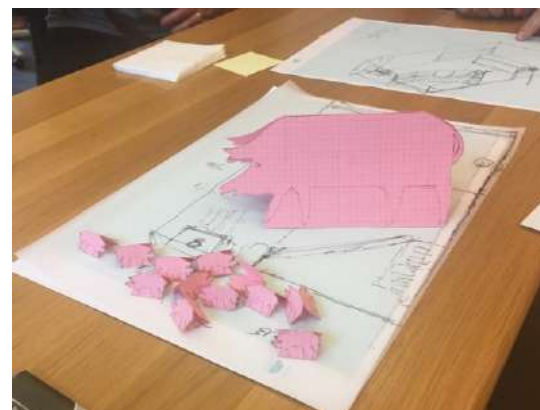


LLS18 – Loose Lactating Sows 2018



Report of the

Loose Lactating Sows Workshop 2018

30th April – 1st May, 2018, Copenhagen, DK

Edited by Vivi Aarestrup Moustsen

Contents

	Page
Delegates	3-8
Introduction	9
Agenda	10-13
Presentations	
Welcome to SEGES Pig Research Centre	14-32
Session 1 - State of the art	
Improving pig welfare in a country where all lactating sows are loose housed	33-46
Presenting concrete results from experiments	47-63
Experience and problems with the pen design	
What to do in the future with the temporary confinement	
Selecting the right sow	64-96
Where do we go from here?	
How much milk can a sow produce – and how to feed a high yielding sow	97-121
Test of ten pen designs – what did we learn?	122-139
Where do we go from here?	
Pro-SAU – what did we learn?	140-170
Where do we go from here?	
Take home messages from session 1	171-172
Session 2 - How to design the perfect pen?	
Welfare Pigs – who, why, what, how many, what’s next?	173-190
Introduction to workshops	191-198
Pen design: There will be a number of tables discussing different subjects. Each participant must choose three subjects to contribute. The discussions shall lead to recommendations and/or specific needs for further research. The subjects to be discussed will be factors related to pen design influencing pig welfare, productivity and/or management.	
Session 3 - Implementation in future farms	
Snapshots – loose lactating sows	199-221
Logistics and health, and impact of eg. using 10 seconds extra per pen per day or 0.5 extra square meter per pen.	222-243
Experience in introduction of new loose farrowing systems and engaging employees	244-262
Welfare in pig production – worldwide/EU/UK perspectives	263-272
Welfare as added value?	273-293
Introduction to <i>Dragons’ Den</i>	294-298
Take home messages	299-300
Notes from discussions	301-311
Posters	
Sow behaviour and piglet growth after late cross-fostering in crates and pens	312
Temporary crate opening procedure affects immediate post-opening litter mortality and sow behaviour	313
Impact of playing classical music and scratching on avoidance distance in loose housed farrowing sows	314
Supplementary	315



WHO ARE WE?

Look in folder: Country, photo, name, email – and a little extra





Loose Lactating Sows 2018















LLS18











Copenhagen 30th April - 1st May

A1 7

LLS18 – Who is here?

















	Name + email	About me
	Emma Baxter Emma.Baxter@sruc.ac.uk 	<ul style="list-style-type: none"> • Senior Researcher, Animal Behaviour and Welfare Team, SRUC • I specialise in pigs with specific research interests in: neonatal survival, developing alternative farrowing and lactation systems for sows and litters, mitigating the health and welfare impacts of selection for production traits, optimising high welfare systems using genetic selection strategies and understanding the short- and long-term health and welfare benefits of positive early-life experiences and understanding negative affective states in sows (e.g. hunger and exhaustion). • I work closely with industry and other stakeholders to translate science into practice and support welfare changes at the farm level. • I'm the co-creator and manage the free farrowing website www.freefarrowing.org
	Sandra Edwards sandra.edwards@newcastle.ac.uk 	<ul style="list-style-type: none"> • Professor Emerita, Newcastle University • Retired since last autumn • Worked with Emma Baxter (SRUC) on FF projects <ul style="list-style-type: none"> (i) PigSAFE (pen design and testing), (ii) Freesow (selecting sows for free farrowing) • PhD student Becky King just completing thesis on

		<ul style="list-style-type: none"> (i) previous farrowing experience, (ii) crate opening protocols, (iii) response to fostering
	<p>George Sorensen G.E.Sorensen@leeds.ac.uk</p> 	<ul style="list-style-type: none"> • Research Manager at the University of Leeds Farms, UK. • The University of Leeds Pig Unit consists of 200 sows housed indoors and 200 sows housed outdoors. We are currently undergoing an indoor expansion from 200 to 440 sows that will include temporary farrowing crates, significant monitoring capability and reconfigurable spaces to allow more welfare and behaviour experiments and product tests to be conducted - hence my interest in this workshop. • PhD in PRRSV host/virus genetics from the Roslin Institute, University of Edinburgh. I am half Danish!
	<p>Kate Parkes kate.parkes@rspca.org.uk</p> 	<ul style="list-style-type: none"> • Joined the Farm Animals Department of the RSPCA in 2005 • Previously worked as a Scientific Officer for another animal welfare organisation. • Specialises in pig and meat chicken production and welfare, to encourage improvements, using the latest evidence from farm animal welfare research and practical farming experience. • Roles include on-going development of the RSPCA's welfare standards for pigs and meat chickens and of the technical support to the Society's Welfare Outcome Assessment programme on these species. • Responsible for provision of scientific/technical information and advice on farm animal welfare issues, both within the RSPCA and externally • Following a degree in Biological Sciences from Oxford University in 2001, Kate continued her strong interest in animal behaviour by completing Edinburgh University's MSc in Applied Animal Behaviour and Welfare in 2003.
	<p>Penny Sawyer Penny.Sawyer@ciwf.org</p> 	<ul style="list-style-type: none"> • Research Manager (China) in CIWF's Food Business China Team and responsible for the technical credibility and ongoing development of Compassion's awards and resources in China. • Previous work has focussed on improving pig and poultry welfare on farm and within corporate supply chains. • Farm animal welfare experience includes international NGO work primarily in Europe, Brazil and the Middle East; Agricultural Management of the pig and poultry supply chain within a large UK retailer, and have worked within the UK poultry industry managing agricultural audit programmes and poultry welfare research projects. • Bachelor of Science (BSc) with honours degree in Animal Behaviour and Welfare and a Master of Science (MSc) degree in Animal Welfare.
	<p>Sarah Ison SarahIson@worldanimalprotection.org</p> 	<ul style="list-style-type: none"> • SI works in the international farming team at World Animal Protection as a Global Farm Animal Advisor. • Prior to this, SI worked as a research technician and completed a 4 year PhD with SRUC, followed by a 2 year post-doc at Michigan State University, working on several topics relating to pig welfare. • During her time at SRUC, SI worked on the 'PigSAFE' project. • Free-farrowing and/or loose-lactation, along with nest building materials are included in World Animal Protection's pig welfare framework as guidelines for improving pig welfare globally. • World Animal Protection are keen to learn more about successful implementation of free-farrowing/loose lactation at scale.
	<p>Anne-Charlotte Olsson anne-charlotte.olsson@slu.se</p> 	<ul style="list-style-type: none"> • Research Leader at Dept of Biosystems and Technology, Swedish University of Agricultural Sciences (SLU), Alnarp • Main topic; Housing, management and emissions in conventional and organic pig production • Lecturer in Pig Production and supervisor to several Bachelor theses at SLU, Alnarp • Have mainly been involved in national projects in close relation to the production ("Applied Research") • At the moment involved in an EU-project about ammonia emission in slaughter pig production
	<p>Maria Vilain Rørvang mariav.rorvang@slu.se</p> 	<ul style="list-style-type: none"> • PostDoc at SLU, Biosystems and Technology, since feb 2018 • PhD in Animal Science – Animal Ethology and welfare from Aarhus University • Olfaction in applied animal ethology • Cognition and mental abilities of domestic animals • Social behavior and interaction between animals and their housing systems
	<p>Rebecka Westin rebecka.westin@gardochdjurhalsan.se</p> 	<ul style="list-style-type: none"> • Working at a private company "Gård & Djurhälsan" (Farm and animal health), as a veterinary consultant on pig farms in South-West of Sweden. • Engaged in research in collaboration with the Dept. of Animal Environment and Health at the Swedish University of Agricultural Sciences. • Received a PhD in 2014 for research about the effects of using large quantities of straw for nest building in loose housed farrowing sows.

	<p>Gudrun Illmann Gudrun.illmann@vuzv.cz</p> 	<ul style="list-style-type: none"> • Senior researcher at the Institute of Animal Science, Ethology group (Prague, CZ),- • Her research focuses on maternal behaviour in pigs • Over the last ten years, her main focus has been on animal welfare specifically on housing of lactating sows. Currently project leader of a project on temporary crating of lactating sows (2016-2018) • Teaching animal welfare at the Czech Agricultural university
	<p>Johannes Baumgartner Johannes.Baumgartner@vetmeduni.ac.at</p> 	<ul style="list-style-type: none"> • Johannes Baumgartner Ass. Prof. Dr. med. vet.; Dipl. ECAWBM (AWSEL) • University of Veterinary Medicine Vienna, Institute of Animal Husbandry and Animal Welfare • Senior lecturer and senior researcher, head of 'Pig Husbandry Group' • Main topics: behaviour and housing of pigs incl mutilations and transport and precision livestock farming • Partner in Austrian project on new farrowing pens 'Pro-SAU' •
	<p>Jean-Loup Rault Jean-Loup.Rault@vetmeduni.ac.at</p> 	<ul style="list-style-type: none"> • Head of the Institute of Animal Husbandry and Animal Welfare at the University of Veterinary Medicine Vienna • Research on pig social behaviour, • Pig-human relationship, and • On-farm piglet euthanasia
	<p>Irene Camerlink Irene.Camerlink@vetmeduni.ac.at</p> 	<ul style="list-style-type: none"> • The main focus of my studies has been the health and welfare of pigs. • BSc in Animal Health Care, followed by an MSc in Animal Production Systems (Animal Sciences) at Wageningen University, the Netherlands. • Followed by a PhD at Wageningen University on the behaviour and productivity of pigs selected for Indirect Genetic Effects. • Seeing the behavioural abnormalities and welfare problems in practice always motivated me to keep on searching for ways to improve health and welfare through providing a scientific base for potential solutions. • Interdisciplinary research combining animal- and social sciences is herein a main interest, as interdisciplinary work is in my opinion essential to apply science into practice. • More specific research interests are social behaviour of pigs, neurobiology, behavioural genetics, homeopathy, and conflict behaviour
	<p>Roland Weber roland.weber@agroscope.admin.ch</p> 	<ul style="list-style-type: none"> • 1974-1979: Agricultural studies • 1979/1980: Work as stockperson in a pig breeding farm • 1981: Start of the dissertation with the theme "Development of a free farrowing pen" • 1982 until now: scientific collaborator at Agroscope (Swiss federal research station for agriculture). Implementation and supervision of projects on husbandry systems in pig farming, including several on free farrowing (developing the free farrowing pen FAT2 which is the basis for several other types of free farrowing systems)
	<p>Astrid vom Brocke Astrid.vomBrocke@LWK.NRW.DE</p> 	<ul style="list-style-type: none"> • 2011-2014 PhD at the FLI Celle: Topic Development of the management tool "SchwIP" abbr. for "tail biting intervention programme" • 2014-now Consultant for pig production at the Chamber of Agriculture in North-Rhine Westphalia • main working fields are animal welfare especially tail biting, castration, enrichment material, two-level housing systems • new working field loose housed sows and redesign of the service area
	<p>Charlotte Grimberg-Henrici cgrimberg@tierzucht.uni-kiel.de</p> 	<ul style="list-style-type: none"> • Postdoc at the Christian-Albrechts-University (Kiel, Germany) at the institute for animal breeding and husbandry (Prof. Joachim Krieter) • Topic of my dissertation (finished in January 2018) : 'Evaluation of group-housing systems of lactating sows – Impact on behavioural, health and performance parameters' • Master of science : 'animal science' (health and behaviour) at Wageningen University (Wageningen, Netherlands) • Bachelor of science: 'applied animal science' at Van Hall Larenstein (Leeuwarden, Netherlands)
	<p>Anita Hoofs anita.hoofs@wur.nl</p> 	<ul style="list-style-type: none"> • Researcher Wageningen Livestock Research, Department Animal Health and Welfare, My live motto: I don't want to be the riches female on the graveyard, but I want to go to bed with a big smile because what I had achieved today was cool. • Projects: • Project manager Pro Dromi project • Facilitate network 10 Farmers with farrowing pens with freedom of movement for sow and her piglets • Project long tails

	<p>Liesbeth Bolhuis, Liesbeth.Bolhuis@wur.nl</p> 	<ul style="list-style-type: none"> • Project manager group housing of sows in early pregnancy • Associate professor at the Adaptation Physiology Group of Wageningen University, the Netherlands. • Studied Animal Science at Wageningen University and obtained PhD on personalities in pigs in 2004. • Main interests are the behaviour and welfare of pigs. • Major focus is to study the impact of (early life) environmental conditions on development, welfare and health. • Authored or co-authored approximately 90 peer-reviewed scientific papers and 4 book chapters.
	<p>Rebecca Morrison RMorrison@rivalea.com.au</p> 	<ul style="list-style-type: none"> • 22 years commercial pig industry research experience • Manages the Rivalea science program • Responsible for the implementation of welfare programs • “Care for every pig, every day” • Research interests: • Loose farrowing, enrichment, pain management, development of housing systems that provide opportunity for enhance welfare, understanding positive affective states and stress resilience
	<p>Yolande Seddon yolande.seddon@usask.ca</p> 	<ul style="list-style-type: none"> • Current position: Assistant Professor, Swine Behaviour and Welfare, Western College of Veterinary Medicine, University of Saskatchewan, Canada. Role: research intensive position. • Academic training, animal behaviour and welfare. PhD Newcastle University, UK, subject: finisher pig health management. • Research mandate: To develop lasting solutions to swine welfare challenges, contribute knowledge to advance sustainable farming solutions. Slideline: supporting advancements in horse welfare research, navicular rehabilitation. • Current research areas: Management of gestating sows, castration pain, long distance transport of weaned piglets, influence of enrichment on disease resilience, space requirements of nursery pigs. • Research involvement with free-farrowing: During time at Newcastle University, economic analysis of high welfare farrowing systems, and watching of sow nesting and piglet crushing in the PigSAFE system. • Hobbies: Horses, the great outdoors, travel.
	<p>Greg Douglas gregory.douglas@mapleleaf.com</p> 	<p>Dr. Greg Douglas is Vice President, Animal Care at Maple Leaf. In this role, Dr. Douglas is responsible for providing animal care leadership across Maple Leaf, working closely with the Company's pork and poultry operations and stakeholder groups to develop and support a company-wide animal welfare strategy, disciplines and policies.</p> <p>Dr. Douglas joins the Company after serving more than 10 years in the public service, including with the Canadian Food Inspection Agency, as Chief Veterinary Officer for the Province of Saskatchewan and most recently, Chief Veterinarian for the Province of Ontario.</p> <p>Maple Leaf Foods Inc. is a leading Canadian consumer protein company, making high quality, innovative products under national brands including Maple Leaf®, Maple Leaf Prime®, Maple Leaf Natural Selections®, Schneiders®, Schneiders Country Naturals® and Mina™. The Company employs approximately 11,000 people across Canada and exports to global markets, including the U.S. and Asia. The Company is headquartered in Mississauga, Ontario and its shares trade on the Toronto Stock Exchange (MFI).</p>
	<p>Monique Pairis-Garcia pairis-garcia.1@osu.edu</p> 	<ul style="list-style-type: none"> • Assistant professor of Animal Science at Ohio State University • 65% extension appointment and 35% teaching appointment with classes taught to undergraduates, graduates and veterinary students • Member of the Pig welfare committee through American Association of Swine Veterinarians and National Pork Board • Research interests include timely euthanasia, pain management on-farm and assessments and audits
	<p>Yuzhi Li yuzhili@umn.edu</p> 	<ul style="list-style-type: none"> • Yuzhi Li, an associate professor of alternative swine production, swine behavior and welfare • Has been working at the West Central Research and Outreach Center, University of Minnesota since 2005 • Research areas include: • Reducing piglet mortality in group farrowing systems • Group housing of gestating sows • Understanding tail biting in growing-finishing pigs • And recently, organic swine production

	<p>Lene Juul Pedersen lene.juulpedersen@anis.au.dk </p>	<ul style="list-style-type: none"> • I am a professor in Animal welfare at Aarhus University, Denmark • I have done research on pig welfare for more than 25 years • Main research areas amongst other piglets mortality and farrowing pens for loose housing system • Recent focus on challenges related to large litter size and piglet mortality in organic production • Methods to deal with large litters in conventional production: nurse sows and milk supplements
	<p>Peter Theil Peter.theil@anis.au.dk </p>	<ul style="list-style-type: none"> • Senior scientist, Aarhus University, Dept of Animal Sciences • Main interests are nutrition of gestating and lactating sows • Nutrient requirement and utilisation of dietary nutrients • Sow colostrum and milk (yield and composition) • Piglet intake of nutrients, piglet survival and piglet growth
	<p>Janni Hales jhp@jydenbur.dk </p>	<ul style="list-style-type: none"> • Involved in development of free farrowing systems and research on sow behavior and piglet mortality for 10 years • MSc in Animal Science and PhD from University of Copenhagen • Dissertation: Loose housing or temporary confinement of sows in designed farrowing pens • Engaged in research on free farrowing pens conducted by FAWEC (Universitat Autònoma de Barcelona) • Research interests include free farrowing, piglet survival, housing systems, sow reproduction, use of confinement, management strategies and much more •
	<p>Johan Skovgaard jsk@skovgaardagroconsult.dk </p>	<ul style="list-style-type: none"> • Owner and Director of Skovgaard Agro Consult • M.Sc. Animal Husbandry. Copenhagen University)+ Diploma in Etology (Cph. Uni) • Planning and design of large scale pig farms – mostly Central and East Europe <ul style="list-style-type: none"> o Dimension and assumption of production o Input and output, flow, investment budget o Design of pen and buildings and overall layout o On site supervision during construction and mounting • Consultant for PRC regarding trial of ten pen designs for loose lactating sows • Focus on solutions with a positive outcome for both pigs and employees
	<p>Peter Sandøe pes@sund.ku.dk </p>	<ul style="list-style-type: none"> • Trained as a philosopher in Copenhagen and Oxford • Since 1997 professor of bioethics at the University of Copenhagen • Has been involved in political advice and in public discussion of animal issues • Interdisciplinary research combining perspectives from natural science, social sciences and philosophy • Focus on ethical issues, related to animals, biotechnology and food production
	<p>Birgith Sloth Beeco11@yahoo.dk </p>	<ul style="list-style-type: none"> • University degree in Nature Conservation and Animal Behaviour. • Consultant on Nature and Species Management & Animal welfare and behavior. • Advisor to DOSO. • DOSO is an association of 20 Danish Animal Welfare Organisations covering a membership of more than 130.000. • The objective of DOSO is to spread knowledge on existing animal welfare legislation. Further to that DOSO works on ensuring the appropriate enforcement of the legislation while at the same time seeking to ensure improvement of the animal welfare legislation. DOSO in this context is represented in ministerial advisory councils and groups and is on the list of organisations participating in public hearings related to animal welfare issues
	<p>Trine Vig tvt@lf.dk </p>	<ul style="list-style-type: none"> • Chief advisor, Danish Agriculture and Food Council • Working with animal health and welfare policy on national as well as international level • Animal welfare labels and animal welfare standards
	<p>Christian Fink Hansen cfha@seges.dk </p>	<ul style="list-style-type: none"> • Sector Director Danish Pig Research Centre (2017-) • Professor (2015-2016) • Director, Center for research in pig production and health - CPH Pig (UCPH) (2013-2016) • Associate professor University of Copenhagen (UCPH) (2010-2015) and Head of Animal Science Studies • Researcher Murdoch University (2007-2010) • PhD Pig nutrition and production (UCPH) (2004) • MSc Animal Sciences (1999)

	<p>Michael Nielsen michael@tilsbaek.dk </p>	<ul style="list-style-type: none"> • Farmer since 1991, pig producer since 1998. • Herd size 850 sows indoors and in addition, an outdoor organic herd since summer2016. • Produce pigs for the welfare label 'Better Welfare' • Member of the Danish Animal Ethics Council
	<p>Jonas Würtz jowras@go-gris.dk http://www.go-gris.dk/ </p>	<ul style="list-style-type: none"> • Innovative farmer by heart • Full line production (1.000 sows 690 ha.) from farm too fork • Very focused on honesty and openness - especially for the surrounding community • Trying to contribute with facts and good stories in the social media • Chairman for the organization Welfare Pigs
	<p>Kent Myllerup kmy@seges.dk </p>	<ul style="list-style-type: none"> • Manager, Danish Pig Research Centre, Dep. Construction & Production Management. (In the dep. we make R&D and knowledge transfer about production system for pig with level of welfare, environmental technology, production monitoring and management, construction of production facilities. (2014-) • Manager, Graakjaer, company delivering pig inventory and construction (2008-2014) • Advirsor, SEGES, R&D digital system for crop production (1999-2008) • MSc Agri. Science (1999), GDBA (2003)
	<p>Lisbeth Ulrich Hansen luh@seges.dk </p>	<ul style="list-style-type: none"> • Almost 25 years working at Pig Research Centre • Work with a broad range of topics: Loose sows in mating, gestation and farrowing unit, housing gilts, sow longevity, floor types and leg lesions, feeding systems for sows • Currently working with loose sow in the farrowing unit – floor types and lesions on sow and piglets, further development of the covered area
	<p>Marie Louise Madelung Pedersen mlp@seges.dk </p>	<ul style="list-style-type: none"> • 8 years working at Pig Research Centre • Work with a broad range of topics: Reproduction, AI and general sow and piglet management • Currently working with supplementary milk and feeding for suckling piglets • In my master thesis I observed 3500 milk letdowns and registrered a difference of 2 sec. between crated sows (8 sec. milk letdown) and loosed housed sows (10 Sec milk letdown)
	<p>Søren Søndergaard soren@baldershav.dk http://www.baldershav.com/ </p>	<ul style="list-style-type: none"> • 900 sows; 29,000 weaners (7-30 kg); 24,000 finishers (30-105 kg) • 5th generation; family farm since 1877 • Vice-chair SEGES Pig Production • Chair SAGRO (advisory service)
	<p>Lisbeth Shooter Lish@seges.dk </p>	<ul style="list-style-type: none"> • Specialized Senior manager, pigs in SEGES Pig Research Centre and responsible for the overall coordination of the innovation portfolio as well as the areas feed, health, data + our research station and the team of technicians • Several years of experience with pig technical communication (presentations, articles etc.), leadership and management and various board positions • MSc in Animal Science • Previous employment include: • 7 years in the UK working for BPEX (now AHDB Pork) • Nearly 3 years as Head of department for an agricultural consultancy company on Funen (DK) + own pig advisory role
	<p>Vivi Aarestrup Moustsen vam@seges.dk </p>	<ul style="list-style-type: none"> • 2017- Affiliate Associate Professor of Animal Husbandry, Pigs, UCPH • 2012-2017Appointed Honorary Associate Professor Animal Science, Pigs, UCPH) • Since 2002 mainly worked with development of systems for loose housed farrowing and lactating sows. • Conducted on-farm trials for more than 20 years. • PhD (management of outdoor sow herds) and MSc (management in dairy herds) both University of Copenhagen (UCPH) • Over time, co-supervisor for PhD-, master-, and bachelor students from UCPH and universities outside Denmark. In addition, VAM teaches at UCPH • Involved in assimilation of results to end users and ongoing encouragement to get results to work in practice. • Author/coauthor of a number of peer review scientific papers, and of a number abstracts for international conferences, and is also reviewer for scientific journals

Introduction

In Denmark, the pig industry announced in 2018 that one main issue in their future strategy is successful loose housing of lactating sows. One first step was to host a workshop focusing on Loose housing of Lactating Sows 2018 (**LLS18**).

The aim of the LLS18-workshop was for delegates to share challenges, solutions and knowledge gaps when it comes to pens for loose farrowing/lactating sows – including pens for sows with large litters, and thereby make it possible for our stakeholders across borders to make decisions on a well-informed basis.

In 2008, delegates Lene Juul Pedersen and Vivi Moustsen organised the first event of this nature in Copenhagen, Denmark: (<http://pure.au.dk/ws/files/2426080/intrhus11.pdf>).

In 2011 delegate Johannes Baumgartner hosted the second, highly successful, event in Vienna, Austria: (http://www.vetmeduni.ac.at/fileadmin/v/tierhaltung/FFWV_2011-Report.pdf).

In 2016, this was followed up upon when delegates Emma Baxter and Sandra Edwards hosted the third, excellent workshop in Edinburgh:

https://www.freefarrowing.org/freefarrowing/downloads/download/30/ffw_2016.

Since the workshop in Edinburgh in 2016, UK-projects regarding finding the best mothers (sows) have been completed, so has the Austrian Pro-SAU-project and the Danish test of ten different pen designs and other relevant studies.

Some results are published in peer reviewed journals, however, there is also very important unpublished experience. Such experience can be valuable in discussions regarding the development of pens and management routines for loose lactating sows. At a workshop it is possible to share our experience with each other. In this way, we can speed up the process of producing pens for loose-housed sows in the farrowing unit and hopefully learn the most up-to-date information from each other.

The LLS18 workshop was held in Copenhagen on 30th April and 1st May 2018. It consisted of presentations of latest results from projects conducted in Sweden, Czech Republic, United Kingdom, Austria and Denmark. In addition, there were discussions on how to implement the knowledge and experience that were presented during the workshop into future pen designs. Day 1 at LLS18 focused on production as it looks today, and Day 2 included the impact of increased litter and herd sizes – including the impact on pen design and how work routines, logistics, and health plans are influenced in herds with 2,000-5,000 sows.

The organisers would like to thank Danish Crown, SEGES Danish Pig Research Centre and the Danish Pig Levy Foundation for their generous support of this workshop and its outputs. This report contains the presentations, as well as selected information from discussions and group work and supplementary material.

The report will be made available to the public via www.svineproduktion.dk and www.freefarrowing.org.

