformed all other treatment groups for average daily weight gain and, as a result, the financial gain per piglet treated. The daily weight gain of pigs in the Strenzen group (416 g) was 16.2% higher than the colistin-treated group (357g) and 1.5% higher than in the amoxicillin treated group (410g). The calculated profit gains for the Strenzen treated pigs was €5.72/pig higher than for colistin-treated pigs and €0.68/pig higher than for pigs treated with amoxicillin. Strenzen treatment gave the most effective control of S. suis infection. Only 4 animals in this group exhibited clinical signs requiring medical interventions by amoxicillin injection in comparison to the amoxicillin (27 pigs), colistin (481 pigs) and control (828 pigs) group. This reduced the overall use of antibiotics on the farm in particular in the group of Strenzen-treated pigs.

P171 SUSCEPTIBILITY OF STREPTOCOCCUS SUIS FROM CLINICAL CASES OF MENINGITIS/ ARTHRITIS/PNEUMONIA TO STRENZEN (AMOXICILLIN/CLAVULANIC ACID)

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Introduction. S.suis is an important pathogen and corresponding infections have been reported in many modern swine operations worldwide. Antimicrobial treatment is considered as one of the most effective approaches and beta-lactam antibiotics are considered as the drug of choice.
Trial objective. Determination of the susceptibility pattern of S.suis strains isolated from piglets affected by meningitis/arthritis/pneumonia in Czech Republic (isolation between 2005 - 2012;n=54) to Amoxicillin/ Clavulanic Acid (AMC, Strenzen).
Material and methods. S suis isolates were chosen from piglets when clinical signs of specified S.suis pathology was observed. Each isolate represented one piglet (aged from 14 to 90 days) and originated from different farms per year sampled during the time period 2005-2012. Identification was performed based on biochemical activity (API20Strep, BioMerieux, France) and by using of MALDI TOF (mass spectrophotometry) (Bruker) methodology. Serotyping was performed by specific PCR testing. In total 54 strains were analysed according this procedure (meningitis- 8 cases, arthritis- 8 cases, pneumonia 15 cases, septicaemia- 23 cases). The MICs were determined using the agar dilution method with Mueller-Hinton agar (MHA), (Oxoid, UK), with the addition of 5 % ovine blood (CLSI, 2008). Results were interpreted using CLSI resistance breakpoints (M31-A3, 2008).
Results. The susceptibility pattern show a high susceptibility of S.suis strains to AMC. The majority (78%) of the S.suis strains indicate a low MIC of <0.015 µg/ml. The highest MIC value observed for AMC was 0.25 µg/ml. MIC50 and MIC90 were established for the whole group of tested strains (serotype 1 and 2). The calculated MIC50 value was <0.015 µg/ml and the corresponding MIC90 value was 0.06 µg/ml. No differences were found in the sensitivity of S. suis isolates originating from different clinical forms of the infection (CNS, joints, lungs). The findings are similar to those reported by the VetPath project (Klein et al.2012) a pan-European surveillance programme. Amox/Clav combination (Strenzen) can be considered as a highly effective antimicrobial based on the in-vitro sensitivity data. No trend of resistance development was observed and no resistant strain detected.
Reference. Klein, U. et al. (2012) 4th ESPHM, Bruges.

P172 SEASONAL VARIATION IN MYCOPLASMA HYOPNEUMONIAE PREVALENCE IN WEANED PIGLETS IN SPAIN

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It has been demonstrated by several research groups that infections with Mycoplasma hyopneumoniae (M.hyo) in Spanish pig herds may already occur starting from 21 days of age (Sibila et al., 2007; Villarreal et al., 2010; Segalés et al., 2012). The aim of the present study was to elucidate eventual differences in the detection rate of M.hyo and its quantities in Spanish piglets around weaning age between seasons and months. The study was conducted between February 2012 and June 2013 in a total of 40 Spanish pig herds. In each herd, at least 30 tracheo-bronchial swabs were collected (Fablet et al., 2012) from 3- to 4-weeks-old piglets and tested for the presence of M.hyo using a RT-PCR assay (Marois et al., 2010). 28 out of the 40 tested herds (70.0%) and 242 out of the 1256 tested piglets (19.3%) tested positive for M.hyo. The prevalence of M.hyo in spring (178/540 piglets; 33.0%) was significantly higher than the one in the 3 other seasons ($P<0.001$). Similarly, the prevalence in April (172/510 piglets; 33.7%) was significantly higher than the one in the other months of the year ($P=0.001$). The lowest prevalence was observed during July (7/120 piglets; 5.8%). Analysis of the M.hyo quantities in the tracheo-bronchial swabs revealed significant differences between winter and the other 3 seasons ($P=0.0045$) and between February and the other months of the year ($P=0.001$). In conclusion, the present study confirmed that 3- to 4-weeks-old piglets may already be infected with M.hyo and that the season and months of sampling determined the probability for being positive for M.hyo at 3 to 4 weeks of age. Indeed, samplings in spring and April were positively associated with the probability of being M.hyo-positive at 3 to 4 weeks of age, even if the M.hyo quantities were highest in winter and February.

P173 EFFICACY OF A VACCINATION AGAINST MYCOPLASMA HYOPNEUMONIAE AT 7 DAYS OF AGE UNDER FIELD CONDITIONS

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It has been demonstrated by several research groups that infections with Mycoplasma hyopneumoniae (M.hyo) in Spanish pig herds may already occur starting from 21 days of age (Sibila et al., 2007; Villarreal et al., 2010; Segalés et al., 2012). Stellamune® One (Elanco Animal Health) has been shown to provide a protective immunity starting from 21 days of age following its administration at 7 days of age (Reynolds et al., 2006). The objective of this study was to confirm the efficacy of this vaccination schedule under field conditions by comparing its performance with another one-shot M.hyo vaccine administered at the same age. The study was conducted in an M.hyo-positive farrow-to-finish herd in Spain between November 2012 and May 2013. Piglets of two consecutive batches were randomly divided into two groups: one group of 481 pigs was vaccinated with Stellamune® One at 7 days of age and the other group of 475 pigs was vaccinated with another one-shot M.hyo vaccine (designated vaccine A) at the same age. The two batches were exposed to a high M.hyo challenge, as evidenced by the high pneumonia rate observed in both vaccinated groups (73.4% and 75.3% in Stellamune® One- and vaccine A-vaccinated pigs, respectively with a mean lung lesion score of 9.23 and 9.47, respectively). The use of Stellamune® One at 7 days of age reduced the consequences of the high infectious pressure in this herd, as evidenced by a significantly lower ($P<0.05$) pleurisy rate (6.6% and 16.5% in Stellamune® One- and vaccine A-vaccinated pigs, respectively) and feed conversion ratio (3.16 and 3.59 in Stellamune® One- and vaccine A-vaccinated pigs, respectively). Although not statistically different, the average daily weight gain during the fattening period was 5 g/pig/day higher in the Stellamune® One-vaccinated pigs (675 g/pig/day) when compared to the vaccine A-vaccinated pigs (670 g/pig/day).

P174 EFFECTS OF AIVLOSIN® ON THE REDUCTION OF MYCOPLASMA HYOPNEUMONIAE FROM THE RESPIRATORY TRACT OF PIGS FROM A FARM AFFECTED BY ENZOOTIC PNEUMONIA

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Introduction. Tylvalosin (TVN), the active ingredient of Aivlosin® (ECO AH), is a macrolide shown its effectiveness in a programme of eradication of Mycoplasma hyopneumoniae (Mh). Aivlosin® is registered in Europe at 2.125mg/kg BW, 7 days in feed. The aim of this study was to study the effect of a treatment with Aivlosin® on the reduction of the bacteria from the respiratory tract of pigs from a farm with a chronic problem of enzootic pneumonia (EP).

Materials and methods. On a 4000-sow farm in the Southeast of Spain with historically problems of EP, 5857 pigs were randomly divided in three groups: G1 (1916 pigs), G2 (2172 pigs), G3 (1769 pigs), and followed from weaning to slaughter. G1 received medicated water at 2.5mg TVN/kg BW for 7 days (off-label) at weaning (4 weeks of age) and when moved to finisher barn (9 weeks of age). G2 were vaccinated with Stellamune One® at 1 week of age. G3 was not medicated or vaccinated. All groups were housed in same conditions. At weaning three bronchoalveolar lavage fluid (BALF) and at slaughter nine lungs with characteristics EP-lesions were taken from each group and a q-PCR against Mh was conducted.

Results and Discussion. In G1, G2 and G3 the samples were respectively positive in BALF in 0/3, 3/3 (121.497±117.759 copies/sample) and 2/3 (2.226.667±1.287.495 copies/sample). In lung tissue respectively 0/9, 9/9 (5.256.833±1.000.383 copies/20 mg of tissue) and 8/9 (2.024.833±770.163/20 mg of tissue). This shows a possible elimination of Mh in the group treated with Aivlosin.

Aivlosin® is a registered trademark of Eco Animal Health Ltd, London, United Kingdom

P175 IN VITRO SUSCEPTIBILITY OF BRACHYSPIRA HYODYSENTERIAE AGAINST A COMBINATION OF TIAMULIN AND APRAMYCIN

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In vitro susceptibility of Brachyspira hyodysenteriae against a combination of tiamulin and apramycin .

Swine dysentery, caused by Brachyspira hyodysenteriae, is still a recurrent health problem in modern swine industry causing severe economical losses. The limited number of antimicrobials available for treatment and the high degree of resistance against these molecules compromises not only treatment options but also the success rate of elimination programs on affected farms. Tiamulin, a pleuromutilin antibiotic is frequently used for treatment but a high degree of resistance is present in Belgian isolates. The aim of the present study was to examine in vitro the susceptibility of Br. hyodysenteriae isolates for a combination of tiamulin with the aminoglycoside apramycin, the active ingredient of respectively Vetmulin® and Apravet®.

Minimal Inhibitory Concentrations (MIC) were determined for 30 Br. hyodysenteriae isolates using the agar dilution technique. The isolates were tested for two-fold dilutions of tiamulin (T) (0.03-16µg/ml) and for tiamulin (0.03-16µg/ml) with a fixed amount of apramycin (4 (TA4) and 0.25 (TA0.25) µg/ml respectively). Antibiotics were supplemented to TSA-BJ agar with 5% sheep blood. MIC was read after a 3-day incubation period at 37°C in anaerobic environment.

The range of MIC's was the same in all three groups: <0.03 - 16 µg/ml. MIC50 was lower (0.06 µg/ml) in the TA4 group compared to both other groups (>16 µg/ml). MIC90 was >16 µg/ml in all groups. When looking in detail, 15 isolates (50%) in the TA4 group had an MIC which was more than two dilutions lower than with tiamulin alone. In the TA0.25 group, 4 isolates (13%) had an MIC >2 dilutions lower compared to the T group. In the tiamulin group and the TA0.25 group, 6 isolates (20%) could be classified in vitro as susceptible (MIC <1 µg/ml), while in the TA4 group 15 isolates (50%) were in vitro susceptible.

In this in vitro experiment, an increase of 30% of strains classified as susceptible to tiamulin could be recorded when adding 4 µg/ml apramycin. Since an apramycin concentration was chosen lower than the MIC50 for apramycin (MIC50 8µg/ml, determined on 10 isolates), the activity of apramycin itself cannot explain completely these results, suggesting a beneficial effect of combining both molecules in this in vitro experiment.

P176 SUSCEPTIBILITY OF ESCHERICHIA COLI FIELD ISOLATES TO APRAMYCIN

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Susceptibility of Escherichia coli field isolates to apramycin.

The aminoglycoside apramycin, is frequently used as therapy in enteric infections in veterinary medicine. Plasmid-linked resistance genes to apramycin are described in E. coli. In agar disc-diffusion testing, inhibition-zone diameters are within a narrow range making interpretation on susceptibility not always straightforward. To objectively measure the susceptibility of E. coli field isolates, the aim of this study was to assess their Minimal Inhibitory Concentration (MIC) to apramycin, the active ingredient of Apravet®.

A total of 31 E. coli strains isolated from clinical samples (25 porcine, 3 bovine, 2 avian, 1 canine) were selected for agar diffusion testing. Fresh cultures (2 µl of a 0.5 McF bacterial suspension) were inoculated on agar plates (Isosensitest, Oxoid) with different concentrations of apramycin. Agar plates were prepared with a two-fold dilution of apramycin ranging from 0.25 to 128 µg/ml. Plates were read after overnight incubation at 37°C. MIC was determined as the lowest concentration with no bacterial growth.

The MIC for apramycin ranged between 2 to 8 µg/ml for all E. coli isolates. MIC 50 was 2µg/ml, MIC90 was 8 µg/ml. According to CSLI breakpoints no resistant strains (>=16µg/ml) were detected. Following this criterion, 27 strains (87%) were categorized as susceptible with an MIC <=4 µg/ml and 4 isolates (13%) were intermediately susceptible. The small range of MIC's and the large number of isolates with an MIC at the limit of susceptibility (2-4 µg/ml), is in agreement with routine sensitivity testing by agar diffusion where only minimal differences in diameter are registered.

In conclusion we can state that, based on these results, a high proportion of Escherichia coli in Belgian farms shows good susceptibility to apramycin. No resistant strains were detected.

P177 USE OF BRONCHO ALVEOLAR LAVAGE FLUID (BALF) SAMPLES FROM LIVE ANIMALS TO DETECT MYCOPLASMA HYOPNEUMONIAE AND HAEMOPHILUS PARASUIS

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The objective of this study was to assess the use of broncho-alveolar lavage fluid (BALF) samples to detect the presence of Mycoplasma hyopneumoniae (Mhyo) and Haemophilus parasuis (Hp). BALF samples from pigs of 8 different European farms displaying respiratory problems were included in the study. At 10 weeks of age, BALF samples from 10 healthy and 5 sick animals were taken. The 5 sick animals were necropsied and Mhyo-like lesions (craneo-ventral pulmonary consolidation [CVPC]) were scored. BALF samples from these 10 healthy animals were taken again at 20 weeks of age. BALF samples were analysed for Mhyo and Hp isolation and PCR (and by Mhyo QPCR when PCR positive).

Mhyo: Overall, detection of Mhyo in BALF samples was higher at 20 (32/67, [47.8%]) than at 10 (27/119, [23%]) weeks of age. There were only 8 out 67 (12%) BALF samples positive to Mhyo at both sampling points. At 10 weeks of age, percentage of detection of Mhyo in BALF samples was higher (p>0.05) in animals showing respiratory problems (11/40, 27.5%) than in healthy ones (16/79, 20.2%). However, mean Mhyo load (QPCR) of sick animals (5.92 [max=8.60-min=3.89]) was not significantly different from that of healthy ones (6.09 [max=7.98-min=4.24]). All BALF samples analyzed by Mhyo culture were negative. CVPC was observed in 19 out of 31 (54.3%) 10 week-old necropsied animals. nPCR positive animals showed a higher (p>0.05) mean Mhyo-like lesions scoring (n= 8, mean=5.37 [max=19-min=0]) than the nPCR negative ones (n= 27, mean=3.33 [max=19-min=0]). At 10 weeks of age, M. hyopneumoniae load in BALF samples was not correlated with Mhyo-like lesion scoring.

Hp: Globally, Hp was detected in 17% (34/119) and 19% (13/67) at 10 and 20 weeks of age, respectively. There were only 4 out 67 (6%) animals that were positive to Hp at both sampling points. At 10 weeks of age, no statistically significant differences on the number of samples positive by Hp PCR between sick (12/40, 30%) and healthy (22/79, 28%) pigs was observed. In addition, no statistically significant differences on the number of samples positive by Hp isolation between sick (11/40, 27.5%) and healthy (20/69, 29%) pigs was observed.

Ten out of 119 (22.7%) and 9 out of 67 (13.4%) BALF samples were positive to both pathogens PCR at 10 and 20 weeks of age, respectively. Obtained results indicate that detection of Mhyo and Hp in BALF samples from live animals of different ages is feasible. However, the diagnostic value of this sample should be further studied.

Acknowledgements: This work was financed by Zoetis.

P178 PRACTICAL APPROACH TO UPPER RESPIRATORY TRACT PROBLEMS IN NURSERY PIGLETS AND THE EFFECT OF PASSIVE ATROPHIC RHINITIS IMMUNITY ON CLINICAL SIGNS AND ANTIBIOTIC USE.

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On many Dutch farms changes in the upper respiratory tract of nursery piglets leads to sneezing and coughing. That often disappears during antibiotic treatment but recur after treatment has finished resulting in higher levels of antibiotic use on farms.
The aim of this study was to measure the effect of a systematic approach to the problem on clinical signs and antibiotic use on 4 farms (F) The 3step protocol. 1Anamneses and positive clinical signs: >30% of piglets in all units with sneezing, conjunctivitis, and tear-staining and response to medication during treatment which lapses when medication is removed. In the results reported as symptoms: +or-(no symptoms) 2Diagnostics. Cross-section or paired blood sampling to exclude Infl, PRRS, PCV2, HPS and M.hyo as causative infections + necropsy of piglets with macroscopic conchae atrophy followed by bacteriological examination of the nasal mucosa or lungs.
3Passive immunization. If conchae atrophy is observed and Bordetella bronchiseptica(Bb) is cultured in absence of the other infections, sows are vaccinated with Porcilis AR-T DF to confer passive protection on their piglets. Under results vac: + means that piglets have passive immunity.
Antibiotic use in Defined Daily Doses is monitored by comparing the 12months before the start of the protocol, and the 12months when piglets received passive Bb immunity from their dams.

Results.

F1(mult.)2010 vac:-,symp+,DDD11.1/2011vac+,symp-, 5.5/2012vac+,symp-,1.8
F1(fatt.) 2010vac-,symp+,DDD10.3/2011 vac+(50%),symp±,14.8/2012vac+,symp-1.3
F2(mult.)2011vac-,symp+,DDD11.7/2012vac+(75%),symp-,19.8/2013vac+,symp-,5
F2(fatt.)2011vac-,symp+,DDD11.7/2012vac+(50%),symp±,3.8/2013vac+,symp-,3.1
F3(mult/fatt)2011vac-,symp+,DDD17.4/2012vac+(50%),symp±,11.2
F3(fatt2)2011vac-,symp+,DDD4.1/,2012vac+(25%),symp±,3.8
F4(mult.)2012vac-,sympt+,DDD71/ 2013,vac+,symp-,29

Conclusion. Bb infections can cause upper respiratory tract symptoms in nursery piglets. Passive immunity via Porcilis AR-T DF sow vaccination can prevent the clinical signs in piglets and fatteners. Antibiotic usage was reduced up to 87% when Bb infection was diagnosed and subsequent litters received passive Bb immunity without any other structural changes. Recurring signs due to Bb infections in spite of apparently curative treatment are probably caused by chronic conchae atrophy (NPAR) when the filtering function of the nasal passages is compromised, allowing secondary infection of the upper respiratory tract and lungs and resultant pathology.

P179 THE PHARMACOKINETICS OF TYLVALOSIN (AIVLOSIN®) IN THE PORCINE COLON AND ITS RELATIONSHIP WITH MIC VALUES FOR BRACHYSPIRA HYODYSENTERIAE

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Introduction. Swine dysentery is a mucohemorrhagic diarrhoea of pigs caused by Brachyspira hyodysenteriae. The recommended dose rate of tylvalosin (TVN, Aivlosin® ECO Animal Health) in-feed for treatment is 4.25 mg/kg/day for 10 days. The definition of a breakpoint is the MIC used to indicate susceptible, intermediate or resistant categories of a specific organism in a defined phenotypic test system. Susceptibility implies that an infection due to the strain can be treated with the dosage regimen of a recommended antimicrobial agent. Conversely resistant strains are not inhibited by usually achievable concentrations of the agent with normal dosing schedules. For the end user this measure of resistance is by far the most useful parameter. A microorganism is defined as wild type (WT) by the absence of resistance mechanisms to the drug in question. The highest MIC value for the wild-type distribution defines the epidemiological cut-off value. A microorganism with an MIC outside (above) the WT distribution has acquired resistance and may or may not respond to antimicrobial treatment.
Materials and methods. Six pigs of mean bodyweight 36.5 kg were given feed containing a nominal inclusion rate of 42.5 ppm of TVN for 10 days. At 240 h after the start of treatment the pigs were euthanized and colon contents taken for TVN analysis.
Results and discussion. The feed contained 47.7 ppm of tylvalosin, mean feed intake was 2.33 kg/day, and the TVN dose rate was 3.04 mg/kg/day. The concentration of TVN in colon contents was 16.5 µg/g (range 12.7-20.5 µg/g). By extrapolation the colon TVN concentration at the recommended dose rate of 4.25 mg/kg BW would be 23.1 µg/g.
As the pathogen B. hyodysenteriae is primarily located in the colon contents, the concentration of TVN in this matrix, the MIC of B. hyodysenteriae and the clinical response can be used to estimate the likely therapeutic success of TVN for treatment of swine dysentery. Clinical data has shown that a dose of TVN in-feed at 4.25 mg/kg BW for 10 days is efficacious for treatment of Swine Dysentery.
The following clinical breakpoints are therefore proposed: sensitive £16 µg/g; intermediate >16 and £32 mg/L; resistant >32 mg/L where the MIC has been determined by agar dilution. These breakpoint values have been used successfully in clinical practice to predict clinical performance of tylvalosin for treatment of Swine Dysentery. Aivlosin® is a registered trademark of Eco Animal Health Ltd, London, UK.