Vivi Aarestrup Moustsen and Christian Fink Hansen

Agenda

Monday 30 th April	#	The workshop takes place at:	Danish Agriculture and Food Council, Axelborg, Axeltorv 3, 1609 Copenhagen. Meeting Room A, 1 st floor.	
8.00-8.15		Coffee + posters	Time to place your posters – you can place them next to one-another regardless of if it is completed, preliminary, ongoing, upcoming....so a potential link/story between your studies can be followed	
8.15-8.25	1	Introduction to the workshop	Everyone is to prepare 20 seconds speak/5 bullets about themselves and send to Vivi by email no later than 25 th April. Preferably including a photo.	Vivi
8.30-8.40	2	Welcome to SEGES Pig Research Centre Introduction to the new strategy Challenges	Sector Director Christian Fink Hansen will introduce us to the strategy the board of the Danish pig livestock industry has recently decided upon. A strategy which includes: No castration, no tail docking, loose housing of lactating sows and improved survival rate of piglets – at the same time as ending the use of zinc-oxide and reducing the use of antibiotics – and not the least – stay competitive in a global market.	Christian Fink Hansen, Sector Director for Danish Pig Production, PhD
Session 1 State of the art		Chair: Sandra Edwards	Presentations must be at least 5 minutes less than the time frame in the agenda – allowing for at least 5 minutes for questions.	
8.45-9.10	3	Improving pig welfare in a country where all lactating sows are loose housed	In Sweden, lactating sows has been loose housed since 1988 and can only be confined the first few days after farrowing if the sows show aggressive or abnormal behaviour which can bring the piglets at risk. However, the piglet mortality rate has been high in Sweden, and Anne-Charlotte (AC) has been in charge of a project aiming at reducing piglet mortality by confining the sows. AC will introduce us to the results from the project and to other initiatives in Sweden towards improving the overall welfare of the lactating sows and their piglets.	Anne-Charlotte Olsson Swedish University of Agricultural Sciences (SLU), Department of Biosystems and Technology (BT)
9.10-9.40	4	Presenting concrete results from experiments Experience and problems with the pen design What to do in the future with the temporary confinement	Gudrun Illmann (GI) will present results from their most recent trials, including experience and problems with the farrowing pen design. In addition, GI will introduce us to the future with the temporary confinement – as she and her colleagues see it.	Gudrun Illmann, Dr., Institute of Animal Sciences Ethology department, Prague
9.40-10.10	5	Selecting the right sow Where do we go from here?	Emma Baxter has worked with maternal capacity of sows in a number of research products. EB will take us through the different elements of successful loose housing of lactating sows influenced by the sows. How does parity, litter size, 'personality', experience, udder confirmation, body movements affect the outcome – so how can we – or can we select the perfect sows - and where do we go from here?	Emma Baxter, Dr., Senior Researcher, Animal & Veterinary Sciences, SRUC
		Short break	Poster session	
10.40-11.05	6	How much milk can a sow produce – and how to feed a high yielding sow	What is the potential milk production of sows, how should we feed high-prolific sows and how can we obtain high milk-production in consecutive lactations? Peter Theil (PT) has in his research focused on the quantitative metabolism of energy and nutrients in sows and piglets, onset of lactation, lactation rescue and cessation of lactation, and regulation of mammary growth and muscle growth.	Peter Theil, PhD., Senior Researcher, Department of Animal Science, Molecular nutrition and reproduction, Aarhus University

			PT will introduce us to how sows in their trials produce 16 litres of milk a day and wean more than 13 piglets weighing beyond xx kg each at 27 days of lactation, and not the least – what does it take to do the same under commercial conditions.	
11.05-11.25	7	Test of ten pen designs – what did we learn? Where do we go from here?	In 2016-2017, PRC tested 10 different pen designs for loose lactating sows in a commercial herd. Lisbeth Ulrich Hansen was in charge of the project and will present results from the trial.	Lisbeth Ulrich Hansen, Chief Scientist, SEGES Danish Pig Research Centre
11.25-12.05	8	Austria restricts crating of sows in farrowing pens to the 'critical period' of piglets' life	In Austria it has been decided that by January 2033 must all lactating sows be loose housed. To support the Austrian pig producers in their decision for pens and management, Pro-SAU was conducted from 2013-2017 with the aim of evaluating novel farrowing systems with possibility for the sow to move. The results are available in a comprehensive 500 page report, which Johannes Baumgartner will introduce to us.	Johannes Baumgartner, Ass. Prof. Dr. med. vet. ; Dipl. ECAWBM, University of Veterinary Medicine Vienna
12.05-12.15	9	Take home messages from session 1		Sandra Edwards
		Lunch	Poster session	
Session 2 How to design the perfect pen?		Chair: Kent Myllerup		
13.00-13.20	10	Welfare Pigs – who, why, what, how many, what's next?	<i>Welfare pigs</i> (www.welfare-pigs.dk) is an organization for Danish pig producers who have loose lactating sows. Jonas Würtz is the chair of the organization and will briefly introduce us to their production, to the organization and not the least to the challenges they see – including needs and expectations to future research activities?	Jonas Würtz www.go-gris.dk
13.20-13.30	11	Introduction to workshops Pen design: There will be a number of tables discussing different subjects. Each participant must choose three subjects to contribute. The discussions shall lead to recommendations and/or specific needs for further research. The subjects to be discussed will be factors related to pen design influencing pig welfare, productivity and/or management.	For loose housing to be successful – we need both to have a high level of productivity, a high level of pig welfare and a high level of management. To achieve this can be like trying to eat an elephant. However, can we eat smaller pieces (solve elements) and then combine solutions, we can get further. Therefore we'll like you to give your qualified input to: 1. Nestbuilding material, enrichment, rooting (including Fulfill sow/piglet needs, commercially available, no risk of ASF or...,) 2. Confinement (Yes/no, if yes – when close/open (time of day, day...)...) 3. Reduction of early piglet mortality (Sow, piglets, pen, management) 4. Increase weaning weight and quality of piglets (Feeding of sow, feeding of piglets, health), 5. Dry and clean floor (Sow dunging behaviour, piglet dunging behaviour, floor characteristics, pen design, ...) 6. Relationship between sow, piglets and staff (Handling of sows, piglets, training of staff, access to pens, importance of 'noise level') 7. Miscellaneous © (Subjects not covered at the other tables – or just to many persons at a table to discuss a subject)	Vivi The model will be '1-2- more'. That is each round will: 1) be initiated by 3 minutes – think and write down your most important inputs on post-it; 2) 4 minutes - explain your ideas in pairs; 3) 15 minutes - discuss and group the inputs in the group Chairs have been appointed for each subject (table).
13.30-13.55		First round		

13.55-14.20		Second round		
14.20-14.45		Third round		
		Coffee break	Poster session	
15.15-15.45	12	Can't live without-messages from session 2	One person per subject discussed during the workshops in session 2 will be asked to sum up the most important messages from the given subject	
15.45-15.50	13	Introduction to 'build a pen'		Vivi
15.50-16.45		'Build the perfect pen anno 2018'	The participants will be placed in new groups – and each group must - based on the 'can't live without' messages – design the perfect farrowing pen anno 2018.	There will be seven groups of five persons. The groups have been formed and will be presented.
16.45-17.15	14	Our pen	The groups will present their pen (five minutes per group).	
17.30-		Pre-dinner reception – catch up	Poster session	
19.00-21.00		Dinner	At Axelborg (8th floor)	

Tuesday 1st May				
7.45-8.00		Coffee to bring in to meeting room		
Session 3 Implementation in future farms		Chair: Monique Pairis-Garcia	Presentations must be at least 5 minutes less than the time frame in the agenda – allowing for at least 5 minutes for questions.	
8.00-8.25	15	Snapshots from PRC's most recent and upcoming work regarding loose housing of lactating sows	PRC has during the last decade run a number of trials with the overall aim of making loose housing of lactating sows a competitive alternative to the well-known and well-functioning system with farrowing crates.	Vivi Aarestrup Moustsen (VAM) has since 2002 mainly worked with development of systems for loose housed farrowing and lactating sows. VAM has conducted on-farm trials for more than 20 years.
8.25-8.50	16	Logistics and health, and impact of eg. using 10 seconds extra per pen per day or 0.5 extra square meter per pen.	Most of us conduct trials in university settings, or at least under controlled conditions. However, if more sows are to benefit from loose housing we also need to consider impact of herd size on design, management routines, education of employees etc. Johan Skovgaard (JSK) has many years' experience in large scale production systems and how we successfully can implement housing systems in other countries than systems were developed in – if the design is well-thought	Johan Skovgaard, CEO Skovgaard, Agriconsult
8.50-9.10	17	Experience in introduction of new loose farrowing systems and engaging employees	Rivalea is a leading Australian agri-food company with 1,200 employees. In their research programme, they've introduced both the English PigSAFE-pen and the Danish SWAP-pen. Rebecca Morrison is the Animal Welfare & Science Program Manager at Rivalea and will share will us the experiences of introducing welfare pens in a large scale.	Rebecca Morrison, Rivalea, Animal Welfare & Science Program Manager

9.10-9.30	18	Welfare in pig production – an NGOs perspective	How do assure schemes develop standards for pig welfare? Do standards differ between schemes in different countries? Can pig producers 'future guarantee' their investment if they build for loose lactating sows 2018?	Kate Parkes, RSPCA, Senior Scientific Officer, Farm Animals Dept, Science Group
9.30-9.50	19	Welfare as added value?	What are citizens expecting and what are consumers willing to pay for when it comes to housing of pigs and pig welfare?	Peter Sandøe, Professor, Institut for Fødevarer- og Ressourceøkonomi, SCIENCE Institut for Veterinær- og Husdyrvidenskab, SUND Københavns Universitet www.dyreetik.dk www.animaethics.net
		Short break	Take down your own posters if you wish to take them home	
10.05-10.10	20	Introduction to <i>Dragons' Den</i>	Can the same pen design be used across the world - in eg Austria, Czech, Denmark, UK, Australia, US and China? Why – or why not? Can large scale herds have loose lactating sows in welfare friendly pens? Can we design pens which can work for larger litters (20+ piglets)? How to attract qualified employees? How to train new employees? How to develop and test management routines? How to voluntarily increase number of loose housed lactating sows?	Vivi
10.10-11.00	21	Implementation of loose housing of lactating sows	We'll form new groups making up their pen to present for the judge. Given that all participants are by now skilled designers of pens – we believe that you in 45 minutes can design or moderate a design of a pen for loose lactating sows and convince the jury that they should invest in your pen design.	
11.00-12.30	22	<i>Dragons' Den</i> final Each group will get five minutes to present their pen to the jury and five minutes to answer questions raised by the jury	Explain how your pen is superior when it comes to meeting the needs of sows', piglets', staff, consumers, retailers and welfare organizations – and therefore have a market potential making it the best investment ever	Jury: Peter Sandøe (UCPH) Johan Skovgaard (Consultant) Sandra Edwards, Kate Parkes, RSPCA
12.30-12.40	23	Take home messages	A very intensive tight-scheduled meeting is coming to an end. We've discussed and shared information about 'pens for lactating sows' for 1½ day. Where are we now; what do we take home – and which questions are open and need for further research?	Sandra Edwards/Vivi
		Herd visit	Lunch on the go	
12.45 - departure		Transport to herd	We'll organize transport.	
13.45-16.00	24	Herd visit		Michael Nielsen, Tilsbæk, Enghaven 5, Slangerup
17.00		Back in Copenhagen	Please let us know if you have a flight to catch and if so then, so we can ensure to have capacity to transport you back in time for flights.	



DANISH PIG SECTOR – NEW STRATEGY

Christian Fink Hansen, Ph.D., Director

30th April 2018

DANISH PIG PRODUCTION



DANISH PIG – 2018

1. Standard pig

- Volume
- Export value
- Securing jobs



2. Niche production

- Licence to produce
- Developing of markets (Welfare, OUA, CSR, organic...)





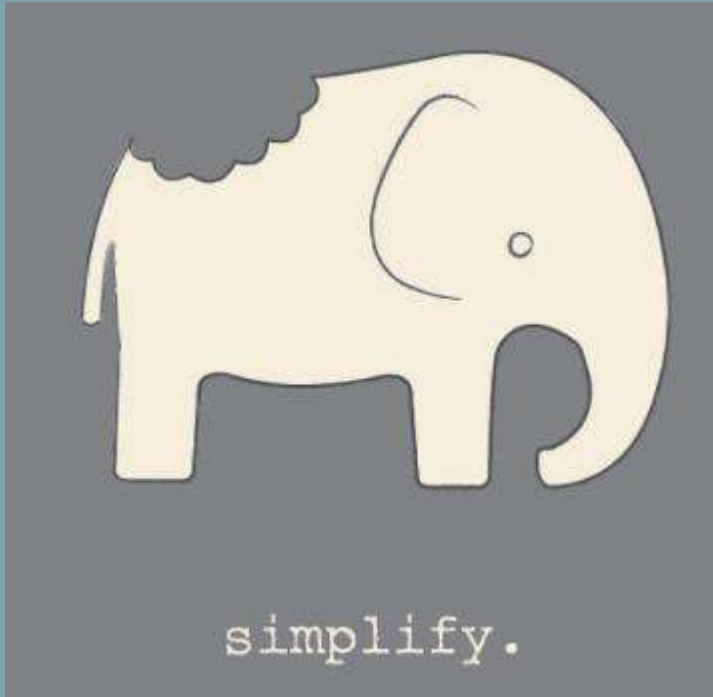
STRATEGY

STRATEGY

- **Improve Communication**
- **Ensure Knowledge Based Production**
- **Strengthen The Danish Concept – Including Third Party Audit**
- **Innovation:**
 - **Ensuring Farm Economy**
 - Genetics – Continue Improvements
 - Concepts For Production And Surveillance Of Production Of Finishers
- **License To Produce:**
 - No Taildocking
 - Loose Lactating Sows
 - Entire Male Production
 - Improving Piglet Survival
 - Reduced Use Of Zink And Antibiotics



SUSTAINABLE SOLUTIONS FOR THE BARNES OF TOMORROW



- **Produced ‘without’**
 - Tail docking
 - Castration
 - Confinement
 - Antibiotics
 - Odour
 - Ammonia emission
 -

MARKET DRIVEN

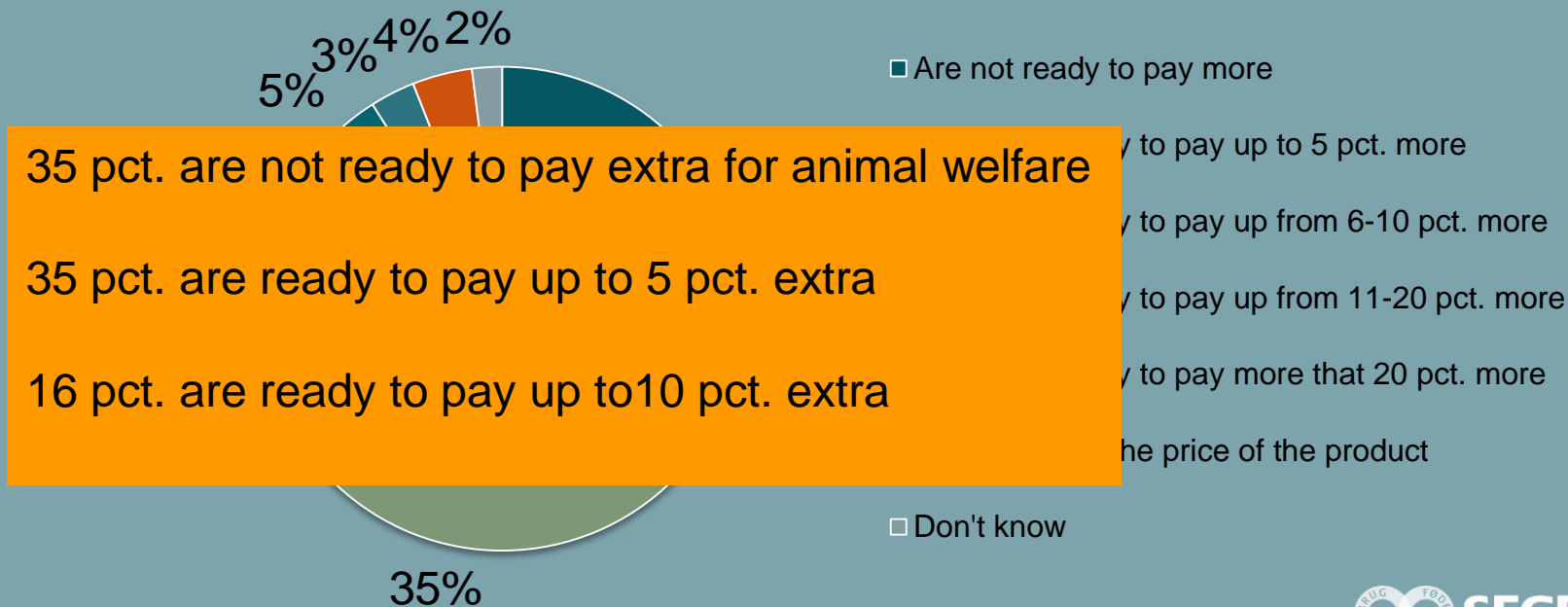
*Animal welfare is in the mindset of the Danes
– and 70 % consider it regularly or frequently.*

But the majority are only willing to pay limited extra









ATTITUDES OF EUROPEANS - TOWARDS ANIMAL WELFARE

EU-28



NATIONAL LABEL WITH THREE LEVELS

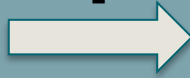
		 	  
No tail docking	X	X	X
Straw as rooting material	X	X (On floor)	X (On floor)
Straw as nesting material	X	X	X
Loose sows	X (Protective rails allowed for 4 days)	X (Protective rails allowed for 2 days)	X
8 hours' transport	X	X	X
Space requirements according to standard requirements	X	+ 30 %	+ roughly 100 %
Weaning 28 days		X	X
Straw in lying area			X
Free-range farrowing			X
Access to outdoor area			X

SCIENCE BASED – AN EXAMPLE

WANTED

- Loose housing of lactating sows
- High level of welfare for sows and piglets

?



Side 10 Effektivt Landbrug Fredag den 5. maj 2017

SVINEFOKUS

SVINEPRODUKTION
Hortavik: Camilla Berntsen
camilla@effektivtlandbrug.dk
63 36 25 44

Peter Møllerup
Chair *Dyrenes Venner* and appointed member of The National Danish Animal Ethics Council

"It is animal welfare to confine the sow around farrowing"

med et få endes flere glæde pr. kasse.
- Det er jo det, alle problemerne opstår. De skruede om på det er mange om-
ter
le-
nes
am-
em-
svet
rede
ning
værke,
ærden
e ham
llet så
ke mar-
rodut-
lgesom
i slapen
lakter vil

af CAMILLA BERNTSEN

Der er forskel på, om bøjen i farvestene til de lede, diegivende søer kaldes beskyttelsesbøjn frøingsbøjn eller færingbøjn. Det af-

Møllerup, formand for Dyrenes Organisations Samarbøjs Organisation - DOSO, da han i forbindelse med seminarer i mandags også holdt et indlæg om vel-



Peter Møllerup, formand for DOSO, mener at danske søer får for mange gris. (Foto: Camilla Berntsen)



Mange pattedyr beskyttes, når søen fås over i det nye færing.

Husdyr

Limousine besætnings sølger
20 køer m/ kalve
28 drægtige køer
1 løddyr
Alle dyr m/ dansk avl
- hermed tryk på
www.limousiner.dk
Telefon 26 12 61 27

WHEN WE PULL TOGETHER - THE CHANCE OF WINNING IS GREATER

- Market driven
- Science based
- Multistakeholder approach





LLS18





LOOSE LACTATING SOWS 2018 – LLS18

Chief scientist Vivi Aarestrup Moustsen, PhD, MSc.,

SEGES Danish Pig Research Centre

Affiliate Associate Professor of Animal Husbandry, Pigs, UCPH.

2018 04 30

LOOSE FARROWING OR LOOSE LACTATING?



LOOSE FARROWING OR LOOSE LACTATING?



LOOSE LACTATING



WHO ARE WE?

Look in folder: Country, photo, name, email – and a little extra



PRACTICAL INFORMATION

- Very tight schedule – please respect
- Water on the tables; coffee/the in between
- Meals- just outside this room
- Toilets – next to the lifts
- Posters – feel free to place posters
- Tonight – reception from 1730 and then dinner 1900 – beer or coffee later on own expense
- Tomorrow – early start – herd visit – cars – ready.....
- Presentations, discussions and posters will be collected and send to you as pdf's



Temporary confinement of the sow to reduce piglet mortality?



Anne-Charlotte Olsson & Jos Botermans
Department of Biosystems and Technology (BT), SLU Alnarp
anne-charlotte.olsson@slu.se 040-41 5092

Short Background- Swedish Pig Production

- Sweden has a very small proportion (1%) of the pig production in the EU.
- In 2016, a total of 2 526 661 pigs were slaughtered.
- Since Sweden joined the EU in 1995, the Swedish pig production has declined about 25 percent.

(<https://www.lrf.se/om-lrf/organisation/branschavdelningar/lrf-kott/grisnaringen/mal-gris/>)

Unequal Competitiveness

	Sweden	Denmark	Germany	USA
Tail docking	0%	90%	90%	Allowed
Fixation of sows	No (?)	<150 days per year	<150 days per year	Yes
Size of farrowing pen	6 m ²	4 m ²	4 m ²	No restrictions
Ban of slatted floors	Yes	No	No	No
Requirements on occupation	Yes + litter	Yes	Yes	No
Use of antibiotics	Lowest in EU	3 x Sweden	15 x Sweden	No
Use of antibiotics as GP / hormones	Ban	Ban	Ban	No restrictions
Day light requirement	Yes	No	Yes	No

Sweden: + zero tolerance against Salmonella

(<https://www.lrf.se/om-lrf/organisation/branschavdelningar/lrf-kott/grisnaringen/mal-gris/>)

Actions to Develop Swedish Pig Production

2014	Action Plan Pig (Handlingsplan Gris) <ul style="list-style-type: none">- production- trading- export
2015	The Investigation of Competitiveness within Swedish Agricultural Production (Konkurrenskraftsutredningen)
2017	The Food Strategy (Livsmedelsstrategin)



Increased competitiveness with maintained animal welfare!

Swedish Pig Production Results 2016

	Average	Best 25%	Best 10%
Pigs per sow and year	25.8	28.2	29.1
Liveborn/litter	14.0	14.5	14.7
Weaned/litter	11.6	12.5	12.8
Mortality %, birth-weaning	17.1	13.7	12.8

Is it possible to decrease piglet mortality by temporary confinement of the sow at farrowing?

A Parallel Comparison Between Temporary Confined and Loose Sows at Farrowing



Comparison

- Dead born (ante partum, intra partum), Liveborn, No. moved, No. piglets after equalisation, ("At risk"), Weaned
- Farrowing time (real and estimated)
- Weight of each pig at birth and at 3 weeks
- For every dead piglet: date and cause of death (no autopsy but detailed template)
 - ⇒ mortality \leq 3 days
 - mortality 4 - 7 days
 - mortality $>$ 7 days
- Treatment / morbidity of sow (template)
- Treatment / morbidity of piglets (template)

Farrowing Pens in the Study

Temporary confined (TC)



Loose (L)



Template - Classification of Death Causes

Recordings in the herd	Comments	After merging death causes
Underweight at birth	≤ 900 g at birth, dead due to starvation, crushing or euthanasia	Underweight
Starvation	Dead due to starvation but without signs of underweight, weakness, splay-leg problems or malformation.	Starvation
Crushing	Died or had to be euthanized due to crushing of the sow without earlier, recorded disabilities.	Crushed by the sow
Weak or splay-leg at birth	Dead due to starvation, crushing or euthanasia since they were unable to cope due to weakness or splay-leg problems (> 900 grams).	Others
Malformation at birth	Dead due to starvation, crushing or euthanasia since they were unable to cope due to malformation.	Others
Diarrhea	Dead due to clear signs of diarrhea.	Others
Joint/claw inflammation	Euthanized due to not recovering after treatment of joint/claw inflammation with antibiotics.	Others
Bitten to death	Bitten to death by the sow	Others
Others		Others

Results

Age Category of Sow	Total		1+2	3+4	≥5
No. litters	318		127	120	71
No. per litter					
Total born	15.1		14.4	15.0	16.8
Dead born	0.8		0.6	0.9	1.1
Live born	14.3		13.9	14.1	15.6
“At risk”	14.3		14.1	14.1	15.1
Dead during suckling period	3.0		2.3	2.9	4.3
Weaned	11.3		11.8	11.2	10.8
Causes of death, No. piglets / litter					
Underweight	1.1		0.8	0.9	1.9
Crushed	1.1		0.8	1.2	1.4
Starvation	0.2		0.2	0.3	0.3
Other	0.6		0.6	0.5	0.7
Mortality, %	20.9		16.5	20.6	28.6

Results

	Farrowing System			p-value	
	Temporary Confined (TC)	Loose (L)		Farrowing System	Age Category
No. litters	157	161			
Total born / litter	15.3 ± 3.9	15.0 ± 3.8		0.23	0.008**
Live born / liter	14.5 ± 3.6	14.2 ± 3.4		0.20	0.03*
“At risk” / litter	14.4 ± 2.7	14.3 ± 2.5		0.51	0.07
Dead during suckling period / litter	2.8 ± 2.4	3.2 ± 2.8		Other statistical model	
Weaned / litter	11.6 ± 1.9	11.1 ± 2.1		0.030*	<0.001***

Results

	Farrowing System		p-value	
	Temporary Confinement (TC)	Loose (L)	Farrowing System	Age Category
Piglet mortality, %				
- Underweight	5.9	6.5	0.40	0.002***
- Crushed	5.8	7.6	Interaction	
- Starvation	1.6	1.5	0.77	0.12
- Others	3.7	4.0	0.75	0.84

Results

	Farrowing system		p-value
	Temporary Confinement (TC)	Loose (L)	Farrowing System x Age category
Piglet mortality, %			
- Crushed (≤ 3 days)	2.6	5.2	
1+2	2.8	3.3	0.57
3+4	1.9	6.6	0.001***
≥ 5	3.3	6.7	0.03*
- Crushed (0-weaning)	5.8	7.6	
1+2	5.6	5.2	0.77
3+4	5.0	10.1	0.001***
≥ 5	7.0	8.6	0.39

Conclusions

- "Underweight" and "crushed" - the most common death causes
- In total 0,4 more surviving piglets in TC compared to L
- Interaction between farrowing system and age category for "crushed" piglets \Rightarrow
no difference between farrowing systems for younger sows
- No significant difference in farrowing time per litter
- Farrowing problems: 7/157 in TC versus 1/161 in L

Temporary crating of lactating sows: What did we learn?

Gudrun Illmann and Sébastien Goumon

Institute of Animal Science, Prague. Czech Republic



*Loose lactating sows workshop,
Copenhagen. April, 30th, 2018.*



Results of our 2 studies



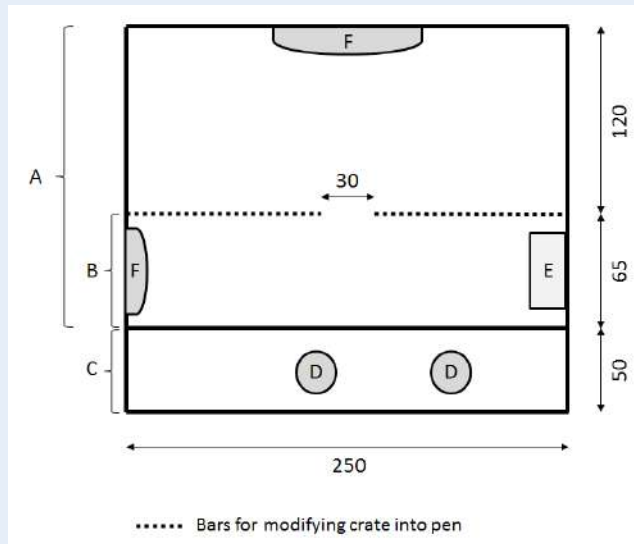
Experience and problems



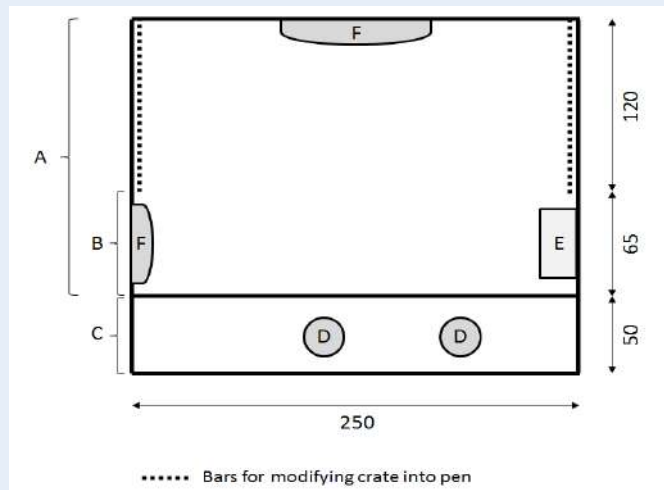
Where do we go from here?

Treatments

- Temporary crating group (N=13): Confinement from D-5 to D3 (≈83h pp.)
- Permanent crating group (N=14): Confinement from D-5 to weaning

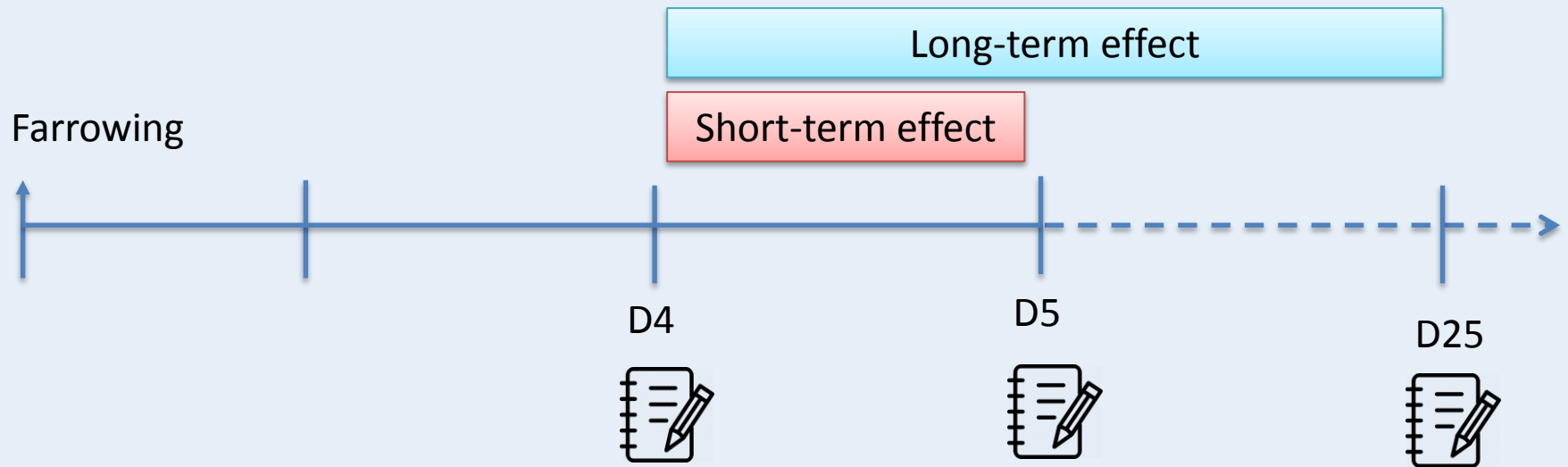


Crated sow (1.6m²)



Free sow (4.6m²)

Short- and long-term effects



Data collection

Behaviour

- Sow posture changes (*rolling, standing to lying*)
- Sow activity (*active/inactive*)
- Sow nursing behaviour (*nursing type, termination*)
- Piglet activity at the udder and in the pen
- Piglet suckling behaviour (*fights, pre- and post-massage duration*)

Stress hormones

- IgA concentration
- Cortisol concentration

Production data

- Piglet mortality (recorded every day)
- Piglet weight gain

Housing effect

Short-term effects:

Sow

- Increase (+3.8%) in activity in TC sows
- Increase (+6.9%) in rolling in TC sows
- Decrease (-54%) in IgA levels in TC sows
- No effects on cortisol levels
- No effects on nursing behaviour

Piglets

- No effects on mortality
- No effects on weight gains
- No effects on activity
- No effects on suckling behaviour

Long-term effects:

Sow

- No effects on sow activity
- No effects on hormones
- Longer duration (+20 s) of pre-massages in PC sows

Piglets

- No effects on mortality
- No effects on weight gains
- No effects on activity
- Fewer piglets (-5 %) attended post-massages in PC sows

Litter size effect on nursing and suckling behaviour

Short-term effects:

Sow

- Longer pre-massages
- Shorter post-massages
- Greater nursing termination

Piglets

- More piglets missing milk ejection

Long-term effects:

Sow

- No effects

Piglets

- More piglets missing milk ejection

■ Sow

Loose-housing after a short postnatal period had **moderate positive effects** on sow welfare in the **short term only** (as reflected by activity and IgA levels).

■ Piglet

Confining the sow during farrowing and **until day 3 post-partum** was **sufficient to ensure** a similar **pre-weaning piglet survival, growth and behaviour** compared to the ones found in permanent crating during the whole lactation.

■ Litter size effect

Increased litter size impaired suckling and nursing behaviour.

■ Further research:

- Detailed sow activity : e.g. total distance walked, qualitative and quantitative assessment of interactions with environment

- Long-term effects on sow and piglets

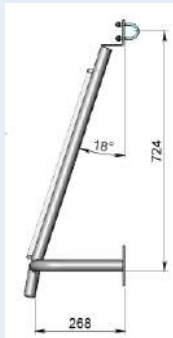
Slope wall from PIG SAFE

Our new version



Sloped wall:

- A couple of designs were tested (full sloped wall/sloped bars)
- Slope wall from PIG SAFE was not working
- Problems = height and width (lack of space : piglet crushing + limited udder access)
- Final version = based on Vivi's design (but with slight modifications)



Nest:

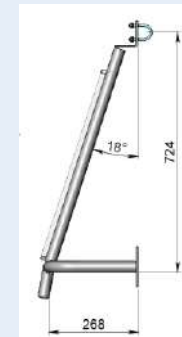
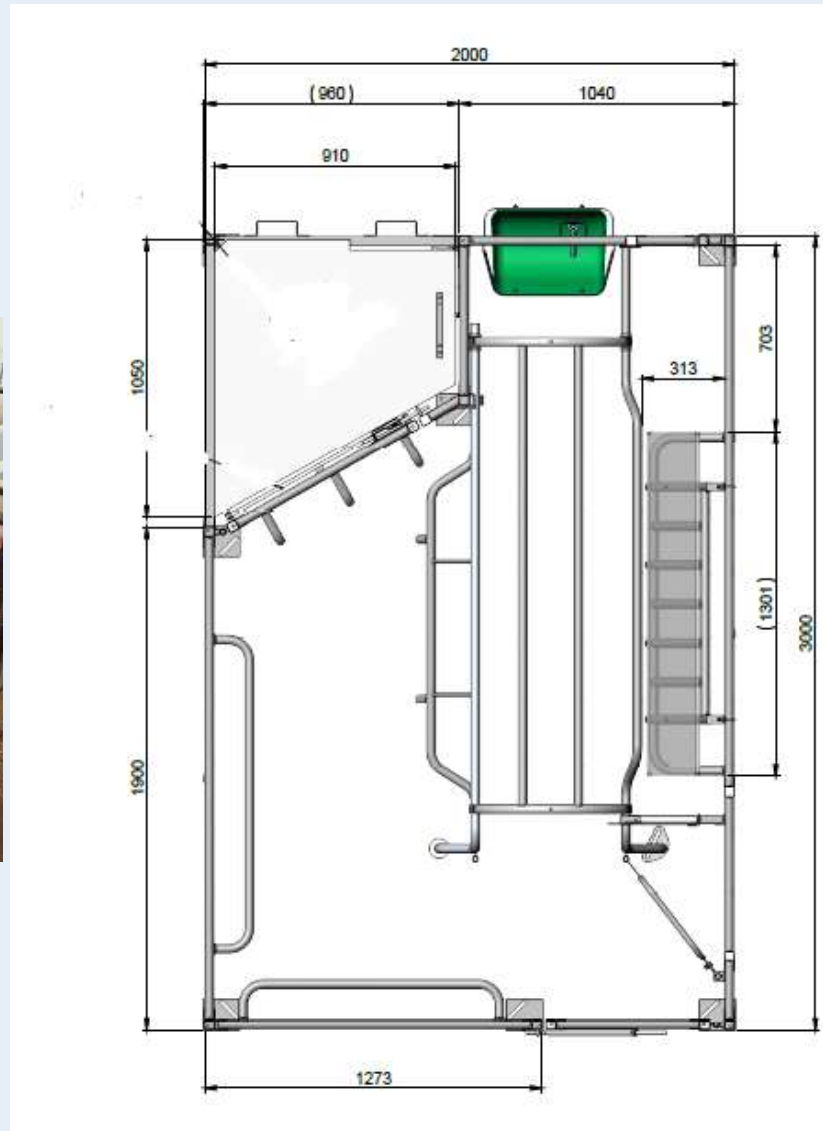
- Protective bars on the nest

Crate:

- Location
- Size: enlarged crate for better udder access

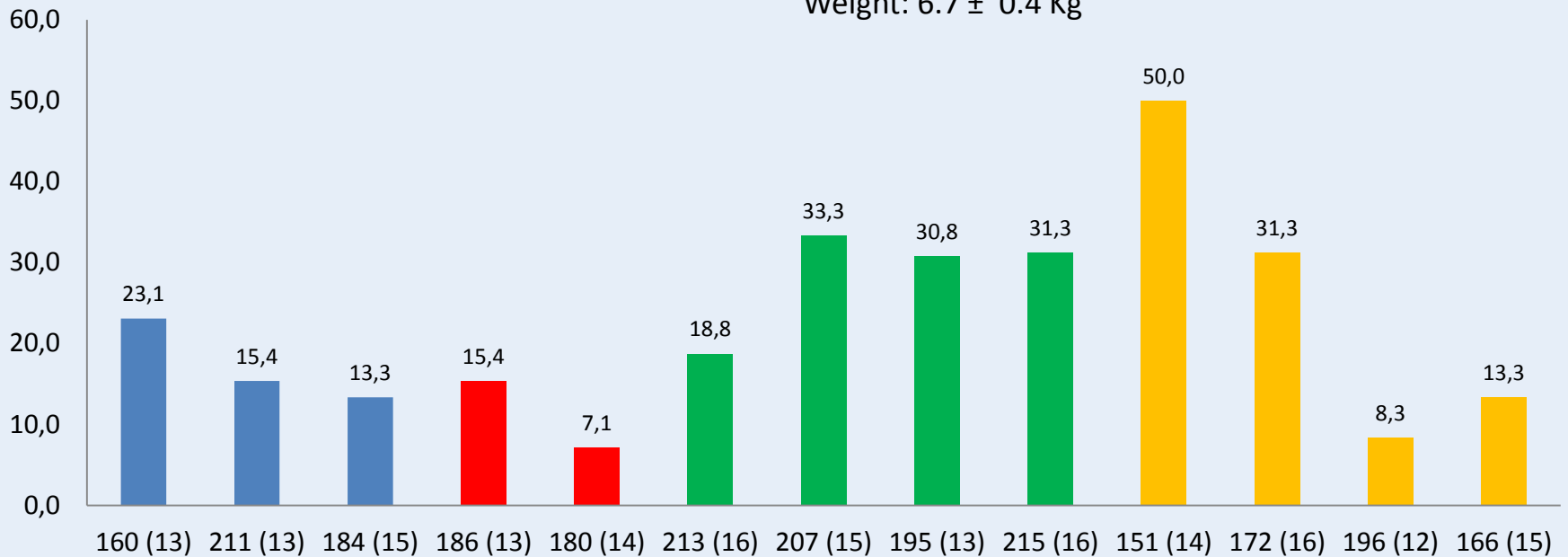


Our new pen

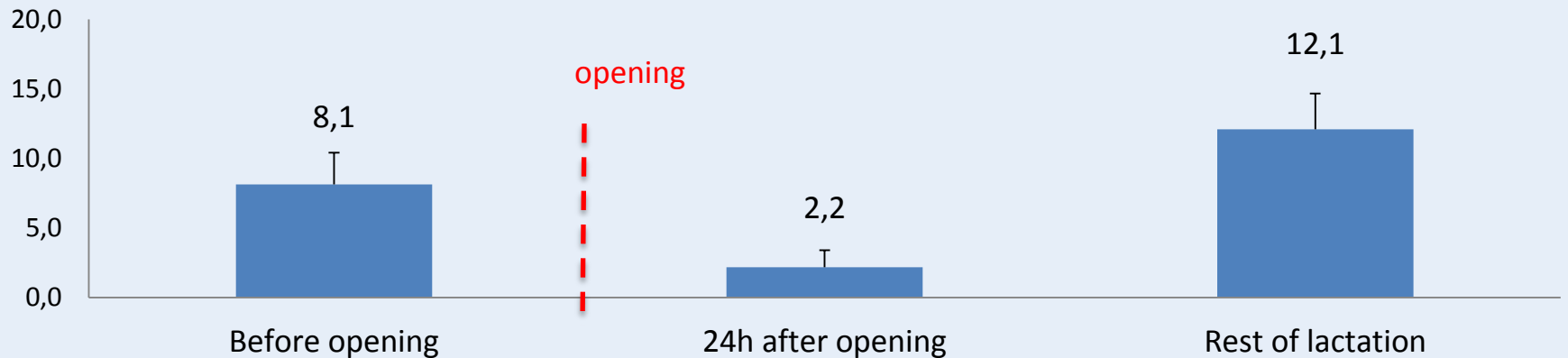


Mortality

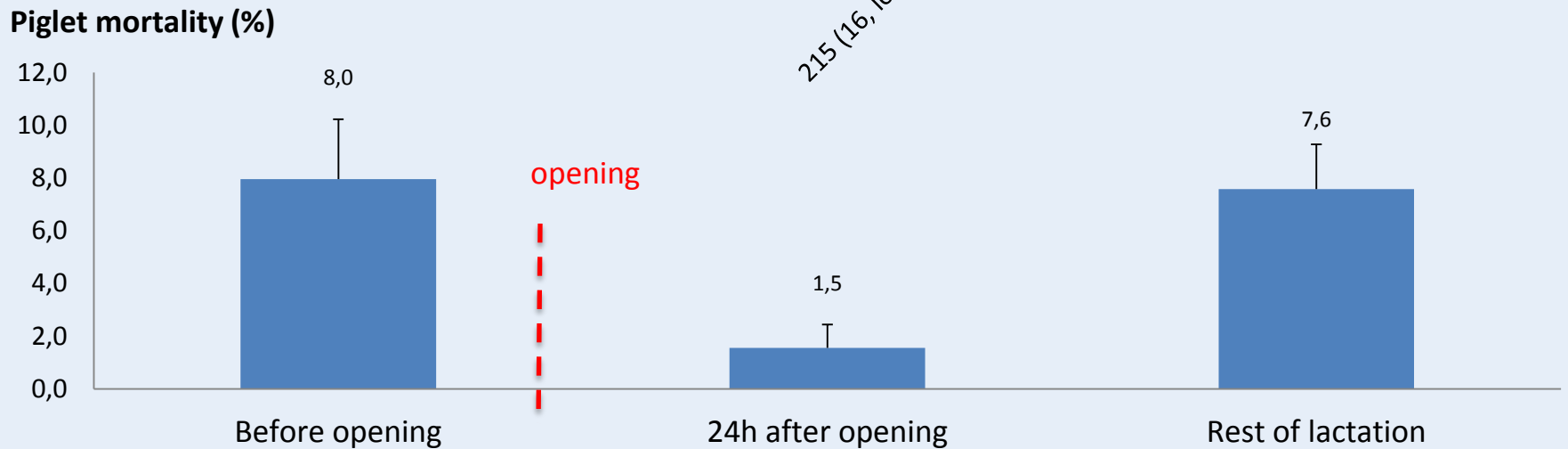
Piglet mortality (%)



Piglet mortality (%)



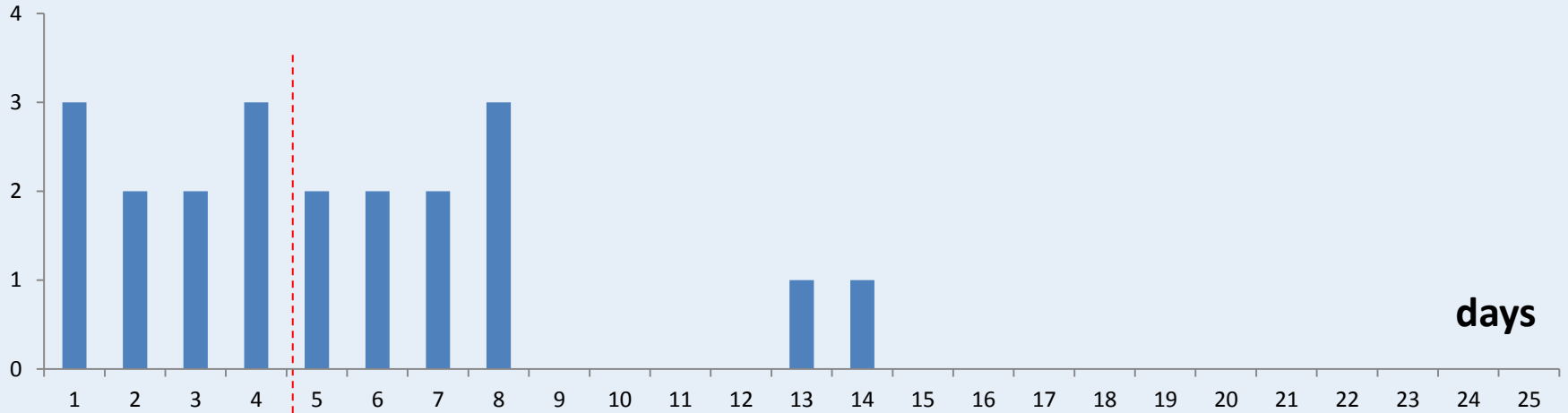
Overall mortality : $17.1 \pm 2.9 \%$ - Weight: 6.7 ± 0.4 Kg



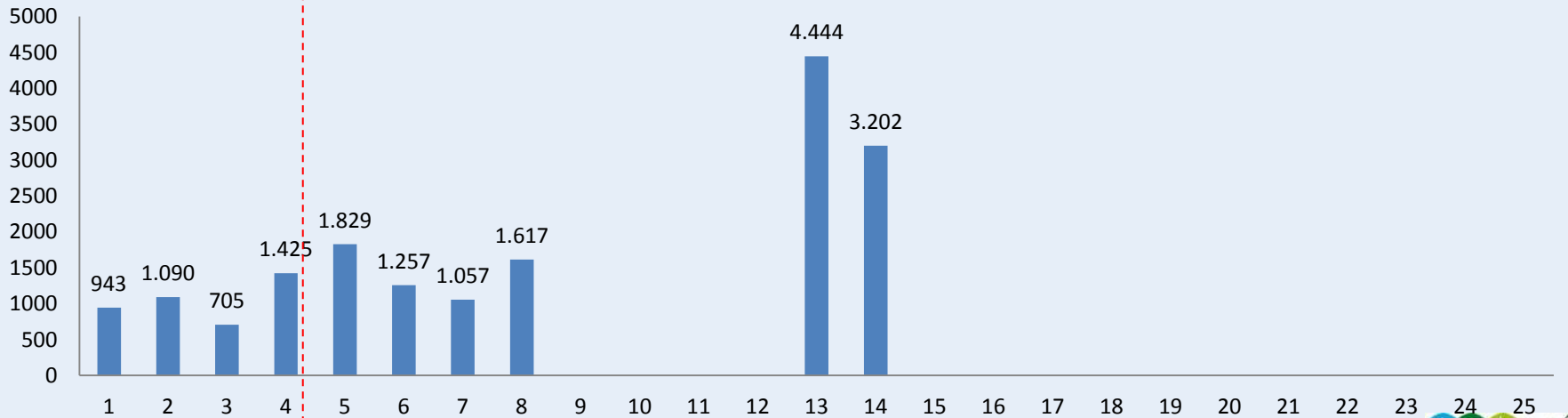
Mortality: when/which piglet die?

(without sick or nervous sows)

Number of dead piglets



Weight (g)



Examples of crushing event in the middle of the pen



Summary : Experience and problems with the new temporary crating

- Piglet weaning weight is good
- Piglet mortality is still a problem after opening the crate
- Large differences between sows (litter size and parity seem not be the reason for higher mortality)
- Modifications of the pen to limit crushing in the middle of the pen (pole, mushroom)



Where do we go from here?

- Temporary crating = a good step before using pens
- Long lasting effect of housing during lactation after weaning
- Enrichment of the pen (to reduce boredom)
- Consequences of increasing litter size

- Exchange of experience between scientists , farmers and producers (better knowledge transfer)

Selecting the right sow

Where do we go from here?



Emma Baxter, Rebecca King, Nicola Bowers, Agnese Balzani,
& Sandra Edwards

Talk remit

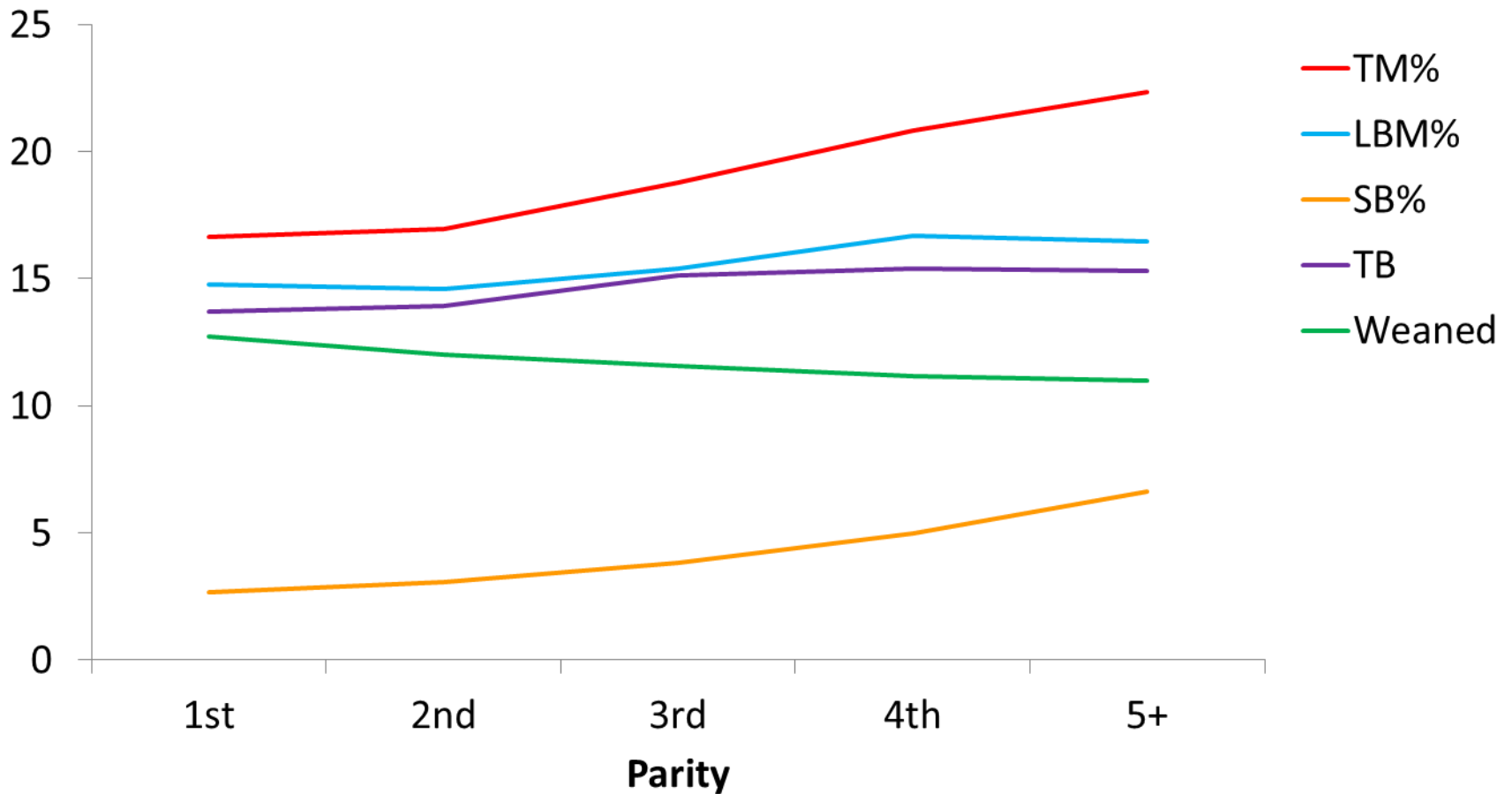
- How does parity, litter size, body movements, experience, temperament and udder conformation affect outcomes?
- Do we need to select perfect sows?
- How can we select perfect sows?



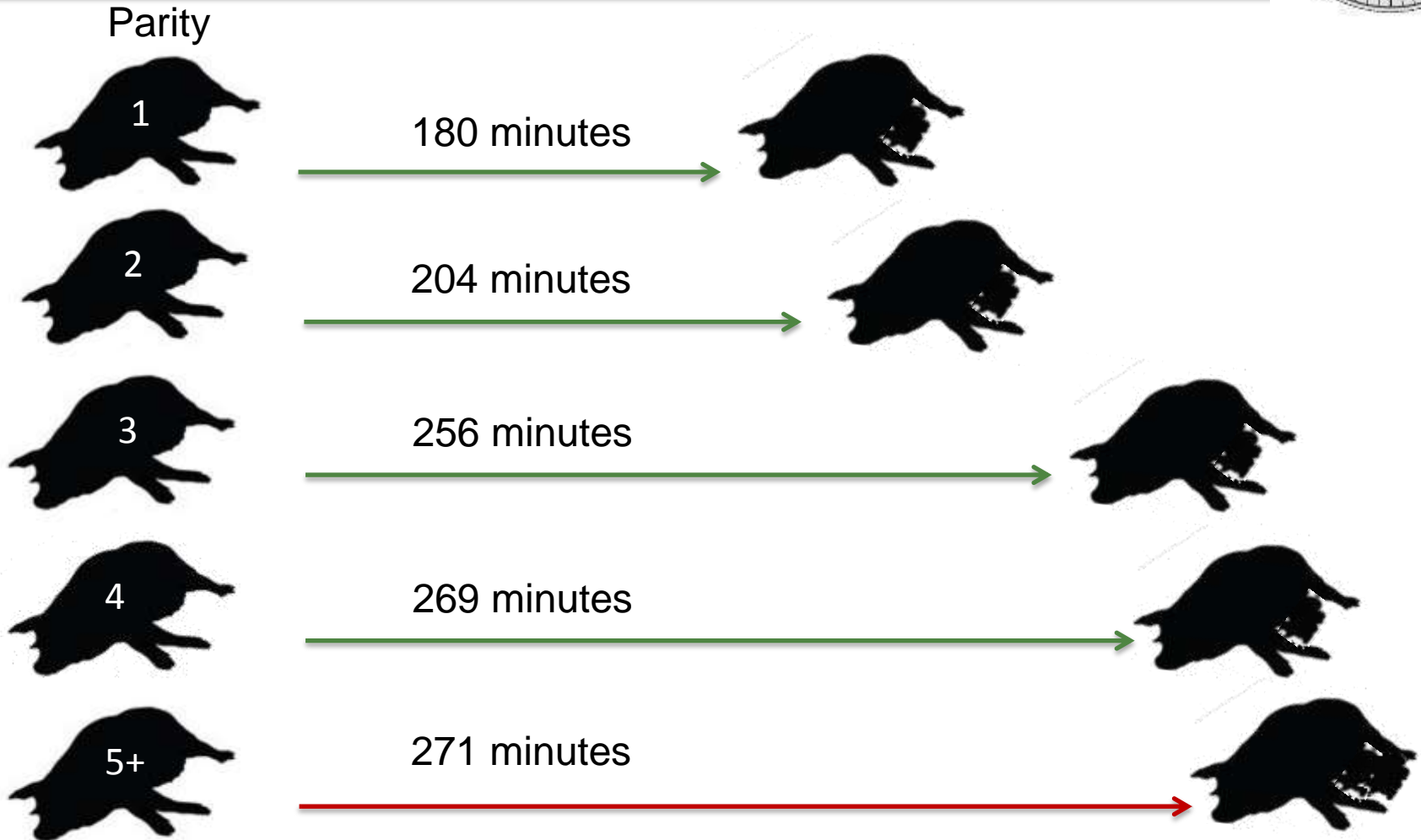
Parity: influence on Key Performance Indicators (KPIs)

FREESOW

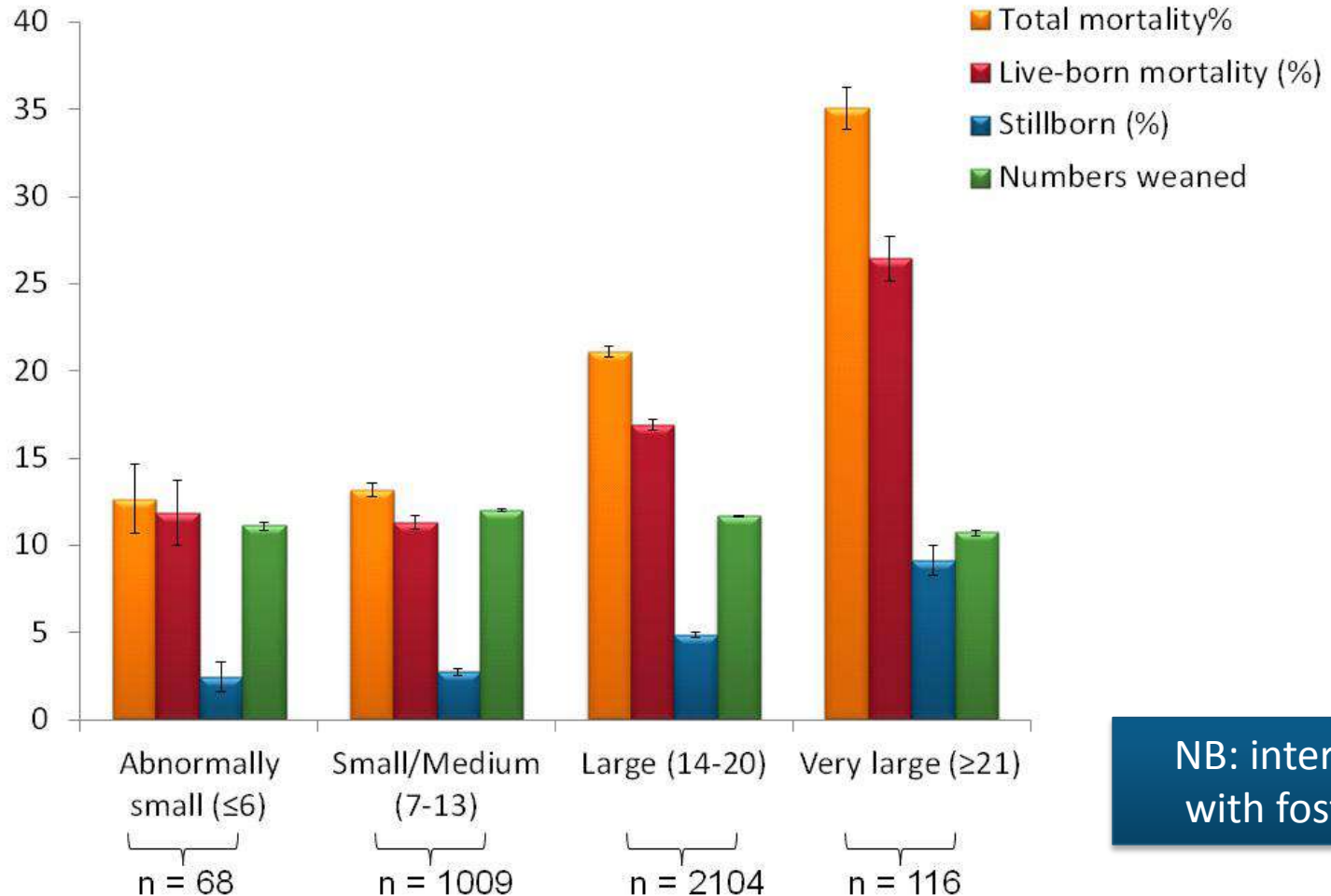
n = 3297 sows, x 3 farms (4 systems)