P180 SOCK-METHOD FOR DIAGNOSIS OF LAWSONIA INTRACELLULARIS ASSOCIATED PROLIFERATIVE ENTEROPATHY

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Introduction. The impact of L. intracellularis associated proliferative enteropathy (PE) on productivity can be evaluated using quantitative PCR (qPCR) testing of pooled faecal samples from individual animals. Sampling and testing using sock covered boots would provide an easy alternative to laboratory pooling of individual faecal samples.
The objective of the current study was to evaluate a sock-method for diagnosis of L. intracellularis associated PE using qPCR.
Materials And Methods. Twenty-eight Danish swine veterinarians performed 111 visits in 43 herds (2-3 months between visits to same herd). Samples were collected from pigs in the nursery period (6-10 weeks of age) in rooms with signs of diarrhoea. One sock-sample was obtained at each visit by walking through all pens in a room wearing sock-covered boots. From the same room 10 normal and 10 diarrhoeic freshly deposited individual faecal samples were collected. The 20 individual faecal samples were diluted to 10% in phosphate buffered saline and equally pooled by weight in one sample (pooling of 10% PBS solutions). The wet sock-samples were weighed, suspended in PBS to obtain a 10% solution and processed in a Stomacher for 1 minute. Pools and sock-samples were subjected to L. intracellularis qPCR. Pools and sock-samples were compared for both dichotomized (agreement and Cohen's Kappa) and quantitative qPCR results (Pearson correlation coefficient).
Results. L. intracellularis was detected in 36% of the pools and 45% of the sock-samples. A total of 91% of the herds were L. intracellularis positive at one or more herd-visits. The mean excretion was 5.2 and 5.1 log10 L. intracellularis cells per gram faeces for the positive pools and socks respectively. Agreement for the dichotomized results was 87% and Cohen's Kappa was 0.74. Pearson correlation coefficient was 0.89 for the quantitative test results.
Discussion. Cohen's Kappa and Pearsons correlations coefficient demonstrated that the sock-method had good agreement with the laboratory pools. Repeated testing within the same herd with diarrhoea alternated between positive and negative detection of L. intracellularis. This implies that repeated testing should be applied in diagnostic herd investigations to increase the probability of detecting the L. intracellularis infection. In conclusion, the sock-method offers an alternative to testing of individual faecal samples or laboratory pools. The method can potentially be used for diagnosis of other intestinal infections and antimicrobial resistance-testing in batches of pigs. This work is in progress.

P181 COMPARISON OF MIC AND MBC RESULTS FOR BRACHYSPIRA HYODYSENTERIAE ISOLATES IN THE UK

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The most commonly used term, minimum inhibitory concentration (MIC), can variably be used to indicate the lowest concentration at which clear inhibition of bacterial growth has occurred, or in some laboratories, the lowest concentration at which no bacterial growth occurs. The latter circumstance describes the minimum bactericidal concentration (MBC) and this result can differ from the MIC by up to 2 doubling dilutions. Attributing the correct term and cut-off in the test is particularly important for assessing the efficacy of agents that work by inhibiting the target organism. Comparative MIC and MBC results for Brachyspira hyodysenteriae are presented and compared with antimicrobial concentrations achieved in the colon contents, to estimate clinical breakpoints.

The MIC and MBC were determined using the agar dilution method with the specified antibiotic incorporated in serial two-fold dilutions from 0.031µg/ml to 128µg/ml. Determination of the MIC and MBC values was done in accordance with the standard operating procedure for the test. The isolates of B. hyodysenteriae were cultured from clinical samples submitted to SAC Veterinary Services, Edinburgh between the years 2004-13. Samples were from pigs with a history of diarrhoea, mostly from herds in the UK.

The MIC 50 and 90 of each antibiotic was recorded, respectively: Tiamulin - 0.125, 4.0µg/ml; Lincomycin - 16, 64µg/ml; Valnemulin 0.031, 1.0µg/ml; Tylosin - >128, >128µg/ml. The MBC 50 and 90 were, respectively: Tiamulin - 0.25, 4.0µg/ml; Lincomycin - 32, 128µg/ml; Valnemulin - 0.031, 2.0µg/ml; Tylosin - >128, >128µg/ml. Colon contents concentrations (CCCs) for each antibiotic were: Tiamulin - 8.05µg/g at 220ppm in feed; Lincomycin 101µg/g at 220ppm; Valnemulin 5.6µg/g at 200ppm; Tylosin 32µg/g at 100ppm. Most MIC/MBC 50 ratios are 1: 2 for all the antibiotics tested suggesting that these antibiotics, which are classified as bacteriostatic, do have bactericidal properties at approximately double the MIC. Resistance can be seen above the inhibitory breakpoints suggested by the CCCs of some antibiotics and a clinical therapeutic breakpoint could be anticipated at approximately 20-25% of the CCC. It is recommended that all laboratories report B. hyodysenteriae sensitivity tests as described above, as this will allow the results to be comparable between different countries and laboratories.

P182 QUANTITATIVE EVALUATION OF CLOSTRIDIUM PERFRINGENS TYPE A AND ASSOCIATED TOXIN GENES ON ONTARIO SWINE FARMS

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To study the prevalence of fecal C. perfringens and selected toxin genes, 354 fecal samples were collected on 48 Ontario swine farms from suckling pigs, lactating sows, weanling pigs, grower-finisher pigs, and gestating sows, as well as from manure pits. The fecal samples were cultured for C. perfringens quantitatively, and the isolates were tested for presence of toxin genes by real-time multiplex polymerase chain reaction.

Clostridium perfringens was isolated from 225 (64%) of 354 fecal samples (98% of suckling piglets, 34% of weanling pigs, 18% of grower-finisher pigs, 89% of gestating sows, 96% of lactating sows, and 75% of manure pit samples). The total mean count (log10CFU/g) of C. perfringens in fecal samples was 2.7 ± 2.4; it was 5.0 ± 1.70 in suckling piglets, 4.0 ± 1.86 in lactating sows, 4.3 ± 1.85 in in gestating sows, 1.3 ± 1.87 in weanling pigs, 0.6 ± 1.24 in grower-finisher pigs, and 2.7 ± 1.82 in manure pit. In mixed multivariable linear analysis, log10 C. perfringens in fecal samples from suckling pigs were higher than that of weanling pigs, grower-finisher pigs, and manure pit samples ($P<0.05$). Alpha toxin gene (cpa) was detected in 99% of isolates. However, no isolate was tested positive for presence of other major toxin genes [beta toxin (cpb), enterotoxin (cpe), epsilon toxin (etx), and iota toxin (itx)], NetB toxin (netB), and large clostridial cytotoxin (tpeL). The consensus beta2 toxin gene (cpb2) and atypical cpb2 was present in 25 and 15% of isolates, respectively. The isolates recovered from suckling pigs were more likely to be positive for the consensus cpb2 gene compared to the isolates from lactating sows, gestating sows, grower-finishers, and manure pits ($P<0.001$). C. perfringens isolates that were positive for consensus cpb2 were more likely to carry the atypical cpb2 gene (OR = 19, $P<0.001$) compared to isolates that were negative for consensus cpb2.

This study provides baseline data on the prevalence of C. perfringens and associated toxin genes in healthy pigs at different stages of production on Ontario swine farms. Further epidemiologic studies are required to identify the conditions under which commensal C. perfringens type A and in particular cpb2 carrying strains may play a pathogenic role in enteric infection in swine.

P183 B. HYODYSENTERIAE LOADS IN FAECES OF EXPERIMENTALLY INFECTED PIGS ARE ASSOCIATED WITH DIARRHOEA AND FAECAL CONSISTENCY

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In many European countries, B. hyodysenteriae, B. pilosicoli and L. intracellularis, are considered the major causes of intestinal diseases of growers and fatteners. The symptoms of these diseases are often similar and mixed infections are frequent in field conditions, making a differential diagnosis awkward. Multiplex real time PCR , targeting these three pathogens simultaneously, could be useful when a mixed infection is suspected, to reduce the time and cost of a differential diagnosis. Since this test can also quantify the bacteria, it has been suggested that it can be used to interpret the test outcomes. An association between faecal loads and low growth rate has been shown for L. intracellularis. For B. hyodysenteriae, an inverse relationship between faecal consistency and faecal loads was suspected in cases occurring in the field. The aim of this work was to confirm the hypothesis of an inverse relationship between the presence of diarrhoea, the faecal consistency and the amount of B. hyodysenteriae excreted by artificially challenged pigs. 151 faecal samples were taken from pigs artificially challenged by B. hyodysenteriae 21 to 48 days before. The pigs were from Salmonella- and B. hyodysenteriae- free herds and tested negative for these pathogens. The samples were categorized as non diarrhoeic or diarrhoeic by the same veterinarian, cultured for Brachyspira spp, and examined by RT-PCR targeting B. hyodysenteriae, L. intracellularis and B. pilosicoli. The dry matter content of 64 faeces samples was evaluated by a microwave procedure; then the faeces were divided in different categories, 1 to 4, with decreasing dry matter content. All samples tested negative for L. intracellularis and B. pilosicoli. Non diarrhoeic faeces were grouped in category 1 only. The bacterial load, expressed as log10, increased when diarrhoea was present (ρ=0,7011; p-value≤0,05) and it was on average 4,3 log in normal faeces, and 7,1 log in diarrhoeic samples. An inverse relationship between the dry matter content and the B. hyodysenteriae excretion, was shown (ρ=-0,4983; p-value≤0,05). This relationship was stronger in diarrhoeic samples (ρ=-0,8047). The bacterial load in faeces increased progressively with the dry matter content category (ρ=0,6734, p-value≤0,05), as it was greater in faeces belonging to category 3 and 4.
In conclusion, this work confirms the correlation between B. hyodysenteriae loads excreted by faeces and the presence and the severity of the diarrhoea, suggesting a possible use of DNA quantification in interpreting test results.

P184 GRAZIX, A NOVEL PHYTOBIOLOGIC COMPLEX, PROVIDES MICROBIAL AND ENDOTOXIN INHIBITION

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An ideal antimicrobial agent for herd health would deliver broad spectrum inhibition of bacteria combined with suppression of the effect of endotoxins (lipopolysaccharide; LPS). Grazix feed supplement (LiveLeaf, Inc., USA) contains LiveXtract, a novel phytobiologic complex that mimics plant hypersensitive response, a form of induced or "reactive" plant immunity (RPI). This new category of natural plant derivatives has shown significant scour reduction in weaned piglets without toxic effects. Studies were undertaken to determine minimal inhibitory concentration (MIC) of the extract solution for Gram-negative and Gram-positive pathogens as well as effect on blocking LPS activity for potential application of LiveXtract in reducing dependence on growth promoters.
The extract was 2-fold serially diluted from 500, to 0.49 µL Grazix per mL of water. Strains of Gram-negative (e.g. Bordetella bronchiseptica, Escherichia coli, Klebsiella pneumoniae, Pasteurella multocida, Pseudomonas aeruginosa, etc) and Gram-positive (Bacillus cereus, Listeria monocytogenes, Staphylococcus aureus, MRSA etc.) bacteria originating from swine diagnostic samples were cultured to reach 10^4 to 10^5 CFU/mL. Grazix dilutions were added to tubes containing Mueller Hinton broth followed by the addition of 10 µL of bacterial suspension to the mixture. All tubes including the negative control with only bacteria and broth were incubated at 37oC for 24 hours. The MIC values were determined based on the lowest concentration of Grazix with no bacterial growth. Grazix's ability to interfere with LPS binding was determined using a specially developed assay evaluating the degree of binding inhibition after incubation of LPS with serial dilutions (0.1X to 500X) of the extract. The MIC of Grazix solutions for all but two bacterial isolates ranged from 3.9 µl/mL to 7.8 µl/mL. One Gram-positive and one Gram-negative isolate were inhibited at 15.6 µl/mL and 31.3 µl/mL, respectively. Binding of LPS to the matrix was suppressed in all Grazix dilutions to reach 96.2% to 98.5% inhibition. Recommended application of Garzix (1X) inhibited 96.6% of LPS binding. Results demonstrate that Grazix redoxigenic polyphenols have significant broad spectrum inhibition of microbial growth and can competitively block endotoxin binding sites. The findings support the potential of Grazix application in reducing dependency of growth promoters.

P185 FIELD EVALUATION OF FORCYL® SWINE FOR THE TREATMENT OF URINARY TRACT INFECTIONS DUE TO ESCHERICHIA COLI IN SOWS

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A comparative, multicentric, blinded and randomised study was conducted to assess the efficacy and safety of a one-shot injectable presentation of marbofloxacin for the treatment of urinary tract infections due to Escherichia coli in sows. Overall, 100 sows presenting with at least 106 E. coli per ml of urine, originating from 15 French farms were included in the study. The animals were randomised in two groups:
marbofloxacin (Forcyl®, Vétoquinol) as a single intramuscular injection at the dosage of 1 ml/20 kg (i.e. 8 mg/kg).
enrofloxacin (Baytril®5%, Bayer) three intramuscular injections at the dosage of 1 ml/20 kg (i.e. 2.5 mg/kg) 24h apart.
Urine was sampled from all sows, in the 10 days before inclusion and then, if included, on D3 and D10, for isolation and counting of E. coli strains in urine. Sows were clinically monitored daily from D0 to D3, and then on D10. Sows with a bacterial count £104 E. coli per ml in urine were considered as cured. The criteria for comparison between groups were cure rate on D3 and relapse rate on D10. Groups were tested for equivalence hypothesis. Local and general tolerance were also monitored.
At pre-inclusion time 89% of E.coli strains were susceptible to enrofloxacin and 91% were susceptible to marbofloxacin (p=0.157).
The percentage of cured sows on D3 was 90.4% in the marbofloxacin group and 77.1% in the enrofloxacin group. The non-equivalence hypothesis H0: $P_{Forcyl®} - P_{Baytril®} \leq -15\%$ was rejected with p<0.001. So, the two products were considered as therapeutically equivalent in term of cure rate. On D10, 74.5% of sows in Forcyl® group didn't relapse vs 75.7% in Baytril®5% group (p=0.899).
Among sows which were not cured on D3, 2 sows treated with Forcyl® and 0 sow treated with Baytril®5% could be considered as cured on D10 (E. coli count ≤ 104 cfu/ml).
Regarding safety, one adverse event in Baytril®5% group was reported and none for Forcyl® group. Local reaction at injection point due to the treatment was observed in 1 sow in Forcyl® group and in 4 sows in Baytril®5% group. Pain at injection was observed in 27/54 sows treated with Forcyl® on the inclusion day and in 11, 8 and 16/48 sows treated with Baytril® 5% respectively on D0, D1 and D2.
In conclusion, a single injection of Forcyl® revealed well tolerated and equivalent to 3 injections 24 hours apart of Baytril®5% in terms of cure rate of urinary tract infections due to E. coli in sows.

P186 FIELD SAFETY OF AN INTRADERMAL VACCINATION AGAINST MYCOPLASMA HYOPNEUMONIAE WITH THE NEEDLE-FREE IDAL DEVICE

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Mycoplasma Hyopneumoniae (M hyo) is widespread in the pig population worldwide and leads to major economic losses due to reduced daily weight gain and increased medication costs. Vaccination is an important strategy to control the clinical diseases associated with M hyo including PRDC. Needle-free injection eliminates not only the risk of needle residues in the pork carcasses and the risk of self-injection but also reduces the haematogenous transmission of infectious diseases. The aim of the present study was to assess the safety of the inactivated M hyo vaccine, Porcilis® M Hyo ID ONCE. The study was done in a commercial 1000 sow farrow-to-finish farm in Germany. The piglets were allocated to two vaccine groups (VC1, needle-free and VC2, needle) receiving the vaccine and two control groups (CC1, needle-free and CC2, needle) receiving only adjuvant at three weeks of age (VC1 (n = 138): M Hyo ID ONCE, IDAL; CC1 (n = 70): Diluvac forte, IDAL; VC2 (n = 144): M+PAC®, i.m. CC2 (n = 68): Diluvac forte i.m.).
The safety of the vaccine was evaluated using an injection site reaction score. The diameter, the consistency of the local induration and signs of inflammation such as redness and warmth were assessed for seven days after vaccination.
In general, the observed injection site reactions (ISR) were of minor extent with a maximum diameter of 1.5 cm. The amount and quality (diameter and consistency) of injection site reactions were not significantly different between the animals within the two control groups. The amount of ISR was higher in the vaccinated groups compared to their respective controls ($p \leq 0{,}035$). The quality of the ISR (diameter and consistency) was more severe in the animals from the VC1 compared to VC2 ($p = 0.001$ and $p < 0.001$ respectively). Furthermore, no systemic side effects were observed in any of the vaccinated pigs.
These results support that the needle-free intradermal administration of Porcilis® M hyo ID ONCE is safe. The differences between the groups concerning the ISR are due to differences in vaccine formulations but not due to the way of application as both control groups received the same adjuvant. It is important to note that a strong immune response may be associated with distinct adverse local reactions.

P187 USE OF RESPIG TM TO MONITOR EFFICACY OF DIFFERENT VACCINATION STRATEGIES TO CONTROL MYCOPLASMA HYOPNEUMONIA INFECTION

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A Danish finisher farm vaccinated pigs shortly after entering the weaning facility with M+Pac (ThoroVAX) and Porcilis PCV, to prevent disease caused by Mycoplasma hyopneumonia (M. hyo) and PCV2 virus. The pigs were transferred from the sow farm in an AI/AU system in batches of 390 every 4th week, reared from 7-30 kg and moved into a continuous flow. The farm was infected with PCV2, M. hyo and A pleuropneumonia type 6 (AP6).

The vaccination program was changed in the beginning of Dec. 2012 to a 2 ml combination of PCV2 and M.

hyo vaccines, approved for mixing. Pigs were still vaccinated shortly after introduction to the weaning facility.

During early spring, coughing frequency increased, resulting into a severe pneumonia problem due to a growing endemic AP6 infection. The number of daily doses of penicillin to treat pneumonia increased from 12 between Dec and March to 45 between April and July.

In the beginning of July, a ResPig investigation was initiated. Serology results supported that M. hyo seroconversion was 100 %, PCV2 virus was present in moderate numbers in 9 week old pigs and ApX-II toxin was present in high numbers of older pigs. PRRS Elisa was negative in all samples. An extended slaughterhouse investigation of 32 lungs showed that 72 % of the combination-vaccinated pigs had catharral pneumonia with an average distribution of 15,5 % of the lungs affected. SIV was not suspected in the farm.

In week 18 the farm started again using M+pac due to the coughing and after Respig findings, PCV2 vaccination was again shifted back to Porcilis PCV. In week 43 and week 48, two new extended slaughterhouse examinations of 53 lungs were done and 47 % of lungs had catharral pneumonia with an average distribution of 7,6 %.

Weekly slaughterhouse reports of the number of pigs with pleurisy supported the development of poor lung health, as the frequency of pleurisy increased from an average of 10% in weeks 51 to 15 to 19% in weeks 16-20, ending at 23% in weeks 21-40. In weeks 41-47, the pleurisy frequency dropped dramatically to in average 5%.

In this case study, pleurisy severity and pneumonia antibiotic treatment increased after switching the vaccination program from M+pac and Porcilis PCV to a combination vaccine and dropped after shifting back to the original vaccination program. Lungs were severely affected by catharral pneumonia during combination vaccination and both frequency and severity dropped significantly after returning to M+Pac and later Porcilis PCV.

P188 OVERVIEW OF ERADICATIONS OF MYCOPLASMA HYOPNEUMONIAE WITH TYLVALOSIN (AIVLOSIN®) IN SOWS IN EUROPE

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Introduction. This paper reviews 10 attempts to eradicate Mycoplasma hyopneumoniae (Mh) on sow farms. Tylvalosin (TVN, the active ingredient of Aivlosin®), was selected as the primary antibiotic because of its low MICs/MBCs (minimum inhibitory/bactericidal concentrations). In the EU Aivlosin is registered at 2.125 mg tylvalosin/kg BW for 7 days in feed for Mh treatment.

Material and Methods. With a few exceptions farms were located low pig dense areas. The protocols had minor variations per farm, but all included; tylvalosin (sows for 21 or 28 days, in water (2.5mg/kg BW), oral powder or premix (2.125mg/kg BW)), tulathromycin (TUL, injection suckling piglets with 7 or 10 day interval, sows off feed or at partus), or tiamulin (TIA, sows off feed, or at partus). The prolonged duration or use in water of tylvalosin for Mh is off-label. Sick bays were emptied and all animals not likely to respond were culled. Number of animals on-site were minimised. Intact fences and restricting external contacts were considered critical.

Results. Five eradications were successful, 3 failed and 3 not concluded yet;

SP (2006);
- 1200 sows
- po; 21d TVN, im; TIA, TUL
- >72 months free

SP (2011)
- 800 sows & 300 gilts (>330d)
- po; 28d TVN, im; TIA, TUL
- >24m free

NL (2010)
- 850 sows & 2500 weaned piglets (<70d) & 6500 finishers (>70d)
- po; 28d, im; TUL
- failed

NL (2011)
- 2450 sows & 500 gilts (70 - 240d)
- po; 28d TVN, im; TUL
- >24m free

FR (2012)
- 300 sows
- po; 28d TVN, im; TUL
- >12m free

FR (2012)
- 500 boars
- po; 28d TVN
- failed

FR (2012)
- 1100 sows & 4900 gilts
- po; 28d TVN, im; TUL
- failed

Spain (3 sites, 2012-2013)
- 500 - 1000 sows
- po; 21d TVN, im; TUL
- not concluded

Discussion. The success of eradicating Mh in pig dense areas and on farms with young animals on-site opens new possibilities due to its relative low cost and minimal impact on production. Young piglets on-site during eradications are likely to increase the risk of failure due to the increased number of animals without a fully developed immune system. A thorough discussion needs to take place to explore all possible options to decrease the number and increase age of the animals on-site. An additional benefit of this approach is that in the case of an initial failure, another attempt to eradicate is easy to implement. The eradication programs summarised have shown that it is possible to eradicate Mh with tylvalosin (Aivlosin®), even with young animals on-site.

P189 ANTIMICROBIAL ACTIVITY OF STALOSAN® F AGAINST BRACHYSPIRA HYODYSENTERIAE USING IN VITRO TEST APPLICATIONS

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Brachyspira hyodysenteriae is the etiological agent of swine dysentery, a major threat in the pig industry with severe economic impact. In the prevention, management procedures and hygienic measures are of great importance. Stalosan®F is a chemical disinfectant indicated for use in animal housing to reduce the number of microorganisms, to absorb moisture and reduce ammonia production. Several scientific trials describe the effectiveness of Stalosan®F on e.g. Lawsonia intracellularis and Ascaris suum. However, no data are available on the effect of Stalosan®F on B. hyodysenteriae.
In this study the effect of Stalosan®F on the survival of B. hyodysenteriae was examined using in vitro test assays. B. hyodysenteriae is an anaerobic bacterium swarming on the agar plate with strong hemolysis on blood agar. These typical aspects on bacteriological culture were used to examine the effect of Stalosan®F on the growth of B. hyodysenteriae.
In a first experiment Stalosan®F was evenly applied on selective culture media previously inoculated with B. hyodysenteriae, after which the growth of B. hyodysenteriae was examined. In a second experiment, Stalosan®F was added to bacterial solutions containing approximately 107 cfu/ml B. hyodysenteriae. The bacterial suspensions were incubated for 6h at room temperature after which they were inoculated on selective culture media. In both experiments, application rates of Stalosan®F corresponding to 50g/m2 were used.
When exposed to Stalosan®F, an inhibition of the growth of B. hyodysenteriae was seen in both experiments. These in vitro results indicate that Stalosan®F should be considered as a useful disinfectant in the framework of hygiene and sanitation practices to help control swine dysentery.

P190 BATCH VARIATION AND EFFECT OF PRODUCTION SYSTEM ON LAWSONIA INTRACELLULARIS SEROPREVALENCE IN FINISHING PIGS

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Introduction. Lawsonia intracellularis (L.i.) infection patterns have been reported to depend on management and antibiotic usage. For respiratory infections, different batches of pigs within the same all-in all-out (AIAO) production system may vary in their infection patterns. A similar batch variation within AIAO production systems has not been described for L.i. The objective of this study was to investigate the batch variation and the effect of AIAO management (by room or by site) on L.i. seroprevalence in finishing pigs.
Material And Methods. Two production systems were included in the study (herds A and B). Each system consisted of a sow unit (2000 and 2100 sows, respectively), a weaner unit and several finishing sites. From each of the two production systems, a finishing site managed AIAO by room (four to six batches on site at a time) and a finishing site managed AIAO by site (one batch on site at a time) were included in the study. At entry to the finishing unit (age 12 weeks) and at slaughter, 20 pigs from each batch were bled. Blood samples were analysed serologically for L.i. Statistical analysis was performed using Chi2 and Fisher's exact test.
Results. Fifteen batches from herd A and six batches from herd B were included. In herd A, the within-batch prevalence of L.i. positive pigs was 0-10% and 30-100% at entry and at slaughter, respectively. In herd B, the corresponding proportions were 50-90% and 10-65%. The proportion of L.i. positive pigs at entry and at slaughter differed between herds A and B ($p<0.01$). No differences between AIAO by room and AIAO by site were demonstrated. For blood samples taken at entry, the difference among batches in the proportion of L.i. positive pigs was statistically significant in herd B ($p<0.01$). Correspondingly, differences between the individual batches at slaughter were observed in both herds A and B ($p<0.01$).
Discussion. Previously reported delayed infection patterns in multi-site systems were confirmed only in herd A. Apparently, the type of AIAO management (by room or by site) did not affect the seroconversion patterns. However, differences were observed between pigs from the two sow and nursery systems. This indicates that factors related to sows and/or nursery pigs influence L.i. infection patterns. Batch variation was observed within finishing herds, indicating different infection patterns for successive batches within the same production system. This has implications both for the performance of cross-sectional herd profiles and the timing of antibiotic treatments or vaccination.

P191 ADMINISTRATION OF A NOVEL PLANT EXTRACT PRODUCT VIA DRINKING WATER TO POST-WEANING PIGLETS: IMPROVEMENT IN PERFORMANCE AND GUT HEALTH DESPITE E. COLI CHALLENGE

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Increased susceptibility to enterotoxigenic Escherichia coli infections and acute diarrhea are common problems in newly weaned piglets in large commercial farms. With reduced emphasis on antibiotics to promote herd health, options to address bacterial infection include plant-based feed additives and restriction in access to feed in order to reduce proliferation of bacteria and incidence of scour. A novel plant extract (PE) derived from leaves of green tea and fruit of pomegranate and the like, (Grazix solution, LiveLeaf Inc., USA) has been noted to reduce scour in small farms but its effect on animal performance and gut health has not been documented. The objective of this study was to assess performance and gut health after a challenge with a common pathogen in piglets provided with the PE or not. One hundred and forty-four piglets were weaned at 24 days and allocated to 8 groups according to a 2 X 2 X 2 factorial combination of (a) treatment [water without product (CT) vs. 8 µl/kg/d PE in drinking water (PE)], (b) feeding regimen [ad libitum (AD) vs. restricted (RE)], and (c) oral E. coli challenge [sham (-) vs. viable bacteria (+)], using 6 pens per group with 3 piglets per pen. Performance and characteristic of feces was measured every 7 days for a total of 5 weeks (35 days). On day 35, twelve piglets on restricted diets in both arms were slaughtered and their distal ileum examined. After 35 days, piglets given the PE had higher average daily gain ($p = 0.03$) and higher gain to feed ratios ($p = 0.10$) than piglets not given the PE. Irrespective of feeding regime, piglets provided with PE had lower fecal scores (meaning little to no scour) after administration of E. coli than did those in the CT groups. On a histologic level, the total area ($p = 0.02$), medulla area ($p = 0.06$) and cortex area ($p = 0.01$) of follicles in PE piglets were smaller than those in the CT group. The E. coli challenge increased macrophage numbers in the ileum mucosa in CT pigs ($p = 0.005$), while PE supplementation reduced the number of macrophages in challenged piglets ($p = 0.003$). These results suggest that PE supplementation may improve gut health status of post-weaning piglets and counteract some negative effects when piglets are challenged with E. coli.

P192 ASSOCIATION OF HAEMOPHILUS PARASUIS-, MYCOPLASMA HYORHINIS- AND PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS-INFECTIONS IN PIGS WITH POLYSEROSITIS

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The objective of this study was to determine the association of Haemophilus (H.) parasuis-, Mycoplasma (M.) hyorhinis- and Porcine Reproductive and Respiratory Syndrome Virus (PRRSV)-infections in pigs with polyserositis. A total of 95 growing pigs from 48 farms were included in the study. At first, typical pathological alterations suggested in the clinical examination were confirmed by necropsy. During necropsy a collective swab of all serous surfaces was taken. A polymerase chain reaction (PCR) was performed on swabs from serous surfaces to detect H. parasuis and M. hyorhinis specific genome fragments. The presence or absence of PRRSV (EU-field strain) was determined by PCR of lung tissue samples. A significant association between the detection of H. parasuis and M. hyorhinis was identified. H. parasuis and M. hyorhinis were significantly more often detected in pigs that were also tested positive for PRRSV (EU-field strain). Our results indicate that pigs which are already infected with PRRSV (EU-field strain) have a significantly higher risk to be also tested positive for H. parasuis and M. hyorhinis or vice-versa. Furthermore, our results indicate that pigs with polyserositis often experience co-infections with H. parasuis and M. hyorhinis.

P193 RISK FACTORS ANALYSIS FOR INCREASED EP-LIKE LESIONS AND PLEURISY LESIONS PREVALENCE IN ENGLAND

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Respiratory conditions form one of the most important disease complexes affecting pigs. The two predominant conditions identified in pigs during routine abattoir inspections in the UK are enzootic pneumonia like (EP-like) lesions and pleurisy. Both are associated with significant losses for the pig industry. From 2009 to 2012 there was an increase in the prevalence of both these lesions in England as measured by the BPEX Pig Health Scheme (BPHS). This study investigated potential risk factors associated with this increase. Three existing datasets from other projects were used. Those datasets were linked to the BPHS data from 2009 to 2012. The outcome measures were EP-like lesions and pleurisy lesions which were analysed independently. The analyses accounted for clustering effects (e.g. greater likelihood of similar management and disease among pigs from the same slap mark) for slap mark, abattoir and assessor. The results showed that the majority of the variation was due to slap mark or slap mark year interaction (more than 70% of the variation in EP-like and pleurisy lesions). A seasonal effect was also evident, with a predominant increase in prevalence over the winter months. The year effect was evident in the base model, showing an increase over the four year period in the prevalence of EP-like and pleurisy lesions. The identified risk factors for EP-like lesions were: vaccination against EP (farms which vaccinated against EP in 2009 showed a decrease in the rate of change of the prevalence per year) and number of sources supplying pigs to the unit (the increase in the number of sources showed an increase in the rate of change of prevalence per year). For pleurisy lesions the risk factors associated with a decrease in the rate of change of prevalence per year were: the number of changes in feed between four and 10 weeks of age, by-product and purchased compound compared to home-mix feed for growers, and good biosecurity practice of farm staff with regard to strict adherence to a visitor policy in relation to contact with pigs. Factors associated with an increase in the rate of change of pleurisy lesion per year were found to be mixed buildings (compared to same building) and free access of all pigs to the kennel (compared to no access). Some of these risk factors were in accordance with what was found previously in the literature. No consistent risk factors were identified across datasets apart from the seasonal effect, although some datasets had information about similar management factors.

P194 CLINICAL EFFICACY AND PERFORMANCE IMPROVEMENT OF ECONOR® (VALNEMULIN) VS LINCOMYCIN FOR THE CONTROL OF BRACHYSPIRA HYODYSENTERIAE INFECTION IN A PIG FATTENING UNIT IN ITALY

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Swine dysentery (SD) infections are of growing concern in Italian pig sector where it is estimated that 40% of fattening units are affected. Large farm units and the long fattening cycle typical of Italian production up to 160 kg bw are two of the main reasons of SD spreading. A trend of increasing MIC values of antimicrobials against Brachyspira hyodysenteriae (B.hyo) is observed. Lincomycin is currently intensively used, while Econor® (valnemulin - Novartis AH) is considered to be the "last resort choice" in case of heavy outbreaks of SD.

A pig fattening unit with a recent history of a heavy outbreak of SD was chosen to run a comparative trial with valnemulin and with lincomycin. Two groups of 480 fattening pigs each were treated via medicated feed with valnemulin (4 mg/kg bw, group A) or with lincomycin (10 mg/kg bw, group B) for 15 days starting at 90 days of age when entering the fattening unit. Thirty pigs in each group were ear-marked and underwent periodic weighing and blood and faeces sampling from the beginning of the trial up to slaughter for isolation of B. hyo and Lawsonia intracellularis from faeces and L. intracellularis titers in the serum. Clinical observation and possible necropsy were carried out weekly.

ADG and FCR were 0,670 and 0,640 and 3,55 and 3,70 respectively in group A (valnemulin) and group B (lincomycin). Mortality rate was 1,47% (7 pigs) in group A and 3,31 % (16 pigs) in group B. At the end of the trial no outbreaks of SD were determined and all faecal samples collected were negative. B. hyo strains were isolated from colon contents in 3 out of 16 animals necropsied (group B) and in 0 out of 7 animals in group A. At the slaughterhouse B hyo strains were isolated in 2 out of 30 colon contents in each treatment groups. These positive samples confirmed active circulation of B. hyo within the pigs. Lawsonia intracellularis was not isolated from faeces but a serological titre increase was demonstrated within the population.

The valnemulin treated group demonstrated a significantly lower mortality and a significantly better performance with a higher ADG, a lower FCR and a better ROI.

P195 EFFECTS OF TYLVALOSIN (AIVLOSIN®) IN DRINKING WATER ON LUNG LESIONS, PRODUCTIVE PARAMETERS AND CARCASE QUALITY ON A FARM AFFECTED BY ENZOOTIC PNEUMONIA

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Introduction. Tylvalosin, the active ingredient of Aivlosin® (ECO Animal Health), is a macrolide antibiotic that has shown its effectiveness in the control of enzootic pneumonia (EP), porcine proliferative enteropathy and swine dysentery in pigs. The aim of this study was to study the effect of a treatment with Aivlosin® on lung lesions, productivity and carcase quality on a farm with a chronic problem of EP. The efficacy of tylvalosin was assessed at a dose rate comparable to the premix, but administered in drinking water.

Materials and methods. A total of 1500 animals born in the same week on a 4000-sow farm located in the Southeast of Spain with a historic problem of EP were randomly allocated to two groups: 900 pigs (treated group, TG) and 600 pigs (control group, CG). Animals were observed from birth to slaughter. TG was medicated with 2.5 mg tylvalosin/kg BW for 7 days in drinking water at weaning (4 weeks of age) and entry finisher barn (9 weeks of age). The CG was not medicated. Both groups were managed under similar conditions throughout. Production parameters were calculated, and lung scoring and carcase weights were recorded at slaughter. For statistics the SPSS v. 15.0 programme was used.

Results and Discussion. The number of animals with lung lesions and severity of lesions was significantly ($p<0.001$) reduced in TG compared with CG. In the TG the Average Daily Growth (ADG) was increased (+28 g), average days in fattening was decreased (-10.9 days), feed conversion ratio (FCR) improved (- 0.074) and cost of medicines per pig reduced (-1.29 €), but the differences were below standard deviation when compared to CG. Respectively for TG and CG the average carcass weight was 86.81±0.24 and 87.65±0.27 kg ($p=0.023$), but the homogeneity in carcase weights was better for the TG.

There was a statistically significant association between the extent of lung lesions and ADG, also between mean lung score and carcase quality.

The decrease of lung lesions and increase of ADG in the TG resulted in improved homogeneity and carcase quality. This could result in a higher price per kg deadweight and increased profit for the slaughterhouse.

Aivlosin® is a registered trademark of Eco Animal Health Ltd, London, UK

P196 ANTIMICROBIAL SUSCEPTIBILITY OF ACTINOBACILLUS PLEUROPNEUMONIAE IN ACUTE RESPIRATORY OUTBREAKS IN FINLAND

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The aim of this study was to investigate how often Actinobacillus pleuropneumoniae (APP) is involved in acute respiratory outbreaks in Finland and what is the antimicrobial susceptibility of this pathogen.

A study was carried out in Finland from May 2011 to March 2013 in 19 herds with acute respiratory symptoms in fattening pigs. The mean number of fattening pigs per herd was 869 (sd 519). Based on occurrence of respiratory symptoms local veterinarians announced farms to this study.

Samples were taken from pigs with acute respiratory symptoms after euthanizing 4-6 pigs per farm. The respiratory apparatus was cut away from the carcass and sent into the laboratory, where it was examined macroscopically and microscopically. After a positive bacterial culture for APP an antimicrobial susceptibility testing was performed against penicillin (PEN),erythromycin (ERY), tetracycline (TET), enrofloxacin (ENR), florfenicol (FF), trimethoprim-sulphonamide (TMPS) and ampicillin (AMP) using the broth microdilution method (VetMIC, SVA). Against tiamulin (TIA) antimicrobial testing was performed by the disk diffusion method.

APP culture was positive in at least one of the lungs in 15 farms (79%). Altogether 40 APP strains were isolated and 12 of them from concurrent, mixed infections with APP and other bacteria. All 40 APP strains were susceptible to ENR, FF and TIA. In two farms we found strains resistant to PEN, TMPS and AMP. In these two farms and in addition in four other farms we found strains which got intermediate result from TET test.

Finland has had national recommendations for antibiotic use already since 1996. Currently the first-choice antimicrobial in APP-infections is g-penicillin and the second choice is tiamulin or tetracycline. In acute outbreaks the most commonly used antimicrobials in Finland have been tetracycline and tiamulin because they are available as premix products. Penicillin has been used in treatment of single animals because it is available only in injectable form. We conclude that in acute respiratory outbreaks sample taking and antimicrobial susceptibility testing are extremely important, because resistance to some recommended antimicrobials does exist.

P197 FIRST REPORT OF CLOSTRIDIUM DIFFICILE IN AUSTRIAN PIGLETS WITH DIARRHEA

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The objective of this study was to analyze different regions of the digestive tract and faeces of diarrheic juvenile pigs. The focuses here is on bacterial results.
Suckling and weaner pigs from 19 holdings in Styria with severe problems of diarrhea were selected by veterinarians for analysis. One to three live piglets per holding (in total 55) and up to 6 faecal samples (in total 85) of other pigs were brought to the institute. Animals were euthanized and immediately processed for sampling. Samples of stomach, duodenum, jejunum, ileum, colon and rectum were obtained and prepared for bacteriological and histological analysis.
Bacteriological examination of ileum, colon and faecal swabs included aerobic culture on COS agar (Biomerieux) and McConkey agar for detection of Escherichia coli, anaerobic culture on COS agar with Neomycin for detection of Clostridium perfringens, phase contrast microscopy for detection of Brachyspira spp., and direct anaerobic culture as well as culture after enrichment, with and without alcohol shock, on CLO Agar (Biomerieux) to find C. difficile. C. perfringens and C. difficile were further typed with PCR toxin typing and ribotyping. C. difficile was present in 5 holdings, 10 (18%) pigs and 10 (12%) swabs. Results of molecular subtyping are: PCR – Ribotype (RT) AI – 12 (4 pig isolates, 2 swab isolates), RT 005 (1 pig, 1 swab), RT 078 (2 pig, 2 swab), RT 598 (4 pig, 4 swab), RT 241 (1 swab). C. perfringens Toxin Type A was present in 18 holdings, 39 (71%) pigs and 61 (72%) swabs; hemolytic E. coli we detected in 12 holdings, 27 (49%) pigs and 29 (34%) swabs, Brachyspira sp. was found in 7 holdings and 18 (33%) pigs. 5 Pigs (9%) of 3 holdings were infected with parasites of Eimeriidae, and 1 (2%) pig with Trichuris suis. Seven holdings showed bacterial infections with two or more type of bacteria, three holdings were additionally infected with parasites and most holdings had coinfections with viruses (Corona-, Rota-, Calici- and Circovirus).
Histological analyses helped to clarify the etiological relevance of the detected microbial agents. Tissue lesions typical for bacterial infections were apical necrosis of the intestinal villi, ulcerations, crypt abscesses, neutrophil granulocytes and detritus in the activated lymphoglandular complexes. Bacterial lesions were more often found in neonatal pigs.

P198 BACTERIOLOGICAL INVESTIGATIONS OF SKIN ULCERS IN A SWEDISH PIG HERD

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Introduction. The investigated herd is a satellite with 44 sows farrowing every 7th or 8th week, arriving from a sow pool. The herd owner reported problems with skin lesions among the weaners, in pigs of age 8-12 weeks. The skin lesions appeared as circumscribed lesions of various sizes, covered by crusts and were generally spread on the body, in some cases also involving the ventral margin of the ears.
Materials and methods. From the margin of five ear lesions and five body lesions, biopsies were taken for histopathological evaluation. Warthin- Starry silver staining was used to detect spirochaetes and Fluorescence In Situ Hybridization (FISH) for specific investigation of Treponema spp. and Treponema pedis. From the ear lesions, scraping samples for analysis with a Treponema spp. specific ISR2-based PCR were collected. From the body lesions, cotton swabs for aerobic culturing of staphylococci and β–hemolytic streptococci were taken. Antimicrobial susceptibility tests were performed for two S. aureus isolates and three isolates of β-hemolytic streptococci for penicillin, ampicillin, ceftiofur, spiramycin, neomycin, gentamicin, streptomycin, trimethoprim/sulphamethoxazole, enrofloxacin, tetracycline, florfenicol and oxacillin.
Results. The histopathological evaluation revealed a traumatized, secondary bacteriologically infected acute to chronic ulcerative dermatitis. The results showed that three of five ear lesions and two of five body lesions were positive for Treponema spp. Presence of Treponema spp. and T. pedis located deep in these ulcers was confirmed by FISH. Aerobic culturing performed on the samples from the body lesions resulted in growth of S. aureus and β-hemolytic streptococci from all five samples. No S. hyicus was found. The antimicrobial susceptibility tests showed that all isolates were susceptible to beta-lactam antibiotics.
Discussion. These few cases show that both classic skin pathogens as S. aureus and streptococci as well as Treponema spp. occur simultaneously in skin ulcers of pigs. Although treponemes were shown to be located deeply in the skin it is not known whether their role is to lead the way for other skin pathogens or if these bacteria are secondary invaders. All isolates were susceptible to beta-lactam antibiotics, which are also active against Treponema spp.

P199 24 WEEK DURATION OF IMMUNITY OF COGLAPIX® IN SWINE ORIGINATED FROM A FARM NATURALLY CONTAMINATED WITH ACTINOBACILLUS PLEUROPNEUMONIAE

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Introduction. Porcine pleuropneumonia, caused by Actinobacillus pleuropneumoniae (A.p.) is an important cause of death, reduced production and increased costs of medication. Vaccination is an effective prevention method. The objective of these laboratory challenge studies was to investigate the protection conferred by COGLAPIX®[1] 24 weeks post-vaccination in pigs originated from naturally contaminated farm by assessing the pulmonary lesions caused by experimental A.p. serotype 1, 2 and 7 challenges.

Materials and methods. The piglets were born and raised in a farm where A.p. was prevalent. Weaned piglets were vaccinated with COGLAPIX (2 ml IM, N=55) in field conditions at 7 and 10 weeks of age or kept as non-vaccinated controls (N=55) until their transport and enrollment into the laboratory challenge efficacy tests, about 1 week before challenge. Twenty four week duration of immunity post-vaccination was tested by challenge at 34 weeks of age. Vaccinated groups (N = 17, 21 and 17 respectively) and control groups (N = 17, 21 and 17 respectively) received 2x10 ml intranasal culture suspension of A.p serotype 1, 2 or 7 respectively (titres of 8.9-9.1 log10 CFU/ml). One week post-challenge, euthanasia, necropsy and lung examination were carried out and lung lesion scoring was performed.