Farrowing duration by parity (***)



Litter size: influence on KPIs

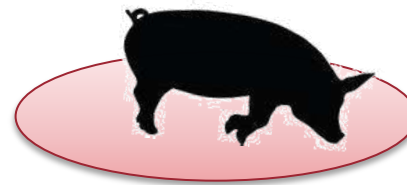
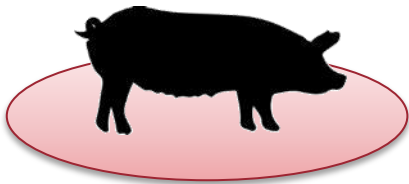


NB: interaction with fostering

Body movements: influence on crushing behaviour

- Farrowing behaviour was compared for the first 24h post-partum for sows categorised as crushers and non-crushers
(C0 = no piglets crushed, C1 = 1 piglet crushed, C2 = 2 or more piglets crushed).
 - Pre-lying behaviour (sniffing, pawing, rooting, lying vertically – i.e. carefully)
 - Number of piglets cleared with pre-lying behaviour

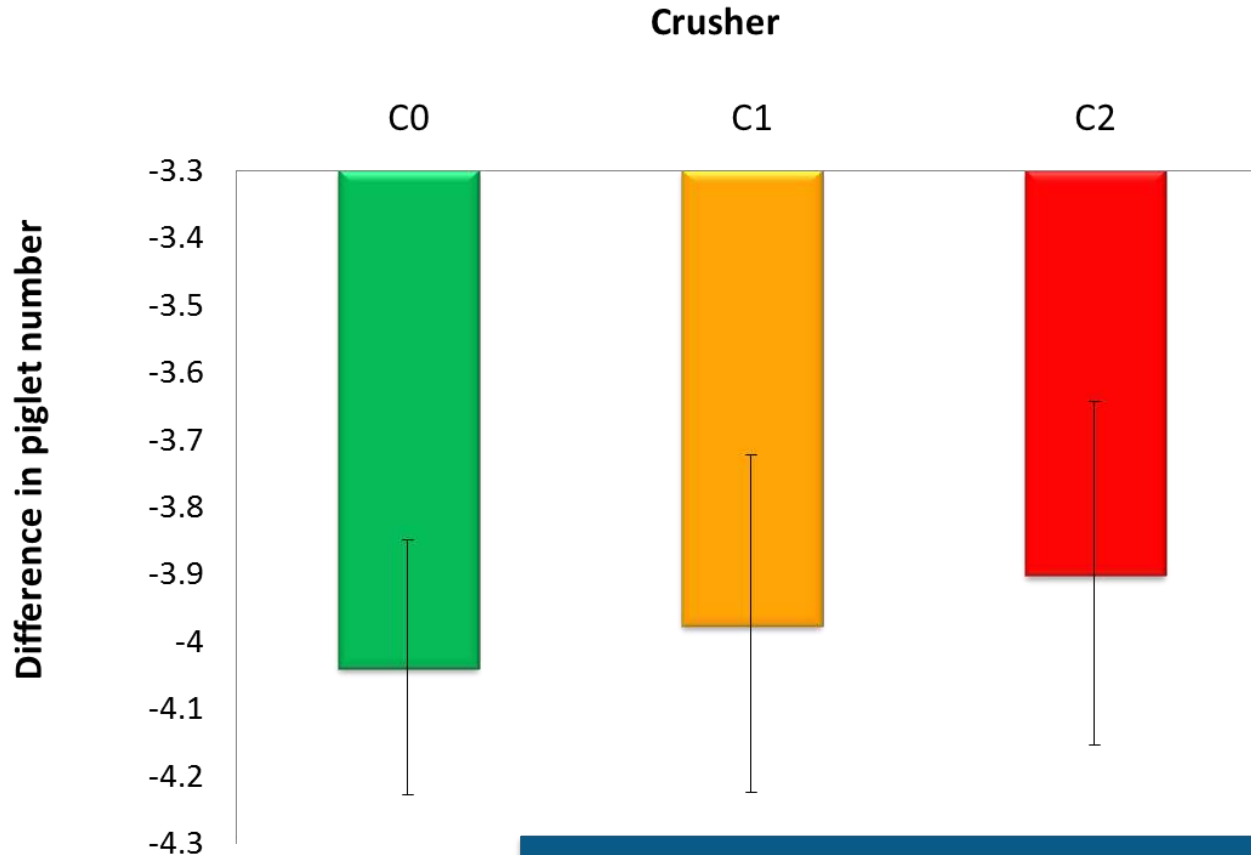
Does sow sniff, paw
and root the ground?



Count piglets before the start of pre-lying behaviour in the danger zone

Count piglets in danger zone after pre-lying and just before descent

Effectiveness of pre-lying behaviour?

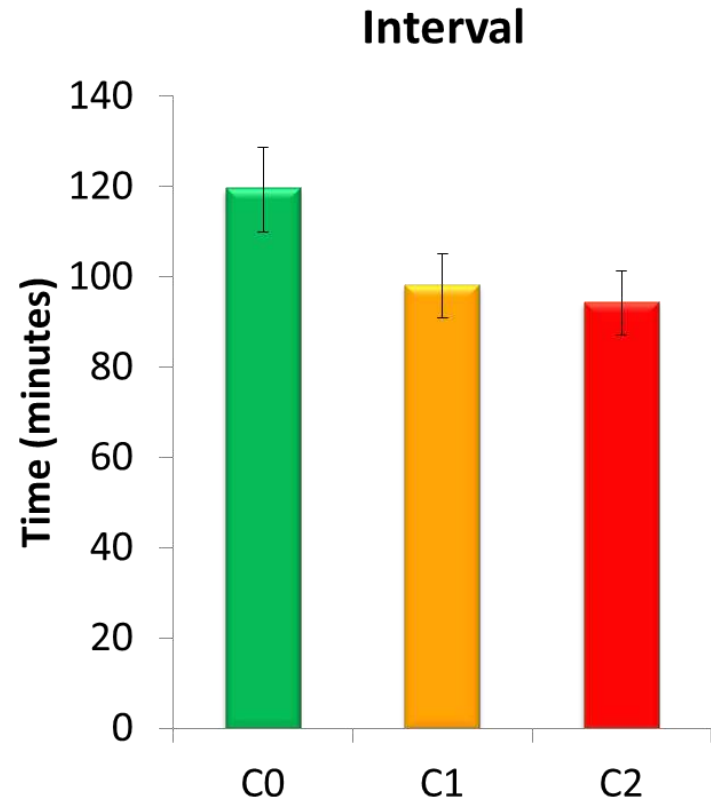
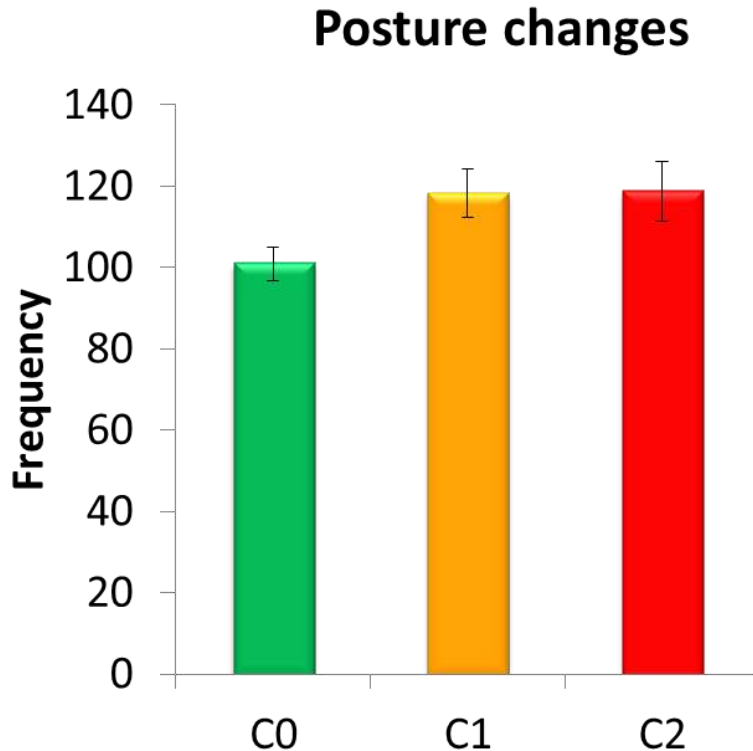


- Not significant – great deal of variation
- No difference in amount of pre-lying behaviour performed

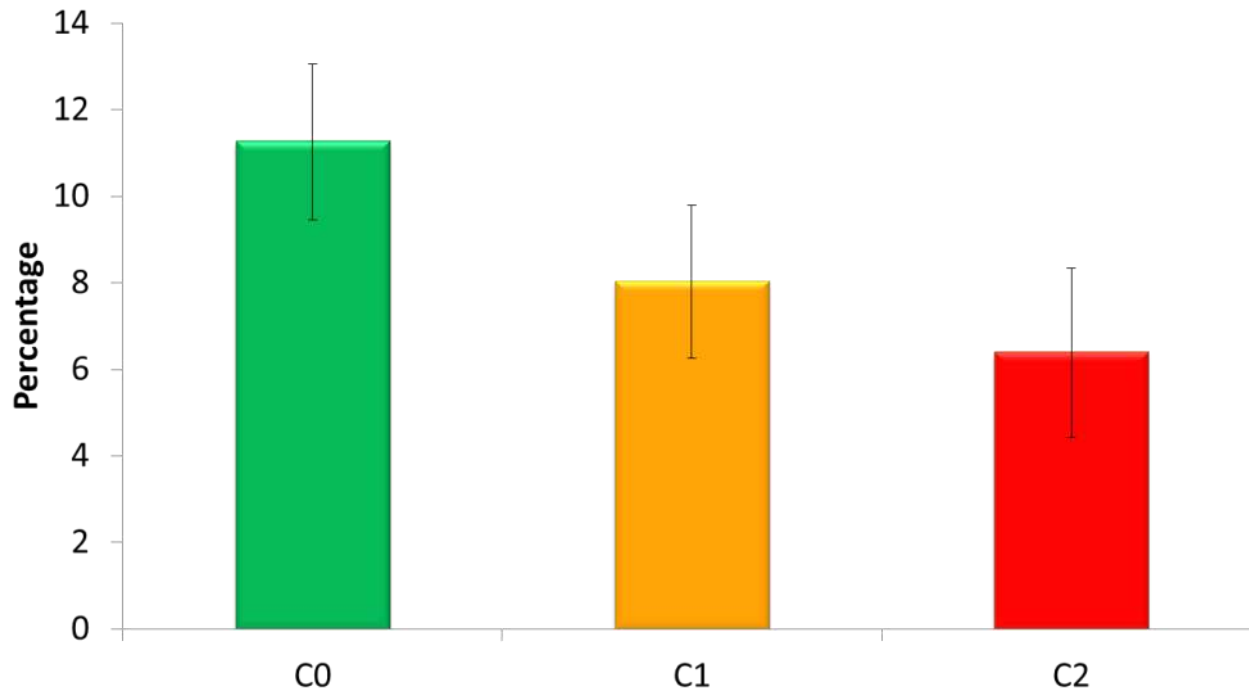
Farrowing behaviour: Restlessness and posture changes

Non-crushers were less restless during first 24h post-partum ($P=0.017$)

Non-crushers tended to show a greater time interval between lying events ($P=0.069$).



Responsiveness



Where there were crush incidents a greater percentage of non-crushers tended to respond to the incident

Conclusions: sow body movements

- No influence of pre-lying behaviour
- Contributes to mixed results in the literature. Sniffing and nosing is protective (e.g. Marchant et al., 2005; Pokorná et al., 2008; Melišová et al. 2011).
- Time spent performing pre-lying maybe a problem - “the faff factor”
- Better measurement? Ocepek et al. 2017 combined sow communication with a detailed sow carefulness score (“attentiveness”, “protectiveness”, orientation). Found positive correlations with survival.
- Restlessness during and immediately after farrowing confirmed as associated with “crushers” (e.g. Weary et al. 1998; Jarvis et al. 2004; Damm et al. 2005)
- Non-crushers tend to be responsive when they do crush but not a strong relationship – why?
 - Over-responsiveness (hyper-responsive) can be just as dangerous in free farrowing situations

“faff” verb

Definition: spend time in ineffectual activity.

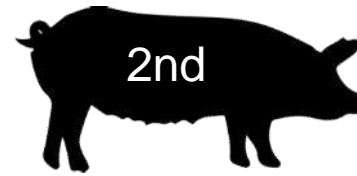
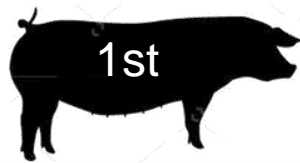
Experience: influences on gilt performance

Does farrowing environment influence current and future performance?

- 753 sows (over parity 1 and 2) swapped between or farrowed in same system:
 - Crates
 - Straw pens
 - Temporary crates
- Pre- and post-processing mortality recorded
- Inter- and intra-parity sow consistency investigated



Hypothesis: Second parity piglet mortality would be higher if a sow farrowed in a different farrowing system to that of her first parity



First parity	Second parity		
STANDARD CRATE (n=247)			
	Standard crate (N=37)	Straw pens (N=67)	Temporary crate (N=143)
Post-processing crushed	0.464 (±0.113)	0.633 (±0.096)	0.994 (±0.083)
Post-processing total	0.349 (±0.087)	0.593 (±0.087)	1.34 (±0.104)



First parity	Second parity		
STRAW PEN (n=186)			
	Standard crate (N=55)	Straw pens (N=15)	Temporary crate (N=116)
Post-processing crushed	0.625 (±0.105)	0.436 (±0.179)	0.666 (±0.075)
Post-processing total	0.662 (±0.105)	0.512 (±0.210)	0.813 (±0.083)



First parity	Second parity		
TEMPORARY CRATE (n=320)			
	Standard crate (N=33)	Straw pens (N=115)	Temporary crate (N=172)
Post-processing crushed	0.750 (±0.151)	0.688 (±0.077)	0.681 (±0.064)
Post-processing total	1.09 (±0.186)	0.727 (±0.079)	1.01 (±0.079)

Experience: influences on gilt performance

- Individual sow consistency apparent between pre- and post-processing mortality in first but not second parity
- Categories of piglet mortality in first parity not predictive of second parity
- Sows produced a significantly larger litter in their second farrowing when housed in the straw pens for their first farrowing

Conclusions: Experience

- Consistency of farrowing environment is important
 - For the sow
 - For the stockpeople
- Implications for early adopters of alternatives with different systems on farm

Temperament: influence on performance

- Temperament tests performed on 216 gilts before insemination (x 2 test runs 6 weeks apart)
 - Quick measures and scores: Response to “handling” (exit order, ease of removal from pen, ease of transit)
 - Tests: Response to startle and voluntary (group) and forced (i.e. individual as per Welfare quality protocol) human approach tests
- Followed gilts through to farrowing: ½ farrowed in crates, ½ in pens
- 62 free farrowing gilts focused on for farrowing behaviours (48h) (just performance for remainder)



Gilt temperament characterisation

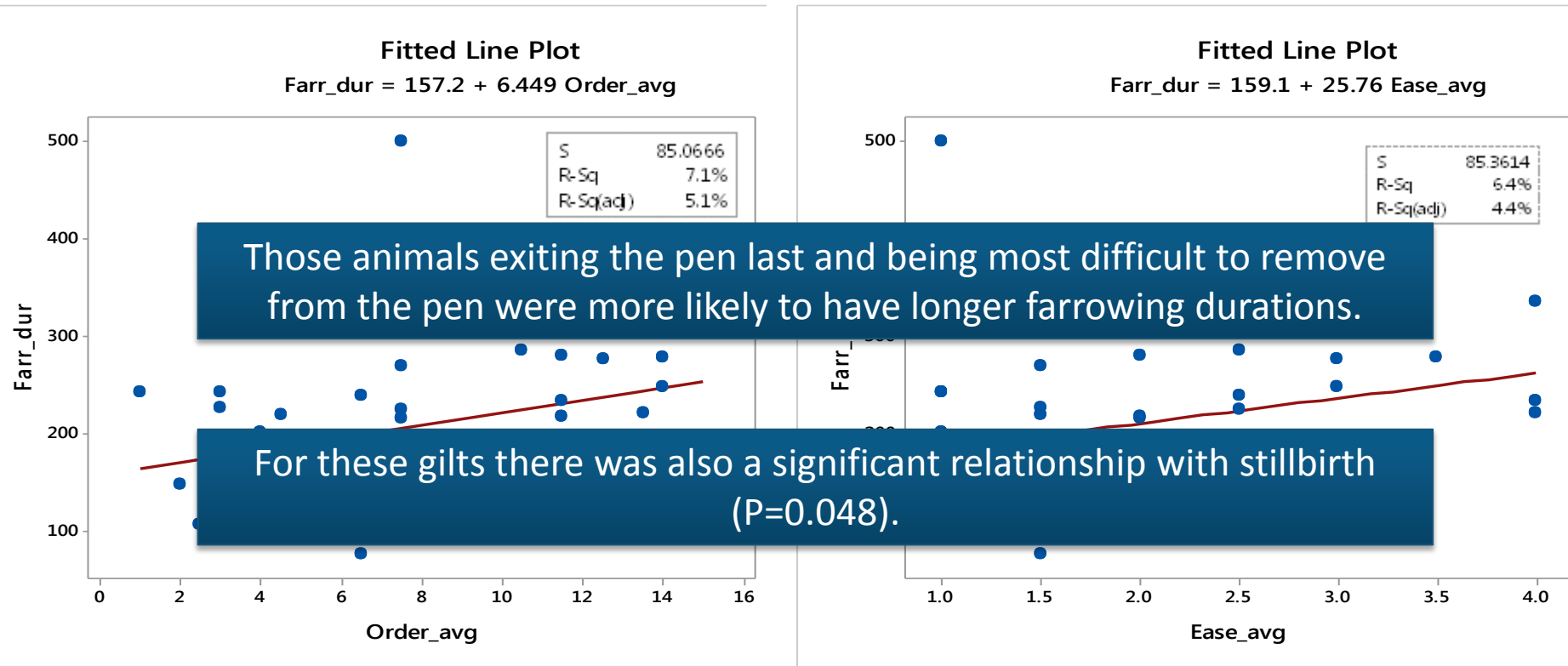
- Behavioural responses that showed most consistency between test runs (i.e. likely temperament traits) were:
 - Exit Order
 - Ease of Removal from the pen
 - Ease of Transit
 - Startle response
 - Response to human

Can we predict which gilts will perform well?

- Were there any correlations between temperament test responses and farrowing behaviour and performance?
 - No significant relationships between temperament test responses and key performance indicators for the larger dataset (n=92).
 - Responses to temperament tests did relate to farrowing behaviour (focal gilts n=62).

Temperament: influence on farrowing behaviour

- Exit order and Ease of removal from the pen to relate to farrowing duration



Conclusions: Temperament

- Fearfulness measured at gilt selection is linked to farrowing duration and stillbirth
- Similar conclusions to earlier work by **Janczak et al. (2003)**
 - Negative response to voluntary human approach test linked to stillbirth, farrowing duration and live-born piglet behaviour and performance
- **Hemsworth and colleagues (1981)** also linked fear behaviours during gestation to poor farrowing performance
- Exit order and ease of movement can be used as quick on-farm assessments of temperament

Udder conformation: influence on performance



Agnese Balzani et al. 2016

Evaluation of Udder Morphology Traits

4 MEASUREMENTS (in millimetres):

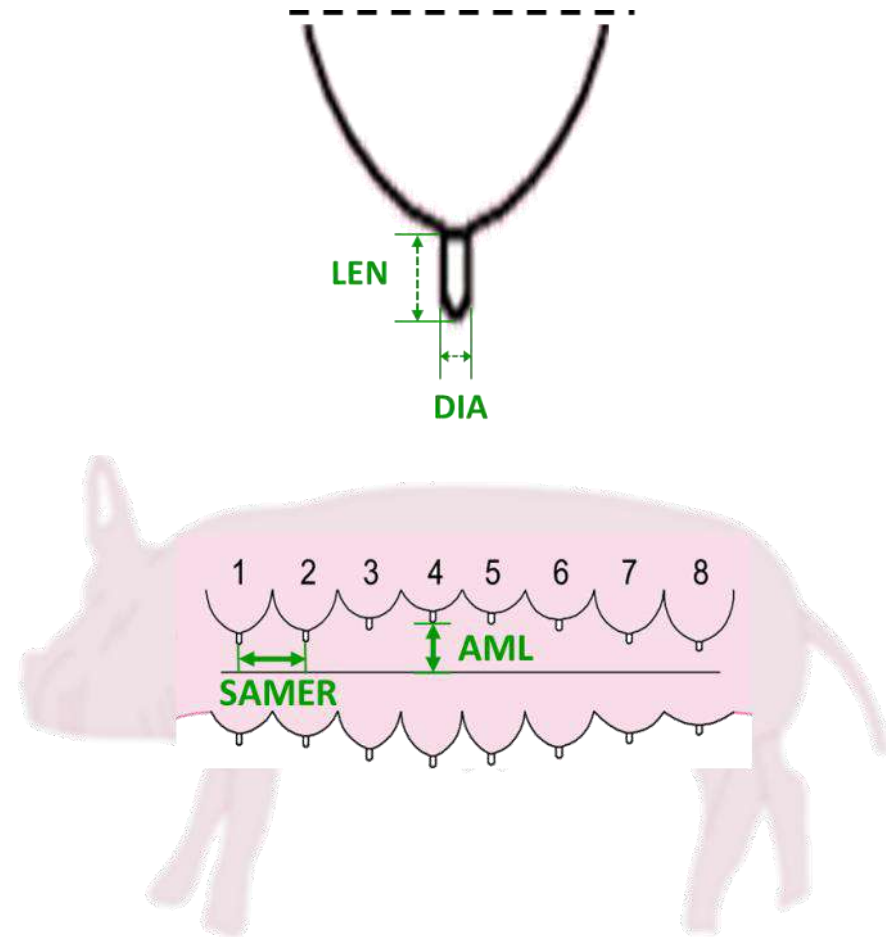
- 1) Inter-teat distance within the same row (SAMER)
- 2) Teats base to the abdominal mid-line (AML)
- 3) Length (LEN)
- 4) Diameter (DIA)

3 SCORES

- 1) Teats orientation (OR)
- 2) Teats functionality (NoFun)
- 3) Udder development (dev)

UDDER TRAITS MEASURED:

- Once shortly prior to farrowing
- Lying down posture
- Upper row of teats



Sources of variation in udder morphology

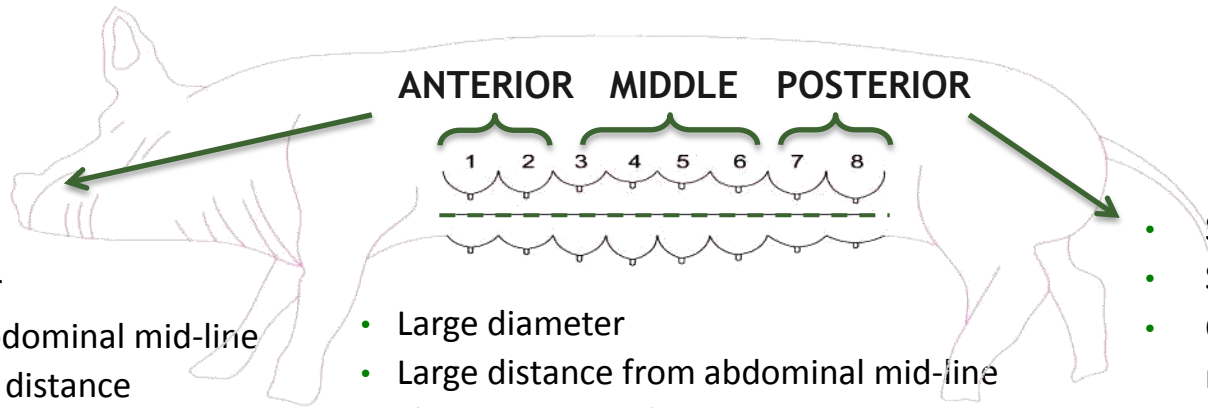
OBJECTIVES

Define reasons for variation in udder conformation between sows

METHODS

220 sows; two breeds (110 MEIDAM 110 Large-White X Landrace) of different parities

RESULTS



- Small length
- Small diameter
- Close to the abdominal mid-line
- Long inter teat distance

- Large diameter
- Large distance from abdominal mid-line
- Short inter teat distance

- Small length
- Small diameter
- Close to the abdominal mid-line
- Long inter teat distance

- 1st parity sows had smaller udder dimensions than multiparous sows
- Meidam breed had a smaller and more uniform udder than LW X L

What is the link between udder morphology & piglet behaviour?

OBJECTIVES Study the link between udder morphology and newborn piglet suckling behaviour

METHODS 75 sows of different parity & 377 piglets

MATERIAL Udder traits. Piglet birth weight, vitality score, birth interval, time elapsed from birth to udder contact & from udder contact to suckling

RESULTS

- The latency to suckle from birth was significantly shorter on the posterior teats compared with the middle ones.
- Heavier and larger litters at birth were correlated with a larger SAMER and AML
- Birth weight and vitality score did not have an effect on the time elapsed from birth to suckling – maternal characteristics important.

Heritability of udder traits

AIM	Assess Heritability of udder morphology traits and colostrum IgG
METHODS	1100 MEIDAM sows
MATERIAL	Measurements of udder morphology & Brix percentage of colostrum.