Results. The lung lesion incidence observed in all 3 vaccinated groups (35.3%, 38.1% and 17.6% respectively) was significantly lower than in their respective challenged non-vaccinated controls (100%, 95.2% and 94.1% respectively) whatever the serotype (A.p st. 1, 2 and 7) used for the challenge (p-value<0.05 for all 3 studies).

Lung lesions scores were significantly lower in all vaccinated groups (cumulated lung lesion mean of 0.6 ± 1.1, 0.7±1.0 and 0.3±0.7 respectively) versus challenged non-vaccinated controls (5.9 ± 3.1, 7.1±4.0 and 6.7±4.1 respectively) whatever the serotype used (A.p st. 1, 2 and 7) for the challenge (Kruskal-Wallis-tests, p<0.001 for all 3 studies).

Conclusion. The vaccination with COGLAPIX® applied even in a naturally A.p. contaminated swine farm significantly decreased the risk of having lung lesions and significantly protected the pigs against those lesions caused by experimental and heavy A.p. serotype 1, 2 and 7 challenges. A very strong and long duration of immunity of 24 weeks post vaccination has also been demonstrated for COGLAPIX®.

[1] COGLAPIX® is a registered trademark of Ceva

P200 16 WEEK DURATION OF IMMUNITY OF COGLAPIX® IN SWINE ORIGINATED FROM A FARM NATURALLY CONTAMINATED WITH ACTINOBACILLUS PLEUROPNEUMONIAE

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Introduction. Porcine pleuropneumonia, caused by Actinobacillus pleuropneumoniae (A.p.) is an important cause of death, reduced production and increased costs of medication. Vaccination is an effective prevention method. The objective of these laboratory challenge studies was to investigate the protection conferred by COGLAPIX®[1] 16 weeks post-vaccination in pigs originated from a naturally contaminated farm by assessing the pulmonary lesions caused by experimental A.p. serotype 1, 2 and 7 challenges.

Materials and methods. The piglets were born and raised in a farm where A.p. was prevalent. Weaned piglets were vaccinated with COGLAPIX (2 ml IM, N=55) in field conditions at 7 and 10 weeks of age or kept as non-vaccinated controls (N=55) until their transport and enrollment into the laboratory challenge efficacy tests, about 1 week before challenge. Sixteen week duration of immunity post-vaccination was tested by challenge at 26 weeks of age. Vaccinated groups (N=17, 17 and 21 respectively) and control groups (N=17, 17 and 21 respectively) received 2x10 ml intranasal culture suspension of A.p serotype 1, 2 or 7 respectively (titres of 8.8-9.2 log10 CFU/ml). One week post-challenge, euthanasia, necropsy and lung examination were carried out and lung lesion scoring was performed.

Results. The lung lesion incidence observed in all 3 vaccinated groups (50%, 45% and 50% respectively) was significantly lower than in their respective challenged non-vaccinated controls (100%, 95% and 100% respectively) whatever the serotype (A.p st. 1, 2 and 7) used for the challenge (p-value<0.05 for all 3 studies).

Lung lesions scores were significantly lower in all vaccinated groups (cumulated lung lesion mean of 2.9 ± 5.4, 1.2 ± 2.0 and 0.9 ± 1.1 respectively) versus challenged non-vaccinated controls (11.1 ± 7.4, 8.3 ± 7.6 and 8.6 ± 6.8 respectively) whatever the serotype used (A.p st. 1, 2 and 7 respectively) for the challenge (Kruskal-Wallis-tests, p<0.001 for all 3 studies).

Conclusion. The vaccination with COGLAPIX® applied even in a naturally A.p. contaminated swine farm significantly decreased the risk of having lung lesions and significantly protected the pigs against those lesions caused by experimental and heavy A.p. serotype 1, 2 and 7 challenges. A good and significant duration of immunity of 16 weeks post vaccination has also been demonstrated for COGLAPIX®.

[1] COGLAPIX® is a registered trademark of Ceva

P201 3 WEEK ONSET OF IMMUNITY OF COGLAPIX® IN SWINE ORIGINATED FROM A FARM NATURALLY CONTAMINATED WITH ACTINOBACILLUS PLEUROPNEUMONIAE

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Introduction. Porcine pleuropneumonia, caused by Actinobacillus pleuropneumoniae (A.p.) can cause pneumonia which results in death, reduced production and increased costs of medication. Vaccination is an effective prevention method. The objective of these laboratory challenge studies was to investigate the onset of immunity and the protection conferred by COGLAPIX®[1] 3 weeks post-vaccination in pigs originated from a naturally contaminated farm by assessing the pulmonary lesions caused by experimental A.p. serotype 1, 2 and 7 challenges.
Materials and methods. The piglets were born and raised in a farm where A.p. was prevalent. Weaned piglets were vaccinated with COGLAPIX (2 ml IM, N=55) in field conditions at 7 and 10 weeks of age or kept as non-vaccinated controls (N=55) until their transport and enrolment into the laboratory challenge efficacy tests, almost 1 week before challenge. Three weeks onset of immunity was tested by challenge at 13 weeks of age. Vaccinated groups (N=17, 17 and 21 respectively) and control groups (N=17, 17 and 21 respectively) received 2x10 ml intranasal culture suspension of A.p serotype 1, 2 or 7 respectively (titres of 7.3-7.8 log10 CFU/ml). One week post-challenge, euthanasia, necropsy and lung examination were carried out and lung lesion scoring was performed.
Results. The lung lesion incidence observed in all 3 vaccinated groups (11.8%, 19% and 11.8% respectively) was significantly lower than in their respective challenged non-vaccinated controls (94.1%, 95.2% and 94.1% respectively) whatever the serotype (A.p st. 1, 2 and 7) used for the challenge (p-value<0.05 for all 3 studies).
Lung lesions scores were significantly lower in all vaccinated groups (cumulated lung lesion mean of 0.5±1.3, 0.4±1.0 and 0.4 ± 1.0 respectively) versus challenged non-vaccinated controls (4.9±3.0, 6.6±4.9 and 7.2±5.7 respectively) whatever the serotype used (A.p st. 1, 2 and 7 respectively) for the challenge (Kruskal-Wallis-tests, p<0.001 for all 3 studies).
Conclusion. The vaccination with COGLAPIX® applied even in a naturally A.p. contaminated swine farm significantly decreased the risk of having lung lesions and significantly protected the pigs against those lesions caused by experimental and heavy A.p. serotype 1, 2 and 7 challenges. A three week onset of immunity has been demonstrated for COGLAPIX®.
[1] COGLAPIX® is a registered trademark of Ceva

P202 DEVELOPMENT OF BRACHYSPIRA HYODYSENTERIAE INFECTION MODEL IN PIGS

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Brachyspira hyodysenteriae is a gram negative bacterium, agent of Swine Dysentery. The disease is characterized by mucohaemorrhagic colitis and rapid loss of weight. Surveillance programs are envisaged for identification of infected herds, hence controlling the spreading of infection.
Different experimental infection models have been already studied to understand B. hyodysenteriae infection and pathogenesis. Unfortunately, many studies failed. Stress facilitates experimentally infection and, recently, interest of many researchers was focused on feed. The effects of different microbial fermentations induced by various substrates, such as rice and soy, are evaluated in their capability to facilitate B. hyodysenteriae colonization.
Aim of this study was to investigate the pathogenicity of B. hyodysenteriae Spanish strain in experimentally infected pigs fed with soy for 7 days before infection.
Four groups of weaned piglets were enrolled in this study. Group A and D were inoculated by gavage with 50 ml of B. hyodysenteriae broth, contained 108 CFU/ml, for three consecutive days. Group B and D were fed with soy and group C was the control group.
Animals were monitored every day, analyzing clinical signs and fecal consistency and were weighted at autopsy. Feces were plated onto selective Brachyspira agar plates (Reparto produzione Terreni, Izsler-Brescia) and incubated for 5 days at 37° C in anaerobic conditions (GENbag anaer, Biomérieux). Hemolytic zones associated with Brachyspira growth were analyzed by end-point multiplex PCR. Animals were euthanized at three different time-points to understand the disease progression.
Differences of growth among groups were observed at 19 and 29 days post inoculation. Animals, inoculated with B. hyodysenteriae, grew less than untreated groups. At the same time points, differences of fecal consistency were recorded, all animals of group A and D had diarrhea and B. hyodysenteriae was isolated in this samples. During necropsy, no lesions were observed in piglets of group B and C. Piglets of group D, fed with soy, manifested serious lesions at colon and caecum starting from two weeks after infection, while piglets of group A, infected but not fed with soy, at three weeks after infection.
In conclusion, these data show that soy diet favored the progression of the infection and worsened gut lesions.

P203 BRACHYSPIRA SPECIFIC PCRS: DO THEY CROSS-REACT WITH B. HAMPSONII ISOLATES OF AVIAN ORIGIN?

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Brachyspira specific PCRs: do they cross-react with B. hampsonii isolates of avian origin?
Brachyspira hampsonii was identified for the first time in swine clinical samples submitted to the Minnesota Veterinary Diagnostic Laboratory. B. hampsonii shows strong β-hemolysis in culture and causes severe mucohemorragic diarrhea that is undistinguishable from swine dysentery. In addition, B. hampsonii has been described in waterfowl both in North America and Europe. In this regard, some European B. hampsonii isolates cross-react with tlyA gene PCR assay designed for the routine diagnosis of swine dysentery. The aim of this study was to analyze several PCRs commonly used for Brachyspira spp. detection and identification against different avian isolates of B. hampsonii.
Ten B. hampsonii isolates recovered from waterfowl fecal samples in Spain and identified according to their nox gene sequence were used. A total of 8 different PCRs were evaluated: four specific for B. hyodysenteriae (two of partial nox gen, one of 23S rRNA and one of tlyA gen), one specific for B. innocens and B. murdochii (partial nox gen), two specific for B. intermedia (partial nox gen and 23S rRNA) and one specific for B. pilosicoli (16S rRNA).
The number of B. hampsonii isolates that give a false positive result in B. hyodysenteriae specific PCRs varies between 10% (23S rRNA), 20% (nox), 60% (tlyA) and 80% (nox2). Furthermore, PCRs used for identification of B. intermedia cross-react with 70% and 90% of B. hampsonii isolates depending on the gene used for amplification. On the contrary, specific B. pilosicoli PCR did not show false positives and only two isolates identified as B. hampsonii were positive in the PCR specific for B. innocens and B. murdochii. However, these two isolates clustered together with B. murdochii and B. innocens when sequencing of 16S rRNA gene was used instead the nox gene for identification.
In conclusion, this study demonstrated that avian B. hampsonii isolates can give false positive results when analyzed by routine PCR diagnostic systems specific for other Brachyspira species. Particularly relevant is the fact that B. hampsonii could be mis-diagnosed as B. hyodysenteriae. According to this, we can conclude that there is a need of a specific PCR for the diagnosis of B. hampsonii infections.

P204 ANTIBACTERIAL EFFECT OF A COMMERCIAL CITRUS EXTRACT (BIOLL®) ON CLOSTRIDIUM DIFFICILE

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Clostridium difficile is considered to be an emergent pathogen that cause porcine neonatal diarrhea. Furthermore, prevalence in individual herds can be 100% and usually ranged from 25% to 50% on animal basis depending on the swine production system considered. The treatment of clinically affected piglets is occasionally complicated by the fact that this agent is resistant to several antibiotics and this therapy may suppress normal flora of the gut and allow the proliferation of C. difficile. In this regard, special attention deserves the development of new alternatives to prevent intestinal C. difficile diseases. Although antimicrobial activity of a commercial citrus extract (BIOLL®) against B. hyodysenteriae, E. coli and Salmonella spp. has been previously recorded, there is no data on C. difficile. Consequently, the aim of this study was to investigate the susceptibility of four C. difficile strains to a commercial citrus extract. For this purpose, susceptibility testing was performed by both the broth dilution and the agar well diffusion methods. Furthermore, growth curves were performed in order to achieve the effect of the commercial citrus extract at concentration below to the MIC. The MIC values of C. difficile strains ranged from 5 ppm to 20 ppm, but no bactericidal effect was observed at concentration tested (1-320 ppm). On the contrary, zones of inhibition on agar plates formed by the C. difficile strains were only observed at a concentration of 160 ppm. This effect may be due to the difficulty of the citrus extract to diffuse on agar. Finally, C. difficile strains cultured with concentrations of citrus extract of 0.1x the MIC grew at a lower rate than those cultured in absence of compound. In conclusion, BIOLL® showed great bacteriostatic activity with MIC values below 20 ppm. Nevertheless, further research is necessary to determine the effect in toxin production, in spore formation and the efficacy in experimental and field conditions against C. difficile associated diarrhea.

P205 EVALUATION OF UKRAINIAN EXPERIENCE IN CONTROL OF PIG NEONATAL DIARRHEA

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Introduction. Neonatal diarrhea is common disorder that occurs in the first days after birth and throughout the lactation period. Well known viral pathogens have some role during some period in many countries. Also, there are very common causes associated with diarrhea in piglets that dependent on many aspects of production and feeding. But despite this, the most significant influence on appearances of neonatal diarrhea have been made in past and continue to remain by two bacterial pathogen - E.coli and Clostridium perfringens.

Materials and Methods. 5 farms with different types of production and size of Ukraine were selected for analysis. The results were obtained by comparing productive parameters and with PCR and histopathology approaches. The main idea was to determine the effectiveness of vaccine Suiseng (after 6 month vaccination by general scheme) in comparison with other well-known commercial vaccines that were used on these herds before.

Results and discussion. The results of this study were evaluated due to common production parameters. We determine that weight at birth didn't change at all before and after vaccination and was in range from 0,9 kg to 1,5. But, weight at weaning increased markedly on each of analyzed farms up to 0,7 kg in some cases (average increasing was 0,45 kg, range from 0,1 to 0,7 kg). The amount of pens with diarrhea decreased to 0-2 % after Suiseng, and before this number was 4-5 times higher. Visible results were received in piglets mortality control – on all farms this parameter decreased markedly in average on 3% from the previous level. Also, none post vaccination reactions were detected after Suiseng administration, but with other vaccines they were present in 2-3 % of animals on 2 of 5 farms. Sow mortality level significantly decrease from 3,5 to 1% in average on all farms, except 1 where it was not present even before.

The other important results were received in trials where detection of LT gene of E.coli and B-toxin gene of Cl. perfringens has been done. In 3 of 5 farms at least 1 of it was positive before Suiseng, but none of them after. At the same time, histopathological examination of intestines samples was evaluated. In some cases, villi were dramatically shortened, the epithelium of the mucosa was necrotized, and in the lamina propria mucosa and submucosa there were lymphocytes, macrophages and eosinophils. But in samples of intestines from piglets after Suiseng, the structure of tissue was preserved. So, we would like to postulate that Suiseng vaccination is appropriate tool to control neonatal diarrhea at Ukrainian farms conditions.

P206 SUSPECT OF PROGRESSIVE ATROPHIC RHINITIS IN A PORTUGUESE COMMERCIAL PIG FARM: THE IMPORTANCE OF A THOROUGH (DIFFERENTIAL) DIAGNOSIS

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Some fattening pigs in the herd displayed deformation of the snout compatible with a diagnosis of progressive atrophic rhinitis (PAR); however, characteristic clinical signs like sneezing, lachrymation or nasal discharge/bleeding were absent. Affected animals appeared weaker and smaller than their apparently unaffected penmates and mortality was higher than expected in this phase.

Section of 11 snouts of randomly selected slaughtered pigs showed varying degrees of nasal turbinate atrophy (mostly grade 2 snouts). Nasal swabs and blood samples were taken from a few randomly-selected grower-finishers and sows, but serology and bacterial culture results were both negative.

Before performing other diagnostic tests it is important to establish some differential diagnosis and exclude other diseases or irritants that can cause rhinitis, such as porcine reproductive and respiratory syndrome virus (PRRS), Ausjzeky's disease virus, porcine cytomegalovirus or poor management factors as excessive dust or ammonia.

Having an important effect in swine producing industry, respiratory diseases like PAR must be correctly approached in order to ensure their prompt resolution.

P207 COGLAPIX VACCINE EFFICIENCY AGAINST SEROTYPE 2 ACTINOBACILLUS PLEUROPNEUMONIAE CHALLENGE OF PIGS

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Introduction. Porcine pleuropneumonia is a highly contagious respiratory disease caused by Actinobacillus pleuropneumoniae (A.p). The disease occurs worldwide with an increasing incidence. Controlling the disease a challenge, for its rapid onset and persistence in infected herds, and because of the issue of antibiotic resistance. Vaccination, however, can provide efficient protection against the disease by decreasing the prevalence and extension of pneumonia and pleuritis. Coglapix contains inactivated serotype 1 and 2 A.p. strains, and RTX toxins (Apx1, Apx2, and Apx3) in order to provide protection against a broad range of A.p. serotypes.The aim of the present study was to demonstrate the efficacy of Coglapix vaccination against challenge of pigs with serotype 2 A.p.
Materials and methods. Six weeks old pigs were vaccinated with Coglapix twice, three weeks apart. Three weeks after the booster vaccination the vaccinated and control animals were challenged with an A.p serotype-2 strain via aerosol in a dedicated chamber by applying approximately 108 CCU/pig of the bacterium suspension. Clinical observations and body temperature measurement were done daily throughout the 7 days post-challenge (pch) observation period. Humoral immune-response to Coglapix® was measured by ELISA (APX II: in-house method of Ceva-Phylaxia, Budapest). All animals were euthanized and subjected to post mortem examination on D7 pch. Post-mortem lesions in the lungs (lung lesion score, LLS) and on the pleura were evaluated in accordance with Hannan et al., 1982.; and the efficacy of Coglapix vaccine was calculated according to Jones et al., 2005. Serological results, body weight gain, and lung lesion score data were analysed by ANOVA. Differences were considered significant at $p<0.05$.
Results. A significant raise of anti-Apx2 serum antibody titres was seen after booster vaccination. Following challenge with A.p serotype-2 strain, 20% of the un-vaccinated control pigs died, while no mortality was recorded in the vaccinated group, which had significantly higher mean body weight gain (3,2 ± 2,71 kg) than the un-vaccinated control group (-0,63 ± 3,01kg).
Further, the mean pathological score was significantly higher for the non-vaccinated control group (2,2 ± 1,8) than for the vaccinates (0,54 ± 0,51).
Calculated vaccine efficiency was 84%.
Conclusion. These results confirm that Coglapix is able to provid an efficient protection against serotype 2 A.p. challenge.

P208 EFFICACY OF HYOGEN VACCINATION AGAINST CHALLENGE INFECTION OF PIGS WITH MYCOPLASMA HYOPNEUMONIAE

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Introduction. Mycoplasma hyopneumoniae (M.h.) is an important pathogen of swine being a major contributor to the Porcine Respiratory Disease Complex (PRDC), which causes substantial losses to the swine industry. Pigs of mid-finishing to slaughter age are mainly affected by PRDC but circulation of the pathogen starts usually already in nursery after mixing of weaned pigs. The severity of clinical signs highly depends on the virulence and infectious dose of M.h. strain. One of the efficient ways to control the infection is vaccination using adjuvanted bacterin vaccines, which prevent clinical symptoms, lung damage and improve overall performance. Hyogen is an innovative bacterin vaccine against M.h., which contains the equilibrated combination of oil in water adjuvant ensuring quick onset and long duration of effective immune response. The aim of this study was to confirm the efficiency of Hyogen against a challenge infection of pigs with M.h.
Materials and methods. Three weeks old M.h. MDA-free pigs were vaccinated with one dose of Hyogen, another group of pigs were kept un-vaccinated to serve as controls. Six weeks later both groups were challenged with the L1 strain of M. hyopneumoniae (108 CCU/ml), intranasally, by applying 5 ml liquid culture/nostril/pig on two consecutive days (D42/ D43). The pigs were observed for 28 days, after that the pigs were slaughtered and necropsied. Lung lesions were scored (LLS) by using a scheme where a maximum score of 5 was given for each lobe (max=35/lung). The obtained scores were compared among vaccinated challenged, and non-vaccinated challenged groups of pigs. Humoral immune response to M.h. following Hyogen vaccination was tested by the Idexx M. hyopneumoniase HerdChek ELISA kit.
Results. Hyogen vaccination induced significant humoral immune response already by three weeks post vaccination (log10 0,30 – to 2,78 titer), which was further boosted by the challenge (reaching a titer of log10 3,58).
Further, Hyogen vaccination lead to substantial reduction of lung lesions induced by the challenge, the vaccinated group having 0,1 mean LLS score while the control group having 0,4 mean LLS score.
Conclusion. Hyogen vaccination provided significant protection against the lung lesions compared to the non-vaccinated challenged group, therefore, its usage can substantially aid the control of M.h. infection, and consequently, the damages of PRDC.