RESULTS

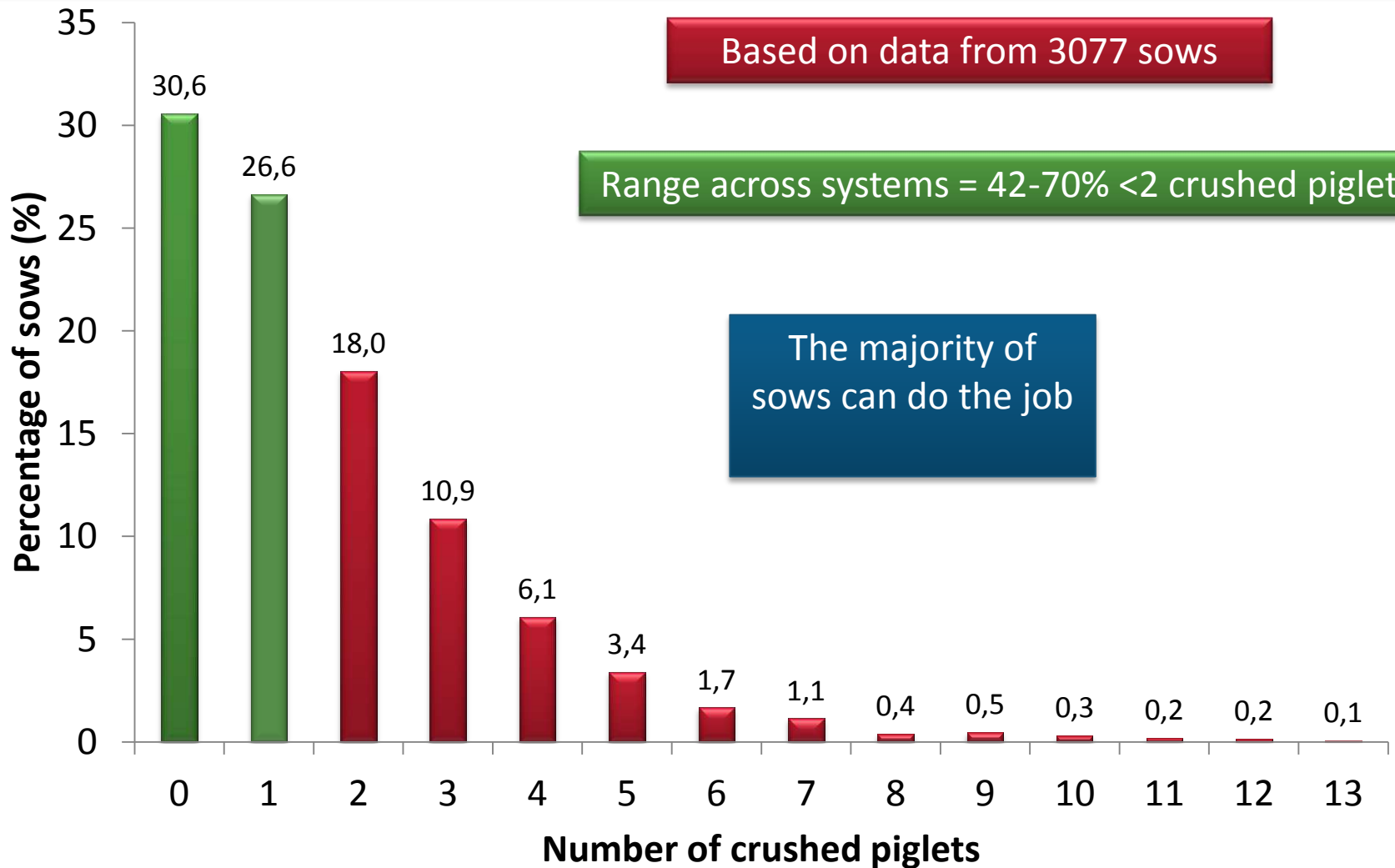
Trait	MEAN± SD	CI	h ²	SE
SAMER (mm)	104.5 ± 14.45	1.88	0.37	0.06
AML (mm)	61.2 ± 10.88	1.42	0.22	0.04
LEN (mm)	16.1 ± 3.00	0.24	0.46	0.04
DIA (mm)	10.5 ± 1.70	0.12	0.53	0.02
COLOSTRUM (%)	25.5 ± 3.50	0.28	0.35	0.07

Conclusions: Udder

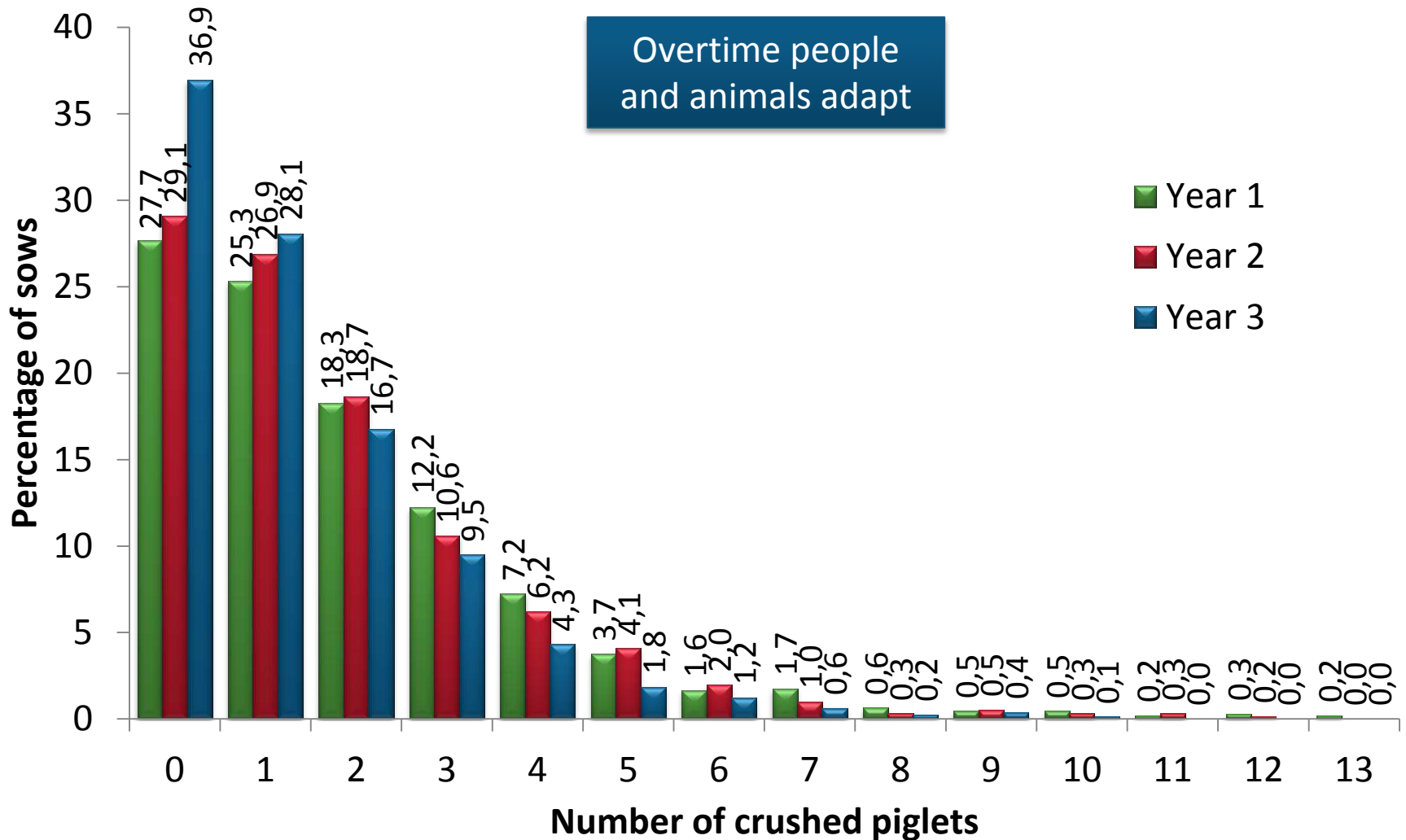
- Breed, parity and teat pair position influence udder morphology
 - This might influence teat accessibility for piglets and early suckling
- Piglet suckling behavior is influenced by the location of the teat
- Litter performance is influenced by udder morphology
- Udder morphology traits are moderately to highly heritable – should be included in breeding goals

Do we need to select for the
perfect sow?

Crushing: Distribution of sows that crushed 0-13 piglets



Performance and experience

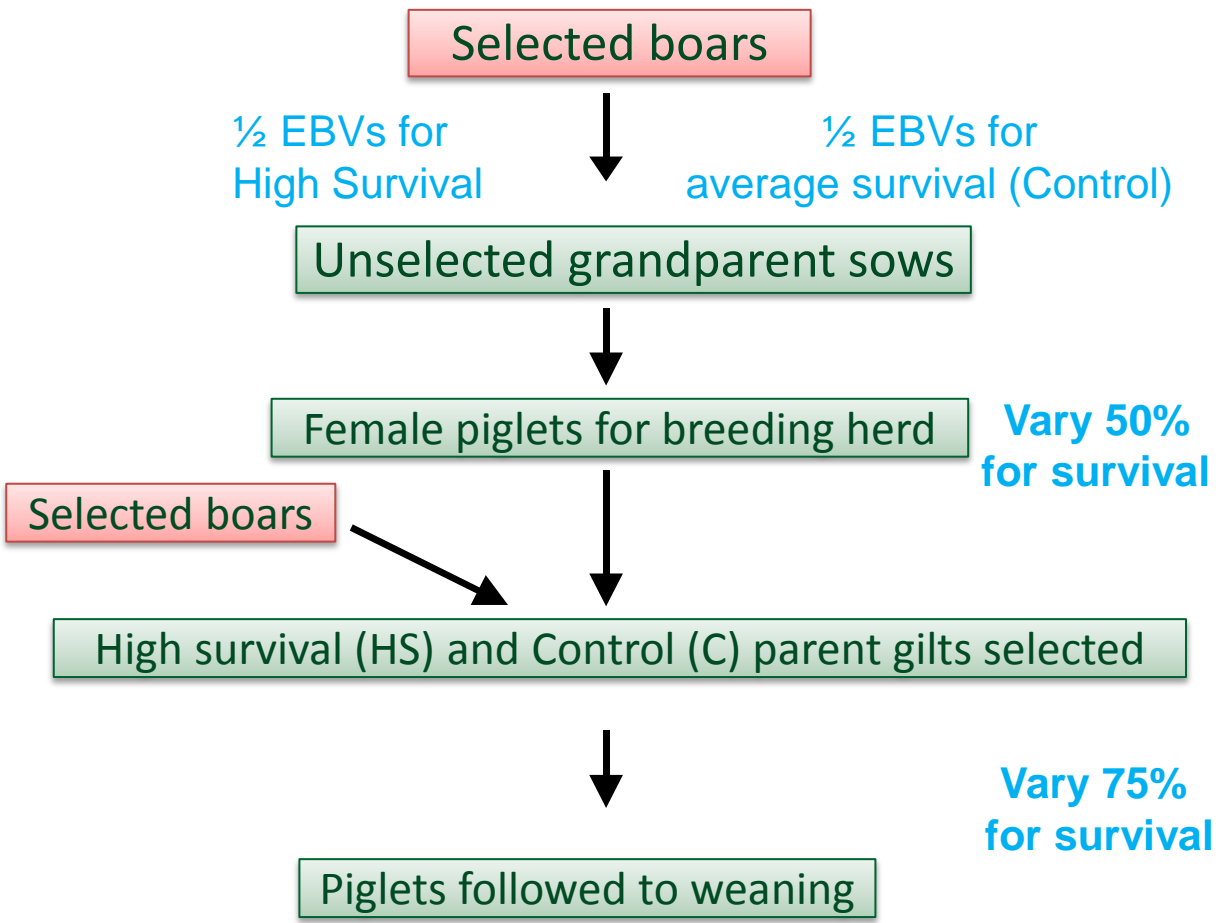
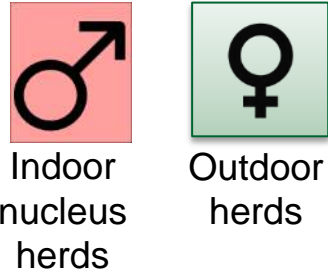


“Genomum”

Breeding for high survival



Large genetic study. Unique (<22k records) **cross-over selection experiment** for piglet survival (High vs. Average) on a Scottish outdoor unit



Direct heritabilities and correlations of survival traits and individual birth weight

Trait	SVB	SVNP	IBW
Survival at birth (SVB)	0.21 (0.14 to 0.28)	0.08 (-0.18 to 0.35)	0.17 (0.02 to 0.32)
Survival during the nursing period (SVNP)		0.24 (0.14 to 0.35)	0.16 (0.01 to 0.31)
Individual birth weight (IBW)			0.36 (0.31 to 0.41)

**genetic improvement in survival:
3% better in HS lines
(over 2 generations)**

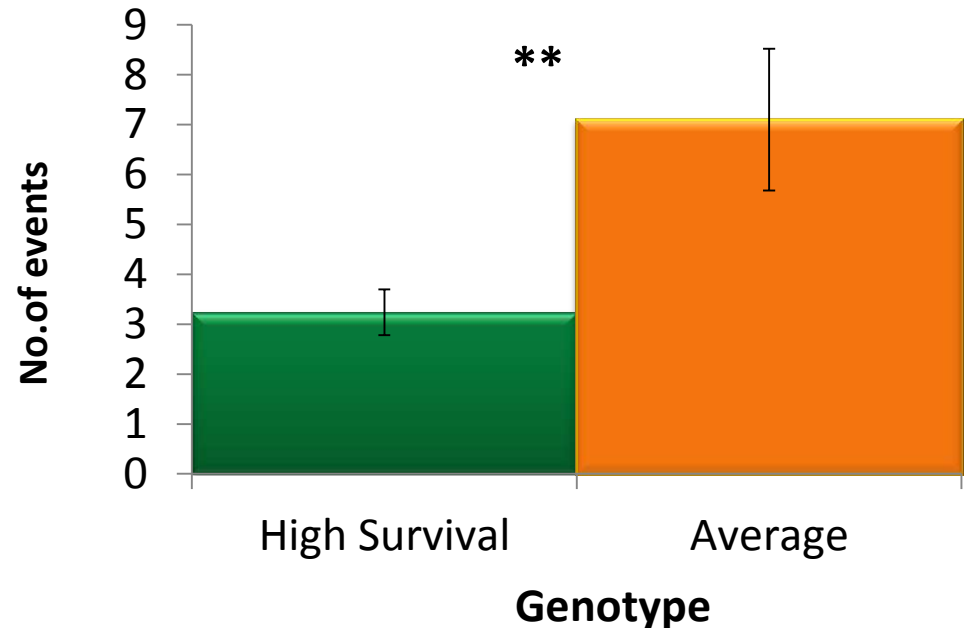
No indication of G x E interaction

Breeding for high survival – influence on maternal behaviour



- Which survival traits were influenced?
 - Maternal behaviour
- Can we breed for improved maternal behaviour?
 - Target calmness
 - Target carefulness
 - Cf. *Grandinson 2005* and *Ocepek & Andersen 2017* for reviews

Crushing behaviour during farrowing



Where do we do from here?



Selection traits

- Increased **numbers of weaned** piglets
- Select sows with better **nursing ability**
- Improved **colostrum quality** and **accessibility**
- **Carefulness** (on-going work Norway loose-housed; UK in crates (ProHealth))
- **Calmness**



Where do we do from here?



At gilt selection

- Majority of sows can “do the job” but at gilt selection choose:
 - Those who exit the pen in the first 2/3^{rds} of the group
 - Those easy to remove from the pen (i.e. no encouragement)
 - Those who are calm when challenged
 - Good udder conformation
 - Good leg conformation and gait

Interactions with parity, litter size and system (and staff)



Acknowledgements

- Sainsburys and participating farms in FREESOW
- BPEX and ACMC and Cockle Park farm staff
- Defra and Grampian farm staff



How much milk can a sow produce? - and how to feed a high yielding sow



April, 30th, 2018
Axelborg, Copenhagen

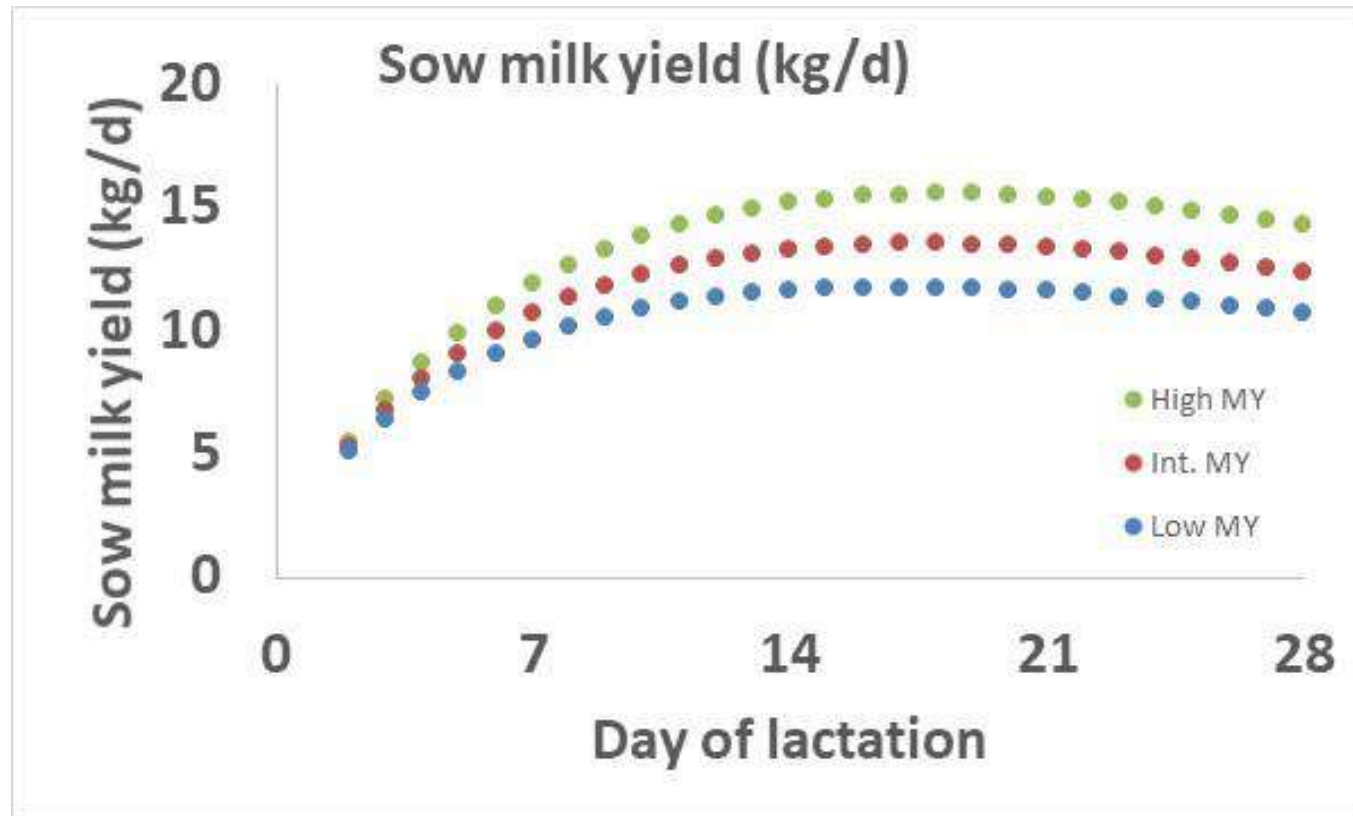
Peter Kappel Theil
Senior scientist
Department of Animal Science
Aarhus University, Foulum
Denmark

Sow milk yield in herds with low, int. and high productivity

Herd with high MY: Litter size 14, litter gain 3.3 kg/d (peak 16 kg/d)

Herd with int. MY: Litter size 13, litter gain 2.9 kg/d (peak 14 kg/d)

Herd with low MY: Litter size 12, litter gain 2.5 kg/d (peak 12 kg/d)



The screenshot shows the Microsoft Excel interface with the Home tab selected. The ribbon includes options for File, Home, Insert, Page Layout, Formulas, Data, Review, View, ACROBAT, and Tell. The ribbon groups are Clipboard, Font, and Alignment. The active cell is G5. The spreadsheet contains the following data:

Row 2: Litter size and litter gain are inputs to the model

Litter size	Litter gain, kg/d
12	2,5

Day in milk	Milk yield, kg	Max milk yield, kg	Day of max milk yield
2	5,12	11,79	17,1
3	6,44		
4	7,50		
5	8,36		
6	9,07		
7	9,66		
8	10,15		
9	10,55		
10	10,89		
11	11,15		

(Hansen et al., J. Anim., Sci., 2012)

Spreadsheet freely available

Number of
Mammary glands?

Mammary
growth?

Mammary
Blood flow?

Litter size?

**What is limiting
sow milk yield?**

Dietary lysine?
Other AA?
Protein?

Udder
access?

Suckling
frequency?

Dietary energy?
(supply/appetite)

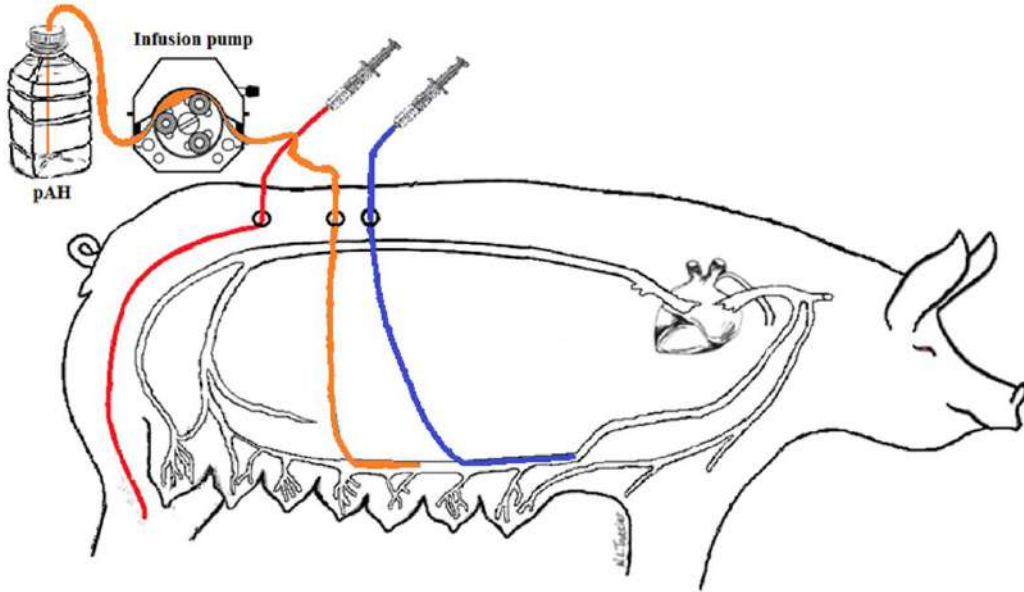
**Production
capacity**

**What is limiting
sow milk yield?**

Milk removal

**Milk
precursors**

➤ Mammary plasma flow (MPF) using para-amino hippuric acid (pAH)



Day -10: Plasma: 3.100 L/d

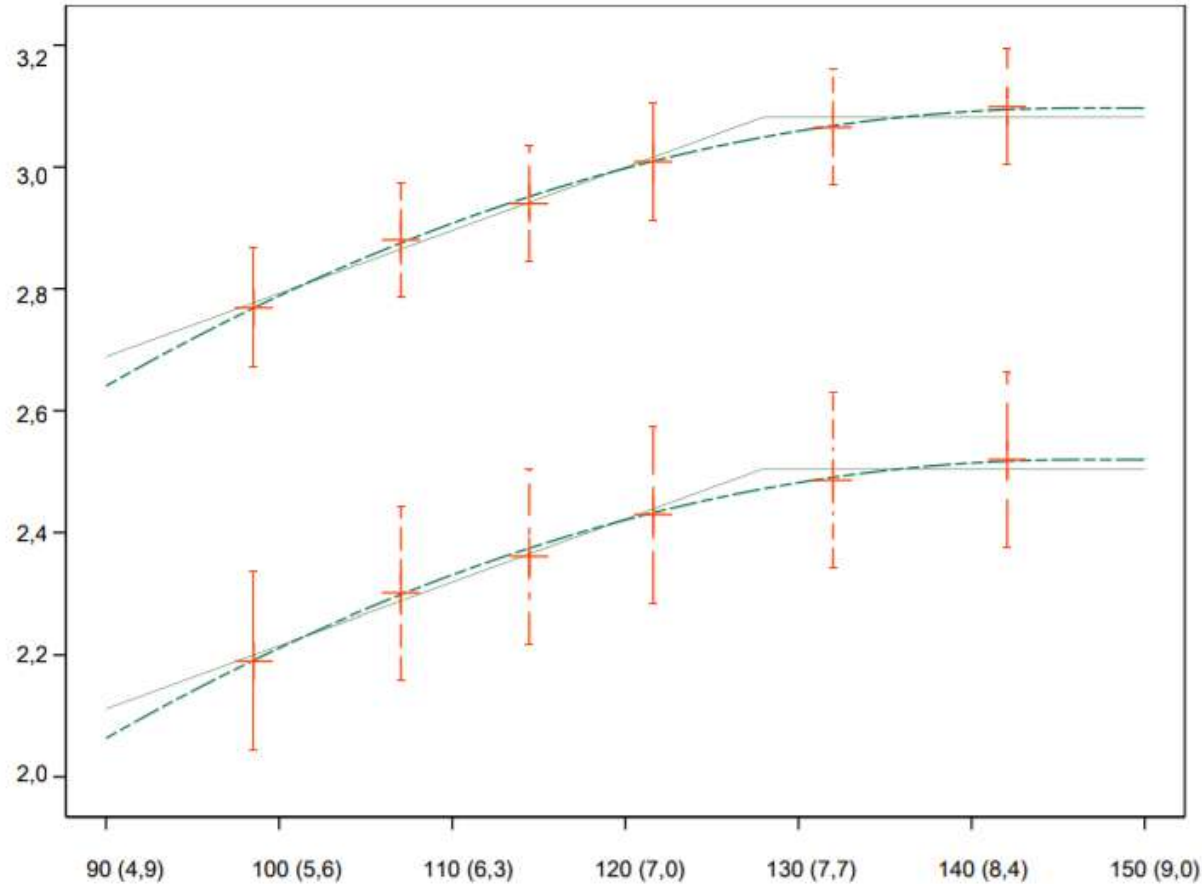
Blood: 4.300 L/d

Day 17: Plasma: 9.300 L/d

Blood: 12.700 L/d

Dietary arginine increased bloodflow 30%, but not MY 😞

Impact of dietary protein (Lysine) per feed unit on milk yield



≥ 2 . parity

1. parity

(Strathe et al., 2017)

Daily requirement of energy (1 FUsow ~ 0.95 kg of feed)

Heat loss (Efficiencies < 100%)

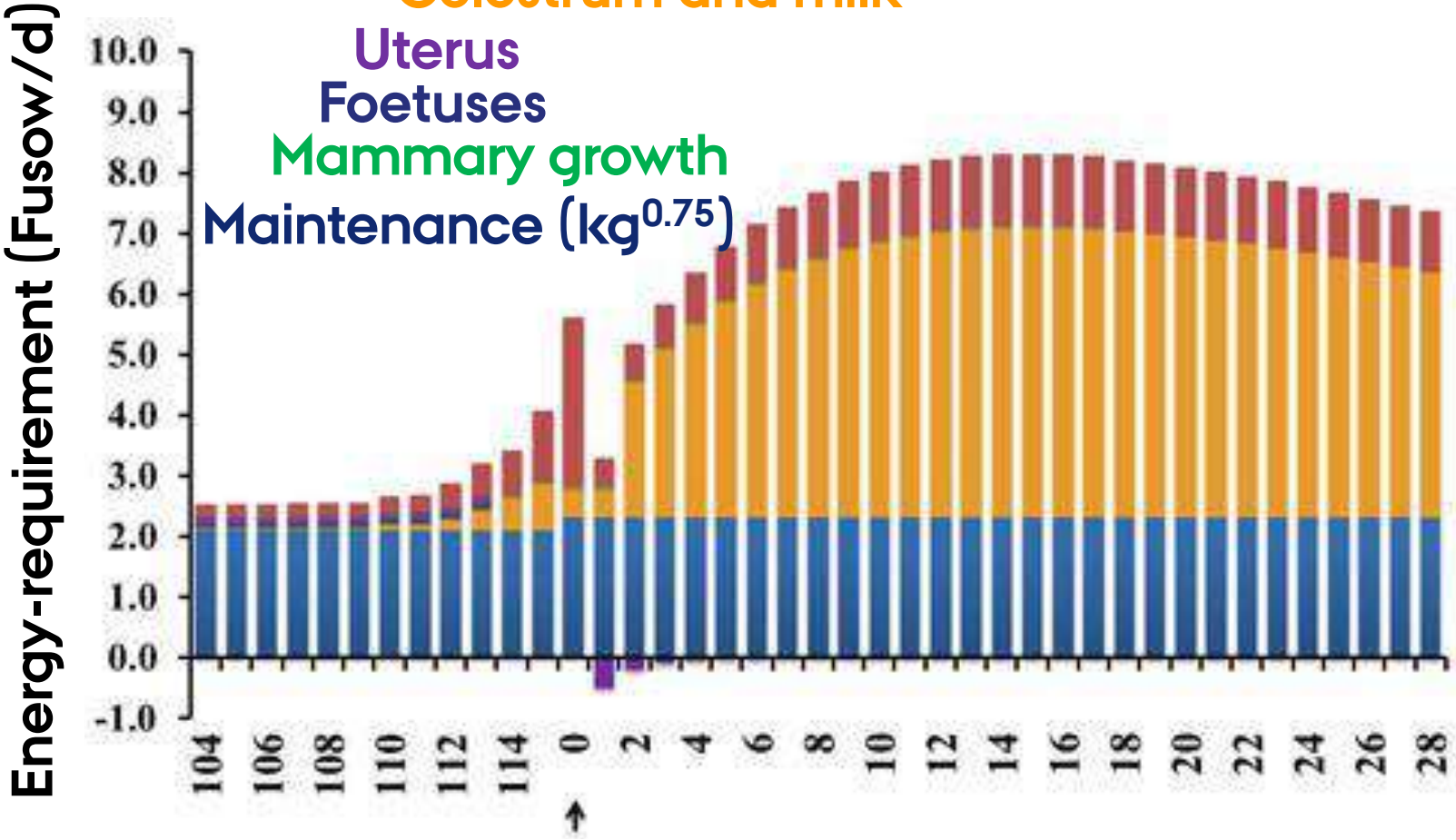
Colostrum and milk

Uterus

Foetuses

Mammary growth

Maintenance ($\text{kg}^{0.75}$)