P209 COMPARISON OF INOCULATION CONDITIONS IN EXPERIMENTALLY-INDUCED COLIBACILLOSIS IN PIGLETS

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Colibacillosis is a severe disease in pigs with outbreaks occurring at weaning worldwide that cause fatal diarrhea. Two infectious models were developed, differing by the age of piglets at inoculation and the inoculum size. A first model using piglets just after weaning was previously developed and a new model with older animals has been implemented.
Post-weaning diarrhoea was induced in conventional piglets by administrating on two consecutive days an Escherichia coli K88 strain. Administration of the inoculum via a gastric feeding probe was preceded by drenching of tryptic soy broth containing 1.2% bicarbonate. Piglets were randomly allocated according to body weight and sex to four groups. The animals were inoculated within 1 week or 2 weeks after weaning using different sizes of inoculum (log9 or log10 CFU) at each age depending on groups.
The animals were clinically examined daily for 2 weeks. Clinical examination included rectal temperatures and scoring of general and digestive clinical signs. Body weight and feed intake were measured. Fecal samples were taken for total E. coli and haemolytic E. coli flora enumeration. The animals were euthanized 2 weeks after inoculation and gross examination of the gastro-intestinal track was conducted.
Inoculation produced characteristic clinical signs of colibacillosis within 1 day whatever the age at inoculation and the size of the inoculum. Abnormal faeces were frequently observed the days following the inoculation, mainly during the first week in all groups, and progressively decreased thereafter. Severity of clinical signs was higher in younger animals but did not differ significantly between groups. Mortality remained limited and occurred shortly after the inoculation. Time courses of mean faecal total and haemolytic counts were similar between groups and showed an increase of the counts just after the challenge and return to basal values the week after for the total counts. No obvious gross lesions were observed at necropsy 2 weeks after the challenge.
Both models succeeded in producing a stable clinical colibacillosis. The age at inoculation and the size of the inoculum did not significantly impact the outcome of this model. Inoculation of piglets 2 weeks after weaning allow a sufficient time period for possible preventive treatment before challenge in experimental efficacy studies.

P210 EFFECT OF METHOXASOL® ON PIGS CHALLENGED WITH ACTINOBACILLUS SEROTYPE 9

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Introduction. The combination of trimethoprim and sulfamethoxasol (Methoxasol®) applied via the drinking water has proven to control Actinobacillosis. A challenge module applying an aerosol containing 4 million bacteria/ml (serotype 9 strain) was used to show this.
Materials and Methods. 30 piglets of 9 weeks old were housed in 6 pens, divided over two compartments and later challenged at 10 weeks of age with Actinobacillus pleuropneumoniae serotype 9. Pigs in two pens were treated with Methoxasol® and the animals in one pen were the negative controls. Methoxasol® through the drinking water was supplied at a dosage of 25 mg TMPS per kg body weight per day for 96 hours. Treatment started immediately after inoculation. The control animals received no medication. Clinical signs, mortality and pathology were monitored. In addition feed intake and growth was measured. The pathological examination consisted mainly of the confirmation of pneumonia, pleuritis and/or pericarditis and abscesses. Each individual piglet was given a pneumonia- and pleuritis-score.
Results. Treatment with Methoxasol® resulted in a significant difference in the number of animals with clinical signs, severity of clinical signs and the pneumonia- and pleuritis-lesions in favour of the animals receiving treatment. Treatment also resulted in a significant difference of growth during the 4-day period between challenge and necropsy, in favour of the animals receiving treatment.
Table 1: Statistical analysis

	METHOXASOL® N = 20	Control group N = 10	p-value
Clinical scores (+/-)	9**	55*	0.0001
Clinical scores (> 1)	0**	27*	n.e
Pneumonia	0.95	3.0	0.0133
Pleuritis	0.0	1.2	0.011
Pericarditis	0.0	0.3	0.0043
Mortality	0/20	1/10	0.150
Growth (gram/day)	723	268	0.0009
Feed intake (kg/day)	1.09	0.78	0.0056

* Out of 135 scores.
** Out of 300 scores.
Discussion. Methoxasol® treated pigs showed a lower incidence of clinical signs. During necropsy and further histological examination of lung lesions, many lesions were diagnosed as enzootic pneumonia (related to a Mycoplasma hyopneumoniae infection). None of the lesions found in groups receiving treatment were related to an infection with Actinobacillus pleuropneumoniae.
Mortality differences were not statistically significant different due to low mortality in the control group. Analyses of pathological findings and clinical signs showed that almost all tested parameters were significantly in favour of groups receiving treatment.

P211 A STUDY ON PRE- AND POST-SUCKLING SERUM TOTAL PROTEIN AND INFLUENCES BY DIFFERENT DAY ONE PIG CARE INTERVENTIONS

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Several factors including low birth-weight, stress, sow behavior, thermal environmental challenges and access to adequate colostrum intake by piglets may influence pre-weaning mortality. The objective of this pilot study was to determine if we could correlate birth weight (BW), post-suckling serum total protein (STP), and treatment with Mistral® at farrowing with performance and survivability. Mistral® is a drying agent which helps piglets to retain their core body temperature. Piglets (n=118) of 10 sows ranging in parity (P) from 0-7 were randomly assigned to either a Control (CO) or Mistral® (MIS) dip treatment. Both a pre-suckle (T0) and 48 hour post-suckle (T48) blood sample (~1.5 mL) were taken by venipuncture from which serum was prepared. STP was determined using a Brix Refractometer. Piglets were subsequently weighed at day 7 (D7) and day 14 (D14). Data was analyzed using Microsoft Office 2010 Excel statistics functions and GraphPad Software. Results indicate that T48-STP values (μ= 6.3 +/- 0.9 g/dL) were significantly greater than T0-STP values (μ= 3.5 +/- 0.4 g/dL) ($p<.0001$) which we may attribute to absorption of colostral proteins prior to gut closure near 48 hours. No correlations were determined between T48-STP and P, birth order (BO), BW, D7, ADG or gender. T48-STP values and later BO of both CO and MIS piglets indicated a low negative correlation (r= -0.26 and -0.077) respectively. While no significant differences were observed between CO and MIS means, a low correlation was noted for MIS treated piglets and D14 weight (r=0.12) and ADG (r=0.11). The associations made in this preliminary study suggest that a Brix refractometer may be a useful tool for determining STP in piglets and despite a low correlation; results hint that MIS may be useful in influencing performance of piglet ADG at D14.

P212 IMPROVED PERFORMANCE AFTER VACCINATION WITH STELLAMUNE® ONCE COMPARED TO A TWO-DOSE MYCOPLASMA HYOPNEUMONIAE VACCINATION

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Mycoplasma hyopneumoniae (M.hyo) is the primary pathogen of enzootic pneumonia (EP), a chronic respiratory disease in pigs causing major economic losses to the pig industry worldwide. Early vaccination against M.hyo has the advantage that immunity can be induced before pigs become infected, and that there are less pathogens present that can interfere with the immune response. This study aims to compare the efficacy of a single-dose vaccination with Stellamune® Once at 7 days of age with a two-dose M.hyo vaccination regime at 7 and 23 days of age.

This study was conducted in a M.hyo-positive 400-sow farrow-to-finish herd. Piglets from 8 consecutive batches of production were randomly allocated into two treatment groups: Stellamune group (n=667 pigs), vaccinated with a single dose of Stellamune® Once (Elanco AH) at 7 days of age and group B (n=664 pigs), vaccinated with M+PAC® (MSD AH) at 7 and 23 days of age.

Pigs vaccinated with Stellamune® Once performed better than pigs of group B (574.4 g/d and 561.5 g/d, respectively), gaining 13.2 g/d more from weaning to slaughter. However, statistically significant differences could not be confirmed due to the limited number of batches. Similarly, pigs in the Stellamune group gained 33 g/d more during the finishing period (713.4 g/d Stellamune group, 680.4 g/d group B).

Vaccination with Stellamune® Once reduced the number of light pigs compared to the two-dose M.hyo vaccine, from 42% to 34% ($p<0.05$). Light pigs were defined as pigs not reaching slaughter weight within the first 5 weeks of the selling process. In addition, pigs vaccinated with Stellamune® Once reached slaughter weight 4.3 days earlier than pigs in group B, at 155.3 and 159.6 days respectively ($p=0.08$).

A total of 591 pigs were investigated at slaughter. There was no statistical difference between the average EP-like lung lesion scores in the experimental groups. Mortality in Stellamune group was 1.5% during the study, increasing up to 2.56% in group B ($p=0.179$).

Under the conditions of this study, vaccination with Stellamune® Once at 7 days of age was effective in controlling lung lesions due to M.hyo. In addition, when performance parameters were examined, early vaccination with Stellamune® Once produced more heavy pigs and saved an average of 4.3 days of finisher accommodation costs when compared to a two-dose M.hyo vaccination.

P213 SYSTEMIC AND LOCAL IMMUNE RESPONSE IN PIGS INTRADERMALLY AND INTRAMUSCULARLY INJECTED WITH INACTIVATED MYCOPLASMA HYOPNEUMONIAE VACCINES

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The systemic and respiratory local immune response induced by the intradermal administration of a commercial inactivated Mycoplasma hyopneumoniae whole-cell vaccine (Porcilis® MHYO ID ONCE - MSD AH) in comparison with two commercial vaccines administered via the intramuscular route and a negative control (adjuvant only) was investigated. Forty conventional M. hyopneumoniae-free pigs were randomly assigned to four groups (ten animals each): Group A= intradermal administration of the test vaccine by using the needle-less IDAL® vaccinator at a dose of 0.2 ml; Group B= intramuscular administration of a commercially available vaccine (vaccine B); Group C= intramuscular administration of the adjuvant only (2 ml of X-solve adjuvant); Group D= intramuscular administration of a commercially available vaccine (vaccine D). Pigs were vaccinated at 28 days of age. Blood and bronchoalveolar lavage (BAL) fluid samples were collected at vaccination (blood only), 4 and 8 weeks post-vaccination. Serum and BAL fluid were tested for the presence of antibodies by ELISA test. Peripheral Blood Monomorphonuclear Cells (PBMC) were isolated to quantify the number of IFN-γ secreting cells by ELISpot. Moreover, cytokine gene expression from the BAL fluid was performed. Total antibodies against M. hyopneumoniae and specific IgG were detected in serum of intradermally and intramuscularly (vaccine B only) vaccinated pigs at 4 and 8 weeks post-vaccination. M. hyopneumoniae specific IgA were detected in BAL fluid from vaccinated animals (group A and B) but not from controls and animals vaccinated with the bacterin D ($p<0.05$). Significantly higher gene expression of IL-10 was observed in the BAL fluid at week 8 post-vaccination in the intradermally vaccinated pigs ($p<0.05$). The results support that the intradermal administration of an adjuvanted bacterin induces both systemic and mucosal immune responses. Moreover, the intramuscularly administered commercial vaccines each had a different ability to stimulate the immune response both systemically and locally.

P214 DIFFERENT INDUCTION OF VIRUS-SPECIFIC IFN-GAMMA SECRETION AND T CELL ACTIVATION IN THE IMMUNE RESPONSE TO PCV2

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The objective of the present study is to investigate the cellular immune response during a PCV2 natural infection in vaccinated and unvaccinated conventional pigs. At weaning (3 weeks), vaccination was performed intramuscularly (IM) to the PCV2 group (10 pigs) by inoculating a single dose (2 ml) of a Cap protein-based PCV2 vaccine and the adjuvant only was administered to the control group (20 pigs). The immune response was evaluated by measuring peripheral lymphocyte subpopulations involved in the anti-viral response and by characterizing the interferon-γ (IFN-γ) secreting cell (SC) response.

The vaccination induced an early and intense IFN-γ SC response and the activation of peripheral lymphocytes within 6 weeks post-vaccination. The increase of IFN-γ SC frequencies was associated with a strong and transient increase of IFN-γ productivity per cell in vaccinated pigs. This increased productivity can be due to highly productive cells which are often considered to be involved in the most effective response. In vaccinated animals, the reactive virus-specific immune cells could be recalled after the exposure to a field virus; moreover, the response was characterized by a moderate percentage of PCV2-specific IFN-γ SC and an augmented productivity in some pigs together with the presence of reactive CD4+ and CD8+ memory T cells; these latter immune cells could play a critical role in the protective immunity. Conversely, unvaccinated-infected piglets showed an intense IFN-γ SC response mainly characterized by very high frequencies, but with a lower productivity per cell in some animals; this latter aspect paralleled with the in vitro recall of effector CD4–CD8+ cytotoxic cells.

Overall, the immune response sustaining the vaccine efficacy was mostly characterized by activation of memory T cells.

P215 GILTS AND SOWS PCV2 RE-VACCINATION AT MATING INCREASES THE HOMOGENEITY AND THE TITRES OF ANTIBODIES AT FARROWING AND THE PASSIVE TRANSFER TO THE PIGLETS, BUT DOES NOT AFFECT THE FREQUENCY OF IFN-γ SECRETING CELLS

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The study aims at evaluating the effect of repeated PCV2 vaccinations (one dose of a commercial PCV2a-based subunit vaccine containing the Cap protein expressed in a baculovirus system) in gilts/sows on the variability of the antibody titres and the frequency of IFN-γ secreting cells (SC). At the start/enrolment, 46 gilts were considered at first mating, bled and vaccinated. At first, second and third farrowing the dams were bled and re-vaccinated at the subsequent mating after weaning piglets. At 4 weeks of age the matching piglets were also bled in order to evaluate the level of passively acquired antibodies. Serology was performed by using a commercial ELISA antibody test and the frequencies of IFN-γ SC were also enumerated.

The evaluation of the variability of the antibody titres and the IFN-γ SC was assessed by measuring the coefficient of variation (CV). The standard formulation of the CV, the ratio of the standard deviation to the mean. The higher the CV, the greater the dispersion is in the variable. The results obtained in the dams showed that at the sampling before the first vaccination (mating of the gilts) the CV of the antibody titers was high (47.5) and their level very low (0.6±0.27). At first farrowing, the level of antibodies was significantly increased (1.5±0.33) and the CV was substantially reduced (21%). At the second and third farrowing either the level of antibodies and the CV was not significantly modified as compared to the previous sampling time. The frequency of IFN-γ SC significantly increased ($p<0.01$) and was more homogeneous compared to the first and the second sampling, but in the subsequent time points, a high inter-individual variability was observed. It is worth mentioning that no PCR positive samples to PCV2 were detected in sows at any sampling sustaining that the field virus infection had little or no effect on the observed variations. In piglets, the antibody titers were slightly increased from the first to the third farrowing. Conversely, the CV did not significantly vary in association to the increased parity of the re-vaccinated dams. In conclusion, the re-vaccination of sows at each mating increases the antibody titers and their homogeneity at the subsequent farrowing and slightly increases the level of antibody transferred via the colostrum to the newborn piglets.

P216 DELAYED TYPE HYPERSENSITIVITY RESPONSE TO PCV2 IN UNVACCINATED PIGLETS

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Introduction. Preliminary trials based on delayed type hypersensitivity (DTH) reaction following the administration of CIRCOVAC® (MERIAL) antigen solution has yielded promising results for the setting-up of a vaccination compliance test in pigs (Callén et al., AASV 2013, submitted). In order to assess the reliability of this potential test in practice, it is necessary to evaluate it in different farms and in animals from different immunological status.

Material and methods.

- First experiment: Fourteen 3-week-old pigs from a commercial PRRS-positive farm were vaccinated with 0.5 mL of reconstituted CIRCOVAC (V1, n=14) . Four weeks later, the pigs were intradermally inoculated with 0.1 mL of the antigen solution in the lower abdomen area. Simultaneously, 14 just weaned 3-week-old piglets of the same farm served as non-vaccinated controls for the DTH test, receiving the same amount of antigen injected in an anologous anatomical area (C1=14).
- Second experiment: Four weeks later, 14 additional piglets aged 7 weeks, vaccinated with CIRCOVAC and a M. hyo vaccine at 3 weeks of age were included and were submitted to the DTH test (V2, n=14). The same piglets from group C1 served as control (C2), and were submitted also to the DTH test at 7 weeks of age (C2, n=14). The skin response was evaluated 24 h after the antigen inoculation according to presence or absence of redness and/or induration and/or edema, and area of reaction compared .

Results and discussion. A visible reaction (red discolouration) was observed at the inoculation point in most of the pigs regardless of the vaccination status: 85.7% (V1) and 100% (V2) of the vaccinated animals, and 100% (C1) and 78.6 %(C2) of the control animals, respectively. However, the area of reaction varied greatly between vaccinated and control groups, and within controls between trials: 5.0±5.9 cm2 (V1), 2.2±2.0 cm2 (C1) and 5.48±4.26 cm2 (V2) 0.99±0.53 cm2 (C2). The response of the vaccinated animals was consistent with previous experience, thus being a clear indication of its usefulness as a compliance test. The reduction in the number of reactive animals and in the average area of skin reactions observed in unvaccinated pigs over time were linked to residual level of maternally derived cellular immunity that should have to take into account when performing the test in young animals.

Conclusion . Maternally derived cellular immunity can elicit a DTH reaction following the administration of a PCV2 antigen in unvaccinated animals. This has to be taken into consideration for the interpretation of the results of a vaccination compliance test.

P217 FIELD EFFICACY STUDY OF AN INTRADERMAL VACCINATION AGAINST MYCOPLASMA HYOPNEUMONIAE WITH THE NEEDLE-FREE IDAL DEVICE

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Mycoplasma Hyopneumoniae (M hyo) is the causative agent of enzootic pneumonia. M hyo leads to poor growth rates and reduced feed conversion ratios. Vaccination is an important strategy to control the clinical diseases associated with M hyo including PRDC. An intradermal vaccination targets dendritic cells (DC) in the dermis. The activation of DCs stimulates the adaptive immune response which is necessary for the protection against M hyo. The aim of the present study was to assess the efficacy of an intradermal needle-free vaccination with Porcilis® M Hyo ID ONCE under field conditions.

The study was carried out in a commercial 1000 sow farrow-to-finish farm in the north-eastern part of Germany in 2013. The piglets were allocated to two vaccine groups (VC1, needle-free and VC2, needle) receiving the vaccine and two control groups (CC1, needle-free and CC2, needle) receiving only adjuvant at three weeks of age (VC1 (n=138): Porcilis® M Hyo ID ONCE, IDAL; CC1 (n=70): Diluvac forte, IDAL; VC2 (n=144): M+PAC®, i.m. CC2 (n=68): Diluvac forte i.m.). For the efficacy parameters the pigs of groups CC1 and CC2 were united to one control group.

The efficacy of the vaccine was determined by comparing performance parameters such as bodyweight at the end of finishing and average daily weight gain (ADWG) between day 21 and the end of finishing (day 145). Furthermore lung lesions will be scored at slaughter in December 2013.

Body weights at the end of finishing were not significantly different between VC1 and VC2. The bodyweight (BW) of pigs from vaccinated groups was significantly higher ($p \leq 0{,}005$) than the BW of the control group. The ADWG for the pigs belonging to VC1 and VC2 was 731.9 g and 740.0 g respectively and 703.8 g for the pigs from the control group ($p = 0.004$ and $p < 0.001$ respectively). The remaining results of the lung lesion score will be presented at the meeting.

The study results indicate that the intradermal administration of Porcilis® M hyo ID ONCE is efficacious by improving the average daily weight gain and the bodyweight at the end of finishing. There were no differences in production parameters between the intradermal and intramuscular vaccination.

P218 COGLAPIX®, AN ACTINOBACILLUS PLEUROPNEUMONIAE INACTIVATED VACCINE INDUCES HIGH LEVELS OF ANTI-APX AND ANTI-SOMATIC ANTIBODIES

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Introduction. Coglapix is an inactivated vaccine that should be given by intramuscular injection, to piglets from 7 weeks of age onwards with a second injection 2 to 3 weeks later. It contains five strains of Actinobacillus pleuropneumoniae (A.p) of serotypes 1 and 2 in the form of formaldehyde-inactivated bacterins. Besides somatic antigens, such as capsular polysaccharides (CPS), lipopolysaccharides (LPS) and outer membrane proteins (OMP), the vaccine contains Apx toxoids as well. The aim of our study was to evaluate the immunogenicity of Coglapix vaccine against somatic antigens and against ApxI, ApxII and ApxIII toxins.

Material and methods. Coglapix contains a defined quantity of each A.p antigen formulated with an aluminium hydroxide-based adjuvant. The vaccine LPS content was quantified with Kinetic QCL method.

To evaluate the humoral immune answer, seronegative rabbits were vaccinated with a 2×2 ml IM dose 14 days (D) apart. Two weeks after 2nd vaccination (D28), rabbit serum samples were collected. The induced antibody titres were evaluated using three in-house Apx-specific competitive ELISAs based on specific monoclonal antibodies. Antibodies against somatic (mainly long chain LPS) antigens were also determined using modified commercial ELISA kits (Swinecheck APP 1,9,11 and APP 2 Biovet).

Results and conclusions. Coglapix induces high levels of specific antibodies against all tested somatic antigens and against ApxI, ApxII and ApxIII toxins, which are the major virulent and protective antigens. The LPS content is set at a certain controlled level that helps boosting the immune answer but still does not cause adverse reactions. Coglapix as such is clearly a very good tool to induce high level of immune responses against all major protective A. pleuropneumoniae antigens.

P219 OBSERVATIONAL SAFETY OF MASS VACCINATION OF TWO LARGE SOW HERDS WITH A SINGLE DOSE, BACULOVIRUS EXPRESSED PCV2 VACCINE

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The safety of administration of Ingelvac CircoFLEX® in late gestation sows and gilts in a controlled trial has been previously reported. However, field safety during the practical application of Ingelvac CircoFLEX® during mass vaccinations of the sow herds to achieve sow herd stabilization has not been previously described. This observational study followed two large sow herds in the United States post-Ingelvac CircoFLEX® vaccination. Herd A, a 100% stall gestation facility, had 3,800 sows and gilts included in the study. Herd B included 2,700 sows and gilts and only had 50% stall gestation. All sows and gilts (n=6,500) were mass vaccinated (1ml, IM in the neck). During the first 48 hours post-vaccination and on day 6 post-vaccination, all sows vaccinated were observed for injection site reactions (any possible site of inflammation regardless of size at the site of injection). Also, sows and gilts not consuming their ration for a 24h period were recorded as off-feed during the 7 day trial period. Any abortions occurring between the days of vaccination and day 6 post-vaccination were recorded. Injection site reactions in Herd A during the first 48 hours were only 1.2% and had reduced to 0.4% by day 6. Herd B experienced a similar level of injection site reactions, with 1.1% observed reactions during the first 48 hrs and 1.7% observed reactions on day 6 post-vaccination. For both herds there were only a total of 4 sows or gilts off-feed for a given day and 4 abortions during the 7 day period. The low number of off-feed events and abortions was at typical baseline values for both farms. There was no negative impact of the vaccination on these farms in relation to sows or gilts going off-feed or impact on abortion levels. The level of injection site lesions observed in this trial are consistent with previous studies showing the safety of Ingelvac CircoFLEX®.

P220 PROTECTIVE EFFECT OF BACTERINS AGAINST LYMPHADENITIS IN FREE-RANGE PIG FARMS

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Vaccination is one of the most effective control measures against different pathogen affecting animals. Lymphadenitis is a complex disease caused by a variety of pathogens, including mainly Mycobacterium spp., Trueperella pyogenes, Corynebacterium spp. and Streptococcus spp., among others. The multiple etiology of this process makes the control of the disease difficult, being responsible for important economic losses associated to the total or partial condemnation of carcasses at the postmortem inspection. In this study, ten free-range pig farms, with a history of condemnation due to lymphadenitis and associated lesions ranging from 20 to 50%, were selected to evaluate the protective effect of inactivated autovaccines (bacterins) made with a combination of T. pyogenes, S.suis and S. dysgalactiae, obtained from lymph nodes of slaughtered pigs from each farm. The resulting bacterin was inactivated with 0.4% buffered formaldehyde and intramuscularly (i.m.) administered without any adjuvant, according to the following protocol: (1) two immunizations 3 to 4 months before the finishing period (montanera), with an interval of twenty days and (2) a third immunization just at the beginning of the finishing period. From a total of 1,526 vaccinated animals and traced to the slaughterhouse, only 16 carcasses (1%) were condemned. The histopathological analysis showed a change of the lesions, from active lesions (87%) before vaccination to fibrosis and/or mineralized lesions (78%) after vaccination. A qPCR was used to confirm the presence of Mycobacterium tuberculosis complex (MTC) or Mycobacterium avium complex (MAC) in lesions from condemned animals, with 67% of samples being positive to MTC. In conclusion, a drastic reduction in the number of lymphadenitis condemnation was observed after a selective vaccination of animals against other pathogens than Mycobacterium spp. Biosecurity measures need to be implemented to control Mycobacterium bovis in free-range systems, limiting the contact among domestic animals and/or with wildlife reservoirs, as red deer or wild boar.

P221 CLINICAL FIELD SAFETY TRIAL OF COGLAPIX® APPLIED IN A NATURALLY CONTAMINATED FARM WITH ACTINOBACILLUS PLEUROPNEUMONIAE

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Introduction. Actinobacillus pleuropneumoniae (A.p) is a major infectious agent is swine, worldwide responsible of mortality and reduced performances. Prevention is possible by vaccination. The objective of the trial was to confirm, in a naturally contaminated farm, the safety of COGLAPIX® [1] vaccine.
Materials and methods. In an 800 sow farrow-to-finish farm in Hungary, the contamination by A.p. has been demonstrated prior to the start and during the course of the study. 2336 pigs have been randomly assigned at weaning into two groups. Within the test group (G1 - 1741 vaccinated pigs) as inside the control group (G2 - 595 pigs), a focus group of 26 animals has been identified. All the pigs of G1 have been vaccinated (2 ml I.M.) at 7 and at 10 weeks of age with Coglapix while the 26 pigs of the G2 focus group were injected with a placebo. The following parameters have been collected: rectal temperature, clinical signs, local reaction, animal weight and feed consumption around each vaccination.
Results. On the focus group pigs no clinical reaction has been observed during three days after vaccination. On the remaining 1715 vaccinated animals observed during 2 days, 2 pigs showed sneezing and prostration (first vaccination), 4 animals showed prostration (second vaccination). These signs had disappeared 24 hours later. On the focus group pigs, no iMIT[2] was higher than 2°C and the average iMIT of each focus group was lower than 1.5°C (European Pharmacopoeia) during 3 days after each vaccination. On the same animals the average daily weight gain was not significantly different from D-1 to D28[3] (453g G1; 427g G2). There was a significant difference between D20 to D28 (704g G1; 609g G2, t-test p=0.02). The feed conversion rate was 1.89 kg for G1 and 2.01 kg for G2 from D-1 to D28. At the injection site, 4 pigs showed mild swellings (1 pig in G1 and 3 pig in G2). Those swellings had disappeared 6 hours later. No local reaction was noticed in the 1715 other vaccinated pigs during the 2 days after each vaccination.
Conclusion. After vaccination with COGLAPIX®, applied at 7 and 10 weeks of age, in an A.p. naturally contaminated farm, no significant general or local reaction was observed. Neither the growth nor the feed efficiency was affected by the vaccination. This trial confirmed the good safety of the vaccine in field condition.
[1] COGLAPIX® is a registered trademark of Ceva
[2] iMIT: individual maximum increase of temperature
[3] D0 is the day of the first vaccination

P222 EVALUTATION OF AN ERYSIPELOTHRIX RHUSIOPATHIAE EXPERIMENTAL INFECTION IN PIGS VACCINATED WITH BIVALENT POCINE PARVOVIRUS AND E. RHUSIOPATHIAE VACCINES

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Objective. The aim of this study was to evaluate the duration of immunity elicited in naïve pigs by three different inactivated bivalent Porcine Parvovirus (PPV) and Erysipelothrix rhusiopathiae vaccines after challenge with pathogenic swine E. rhusiopathiae strains.
Materials and methods. Twenty-six six-month-old gilts, clinically healthy and free from antibodies against PPV and E. rhusiopathiae were randomly assigned to group 1 (n=8), group 2 (n=5), group 3(n=5) or group 4 (n=8). Animals in groups 1-3 were immunised twice intramuscularly (2ml/dose, three weeks apart) with three different PPV - E. rhusiopathiae vaccines named A, B and C respectively. Vaccine A was a new vaccine adjuvanted with Hipramune®-Gd; vaccine B was a commercially available vaccine adjuvanted with aluminium hydroxide; vaccine C was a commercially available vaccine adjuvanted with dl-α-tocopherol acetate. Animals in group 4 (placebo) received PBS using the same strategy as groups 1-3. On day 93, all groups were challenged with separate dorsal and intradermal injections of 106 cfu/dose of pathogenic E. rhusiopathiae BRP belonging to serovars 1 and 2, and their body temperature and the diameter of the skin erythema at the injection site were recorded until the end of the trial (day 100). Temperatures between groups were compared by means of an ANOVA 1F test ($p<0.05$) and skin lesions were compared using a chi-square test.
Results. On days 95 and 97-99 of the study, the mean temperature results of the animals from group 1 showed statistically significant differences with the placebo group, whereas groups 2 (except day 97) and 3 did not show statistically significant differences with the placebo group throughout the entire study. The percentage of animals that displayed typical skin lesions after the challenge with serovars 1 and 2 respectively were: group 1 0/12.5 ($p<0.05$); group 2 40/100; group 3 80/100; group 4 100/100. Statistically significant differences in the appearance of typical skin lesions after infection between group 1 and group 4 were observed for both serovars.
Conclusions. Animals from group 1 had the lowest temperature increase after the experimental infection with the virulent E. rhusiopathiae strains, indicating that the new vaccine is capable of maintaining physiological temperatures after infection. The new vaccine is effective in reducing skin lesions produced after the E. rhusiopathiae infection.

P223 EVALUATION OF THE ERYSIPELOTHRIX RHUSIOPATHIAE ANTIGENIC COMPONENT IN BIVALENT PORCINE PARVOVIRUS AND E. RHUSIOPATHIAE VACCINES BY HUMORAL IMMUNE RESPONSES IN PIGS

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Objective. This study aimed to compare the humoral immune responses elicited in naïve pigs by three different inactivated bivalent Porcine Parvovirus (PPV) and Erysipelothrix rhusiopathiae vaccines against E. rhusiopathiae.
Materials and methods. Six-month-old gilts (n=26), clinically healthy and free from antibodies against PPV and E. rhusiopathiae were randomly assigned to group 1 (n=8), group 2 (n=5), group 3 (n=5) or group 4 (n=8). Animals in groups 1-3 were immunised twice intramuscularly (2ml/dose, three weeks apart) with three different PPV - E. rhusiopathiae vaccines named A, B and C. Vaccine A was a new vaccine adjuvanted with Hipramune®-Gd; vaccine B was a commercially available vaccine adjuvanted with aluminium hydroxide; vaccine C was a commercially available vaccine adjuvanted with dl-α-tocopherol acetate. Animals in group 4 (placebo group) received phosphate buffered saline using the same strategy as in groups 1-3. Blood samples were obtained sequentially by direct venepuncture of the jugular vein on days -7, 0, 21, 41, 60, 80 and 93. Serum antibodies to E. rhusiopathiae (IgG) were titrated using a commercially available ELISA assay, and titres between groups were compared by means of an ANOVA 1F test ($p<0.05$).
Results. While mean of E. rhusiopathiae-specific ELISA antibodies titres in group 1 exceed the cut-off value from day 21 until the end of the trial, in groups 2 and 3 mean of antibody titres remained under the cut-off throughout the study, except on day 41 (three weeks after second dose of vaccines). The mean of antibody titres from group 1 compared to groups 2 and 3 was statistically significant higher from day 21 until the end of the trial on day 93. No seroconversion was detected in any of the animals in the placebo group.
Conclusions. The humoral immune response against E. rhusiopathiae in the group of animals vaccinated with the new vaccine is faster, higher and lasts longer than the humoral immune response developed by the other vaccines.

P224 BIOTRANSFORMATION OF FUSARIUM TOXINS AS A STRATEGY TO COUNTERACT TOXIC EFFECTS IN PIGS

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Pigs are considered to be the most susceptible livestock to mycotoxin contamination. Fusarium fungi produce mainly trichothecenes (e.g. deoxynivalenol (DON) and T-2 toxin), and fumonisins (FUM), amongst others. These toxins are known to modulate the immune function in pigs but only few studies have investigated this effect.
The aim of this trial was to evaluate the biotransformation efficiency of a feed additive (FA) which contains FUMzyme® and Biomin® BBSH 797 to reduce the adverse effects of DON and FUM on weaning pigs. The trial was conducted at the animal facility of the INRA ToxAlim Laboratory.
A total of 48 four-week-old weaned male pigs were weighed and randomly allocated to 8 experimental groups. Eight diets were formulated and given to piglets for 5 weeks; a control diet with or without the FA, a diet containing either DON or FUM (3 mg DON/kg, 6 mg FUM/kg of feed) with or without the FA and a co-contaminated diet with both Fusarium toxins with or without FA. At days 4 and 16, the animals were subcutaneously immunized with ovalbumin (OVA) to assess the specific immune response.
A decreased proportion of blood neutrophils was observed in the animals fed toxin-diets ($p<0.05$). In contrast, animals fed the same diet containing FA were not affected. Creatinine and albumin were measured in the plasma. A significant effect ($P<0.05$) of FUM contamination was observed on the creatinine level and of DON contamination on the albumin level. Both effects were counteracted by the addition of the FA to the diet. Another parameter assessed was the vaccinal response to OVA. Blood lymphocytes were stimulated with OVA in vitro and lymphocyte proliferation was measured. DON and FUM alone and in combination resulted in low proliferation indexes. The FA was able to counteract the effect of the disturbance of lymphocytes on the proliferation upon antigenic stimulation in mycotoxin contaminated diets.
In conclusion, a feed additive consisting of FUMzyme® and Biomin® BBSH 797 is able to counteract toxic effects induced by DON and FUM. The inclusion of the feed additive supported the immune response of the animals.

P225 EFFECTS OF INCLUSION OF HYDROLYZED YEAST ON THE IMMUNE RESPONSE AND PERFORMANCE OF PIGLETS AFTER WEANING

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An experiment was conducted with the objective to evaluate the effects of including a yeast derivative (YD) in a post-weaning diet on the piglet performance and immune system response.
The experiment comprised two treatments: 1) negative control treatment (NC); 2) NC supplemented with 2 g YD /kg. The YD used was Progut (Suomen Rehu Oy, Helsinki, Finland). The experiment was performed with 10 replicate pens per treatment, with 6 piglets per pen resulting in 60 piglets per treatment. The experimental period lasted for 28 days post-weaning.
At the beginning of the experiment (day 0), day 14, 21 and 28, blood samples were taken from half of the animals from the NC and the YD group. At 7 and 21 days post-weaning the same animals were challenged with an intramuscular injection with 1 ml of 20% sheep red blood cells (SRBC) in PBS solution. Piglets were weighed per pen at day 0, 14, and 28. Pig-MAP concentration in blood was measured on day 14 and 28 post-weaning. Natural antibodies of IgM and IgG isotypes binding to keyhole limpet hemocyanin (KLH) were determined on day 0, 14 and 28 post-weaning. Finally SRBC antibody titers were analyzed on day 0, 14, 21 and 28 post-weaning.
During the first two weeks post-weaning (d 0 to 14), average daily gain (ADG) was not affected by dietary treatment. The feed conversion ratio (FCR) during the first two weeks post-weaning tended to be improved in piglets fed the diet supplemented with YD compared with piglets fed the control diet. During day 14 to 28, feeding the piglets with YD diet improved FCR compared to piglets fed the control diet. During the total experimental period, FCR was better in piglets fed the YD diet compared with piglets fed the control diet.
Regarding the immune system parameters, pigs fed with YD tended to have a higher anti-KLH IgG titer at d 14 post-weaning compared with piglets fed the control diet. No significant difference in anti-KLH titers between diets was found on d 21 and 28 post-weaning. On the other hand, piglets fed with YD tended to have a higher SRBC antibody titer after the first challenge (d 21) compared with piglets fed the control diet. At the end of the experiment, piglets fed with the YD diet showed a higher SRBC antibody titer compared with piglets fed the control diet.
Based on this study it can be concluded that Progut supplementation to weanling pigs led to an improvement in feed conversion ratio and suggest that the immune system is triggered to a more responsive state, which could potentially be beneficial for overcoming disease challenges.

P226 EVALUATION OF A NEW TOOL FOR THE ASSESSMENT OF IMMUNOGLOBULIN UPTAKE THROUGH COLOSTRUM IN PIGLETS

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Introduction. The importance of colostrum uptake for the preweaning survival, growth and general health of piglets is without much dispute. Yet screening of colostrum uptake at herd level is rarely performed in practice, mainly because of the lack of a simple, inexpensive test. Therefore a field trial was performed in Benelux with the immunocrit method. In this method, certain serum proteins are precipitated from the blood of young piglets, and the ratio of precipitate to sample volume is measured to estimate an Ig concentration. The aim of the study was to compare immunocrit values with serum protein electrophoresis, which is the standard method for Ig screening, to determine the correlation between outcomes of these 2 tests.
Materials and methods. On a conventional pig farm, 36 sera were collected from 3 to 4 day old piglets, born from 6 sows of different parities. From each litter 2 heavy-, 2 light- and 2 intermediate-weight piglets were chosen. All 36 samples were tested by immunocrit and serum protein electrophoresis. To perform the immunocrit test, 50 µl serum is mixed with 50 µl 40% (NH4)2SO4 (ammonium sulfate). The mixture is inserted into a hematocrit capillary tube and centrifuged for 10 min at >15.000 g. The ratio of the mm precipitate to mm solution in the tube is measured, and used to calculate an Ig concentration, based on earlier defined standards. Results from both tests were compared with the use of the linear regression module of the Statistical Pack for the Social Studies 15.0.
Results. Based on electrophoresis, the average Ig concentration was 27,1 mg/ml (range 1,6 - 43,4) whereas based on the immunocrit estimation, this was 33,8 mg/ml (range1,1 - 51,4). An R square of 0,932 was determined for the relationship between results from serum protein electrophoresis (constant) and immunocrit (variable).
Discussion and conclusion. Although the amount of samples used in this comparison was limited, the high correlation between immunocrit and serum protein electrophoresis results indicate that predominantly Ig are precipitated. The immunocrit results show a tendency to be slightly higher in absolute value compared to serum protein electrophoresis. Therefore, additional validation experiments are needed to evaluate the usefulness of the test.
The Immunocrit test could be a valuable tool to assess the passive Ig transfer from sow to piglets, although further validation is needed.

P227 EVALUATION OF THE SAFETY OF A NEW INACTIVATED VACCINE AGAINST PORCINE PARVOVIRUS AND ERYSIPELOTHRIX RHUSIOPATHIAE UNDER FIELD CONDITIONS

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Objectives. The aim of this study was to evaluate the safety of a new inactivated vaccine against Porcine Parvovirus (PPV) and Erysipelothrix rhusiopathiae under field conditions.
Material and Methods. A multicentric, randomized, double blinded and controlled trial was carried out in 712 animals. The study was conducted in 5 commercial farms located in Europe. A total of 364 multiparous sows and 348 nulliparous sows were randomly distributed into two groups: group A was vaccinated with a commercially available vaccine adjuvanted with aluminium hydroxide and group B was vaccinated with the new inactivated vaccine adjuvanted with Hipramune®-Gd. Animals were vaccinated according to the manufacturers recommended schedule. General clinical signs, local clinical signs, rectal temperatures, reproductive performance and adverse events were monitored during the trial. Clinical observations (general and local clinical signs at the inoculation site) were recorded individually from 265 animals (131 nulliparous and 134 multiparous), the day of vaccination, 6 hours post-vaccination, daily during the 2 following days, and weekly during 15 days. Rectal temperatures were recorded individually the day before and the same day of vaccination in order to establish normal baseline values, 6 hours post-vaccination, daily during the 2 following days. Adverse events were monitored individually in all animals during all study long. Variables of numerical type were analyzed using an ANOVA. The comparisons of Independence and/or association relating to categorical reference variables were performed using a chi-square test and/or a Mann-Whitney U test.
Results and conclusions. No severe or unexpected adverse events attributable to the vaccination with the new vaccine were observed, independently of the target category: nulliparous or multiparous. None of the sows vaccinated with the new vaccine showed abnormal general or local clinical signs from causes attributable to the vaccination. The average rectal temperature increase for all evaluated sows vaccinated did not exceed 1.5°C. No sow vaccinated with the new vaccine showed abnormal reproductive performance from causes attributable to the vaccination. No differences regarding the safety parameters between both vaccines were observed.

P228 STUDY OF THE EFFICACY OF A NEW INACTIVATED VACCINE AGAINST PORCINE PARVOVIRUS AND ERYSIPELOTHRIX RHUSIOPATHIAE UNDER FIELD CONDITIONS

Noguera M.[1], Puig A.[1], Simon M.[1], Perozo E.[1], Fontseca M.[1], Camprodon A.[1], March R.[1]
[1]HIPRA ~ Amer ~ Spain

Objectives. The aim of this study was to evaluate the efficacy of a new inactivated vaccine against Porcine Parvovirus (PPV) and Erysipelothrix rhusiopathiae under field conditions.
Material and Methods. A multicentric, randomized, double blinded and controlled trial was carried out in 712 animals (364 multiparous sows and 348 nulliparous sows) distributed in 5 commercial farms in Europe. These two categories were randomly divided into two treatment groups: group A was vaccinated with a commercially available vaccine adjuvanted with aluminium hydroxide and group B was vaccinated with the new vaccine adjuvanted with Hipramune®-Gd. Nulliparous sows received the 1st dose of vaccine 6-8 weeks before matting (D0) and a booster dose was administered 3-4 weeks later (D21). Multiparous sows were vaccinated during lactation period, 2-3 weeks before next mating (D0). Swine Erysipelas pathognomonic skin lesions and reproductive parameters such as heat repeating, abortions, mummified piglets, total piglets born and total piglets born alive were registered from all the animals included in the trial to assess the efficacy of the new vaccine against natural infection of PPV and Erysipelothrix rhusiopathiae. Chi-square test and a Mann-Whitney U test were used.
Results and conclusions. Equivalence between treatments was observed in most of the efficacy parameters. In general, the mean reproductive parameters evaluated (% heat repeating, % abortions, total piglet born and total piglet born alive) were not statistically different between groups of treatment in none of the categories: multiparous and nulliparous. The number of mummified piglets per sow was the only parameter statistically different between groups of treatment, being lower in the group vaccinated with the new vaccine. No differences were observed in this parameter in the multiparous sows. Moreover, in one of the five farms, the nulliparous group vaccinated with the new vaccine showed higher number of total piglets born alive. The equivalence between vaccines in the reproductive parameters also supports the safety of the new vaccine. Moreover, and bearing in mind the data recorded previous vaccination, it can also be confirmed that this did not promote any reproductive safety concern.

P229 DURATION OF THE PROTECTIVE IMMUNITY AGAINST PORCINE PARVOVIRUS INFECTION AFTER VACCINATION OF SOWS USING A NEW BIVALENT PARVOVIRUS AND ERYSIPELAS VACCINE.

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Objective. The aim of this study was to assess the duration of the protective immunity in naïve young breeding stock to porcine parvovirus conferred by a new inactivated bivalent vaccine against PPV and E. rhusiopathiae in pigs. The study design sought to test the "prime-boost immunization strategy" by means of an experimental infection in sows during the second gestation. **Materials and methods.** Twelve six-month-old gilts, clinically healthy and free from antibodies against PPV and E. rhusiopathiae were randomly assigned to group 1 (n=7) or group 2 (n=5). Group 1 was immunised intramuscularly with a 2ml dose following the primary vaccination scheme (two doses three weeks apart, three weeks before mating) and the revaccination scheme (booster dose on day 170, three weeks before the second mating). Group 2 (placebo) received phosphate buffered saline using the same prime-boost immunisation strategy as the vaccinated group. Animals in both groups were challenged intravenous and intranasally on day 40 of the second gestation (i.e. day 238) with 4ml 10 5.8 CCID50. Blood samples were obtained on days -5, 21, 70, 92, 127, 170, 224, 238, and the antibody titres against PPV in serum were determined by the Haemagglutination Inhibition (HI) assay. All animals were humanely sacrificed to perform a necropsy on day 90 of the second gestation (i.e. day 287). The appearance of the foetuses was evaluated, and blood samples as well as lung, liver and intestine tissues were collected for virus detection (by Haemagglutination, HA) and antibody detection (by HI). The differences in antibody titres and reproductive parameters between groups were assessed using the T- test ($p<0.05$). **Results.** From day 70 until the end of the trial, the titres of PPV-specific HI antibodies were statistically significantly different between vaccinated and placebo-injected sows. Regarding the appearance of the foetuses, the percentage of normal foetuses per litter and the number of piglets per litter were 93%/11.57 and 35%/5.2 in the vaccinated and placebo groups respectively ($p<0.05$). Whereas 91.30% of the foetuses in the placebo group were infected by PPV, no infection was detected in any of the foetuses from the vaccinated group ($p<0.05$). **Conclusions.** The regime of vaccination (primary and revaccination schemes) effectively protects the animals from transplacental infection caused by PPV.