Gestation

Farrowing

Lactation

(Feyera & Theil, 2017)

Daily requirement of lysine (g SID/d)

Lysine loss (Efficiency < 100%)

Colostrum and milk

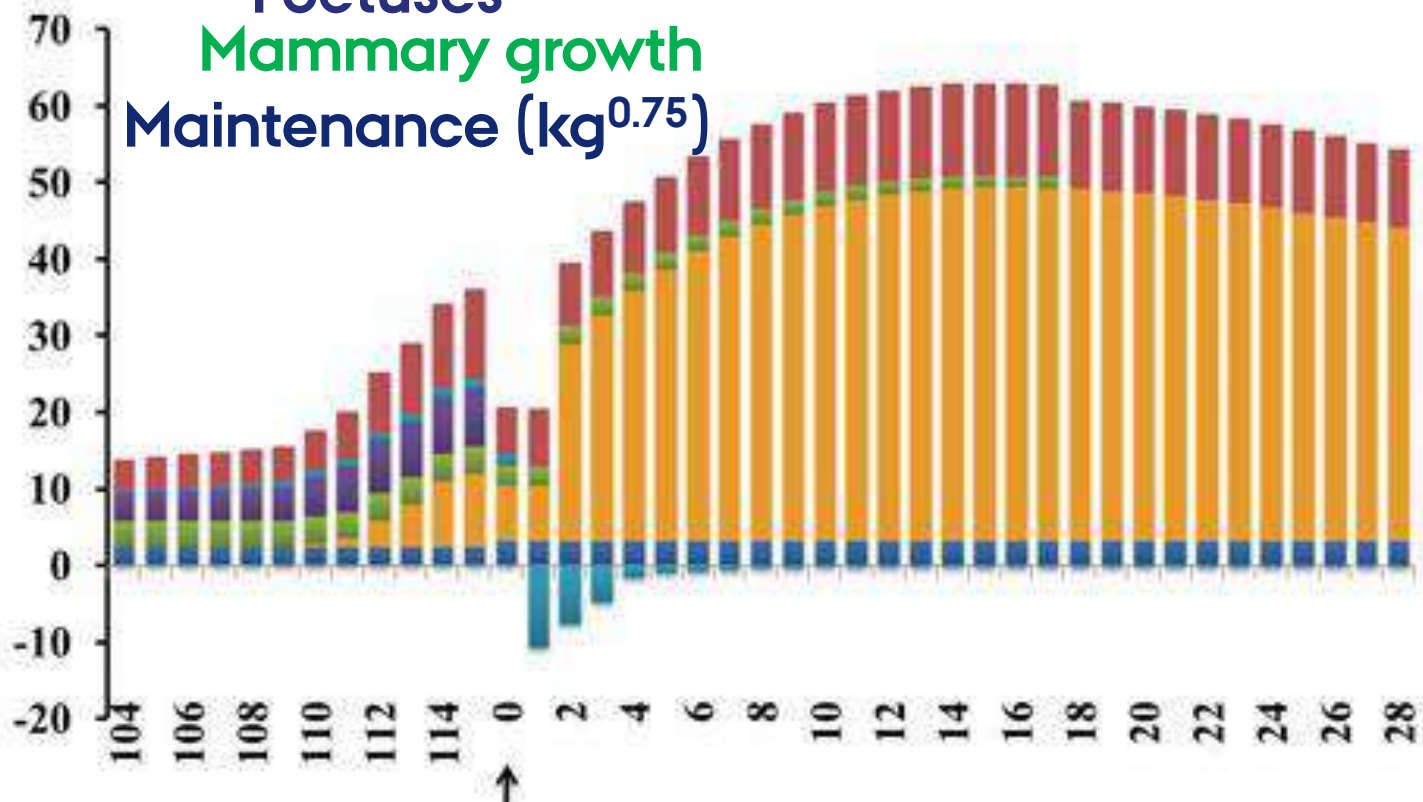
Uterus

Foetuses

Mammary growth

Maintenance ($\text{kg}^{0.75}$)

Lysine-requirement (g SID/d)



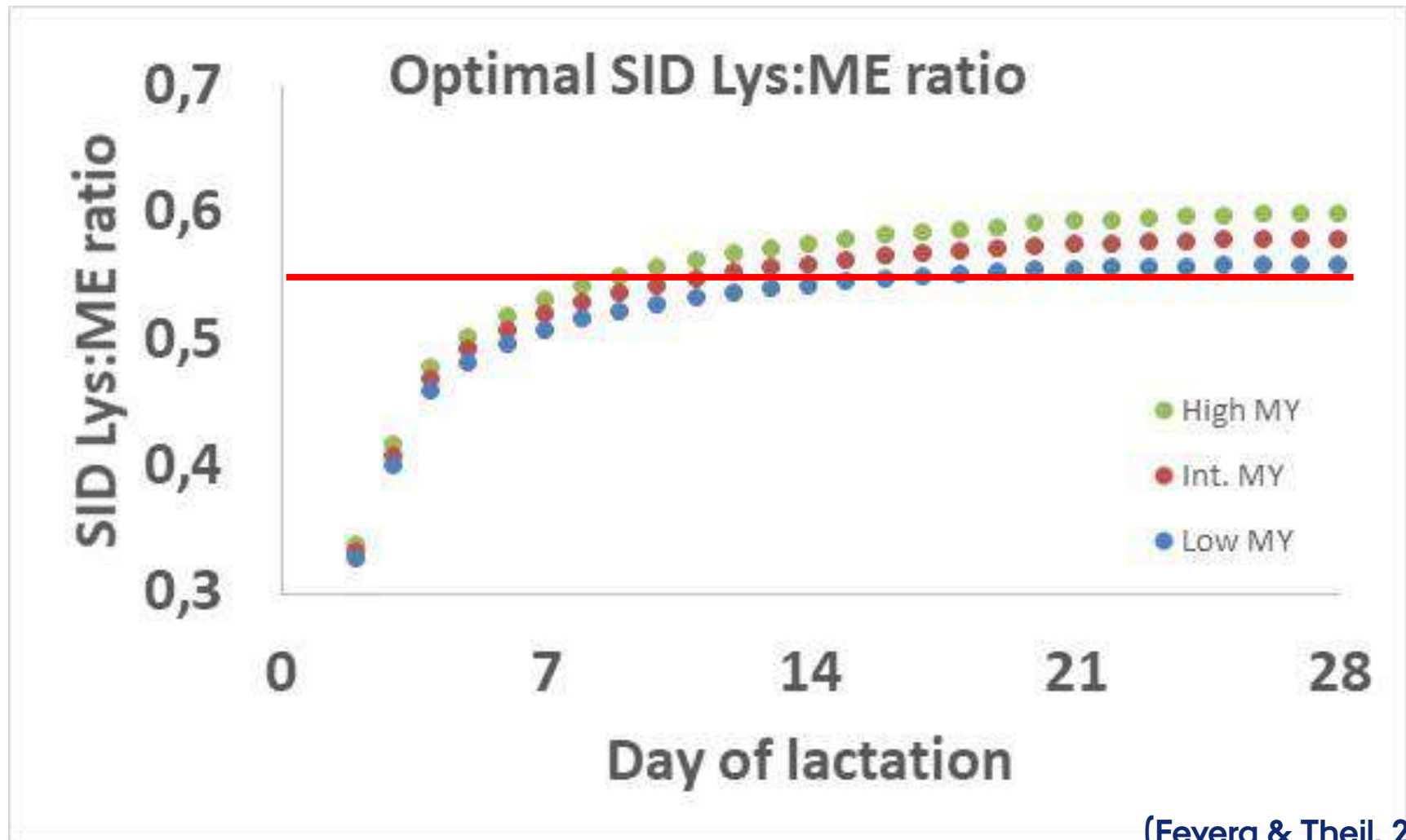
Gestation

Farrowing

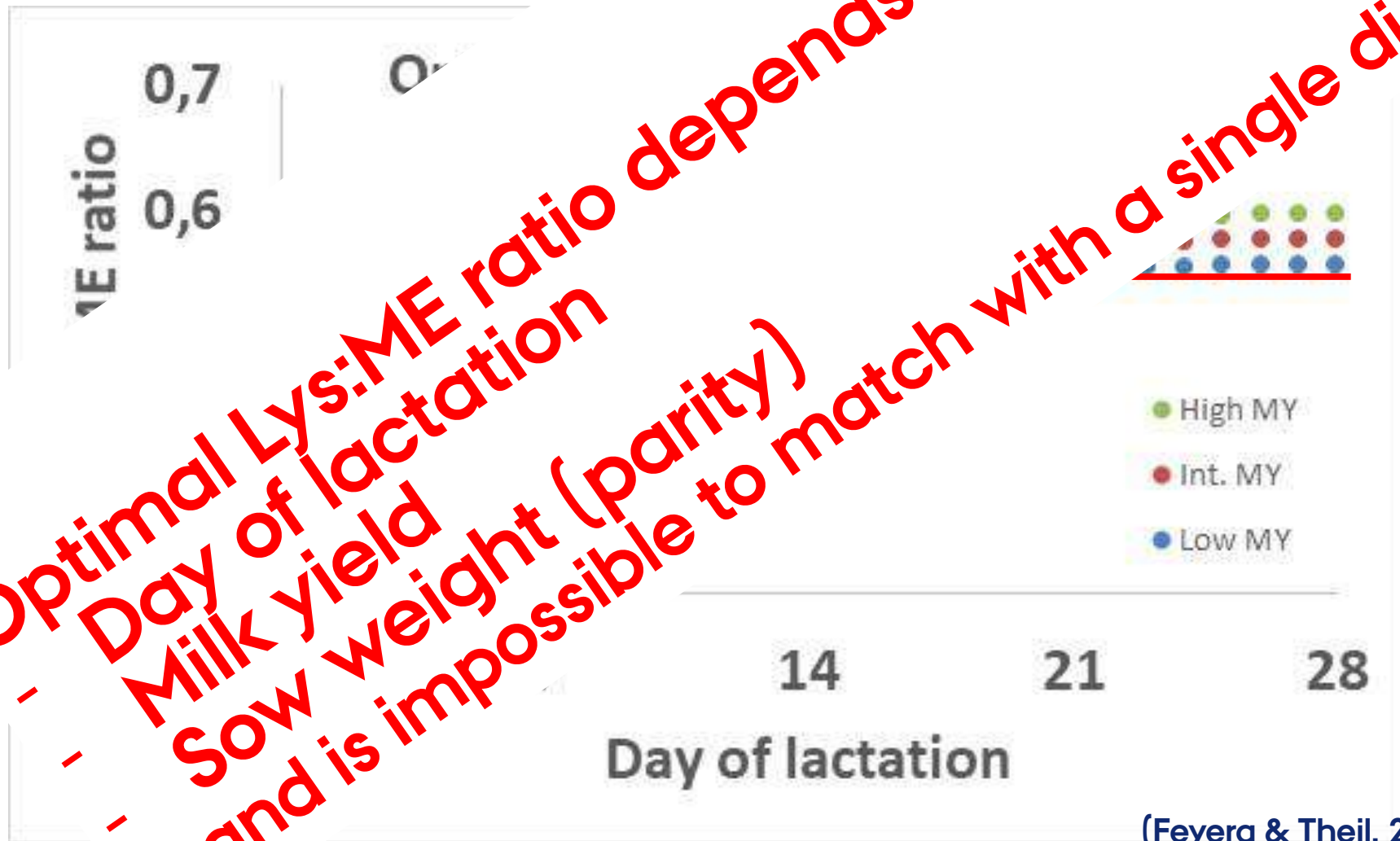
Lactation

(Feyera & Theil, 2017)

Milk yield (MY) and SID Lys:ME ratio



Milk yield (MY) and s²



(Feyera & Theil, 2017)

Two-component feeding – the way forward?

maintenance



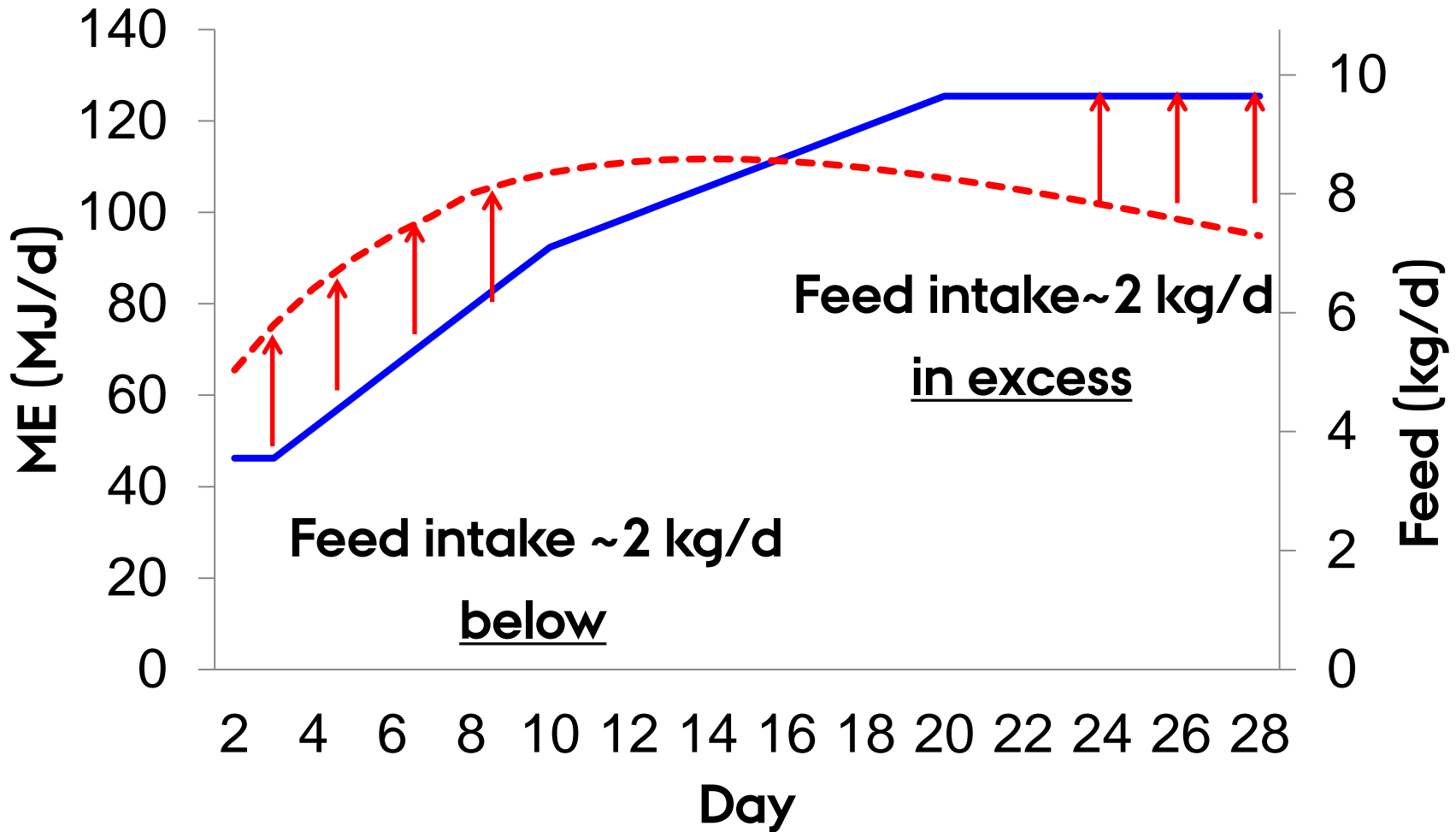
Energy

milk production

Lysine + energy

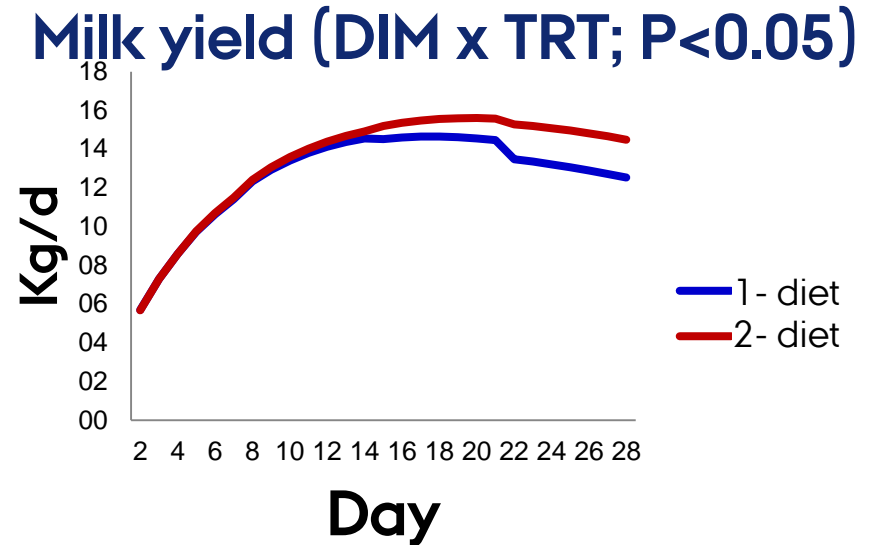
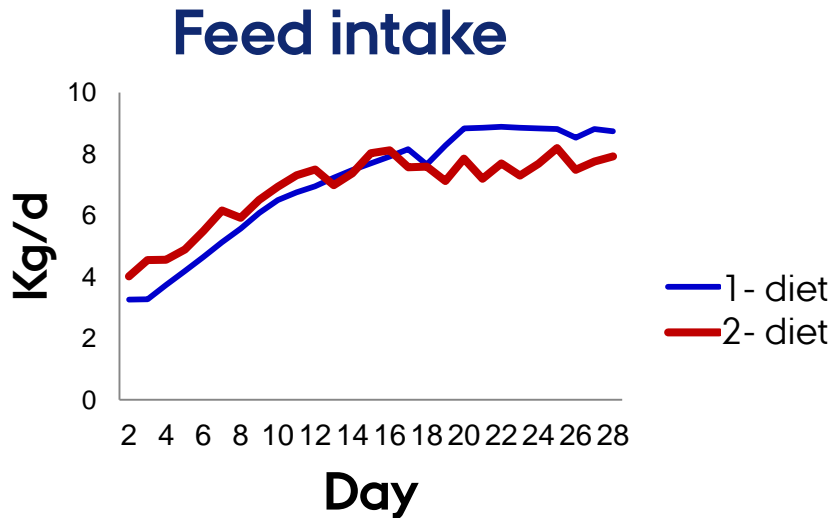
Common strategy (1-diet): Energy intake

Two-component strategy (2-diet): Energy intake = Energy req.



TWO COMPONENT FEEDING

One vs. Two-component feeding



Piglet weight at weaning

One diet:

7.3 kg

Two diet:

8.0 kg

Sow backfat loss

1.8 mm

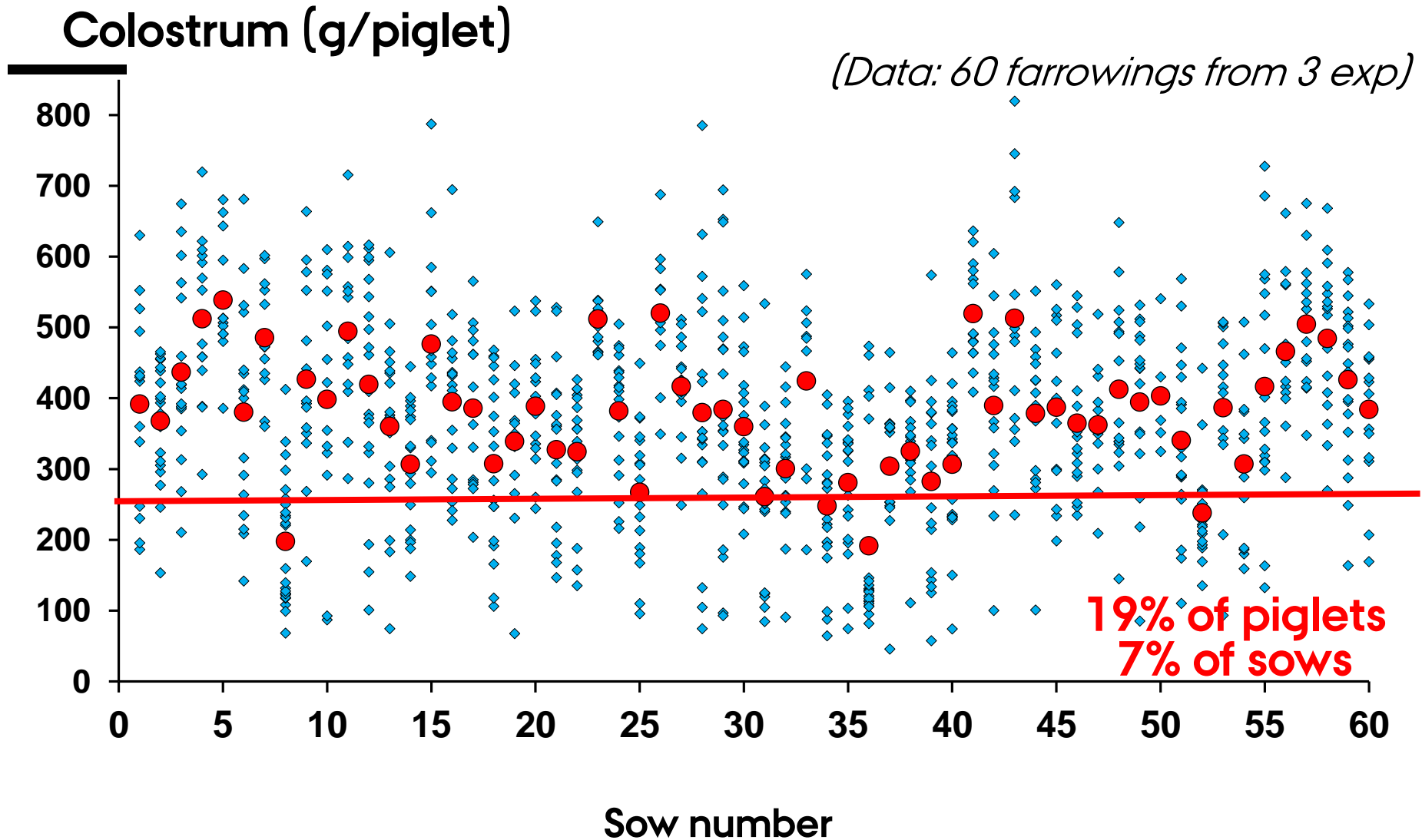
1.7 mm

(Pedersen et al., 2016)

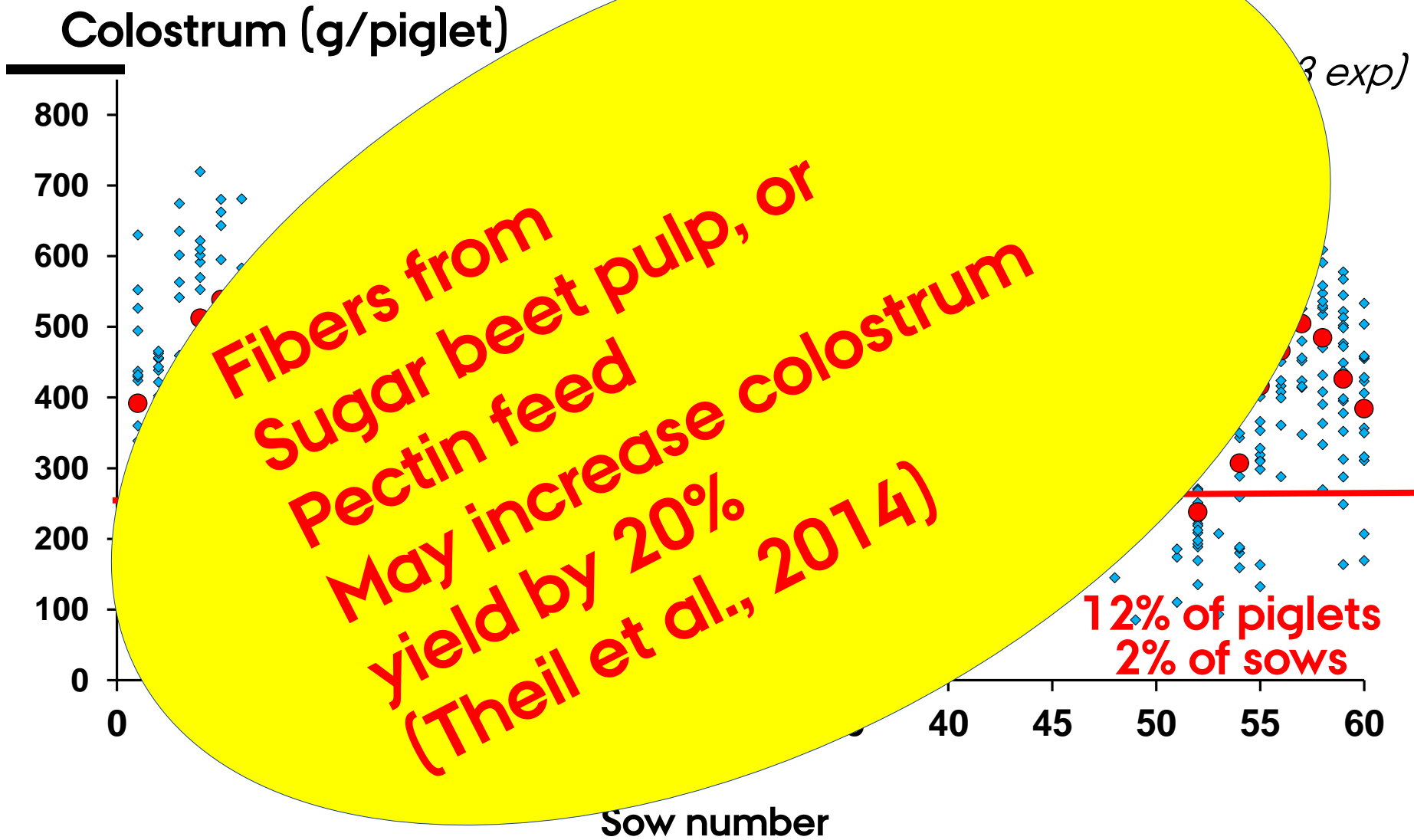
Two-component feeding is first step towards precision feeding:

- ⇒ Targeted feeding day by day**
- ⇒ Targeted feeding depending on production level (litter size)**
- ⇒ Targeted feeding to young and older sows (parity)**
- ⇒ Minimization of sow mobilization**
- ⇒ High feed efficiency (most milk produced directly from feed)**

Colostrum intake (piglets) and colostrum yield (sow)



Colostrum intake (piglets) and colostrum yield (sow)