P230 GOOD VACCINATION PRACTICES : SUMMARY OF OBSERVATIONS MADE IN 45 FARMS VACCINATING PIGS AGAINST ENZOOTIC PNEUMONIA IN FRANCE

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Mycoplasma hyopneumoniae (M. hyo) is the primary agent of enzootic pneumonia (EP). The infection can be controlled by improving the breeding behavior and buildings, by the use of antibiotics and by vaccination. However, the effectiveness of a vaccine depends on good vaccination practices. This study is a synthesis of good vaccination practices carried out in 45 French farms. The audit was carried out in 3 stages. At first it is to observe the practices of the breeder. In a second step, the positives are highlighted and suggestions for improvements are proposed. In a third step, to ensure that the recommendations are well integrated, the auditor participates in the vaccination of an entire batch with the breeder. Each audit is followed by a written report delivered by the auditor to the vet.

The first key issue is the contention of the piglets. If we obse64% of farms 2 people involved in vaccination, only 1/3 alternate spots: someone cath piglets while the other vaccine and vice versa.

Another interesting observation concerns the adaptation of the number of vials of vaccine to the number of pigs to be vaccinated. If the number of bottles do not fit the need, missing doses are collected aseptically in only 33% of cases (sterile syringe and needle). Opened vials are returned to the fridge in 44% of farms.

About preservation of vaccine, refrigerator's temperature was consistent, between 2 and 8 ° C, in 68% of cases. Note that in a case the temperature was negative (-1 ° C) and in four fridge temperature was above 10 ° C. Note the presence of a min-max thermometer in 43% of refrigerators.

Last key point, the injection of vaccines. Only 19% of farmers slowly inject the vaccine. The intramuscular injection zone is considered optimal in only 20% of farms. And 47% of farmers are changing needle between each litter.

Much progress remains to be made, including the adaptation of the size of the needles to the size of the piglet, changing needle between each case, slow injection and intramuscular injection site. Vaccination is too often considered a tedious and time consuming task when farmers should devote quality time and human resources.

P231 INFLUENCE OF EUBIOTIC LIGNOCELLULOSE ON THE DURATION OF FARROWING AND THE NUMBER OF DEAD-BORN PIGLETS

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Introduction. Nutritional products based on lignocellulose are increasingly used in sow nutrition as they promise to increase prepartal defacation. Eubiotic lignocellulose additionally has prebiotic properties. This study compares two rates of eubiotic lignocellulose substitutions (OptiCell®, Agromed Austria) of sow feed with respect to the duration of farrowing and the number of dead-born piglets.
Materials and Methods . 92 sows (Large White) deriving from a sow farm housing 600 sows and working in a 4-weeks-rhythm located in Lower Austria were divided into two groups. Group A (n = 36 sows) was fed with 2.5 % eubiotic lignocellulose and group B (n = 56 sows) was fed 1.25 % starting 6 weeks prior to farrowing. Sows were routinely vaccinated against PPV, SIV and Erysipelothrix rhusiopathiae and are free of PRRSV. Insemination was done by using semen from Pietrain boars, which are serologically free of PRRSV-, PRV-, CSFV-, Leptospira- and Brucella-specific antibodies, from the Lower Austrian AI center. Temperature in the farrowing crates was constantly 25.3°C. All sows of both groups were treated with oxytocin at similar rates. Farrowing was completely surveyed and reproductive data were recorded. Statistical analysis was done by Student's T-Test.
Results. Mean duration of farrowing was 230 min in group A and 266 min in group B (p=0.03). Mean total number of piglets per sow was 12.97 in group A and 12.98 in group B. Mean number of dead-born piglets per sow was 0.69 in group A and 1.19 in group B (p=0.04).
Discussion. We could show that the addition of 2.5 % eubiotic lignocellulose to sow feed had a positive impact on the duration of farrowing and the number of dead-born piglets. In conclusion, this led to a reduction of 0.5 dead-born piglets per sow and year and consequently to an increase of approximately 1.2 piglets per sow and year. Also, this study exhibited the positive impact of a shortening of the duration of farrowing on piglet mortality in the course of farrowing.

P232 FERTILITY AND PROLIFICACY OF SOWS BRED DURING LACTATION AND USED AS NURSE SOWS AFTERWARDS

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The purpose of this study was to determine whether it would be efficient to breed sows showing spontaneous heat during lactation. This was assessed by comparing the fertility and prolificacy rate of 117 sows mated during lactation (LM) and 3329 sows mated after weaning (NM). The LM sows were used as nurse sows after their breeding. Some of them were only used as nurse sows during one time, and therefore weaned with around 28 days of gestation. Others were used several times, and therefore their duration of lactation was prolonged. Before weaning, lactation and pregnancy overlapped. On average, LM sows were used as nurse sows 1.8 times during their lactation and were weaned at an average of 43.5 days of gestation.
The percentage of LM sows was around 3.4% of those bred in total and the proportion of returns was increased by 18%. For the LM sows, the total born litter size was reduced by 1.09 piglets and there were 1.37 less piglets alive compared to the CN sows. However, these negative results may be compensated by increased litters / sow / year. This may be especially the case if they are employed as nurse sows, in this case, cutting down the production cycle length by more than 43 days / sow.

P233 IS THE SKIN TEMPERATURE THE KEY TO DETERMINING OVULATION TIME IN THE SOW?

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Is the skin temperature the key to determining ovulation time in the sow?

Oestrus determination allows designing an efficient artificial insemination (AI) program in order to improve the farrowing rate and litter size. The interval between AI and ovulation moment is the major factor affecting fertility, mainly when frozen thawed semen or low number of insemination are carried out. In the sow, ovulation can range from 10 and 58 hours after onset of oestrus, so it may be difficult to predict this moment. The aim of this study was to determine the temperature fluctuations in two different parts of the body, vulva and ear skin during periovulatory period.

Multiparous sows were monitoring by transrectal real time ultrasonography to determine ovulation time every 12 hours. The temperature was measured in 39 cycling sows in two different parts of the body, in the ear base and in the superior area of the vulvar skin from a distance of 5 cm. The LH plasma concentration was determined with ELISA kit hormonal assay in 11 cycling sows. All measurements were carried out every 12 hours from 1 day after the weaning to 3 days after oestrus onset. Temperature and plasma LH concentration results are expressed as mean ±SEM, and average values in each moment were compared using Kruskal-Wallis non-parametric test. Different were considered stylistically significant at $P \leq 0.05$.

The duration of oestrus was 60.31 ±8.92 hours, and the interval from onset of oestrus to ovulation was 43.38± 8.97 hours. LH media levels reached a maximum of 5.17 ± 1.17 mIU/ml at 26.18 ± 4.85 hours before ovulation. There was significant difference ($P<0.05$) in vulvar skin temperature values around the periovulatory period. At 12 hours prior to ovulation, vulvar skin temperature decreased significantly ($P<0.05$) and then returned to normal values. The lowest temperature reached in the vulvar skin was 34.88 ± 0.06°C. Vulvar temperature at 12 hours before ovulation was 1.14°C lower compared with the previous and next measurements. Temperature of the ear skin demonstrated similar variations. Temperatures remained relatively steady during the measurement periods, except at 12 hours before ovulation time, which decreased significantly to 35.12 ± 0.80°C ($P<0.05$).

In conclusion, the results demonstrated that skin temperature measurements showed significant difference around the periovulatory period. The temperature determination may provide accurate predictions of the moment of ovulation and the optimal insemination time

P234 BACTERIOLOGICAL STATUS OF THE UROGENITAL TRACT OF SOWS SUFFERING FROM FERTILITY FAILURE

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Introduction. Reproductive disorders in sows may origin from infections of the urogenital tract. This study deals with the actual range of pathogens isolated from the bladder and the endometrium of affected sows.

Materials and Methods. 39 sows out of 9 farms located in Lower Austria with a history of fertility failure were included. One day before slaughter spontaneous urine samples and immediately after slaughter sterile urine samples as well as bladder and endometrial swabs were collected and analysed bacteriologically.

Results. Most frequently E. coli, Enterococcus spp. and Staphylococcus hyicus could be isolated from spontaneous urine. In sterile urine samples, most frequently E. coli, α-haemolysing streptococci and Enterococcus spp. could be found. In swabs from the bladder and the endometrium, most frequently E. coli, α-haemolysing streptococci, Enterococcus spp. and Candida spp. could be isolated. By means of PCR also pathogenic leptospirae and chlamydiae could be detected. However, Actinobaculum suis could not be found in any sample. Most frequent pathogens identified as sole infectious agents were pathogenic leptospirae, E. coli, and Candida spp., whereas in about one half of cases no specific infectious agents could be found.

Discussion. In only one half of cases with a history of fertility failure pathogenic microorganisms could be detected by either classical bacteriological methods or by PCR. Sterile swab samples collected from bladder and endometrium are best suited for detecting bacteria as causative agents of reproductive failure in sows.

P235 PATHOLOGICAL EVALUATION OF REPRODUCTIVE SYSTEM OF PRRSV VACCINATED AND NON-VACCINATED SOWS/GILTS

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Porcine reproductive and respiratory syndrome virus (PRRSV) causes an economically important disease worldwide. PRRSV induces reproductive failure (e.g. premature farrowing, abortions, low farrowing rate), while macroscopic lesions are frequently noticed in the uterus of pregnant PRRSV-infected sows.

The aim of this study was to evaluate pathologically the reproductive system of non-vaccinated and PRRSV-vaccinated females, as well as the assessment of vaccination impact on their endometrium / myometrium and ovaries. In a farrow-to-finish farm, all sows and gilts were systematically vaccinated with a commercial PRRSV-inactivated vaccine for a period of 18 months.

During the last semester before the beginning of the trial, the genital organs (uterus and ovaries) from 50 females were collected at slaughterhouse for gross and microscopic examinations. During the following three semesters after the implementation of PRRSV vaccination, the genital organs from 75 vaccinated females were also collected. Sampling of females was based on homogeneity of age and their parity. Pathological examinations included gross measurements of uterine horn (thickness, diameter, weight) and ovaries (diameter, weight), histopathological examination of the endometrium and the myometrium, as well as the ovaries for ovarian cysts or other cystic formations. Based on gross examination, no significant differences were noticed between vaccinated and non-vaccinated females. Histopathological examination did not show lesions of endometritis or myometritis, but it revealed that the ovarian cystic formations observed (diameter >2cm) were luteinizing cysts. The presence of these luteinizing cysts is significantly lower in PRRSV-vaccinated animals, compared to non-vaccinated, three semesters (P=0.017) after the start of vaccinations and for the total trial period (P=0.009).

P236 EFFECT OF A SINGLE DOSE OF ANTI-GNRF VACCINE (IMPROVAC®) ON TESTICLES' WEIGHT AND NORMAL SPERMATOZOA PERCENTAGE OF YOUNG BOARS

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Boar stations select boars to be used in the AI programs for commercial swine breed lines. Usually a considerable number of boars arrive to the station, but only few are selected at the end of the process. The rejected boars sent to the slaughter will get a considerable reduction in the price paid, due to possible presence of boar taint. Since the boars are usually selected around 20 weeks of age, a surgical castration at this age is not economically affordable. Immunization against GnRF is an alternative to the physical castration of male pigs to avoid presence of boar taint at slaughter. Two doses of vaccine are needed, at least 4 weeks apart. The first primes the immune system and the second produces a temporary suppression of testicular function. We wanted to investigate if a single dose of Improvac given to boars of 16 weeks of age has any negative effect on the testicles' development and function. The advantage of injecting all boars before the final selection is later exploited giving a second injection to all rejected boars after the final selection. This will allow to fully immunocastrate the rejected boars avoiding presence of boar taint at slaughter. Implementation of this protocol at boar stations would allow an increase in the number of boars tested per year and an increase in the slaughter revenues of rejected boars (95%). At the boar station 44 boars (Figen Yorkshire or Figen Landrace) were randomly allocated to two different treatments. SALINE (n=22) were injected im with 2 ml of NaCl 9%, and IMPROVAC (n=22) were injected im with 2 ml of Improvac® (Zoetis, USA). At the age of 25 weeks the boars were sent to slaughter, both testicles were collected, immediately cooled, refrigerated and sent for analysis within 24 h. Testicles were extracted from the scrotal sac, an incision with a surgical blade on the tail of the epididymis allowed us to extract spermatozoa to determine % of normal spermatozoa (N-sperm %). Right testicle weight (RT) was 254±74 g and 225±68 g, left testicle weight (LT) was 250±67 g and 225±63 g, N-sperm (%) was 59±36 and 68±33 in SALINE and IMPROVAC groups respectively (average±SD, p>0.05). In conclusion we found no significance differences in testicles' weight and N-sperm (%) in boars vaccinated once with Improvac®, suggesting that this protocol could be used in boar stations.

P237 A CASE REPORT OF SINGLE DOSE FIXED TIME INSEMINATION

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Introduction. Synchronizing ovulation with buserelin (Porceptal) gives farms via a single dose fixed time artificial insemination (FTI) benefits: reduced semen use, reduced labor due to less estrus detection and fewer inseminations. Confirmation that there is no significant change in reproductive parameters compared to the conventional reproductive management is investigated in this trial on a 750-sow multiplying farm.
Material and Methods. Piglets were weaned at 23 days of age and the estrus of gilts is synchronized with Regumate.
In total 150 gilts and sows were included: 69 Porceptal Group (P) and 81 Control Group (C). 1st parity sows were equally divided between both groups. Sows with lameness, metritis, mastitis at weaning were excluded. Both groups had boar exposure twice a day (15 minutes) and a 16-hour light scheme to stimulate estrus.
The P group wasn't checked for estrus: the gilts were injected with 2.5ml Porceptal 115-120 hrs after the final Regumate dose and the sows were injected 83-89 hrs after weaning. After 30-33 hrs, they were checked for heat and inseminated. C group by farms' AI protocol. Recorded are: back fat los during lactation, insemination-, fertility-, farrowing rates, total- and live born piglets per sow (TB/LB).
Fertility rate: (N sows + gilts pregnant/ N sows + gilts selected for the next reproductive group) x 100%. Farrowing rate: (N sows + gilts farrowed/ N sows + gilts selected for the next reproductive group) x 100%. Pregnancy was detected via ultrasound.
Results. Results P group vs C group: insemination rate 100% vs 95%, fertility rate 94.2% vs 92.6a, farrowing rate 91,3% vs 88.9%, TB 15,3 vs 15,2b, LB 14,3 vs 14,2. [ORa: 1.3 P=0.69, ORb: 1.0 P=1.0]
There were 22% gilts and 13% 1st parity sows total present. Fertility rate was 100% in 1st parity sows and 82% in gilts. Back fat loss group P: 0 to -7 mm, group C: +1 to -10 mm. In group P, 1 sow wasn't in heat at time, but still inseminated and pregnant. Average sperm dose group P: 1.0, group C 1.6.
Conclusion and discussion. There were no significant differences in the reproductive parameters between group P and C.
The fertility rate of gilts in both groups was lower than the average for the trial. Gilts were housed in a different insemination unit with lower light intensity which could cause the difference.
In this study back fat loss had no influence on the fertility rate, all extremes were pregnant.
The FTI-protocol was demonstrated to be useful for industrialized farms interested in simplifying estrus management and reduction of cost of semen and labor.

P238 A RELATIONSHIP BETWEEN BACKFAT THICKNESS OF BERKSHIRE SOWS AND POSTWEANING REPRODUCTIVE PERFORMANCE ON A JAPANESE COMMERCIAL SWINE FARM

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The objective of the present study was to observe a change of backfat thickness of purebred Berkshire sows over parity and to determine an association between the backfat thickness and postweaning reproductive performance on a Japanese commercial swine farm. This study was conducted on a commercial farrow-to-finish farm in Japan with approximately 2,000 sow inventory. Backfat was measured at pre-farrowing (approximately 7 days prior to predicted farrowing data) and at weaning. The backfat thickness was measured at the P2 position (last rib, 65 mm from the center line of the back) on both sides of the backbone using a Lean-Meater. Values from the two measurements were averaged to obtain a single backfat measurement. Of 3,491 Berkshire sows, the mean parity (± SD) of animals was 4.1 ± 2.30. Means of backfat thickness at pre-farrowing and at weaning were 17.0 ± 3.20 and 15.3 ± 3.13 mm, respectively. As parity increased from 1 to ≥7, pre-farrowing backfat thickness decreased from 18.4 to 15.9 mm ($P < 0.05$). Similarly, backfat thickness at weaning decreased from 16.6 to 14.4 mm as parity increased ($P < 0.05$). Loss of backfat thickness during lactation was 1.76 ± 1.50 mm, and was positively correlated with pre-farrowing backfat thickness ($P < 0.05$). As number of suckling piglets increased, loss of backfat thickness during lactation decreased ($P < 0.05$). Loss of backfat thickness during lactation was positively associated with piglet weight at weaning ($P < 0.05$), but not with preweaning mortality. Weaning-to-first mating interval was associated with backfat thickness at weaning ($P < 0.05$), but not with loss of backfat thickness during lactation. In parity 1 and 2, weaning-to-first mating interval decreased as backfat thickness at weaning increased ($P < 0.05$), whereas no association between weaning-to-first mating interval and backfat thickness at weaning was found in parity 3 to ≥7. Farrowing rate was not associated with loss of backfat thickness during lactation and backfat thickness at weaning. This study indicated that measuring backfat thickness and the change is a useful management tool for Berkshire sows on commercial farms.

P239 EFFECTIVE TREATMENT OF POLYCYSTIC OVARIAN DEGENERATION IN GILTS AND SOWS WITH ALTRENOGEST (REGUMATE®) - FIRST RESULTS

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Polycystic Ovarian Degeneration (POD) is a severe pathological ovarian condition in breeding sows, which can result in life-long infertility when persistent. Up until now, there has been no reliable therapy for POD in swine, and females suffering from POD are usually sent to slaughter. In cattle, an intravaginal progesterone-releasing device is used to treat cystic ovaries. For swine, a progesterone-like formulation, i.e. Altrenogest (Regumate®), is available for the purpose of synchronizing heat in gilts. The aim of this study was to evaluate Altrenogest (Regumate®) as a treatment for POD in gilts and sows. A total of 5 sows and 2 gilts i) found open on day 21 post breeding (n = 3; Danbred) or ii) scanned 7-14 days post weaning for no heat (n = 3; GL x LW), or iii) for ovulation in post weaning estrus (n = 1; Danbred) and diagnosed with POD (non-ovulatory ovarian bubbles of > 10 mm in the absence of physiological ovarian structures). Scanning was done by transcutaneous ultrasonography with a Fazone ultrasound unit and a convex probe. Cysts were either follicular (i.e. with a thinner wall) or luteal (i.e. with a thicker wall), or a combination of both. Sows were treated with 5 ml Regumate® (20 mg/Altrenogest) per day per animal for 18 consecutive days. When sows were again scanned around the last day of treatment, none had POD but only small 3-4 mm follicles. Five sows and a gilt were subsequently bred by AI either in a spontaneous estrus 4 days after last Regumate® treatment (n = 1), or after hormonal stimulation of estrus and ovulation; four sows and the gilt conceived as tested by ultrasound, while one sow still needs to be tested. The non-bred animal was culled for uterine infection. Average litter size (without mummies) was 17.3 ± 3.1. In conclusion, this is the first report of Altrenogest (Regumate®) for treatment of POD in female swine leading to a complete disappearance of, and cure from POD regardless of the cyst's quality (i.e. follicular or luteal, or both). The exact working mechanism for Altrenogest remains to be elucidated.

P240 SINGLE FIXED TIME INSEMINATION IN MULTIPAROUS SOWS WITH AN INJECTION OF GONADOTROPIN-RELEASING HORMONE AGONIST (RECEPTAL)

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Ovulation occurs in sows 70% of the way through estrus. Due to varied duration of estrus, artificial insemination (AI) at an optimal time is difficult. Sows are inseminated 2 to 3 times during estrus over a 12 to 24 hours interval. The ability of exogenous GnRH to induce LH release is used to synchronize ovulation in gilts and sows and minimize variability in time interval between estrus and ovulation. The aim of this study was to demonstrate feasibility of implementing a systematic approach for breeding weaned sows by induced ovulation and confirm the safety and efficacy of induced ovulation with Buserelin (Receptal) followed by single fixed time AI in sows. The experiment was conducted in a 1000 sow, farrow to finish unit with a 2 week batch system and 21 day weaning age. Sows are inseminated postcervically. Four batches (202) of weaned different parity sows were included. After weaning, sows were placed in individual crates and checked for estrus by a sexually mature boar, using the standing reflex in response to back pressure. Based on parity, body condition score, wean-to-estrus interval and lactation length, sows were paired and randomly assigned to one of two groups, same boars were selected for both groups, and same worker to inseminate and check heat. Receptal (R): 2,5ml R (10µgr Buserelin) I.M. injection 86 (±3) hrs. after weaning and Single fixed time AI for all sows 30-33 hrs. after R injection. Standing reflex as inclusionn. Control (C): Based on estrus behavior (2x per day), 1st insemination +/- 12 hrs. after first standing heat, 2nd insemination 12 (±4) hrs. Fertility and heat output were not significantly different between R group 92,1%, 88,7% and group C 91%, 90,5% respectively (p>0,05). Estrus duration was lower in R group than in C (2.11 vs 2.73 days), sperm doses in R group were reduced compared to C (1 vs 2.20) and number of boars to fertilize each batch was lower in R group, than in C.