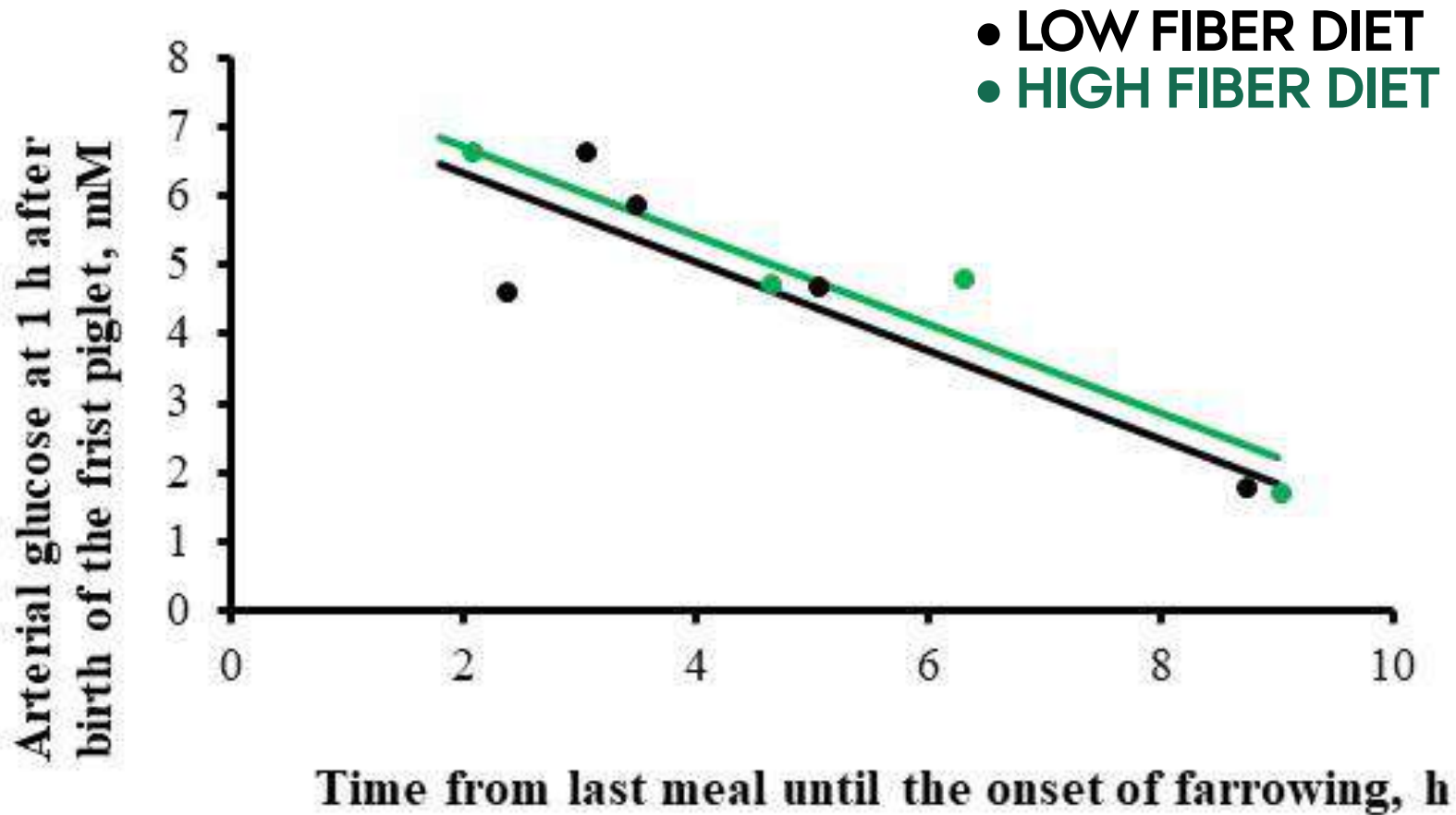


Increased fibre supply and piglet mortality

	Control	Fiber-suppl.	P-val
Groups (weeks)	32	32	
Number of sows	298	322	
Total born per litter	18.4	18.1	0.38
Dead born per litter, %	8.7	6.6	<0.001
Mortality, birth - weaning, %	14.6	13.7	0.21
Total mortality, %	22.3	19.9	0.004
Medication, % of sows	6.4	5.3	0.66

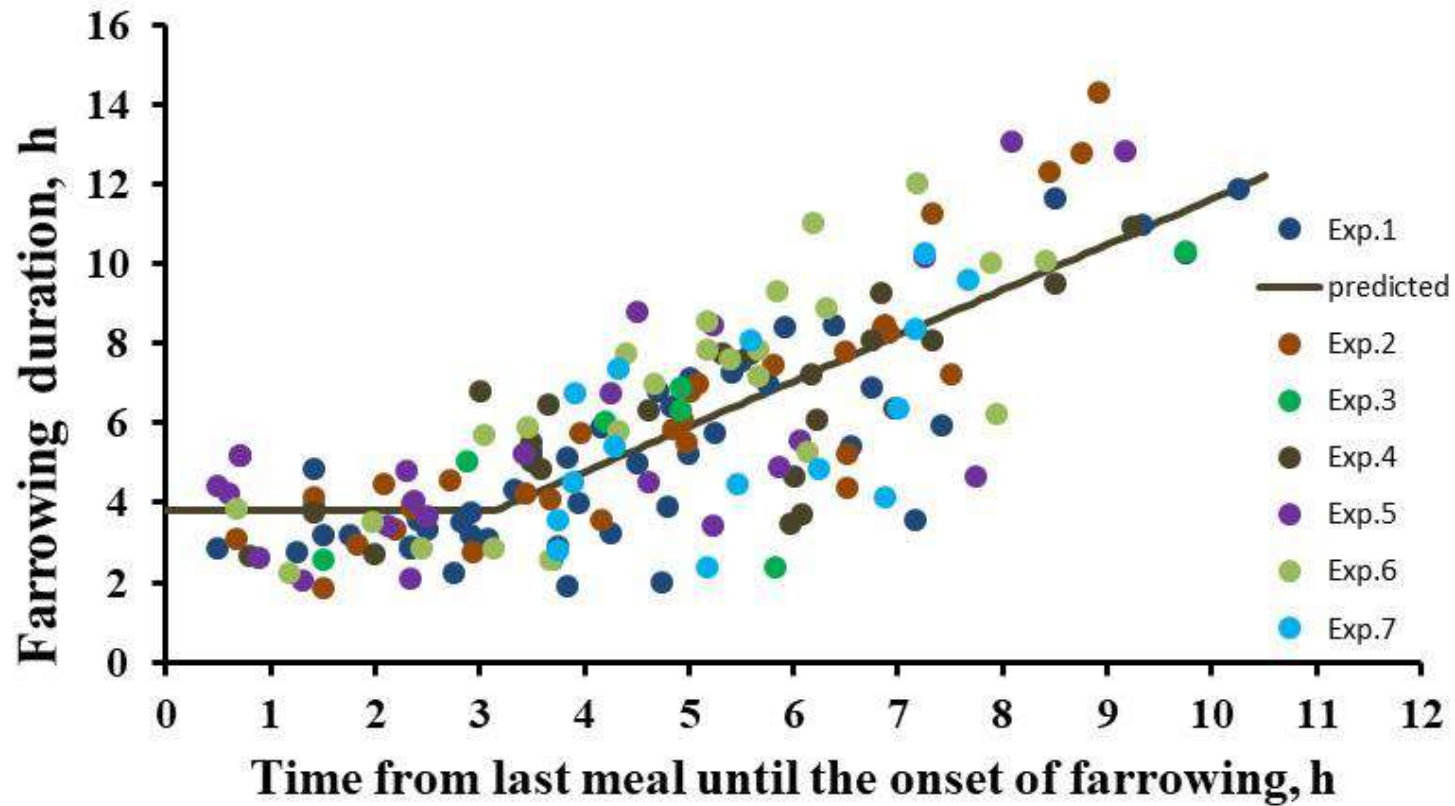
(Feyera et al., 2017)

ENERGY STATUS AND PLASMA GLUCOSE



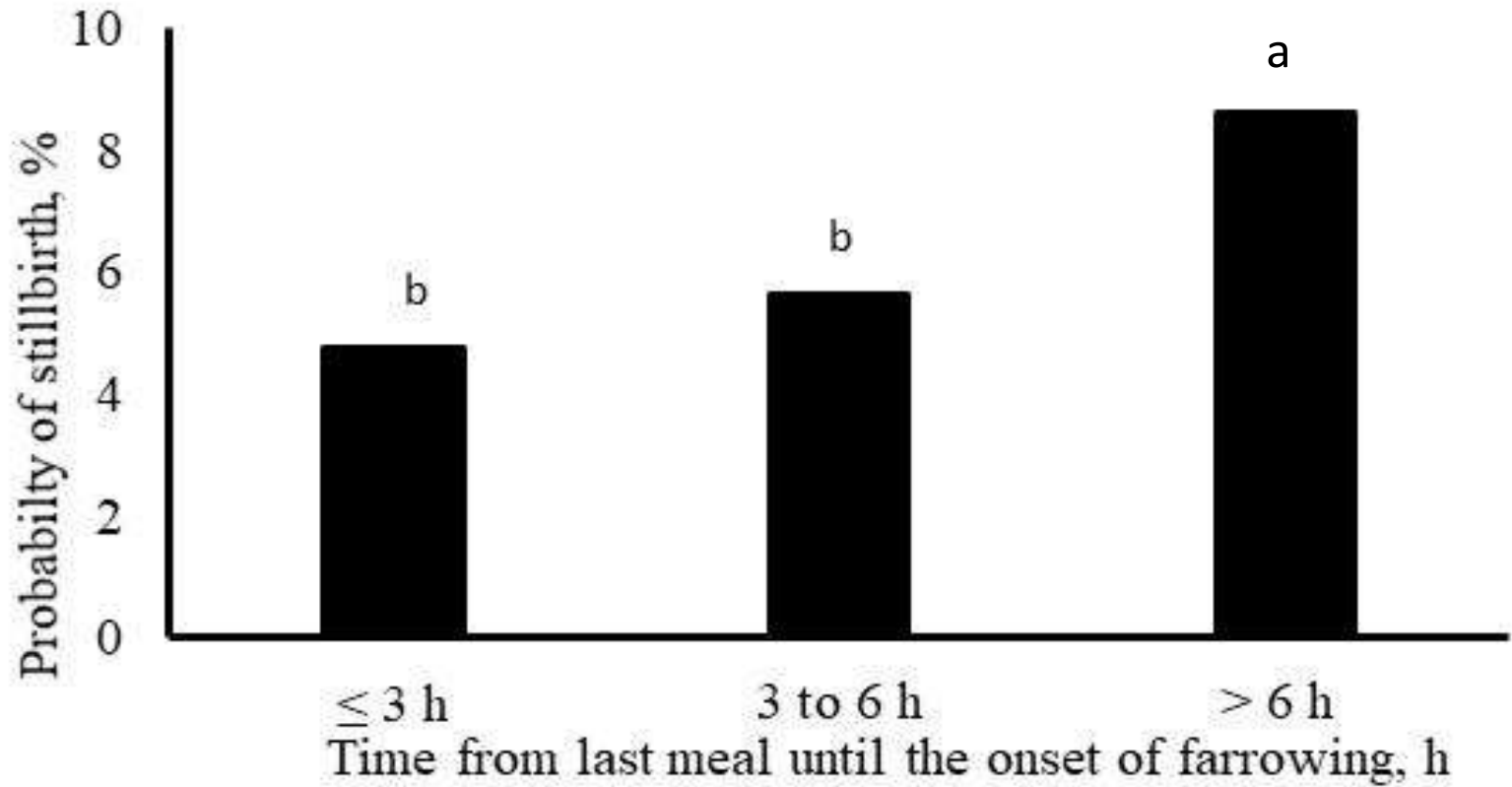
Feyera et al. (2018)

ENERGY STATUS AND FARROWING DURATION



Feyera et al. (2018)

ENERGY STATUS AND STILLBIRTH RATE



Feyera et al. (2018)

Optimal feeding in practice

- Late gestation (more fibers, more energy @ parturition):
≥ 500 g of fiber each day, ≥ 3 daily meals

Inappropriate nutrition: Stillbirth rate ↑ pre-weaning mortality ↑

Early lactation (more energy, appetite may be limiting factor):

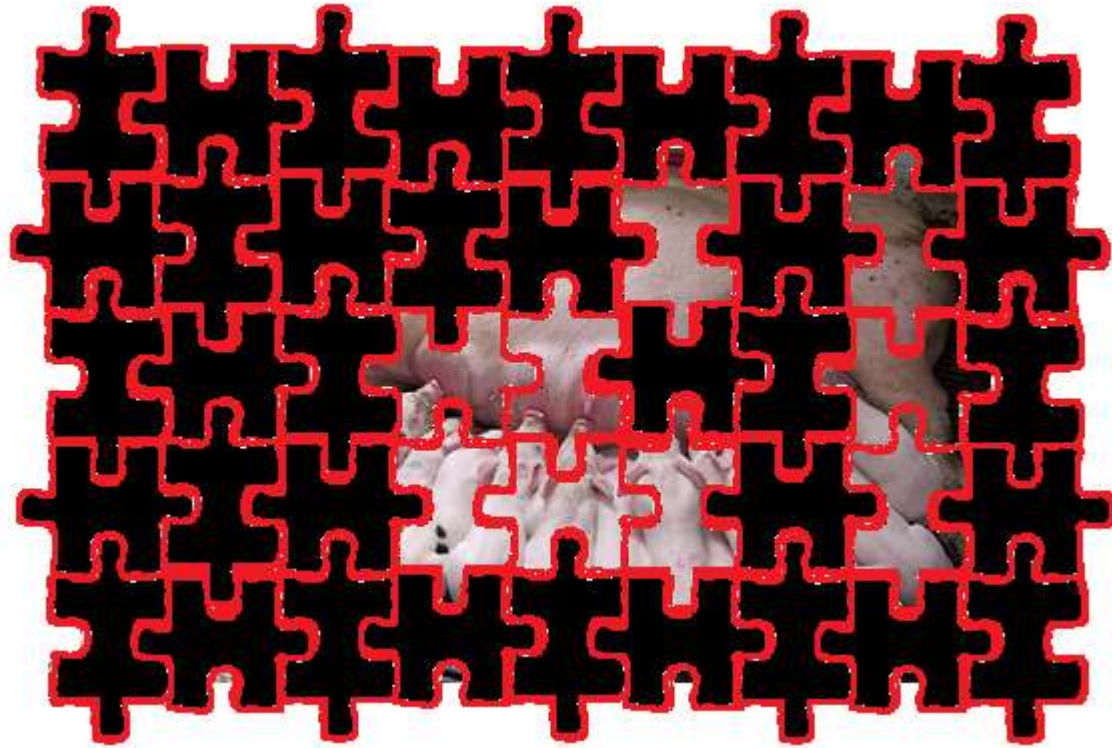
Start at 3.5 kg/d the day after farrowing, increase by 0.5 kg/d

Inappropriate nutrition: Low milk yield, pre-weaning mortality ↑

Peak lactation:

Feed composition OK. Fiber intake high, feed utilisation may be improved by using NSP degrading enzymes.

Inappropriate nutrition: Low milk yield, excessive mobilisation & subsequent reproductive failure



Thank you for your attention 😊

Contact: peter.theil@anis.au.dk

Interested in sows before and during parturition?

Colostrum production – when is it produced?

How is colostrum produced (mammary uptake)

Farrowing duration/interbirth intervals/stillbirth rate

Uterine uptake of energy metabolites during parturition

PhD defence @ Aarhus University, Foulum

Oct, 10th, 2018



10 DIFFERENT FARROWING PENS – IN TEST

**Chief Scientist Lisbeth Ulrich Hansen, SEGES
Svineproduktion**

Copenhagen 2018

THE AIM



- The aim was to evaluate and compare different farrowing pens under identical management and housing conditions
- The test did not include analysis of piglet mortality (only 60 litters per pen type)
- Report no. 1803

5 PENS WITH FULLY SLATTED FLOOR



Big Dutchman
ACO FUNKI
Vissing Agro

Midland
Vereijken



5 PENS WITH PARTLY SOLID FOOR



Bopil/Schauer
Jyden

VSP/KU

Søren Juul Jensen
STEWA



EVALUATION OF THE PENS – SELECTED



- Transfer of sows to the pen
- Working conditions, staff safety
- Piglets' use of the creep area
- Injuries – sow and piglets
- Hygiene in the pen
- Weaning sow and piglets

****/** = very good/good

**/* = average/poor

TRANSFER OF SOWS TO THE PEN



FUNKI



Vissing



Midland

CONFINEMENT AND OBSTETRIC AID



Vissing



Big Dutchman



Midland



Vereijken

ACCESS TO THE PEN/THE PIGLETS



Big Dutchman



Big Dutchman



Bopil

SAFETY FOR THE STAFF



Bopil



STEWA

CREEP AREA



- Easy for the staff to see and reach all pigs from the passageway
- Easy to confine the pigs in the creep area
- Danish legislation – all pigs must be able to lie down on solid floor

Further research in 2018-19

THE USE OF THE CREEP AREA



Big Dutchman



Søren Juul

Further research in
2018-19

KNEE INJURIES – PIGLETS

Day 4	20-25 % FUNKI, Vissing, Vereijken, Midland	35-60 % Big Dutchman, Bopil, Søren Juul, STEWA, VSP/KU, Jyden
Day 14	40-45 %	40-70 %

Further research
in 2018-19



INJURIES – SOWS

Shoulder	Bopil, Søren Juul, STEWA, VSP/KU	Big Dutchman, FUNKI, Vissing, Vereijken, Midland, Jyden
Leg problems	Bopil, Vereijken, Søren Juul, STEWA, VSP/KU, Jyden	Big Dutchman, FUNKI, Vissing, Midland



Further research
in 2018-19

HYGIENE ON SOLID AND DRAINED FLOOR



STEWA

Søren Juul

Jyden

Further research in
2018-19

WEANING THE SOW



VSP/KU



WEANING PIGLETS



FUNKI



Midland

	Big D	Bopil	FUNKI	Vissing	Vereijken	Søren Juul	STEWA	Midland	VSP/KU	Jyden
--	-------	-------	-------	---------	-----------	------------	-------	---------	--------	-------

Transfer sow	*	***	****	****	**	****	***	****	****	****
Gat		**	***					**	***	****
Dir con		**	***					*	**	***
Obs		**	***					****	**	****
Sup cre		***	**					**	**	***
Use		***	***					****	***	***
Injury sow	**	***	**					*	***	**



Inju				**	**	*				
Wea				****	***	****				
Wea				***	***	****				
Saf				****	**	*				
Hygiene	***	**	****	****	**	****	****	****	*	*





Pro-SAU

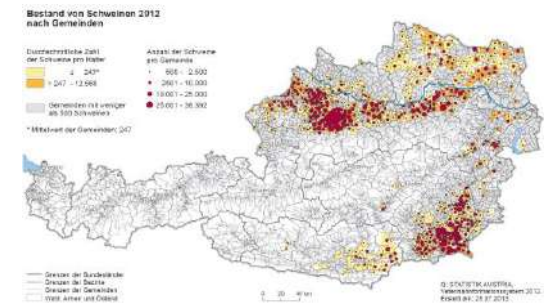
Austria restricts crating of sows in farrowing pens to the *critical period* of piglets' life

Johannes Baumgartner*, Kristina Maschat*,
Johann Stinglmayr, Birgit Heidinger

*Institute of Animal Husbandry and Animal Welfare

Pig Industry in Austria

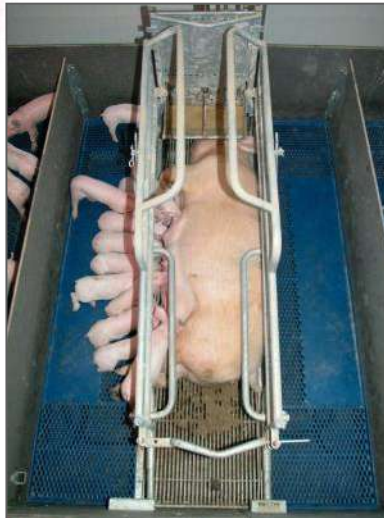
- 2.9 Mio pigs incl. 280,000 sows
- 25,000 pig farms (1980: >200,000)
combined & specialized, equity financed, family farms, high degree of organisation
- 5.4 Mio slaughter pigs/ year
- 56 kg pork per capita, >100 % self supply



AT / 2011: 'Iron Maiden' versus 'Piglet Protection Basket'



Farrowing crate



Free Farrowing Workshop Vienna

8-9 DEC, 2011



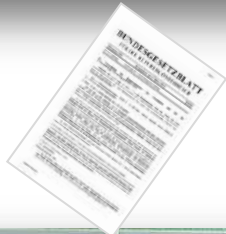
FFWV_2011



Report of the
Free Farrowing Workshop Vienna 2011

8 – 9 December, 2011, Vienna, Austria

edited by
Johannes Baumgartner



Farrowing **until 2033**

- Permanent crating permitted
- 5 days before farrowing in farrowing accommodation
- Pen ≥ 4 (5) m²
- 1/3 solid floor (≤ 5 % openings)

Farrowing pen **from 2033:**

- Room for free movement for sow
- ≥ 5.5 m², 50 % lying area
- 1/3 solid floor (max. 5 % openings)
- Crating only in critical period of piglets' life
- Research until 2018
 - **Critical period** of piglets' life?
 - Suitable farrowing systems?

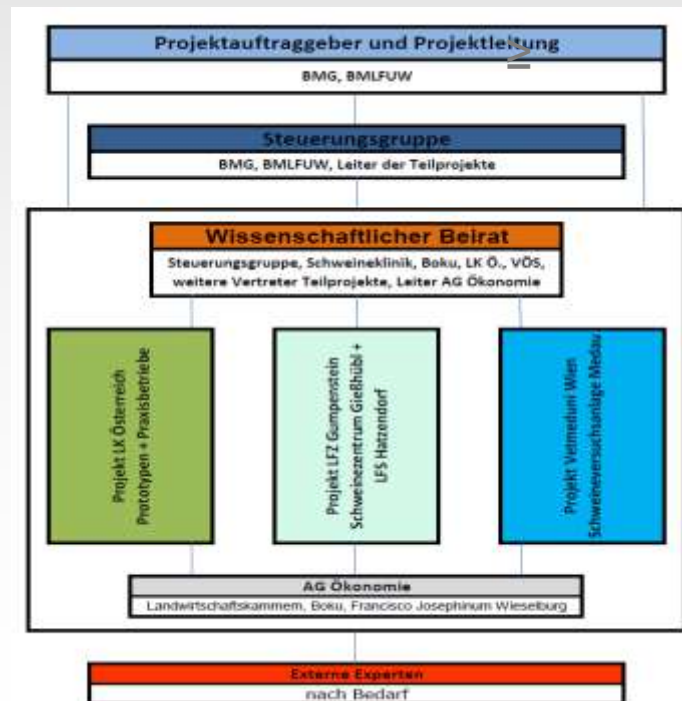


Universität für Bodenkultur Wien



Pro-SAU

*„Evaluation of novel farrowing pens
with possibility for the sow to move“*

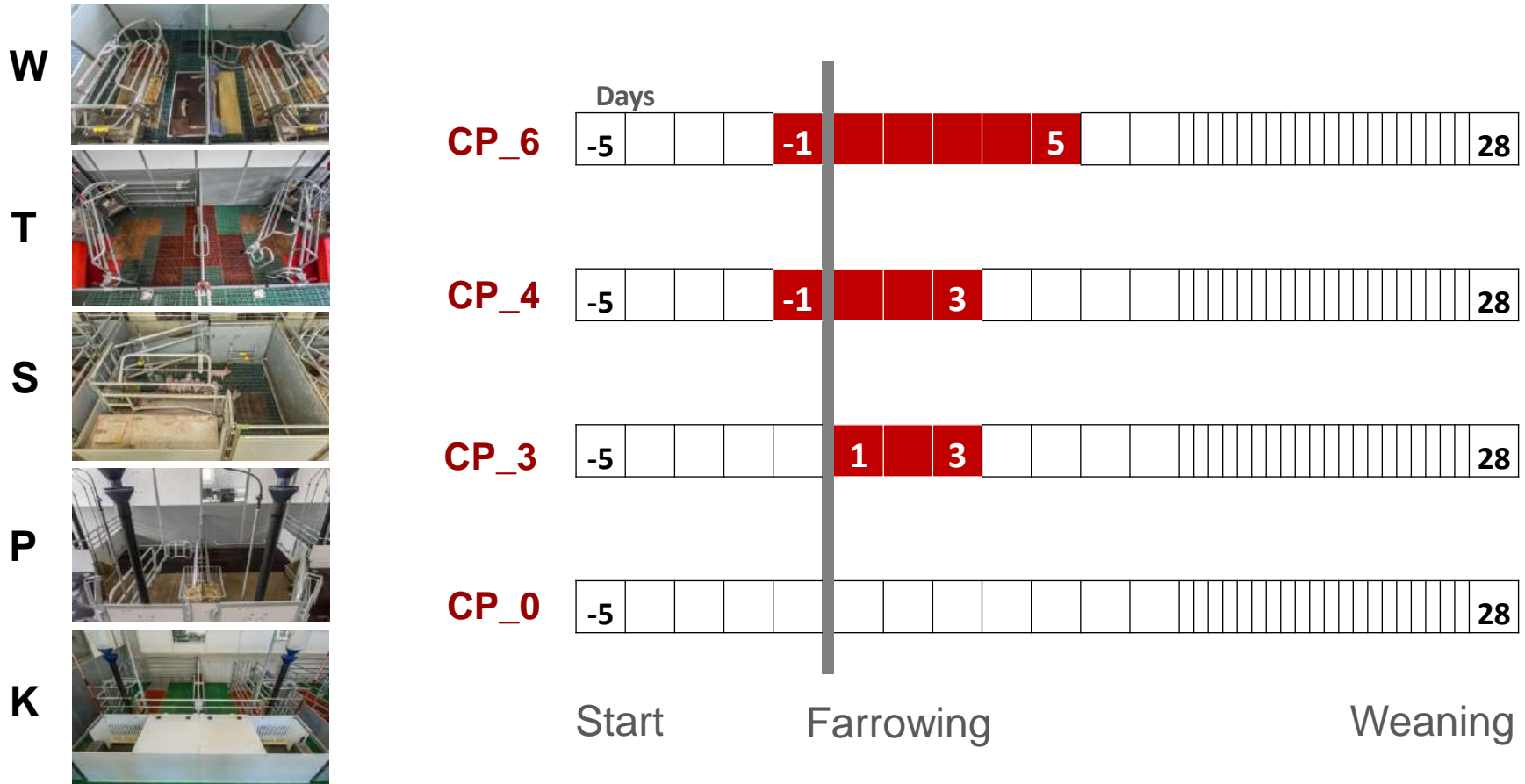


Research project 100986
BMLFUW-LE.1.3.2/0086-II/1/2013
Final report 07/2017

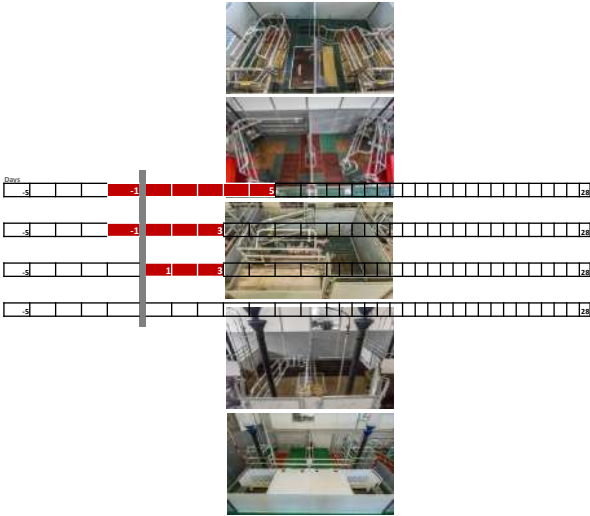
https://www.raumberg-gumpenstein.at/cm4/de/?option=com_r_fodok&Itemid=200881&task=detail&publNr=19428

Study Design – Research Farms

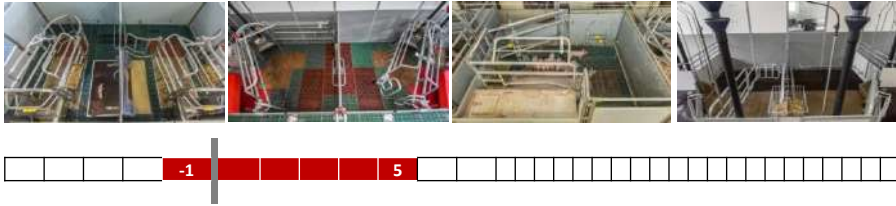
5 Pen Types (PT) x 4 crating periods (CP ■) = *critical period of piglets' life*