This system allows breeding once at a fixed time following buserelin injection while maintaining reproductive performance at a level similar to that of sows bred twice during estrus. Homogeneity of piglets will be an important point to evaluate, because less boars are used to fertilize a batch. In addition, the semen doses and the labour are clearly reduced and a standard working protocol is implemented in farms.

P241 THE EFFECT OF CORRECT GILT MANAGEMENT ON REPRODUCTON PARAMETERS

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Over the last years productivity of pig farms has increased noticeably. To achieve actual targets is necessary to optimize lifetime production, and it starts with a correct performance of gilts and 1st litter sows, optimizing parameters as management, environment or nutrition. The aim of this report is demonstrate how correct management and nutritional strategies in gilts have a significant effect on their reproductive performance and on the weaning capacity of the farm.

The study was conducted in a closed herd of 850 sows. Gilts were purchased from an external source and annual replacement rate was 45%. 90 PRRS negative gilts of 95kg BW and 5 months entered the farm 4 times/year, and were located in an old fattening unit where vaccination program was realized. Two months later heat detection was initiated and gilts began to be mated, independently on their BW. In January 2013 it was decided that reproduction parameters of 1st litter sows could be improved, so changes in gilts management were introduced: new quarantine, specific feed, strict vaccination program, boar stimulation and heat detection, ensuring 2 heats and 140 kg BW before mating and planning of the need of gilts/batch. It was also decided to synchronize gilt's estrus using Regumate® (Altrenogest, MSD AH) in order to ensure a correct timed introduction of gilts per batch (60-70% of gilts were treated). To avoid bad performance of 2nd parity sows, Regumate® was also administered during 7 days after weaning to sows with poor body condition to allow them to recover it. To evaluate the efficacy of the new gilts management strategies, reproduction data from January to October of 2013 were compared to the same period of 2012.

Regarding to 1st litter sows, data of 284 sows reared in 2012 were compared with 302 sows reared in 2013. Fertility increased from 88% to 93%. Total Born also shown a clear improvement, moving from 11,76 in 2012 to 12,47. Regarding to 2nd parity sows, its fertility was recovered from 78% in 2012 to 88% in 2013. Total Born also improved from 12,32 to 13,03. Weaning capacity of the farm increased from 24,76 to 26,1piglets/sow/year. If we refer to the Fertilty Index of the farm (Total Born/matings) there was an increase of 1,03 piglet/mating, meaning that in 2013, an extra of 1812 piglets TB were obtained in the farm.

Management of replacement gilts is critical to obtain reproduction targets. The application of the existing knowledge in terms of environment, heat stimulation and detection, nutrition and estrus synchronization is key in terms of reproductive optimization.

P242 IMPROVED PIGLET QUALITY AND SOW REPRODUCTIVE PERFORMANCE FOLLOWING TREATMENT WITH A GNRH ANALOGUE (PEFORELIN) ON A HIGH PRODUCTIVE SOW HERD

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In high productive farms, FSH/LH analogues and GnRH analogues are used to decrease the weaning-to-oestrus interval and to increase the insemination rate. The present study investigated the effect of a GnRH analogue (peforelin, Maprelin®) administration in gilts, primiparous and pluriparous sows on sow reproductive performance and piglet quality at birth. In a high productive sow herd with 450 sows, sows were stratified in gilts, primiparous and pluriparous sows and randomly allocated to 2 groups: peforelin treated (Maprelin® = M-group) or no treatment (control = C-group). Gilts were injected 48h after the last altrenogest treatment and sows 24h after post weaning (PW) . Weaning-to-estrus interval (WEI), insemination rate (IR), farrowing rate (FR), farrowing efficiency index (FEI), number of total (TBP), life and stillborn piglets, mummies and life piglet index (LPI) were calculated and compared between treatment groups. To assess piglet quality at birth, 6033 piglets from 426 litters were weighed individually within 24 h after birth.

IR improved significantly (P = 0.0119) in the M-group compared to C-group with similar WEI for both groups for sows in estrus until day 7. FR was not impacted resulting in a significantly better FSR (= farrowings per 100 treatments) (P = 0.0078) for M-group (79.2%) as compared to the C-group (70.2%). All parameters concerning number of piglets born were similar between both groups, resulting in a significant effect on the LPI (C-group, LPI = 1032; M-group, LPI = 1151; P = 0.0078). Overall, no effect of peforelin treatment on piglet birth weight could be observed, although specific subcategories (1st parity and older (5+ parity) sows) did have a significant positive impact of treatment on birth weight. During late summer (August-September) alltreated sows profited from peforelin treatment, although the weight improvement was not statistically significant.

In conclusion, peforelin treatment had a significant positive effect on several to the crucial sow performance parameters (IR, FEI and LPI) without a negative impact on piglet birth weight.

P243 PROFITABILITY OF MONZAL® IN FARROWING SOWS COMPARED WITH THE USE OF CARBETOCINE

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Introduction. Incidence of stillbirths is a major cause of piglet loss before weaning.
The use of vetrabutine or oxytocin seems to be interesting in order to decrease the duration of piglet expulsion. Nevertheless the use of oxytocin may increase intraparturition piglet mortality.
The objective of this study was to evaluate the profitability using vetrabutine(Monzal®, Boehringer Ingelheim Vetmedica GmbH) or carbetocine systematically in sows at farrowing.
Materials and Methods. The study was conducted in a 550 hyperprolific sows farm in Spain.
Sow treatment groups were randomly selected in a before and after study as follows. First, during several weeks, 145 sows were injected intramusculary with 1,5 ml carbetocine after the first born piglet. In the following week's batches, 125 sows were treated with Monzal® also after the first born (3ml/gilts and 4ml/multiparity sows). No prostaglandine treatment was applied. Data collected were farrowing parameters and piglet average weight. The return on investment was calculated using a large economics data base and market prices for each product. The data were evaluated by Analysis of Variance(ANOVA).
Results. Table 1 reveals that, total born piglets was similar for both treatments (+0,02 for Monzal® group). The Monzal® group had 0,22 stillbirth less than the carbetocine group. With this scenario we can see that sows treated with Monzal® weaned more piglets (13,32) than those treated with carbetocine (13,08).
No statistical differences were detected between treatments but it should be expected with a higher sample size. The significance for stillborn could be defined as a tendency ($p<0.10$) accompanied with a relevant difference between treatments.
The coefficient of variation for number stillborn per litter was 20% higher (significative F Test).
When using all of parameters including improvements at farrowing and reduction of stillbirths, the Monzal group showed the largest return on investment of 11,76€ per euro invested, versus carbetocine
Conclusions. This study has demostrated that the systematic use of Monzal® improves sow herd performance parameters compared with carbetocine. In hyperprolific sows the use of Monzal® in the beginning of farrowing has shown a reduction of stillbirths, particularly for the high stillborn litters and therefore an increase of the number of weaned piglets per sow/year.

P244 DEVELOPMENT OF AN ABORTION PROTOCOL IN PIGS IN FLANDERS

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Abortions have a major economic impact on pig production. However, determining their etiological diagnosis is rather disappointing. The purpose of this study was to set up a protocol to increase the percentage of diagnoses of abortions in pigs. Preliminary results of 50 cases are presented. Aborted fetuses of 29 herds with several abortions in one week were investigated. Only abortions between 70-108 days of gestation were included (1 to 6 per farm). A necropsy of all fetuses (n= 350) was carried out to detect macroscopical lesions. Several mixed samples were taken from 3 piglets per abortion. A stomach swab was taken for microbiological examination, in order to detect aerobic bacteria, L. monocytogenes, B. suis, yeasts and molds. Various samples were taken for PCR testing, including a mixed sample of liver and spleen for PRRSv, Leptospira spp. and BVDv, umbilical cord for PRRSv, brains for T. gondii, heart for EMCv and PCV2 and liver for M. suis. Lung samples were used for isolation of enteroviruses whereas thoracic fluid was tested for parvovirus. Organs with macroscopical lesions were histologically examined. Thirty-four abortions had a positive aerobic bacterial culture, in which mainly E. coli was found. One culture was positive for L. monocytogenes, 5 for yeast and molds. Twelve PCR tests were positive for PRRSv, 6 for PCV2 and 2 for M. suis. Eight thoracic fluids were tested positive for parvovirus. Although positive results were obtained, the detected pathogen was not always thought to be the primary cause of the abortion. Some cases had positive results in several tests, indicating that the abortion could be multifactorial. However, in half of the cases, an indication of the etiological abortive agent was present, and more specifically PRRSv (25%), an aerobic bacterium (8%), PCV2 (6%), yeasts and molds (6%), M. suis (4%) and L. monocytogenes (2%). In 33 abortions a matrix comparison was made for PCR PRRSv between the umbilical cord and a mixed sample of liver and spleen. Of all positive samples, PRRSv was found in the umbilical cord in 92%, whereas the mixed sample was only positive in 55% of the cases. These preliminary results suggest that setting up an abortion protocol which include necropsy and histological examination could be promising. In addition, samples can be taken for examination of those pathogens, that seem to occur as an etiological cause of abortion in Flanders. For PCR PRRSv in particular, a mixed sample of liver, spleen and umbilical cord should be taken in order to ensure a proper detection of the virus.

P245 OVULATION INDUCTION BY PORCEPTAL ALLOWS SINGLE FIXED TIME AI OF GILTS AND SOWS

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A pre-requisite to obtain high fertility and prolificacy is to perform insemination with fresh semen less than 24h before ovulation. An approach whereby this may be consistently achieved combines ovulation induction (when LH responsive follicles have developed) and insemination in the hours preceding ovulation. Irrespective of age and parity, injection of 10µg buserelin (Porceptal) immediately induces an LH surge that consistently induces ovulation 38-42h later. Two field clinical trials, run in several European farms tested whether a single fixed time insemination, 30-33h following buserelin injection would generate similar reproductive performance as that observed following multiple inseminations at detected estrus. In the gilt study (trial 1), buserelin was injected 115-120 h after the last altrenogest (Regumate) administration. In sows (trial 2), buserelin was injected 83-87h after weaning. In trial 1, farrowing and prolificacy data were obtained on 199 controls and 184 treated gilts. Farrowing rate (controls: 80.9% vs treated: 78.8%) as well as prolificacy, expressed as the total number of piglets born (controls: 12.9±0.3 vs treated 13.1±0.3) were similar between groups. Trial 2 involved 206 and 213 control and treated sows respectively, that were from a range of genetic lines (Dalland, Naima, PIC, ADN and crossbreds) that were either primiparous (20%) or multiparous (80%). Out of these, 200 control and 192 treated sows were inseminated as planned. Fertility (controls: 84.5% vs treated: 87%) was similar between groups. Prolificacy was also unaffected by treatment. In multiparous sows, analysis of the factors likely to interact with treatment to modulate fertility (lactation length, body condition loss) revealed no significant interaction between these factors and fertility. This proves the robust performance of the treatment tested. Noteworthy was the observation that fertility of primiparous sows with short lactations was low, particularly in the treated group. It is concluded that the proposed treatment schedules allows successful breeding of gilts and sows with a single fixed time insemination. This may help to optimize batch management in breeding farms as well as trigger saving on semen costs and reduce the time needed for estrus detection. However, for obtaining optimal reproductive performance, the timings of buserelin administration and of insemination will need to be strictly respected.

P246 TRANSVAGINAL ULTRASOUND-GUIDED BIOPSY COLLECTION OF OVARIAN TISSUE IN SOWS - A PILOT STUDY

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A procedure for obtaining ovarian tissue in sows without euthanizing or compromising the welfare of the animal would be desirable for experimental and clinical purposes. For these purposes, a transvaginal ultrasound-guided biopsy collection method has been used in other species, such as mares and cows, but not in sows.

Thus, purpose of the present pilot study was to develop and evaluate a similar method in sows. Different biopsy needle sets and intravaginal ultrasound probes were tested. The most suitable biopsy needle was a semi-automatic tru-cut Biopsy needle (16G, 25cm length, 10mm notch, Ultimate by Zamar). The biopsy needle consisted of an inner needle with the specimen notch and an outer cutting cannula. The needle was inserted into a needle guide, which was placed onto a micro-convex transvaginal ultrasound probe (SE3123, Endocavity probe, Esaote). The probe was connected to an ultrasound device (MyLabOne Vet, Esaote).

The probe was placed into the vagina adjacent to the cervix with one hand. With the other hand the ovary was placed transrectally against the vaginal wall towards the tip of the probe until the ovary was visible on the ultrasound screen. After the ovary was in place, the biopsy needle was pushed about 5mm through the vaginal wall into the ovary. The echogenic tip of the needle allowed confirmation on the ultrasound screen of the right position of the biopsy needle in the ovary. After the biopsy needle was in place, the trigger was pushed and the inner needle advanced for 10mm into the ovarian tissue exposing the specimen notch, followed by the outer cannula cutting and trapping ovarian tissue in the notch. Biopsies were collected from 4 animals at 6 consecutive days. A biopsy core was obtained in 18 out of 24 attempts (75%). After the 6 consecutive days, the animals were euthanized and a laparotomy was performed. The ovaries and the vaginal wall were gross evaluated to assess the effect of the biopsies on the reproductive tract. In none of the animals pathological changes occurred. Furthermore, during sampling period the stage of the oestrus cycle was monitored with the ultrasound before biopsy was performed. All animals showed normal cyclic changes at the ovary throughout the sampling period. Both findings indicate that the procedure has no negative effect on the reproductive tract.

In conclusion, an ultrasound-guided biopsy collection of ovarian tissue is also possible in sows. It is a practical none invasive approach that makes euthanasia unnecessary and can be used routinely and repetitively for experimental and clinical purposes.

P247 RNA EXTRACTION FROM OVARIAN TISSUE COLLECTED WITH A TRANSVAGINAL ULTRASOUND-GUIDED BIOPSY METHOD – A PILOT STUDY

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The determination of gene expression patterns, under specific circumstances or in a specific cell, is of big scientific interest. So far, to study gene expression patterns in ovarian tissue in the sow, the animal had to be euthanized and excisional biopsy (EB) had to be performed. Our research group has lately developed a transvaginal ultrasound-guided biopsy (TUB) collection method, which would make euthanasia unnecessary. Nevertheless, TUBs are very small in size which makes it difficult to handle and store them without degrading the genetic material. Thus, the present pilot study evaluates different storage media for TUB and compares the integrity and quantity of genetic material in TUB and EB.
On the farm, biopsies were collected from the ovaries of 4 sows in 2 different ways. First, TUBs were collected in living animals. After that, sows were euthanized and EBs were collected. The TUBs were placed into 3 different storage media. These media were paraffin, liquid nitrogen, and RNAlater. The EBs were stored only in liquid nitrogen which was considered as the golden standard for gene expression analysis.
In the Laboratory, TUBs stored in paraffin and liquid nitrogen were dismissed, because these media proved to be inappropriate for processing the small-sized biopsies. Thus, only TUBs stored in RNAlater and EBs in liquid nitrogen were analyzed and compared. The biopsies were homogenized and RNA was extracted using GenElute™ (Sigma Aldrich Life Science). For assessment of RNA quantity a spectrophotometer was used (NanoDrop 1000, ThermoScientific). For assessment of RNA integrity the RNA integrity Number (RIN) was determined (Agilent 2100 Bioanalyzer, RNA Nano LabChip, Agilent Technologies). The RIN score ranges from 1 to 10, where 1 is completely degraded and 10 completely intact. A RIN of >8 is generally regarded as a good quality RNA.
The resulting RNA integrities were similar between TUBs and EBs with RINs of 7.7 (TUB) vs. 7.8 (EB). The RNA quantities were different with amounts of 70 µg (TUB) vs. 250 µg (EB).
I conclusion, handling and storing very small tissue samples such as biopsies obtained with TUB is challenging. There is a risk of degradation of genetic material. However, the present results indicate that it is possible to use biopsies collected with TUB for gene expression analysis if they are stored in RNAlater. The RNA integrity is similar to biopsies collected traditionally with EB. Furthermore, sufficient RNA quantities can be obtained which allows performing further downstream applications, such as real-time PCR.

P248 SOW BEHAVIOR EVALUATION AT FARROWING AND FIRST CONCLUSIONS

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Gestation leads to physiological and behavioral changes. In particular, a slower digestive transit resulting in abdominal pain, which, adding up to the pain of the farrowing process can affect sow behavior. This study proposed a simple protocol to characterize sow behavior at farrowing and to evaluate the difficulty of farrowing depending on human vagina exploration, oxytocine injection, length of farrowing, sow rectal temperature, and the sow noise for each birth.
Results demonstrated the reality of nervous sows at farrowing (only 54% of "maternal sows" in the herd), and showed the correlation between maternal behavior and piglets performances: piglets from calm mothers were significantly more vigorous at birth, while piglets' mortality was higher for aggressive sows, with negative consequences on piglets' weight at birth.

P249 NEW WAYS TO EVALUATE THE BENEFIT OF GILTS SYNCHRONIZED BY ALTRESYN® ON THE FLOW OF BREEDING ANIMALS AND THE PIGLET OUTPUT

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Introduction. The ability to introduce a proper number of replacement gilts is essential for batch management to maintain the batch size, in weekly or more week batch management systems. Having gilts in estrus at a predicted time simplifies the entry of gilts into the sow group and allows using more efficiently the farrowing facilities.
Materials and methods. A SPF 1170 sow farm with weekly farrowing cycle started synchronizing estrus of gilts using Altresyn®. The reason was to avoid weeks with too many weaned piglets due to uneven availability of gilts in heat every week and to unify the age of gilts at first service. Gilts after observed first estrus were treated 18 days with Altresyn®. Farrowings of 42 batches with synchronized gilts were compared with previous 40 batches, when gilts were inseminated in 2nd spontaneous heat.
Results. Out of 816 gilts treated with Altresyn®, 758 were successfully mated (93%) with high rate of synchronization (89.7% mated within 3 days). When counted altogether sows and gilts, 94.5% of them were mated in 3 days, compared to 83.5% before. The distribution of the age range at first service of 210-239, 240-269 and 270-299 days was previously 19%, 50% and 31% respectively while after synchronization it was 52%, 42% and 6% respectively. The average N° of weekly inseminated gilts increased from 13.2 to 15.3 ($p<0.05$) and the variability among weeks decreased significantly ($p<0.0001$). There was also statistically significant difference for homogeneity of variance before synchronization and after in terms of weekly served sows and gilts together ($p<0.005$). As the result the weekly N° of farrowings in batches with synchronized gilts increased from 50.8 to 53.5 ($p<0.05$) and became more even as well ($p<0.05$). Better filled farrowing rooms with less divergence resulted in the increase of 1.2 days of lactation and 27.5 piglets weaned weekly on average ($p>0.05$). The reproductive performance of P1 sows treated as gilts with Altresyn® was similar as before with the conception rate 92.1% and WOI 5.3 days compared to previous results of 91.4% and 7.8 days.
Conclusion. Synchronization of a planned number of gilts in heat to be introduced into new batches was a challenge for the weekly operating farm. Synchronization of gilts with Altresyn® allowed more even numbers of matings every week. Higher homogeneity of the flow into the farrowing rooms improved the utilization of farrowing units which resulted in higher overall weekly output of piglets.

P250 COMPARISON OF ALTRESYN® WITH ANOTHER ALTRENOGEST PRODUCT IN SYNCHRONIZING THE ESTRUS IN GILTS

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Introduction. Synchronisation of estrus in sexually mature gilts can be achieved by suppressing the ovarian activity with progesterone analogues for the period longer than the lifespan of corpora lutea. After the withdrawal of such inhibition, new follicular phase will start in all treated animals at the same time, resulting in synchronized onset of estrus. In numerous studies the administration of altrenogest to the gilts resulted in the increased fertility rate compared to non-treated animals. The objective of this study was to compare the efficacy of Altresyn® (Ceva) with another altrenogest product and the control, not synchronized gilts.
Material and methods. Puberal gilts were allocated into three groups G1-G3 with 40 animals in each group. After the first observed heat G1 was treated with Altresyn® for 18 days, G2 with product A for 18 days and G3 included gilts in their second spontaneous heat. All gilts were inseminated twice with 12 hours interval after the standing heat was observed in the presence of the teaser boar. Four weeks after insemination the gilts were tested for pregnancy by ultrasonography.
Results. All gilts came in heat after the treatment. The average interval between the end of treatment was 6 days in G1 and 6.5 days in G2. In the treated groups 3 gilts were re-inseminated (1 and 2 in Altresyn® and G2, respectively), while 4 gilts were re-inseminated in the control group. There were no statistically significant differences among the groups ($P> 0.3589$), however more gilts were re-inseminated in the control group than those in the treated groups. In each treated groups, 2 gilts were not pregnant while there were 4 in the control group. There were no statistically significant differences among the three groups ($P=0.6752$), however more gilts were non-pregnant in the control group (2 vs. 4).

	Oestrus rate	Non-returns	Pregnancy rate
Altresyn®	100%	97.5%	95%
Product A	100%	95%	95%
Control	NA	90%	90%

Conclusion. Treatment of gilts for 18 days with product A and Altresyn® resulted in 100% induction of estrus within a predicted time interval. The pregnancy rate was numerically increased in treated gilts in comparison to the controls, however the difference was not statistically significant. Altresyn® proved to be a highly efficient product used for managing the estrus in replacement gilts.

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