Pro-SA^U design



3 research farms



6 practical farms



≥8 pens of ≥1 type in CP_6

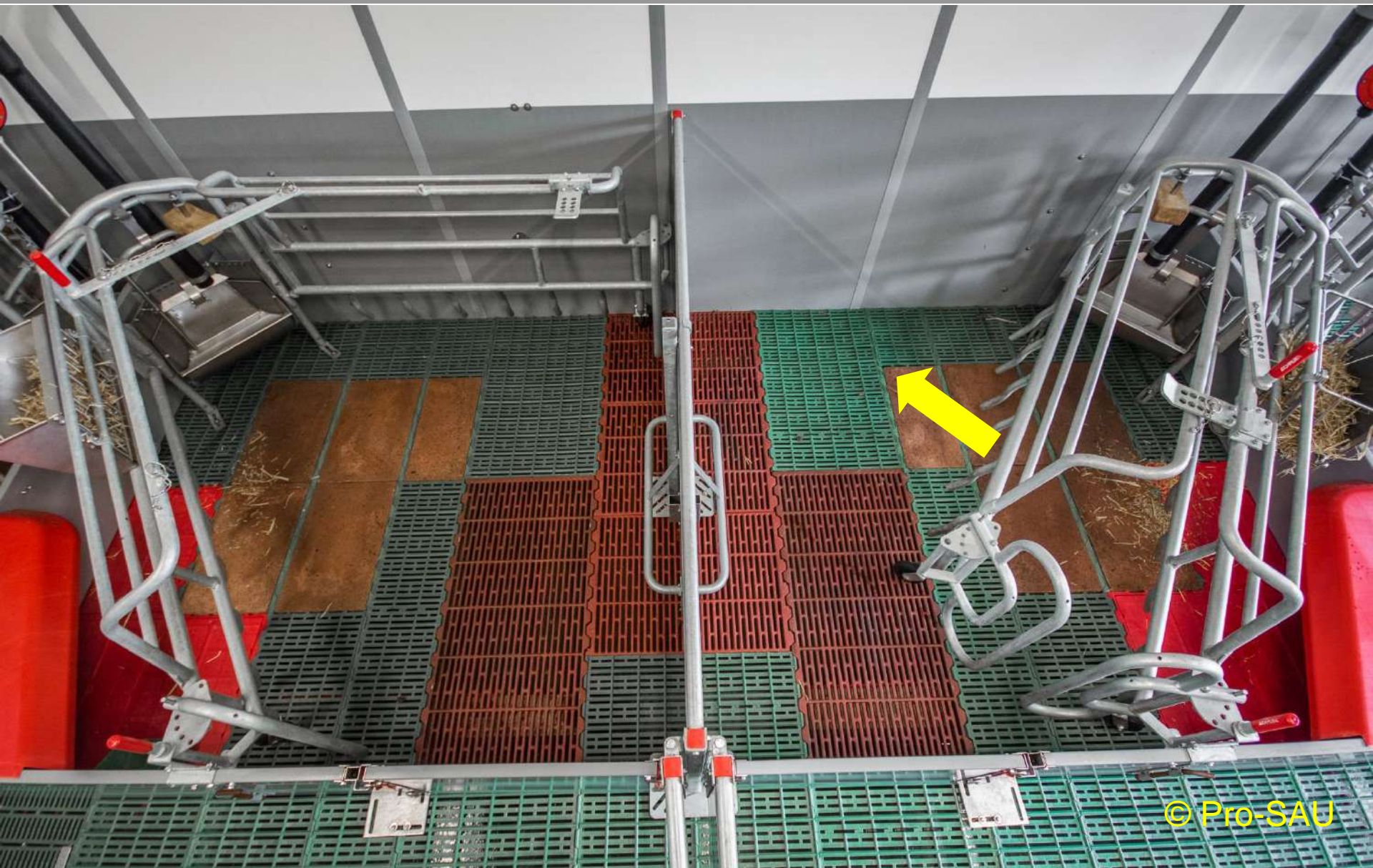
Wing Pen (5.5 m²)



Wing Pen (5.5 m²)



Trapezoid Pen (5.5 m²)



Trapezoid Pen (5.5 m²)

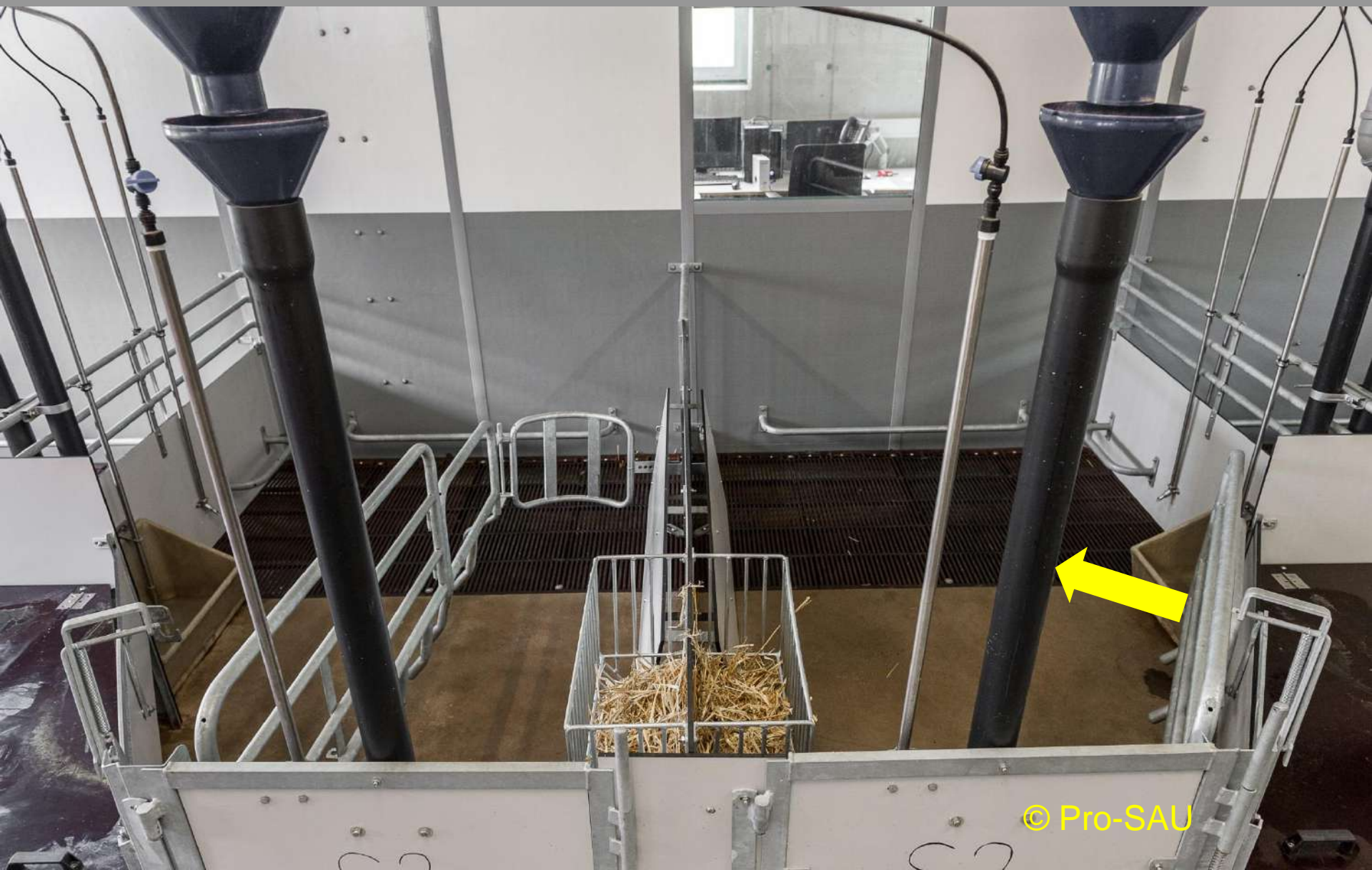


Kink Pen (5.5 m²)



© Pro-SAU

SWAP Pen (6.0 m²)



SWAP Pen (6.0 m²)



Pro Dromi (7.4 m²)



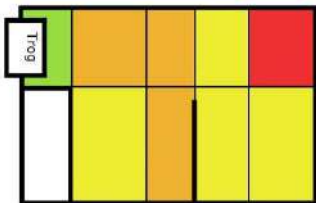
Pro Dromi (7.4 m²)





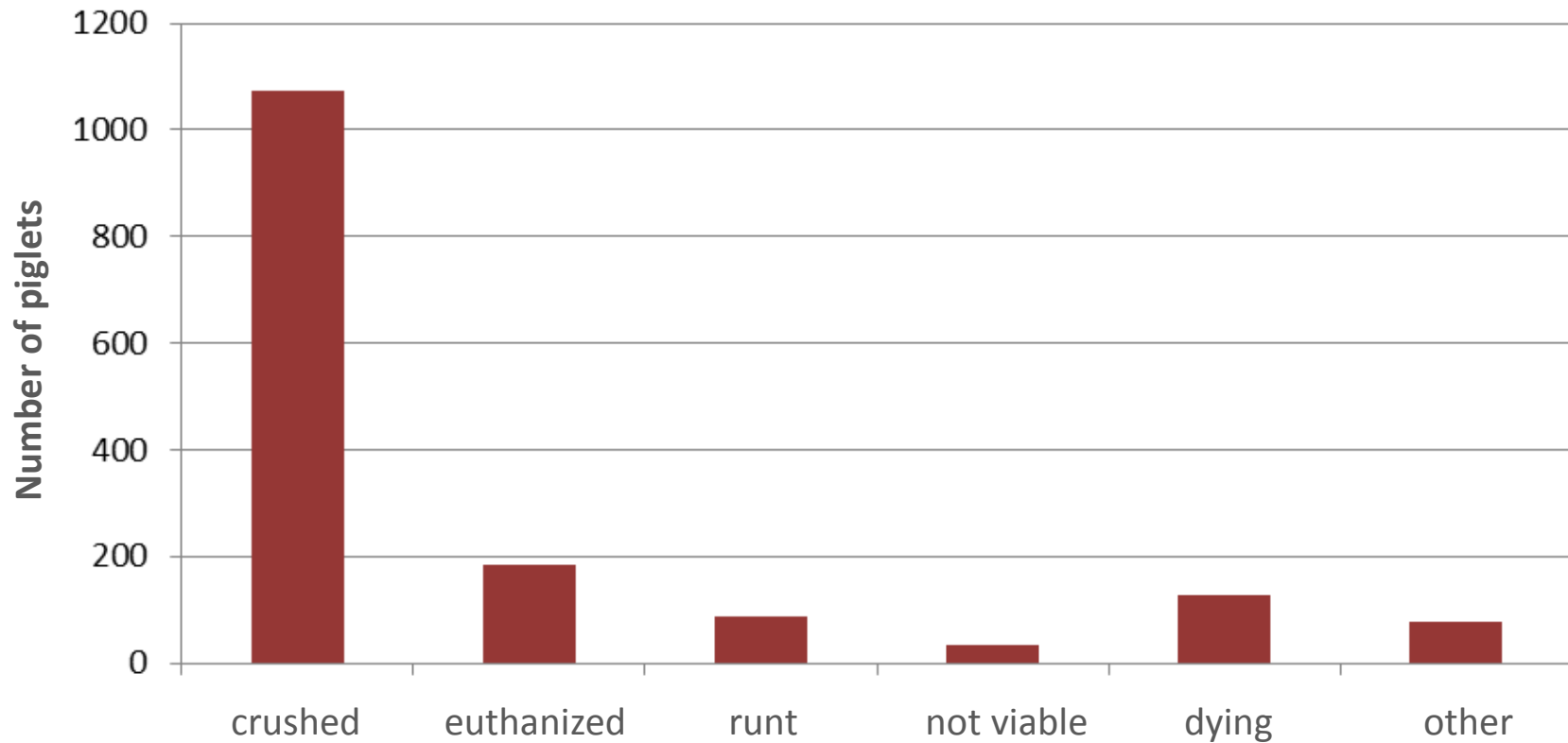
31 months, 383 visits, 3 + 6 farms, 164 pens

- Productivity data
n= 2,069 litters (750+1319)
- Behaviour
n= 281 24 h-Videos (321 TB)
- Skin lesions
n= 820 sows, 1,657 litters/ 6,703 piglets
- Dissection of piglets
n= 5,820 (2,967 + 2,853)
- Dirtiness of pigs and pens
- Work load, economy & market
- Mainly General & Generalized Linear Mixed Models

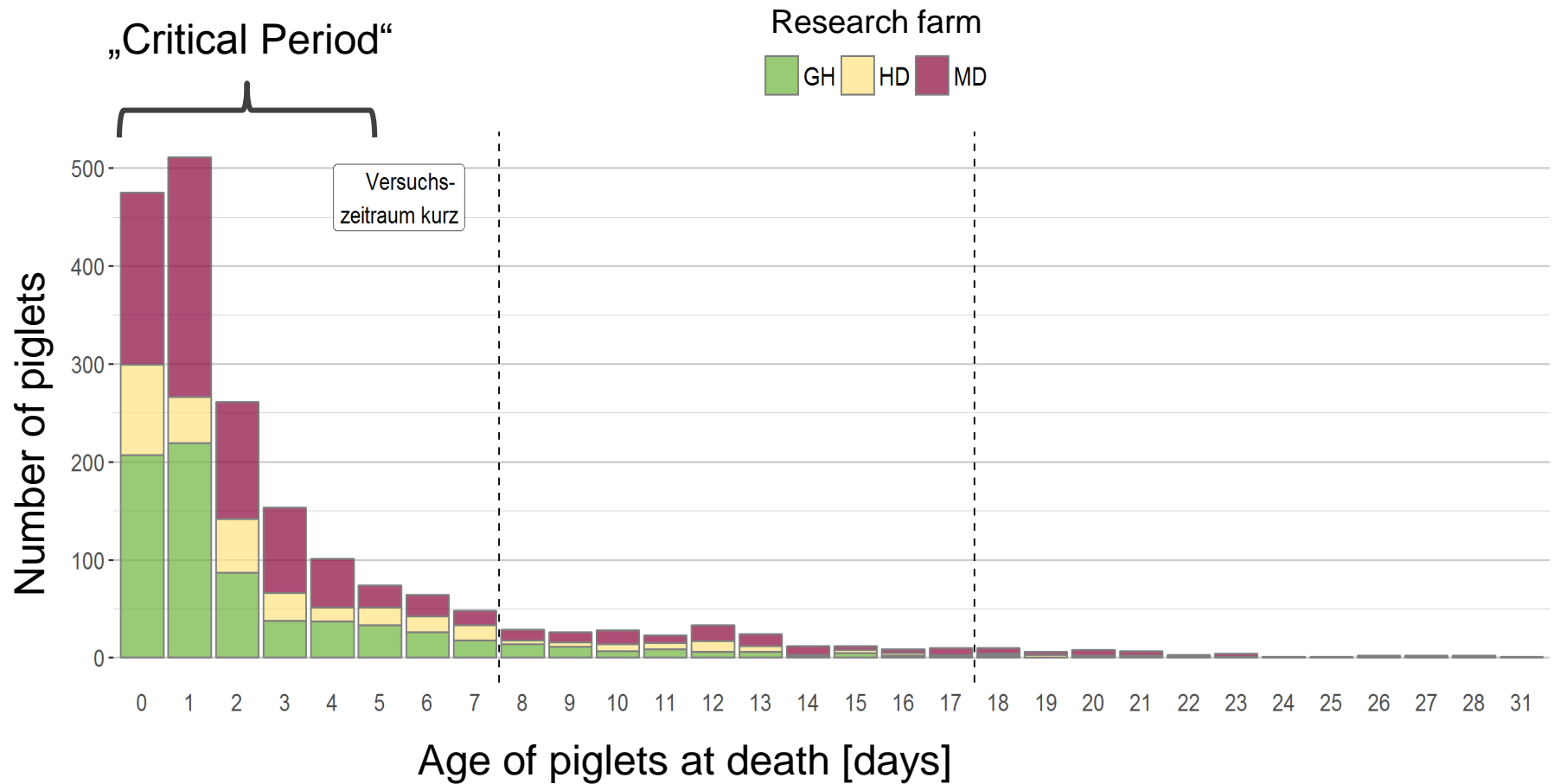


Piglet Mortality – Research farms

Cause of Death

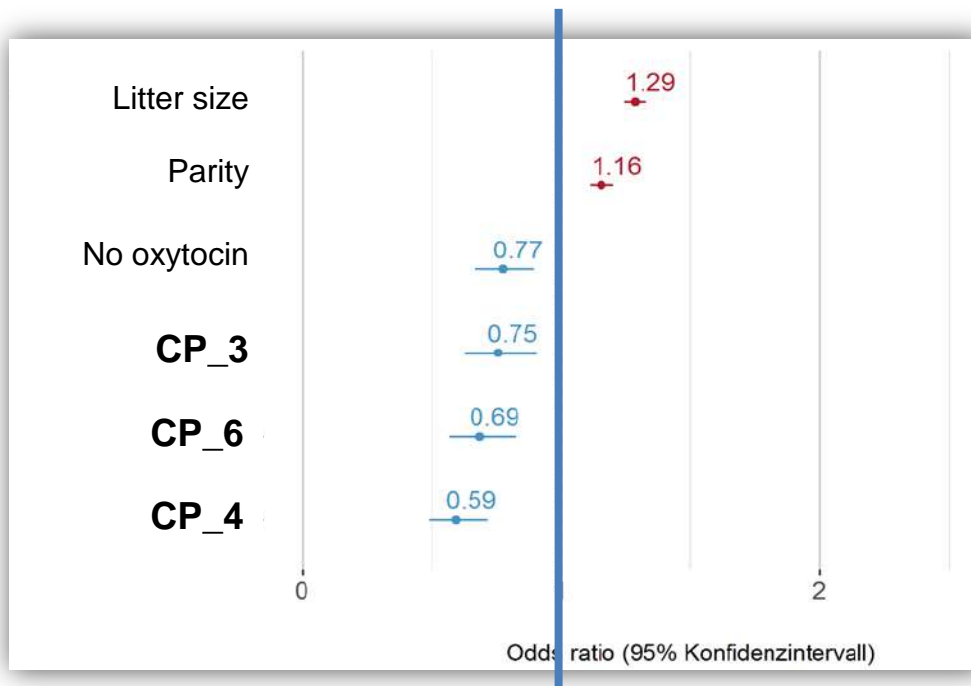


Piglet Mortality – Age



Piglet Mortality

- Significant effect of **Crating Period**
- No effect of **Pen Type**



Crating Period	Effect (Link)	Std. Error	p-Value
3 - 0	-0.281	0.094	0.015
4 - 0	-0.521	0.098	<0.001
6 - 0	-0.378	0.094	<0.001
4 - 3	-0.240	0.099	0.071
6 - 3	-0.096	0.094	0.737
6 - 4	0.144	0.101	0.481

[W + **CP_0**] 13 piglets/ parity 3/ no oxytocin

Effect of **C**rating **P**eriod only in a few parameters!

„Long“ crating (CP_4 & CP_6):

- **Sows**

- ▲ Back lesions
- ▲ Teat lesions



- **Piglets**

- ▼ Arthritis
- ▼ Lameness
- ▼ Claw lesions (hind legs)





No consistent effect of **Pen Type!**

Wing

- Sows: ▲ claws, teats
- Piglets: ±

Kink

- Sows: ▲ shoulder sores, neck/back
- Piglets: ±

Trapez

- Sows & Piglets: ±

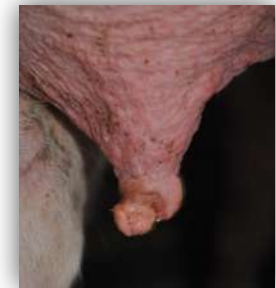
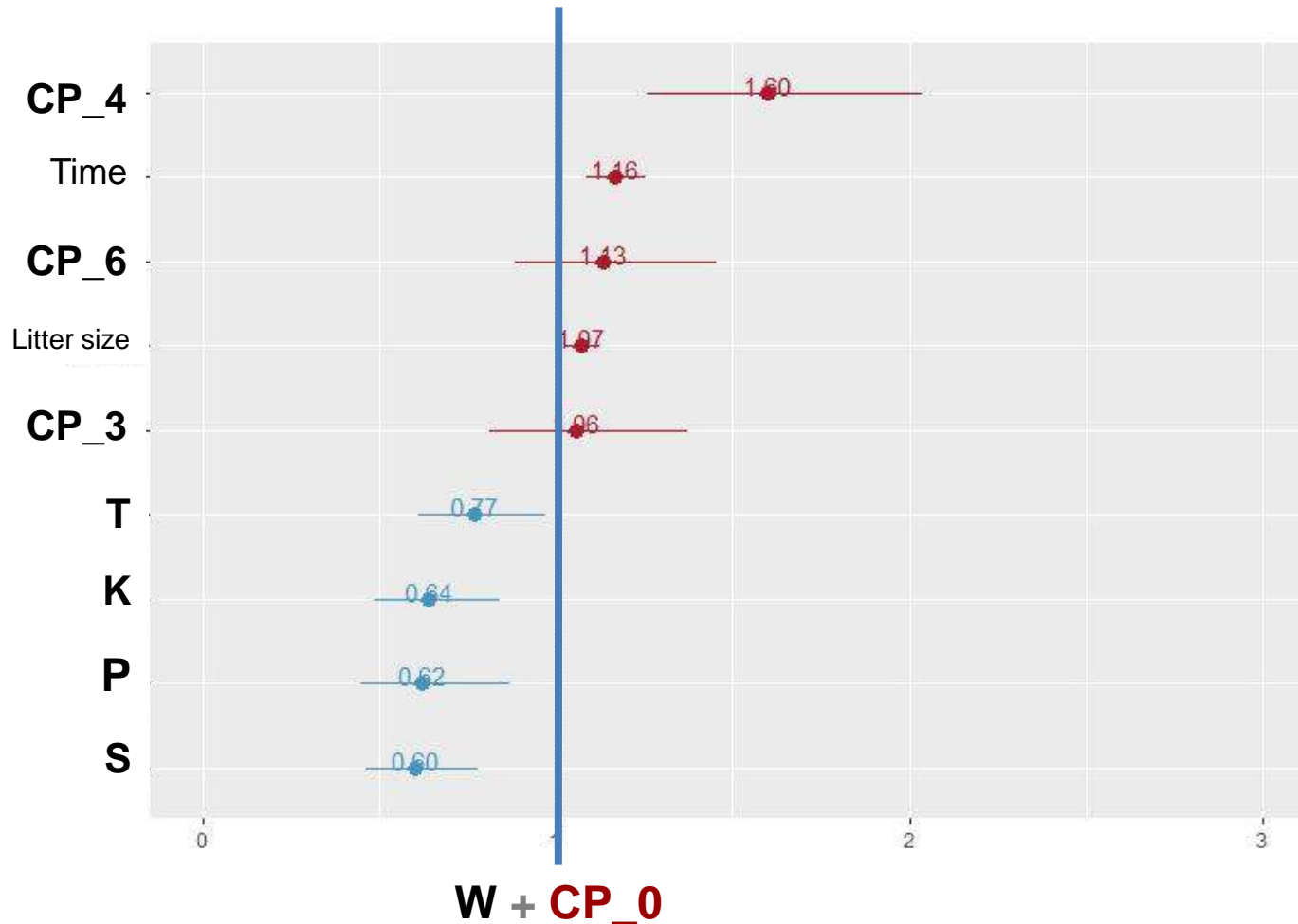
SWAP

- Sows: ±
- Piglets: ▲ carpus/ tarsus, claws, tail

Pro Dromi

- Sows: ▲ neck/back, lameness, ...
- Piglets: ±

Sow: Teat Lesions



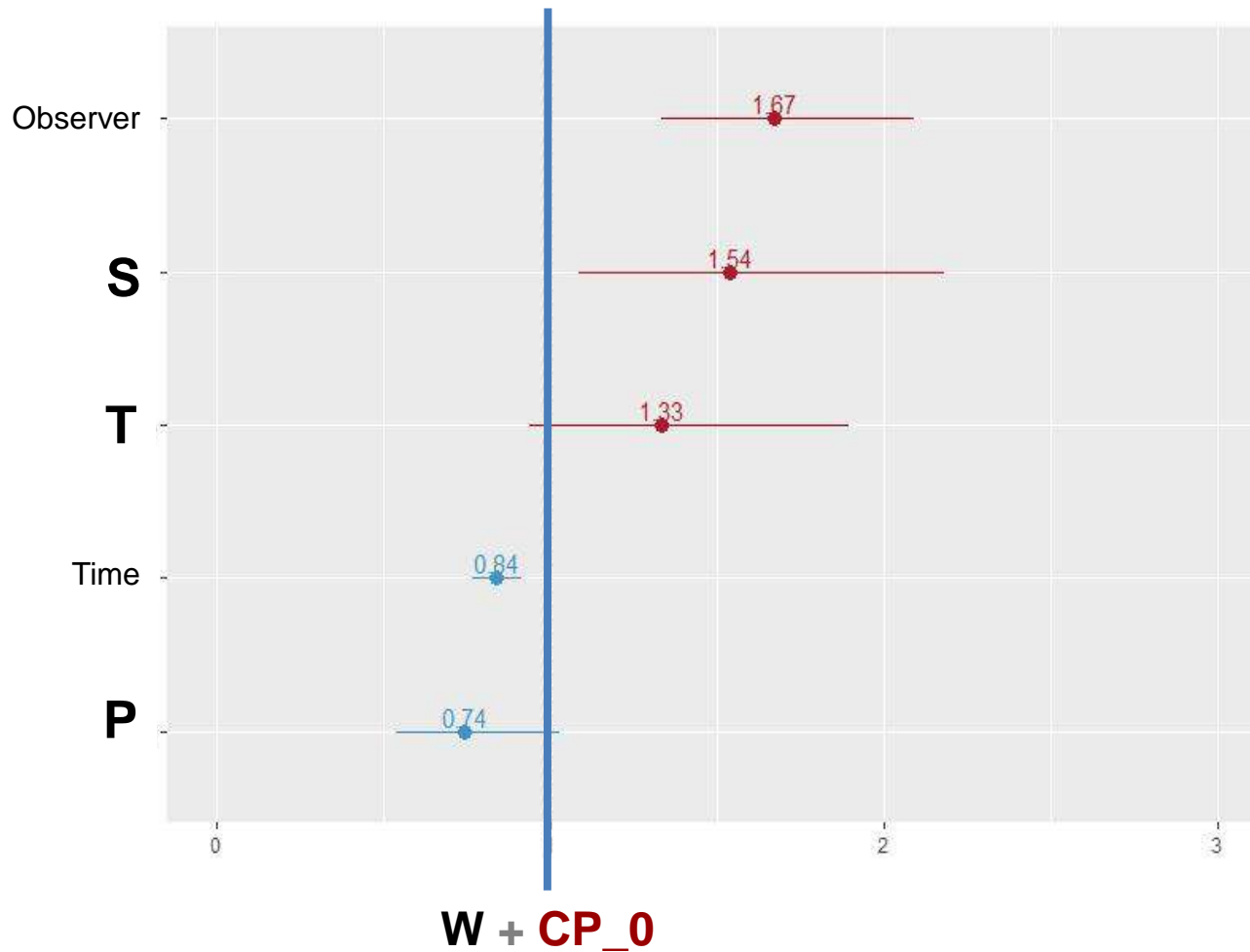
- F>K (0.012)
- F>P (0.041)
- F>S (0.001)
- T>P (<0.001)

CP_4 > CP_0

CP_4 > CP_3

CP_4 > CP_6

Piglets: Carpus



- $P < S$ (0.001)
- $P < T$ (0.03)



Effect of Crating

Nest building

- Activity & Nest building: ▼ crated
- Position changes: ▲ crated

Farrowing

- Activity: ▼ crated
- Sitting & Lying on side: ▲ crated

6. day p.p.

- Activity: ▲ newly released
compared to loose sows



Effect of Pen Type

Nest building

- $S > T, W, K, P$

Farrowing

- Position changes: $T > S$

Activity

- $S > W$
- Day 4 p.p.: $T > S \& W$
- Day 13 p.p.: $S > W \& T$

- ▲ High motivation of sows to move during nest building and after day 1 p.p.
- ▲ Position changes of crated sows during farrowing
- No effect of crating on farrowing duration
- ▲ Dangerous position changes in CP_3 at day 1 p.p.
- **Crate farrowing sow after nest building and before start of birth**
- **Open crate at day 4 after farrowing!**

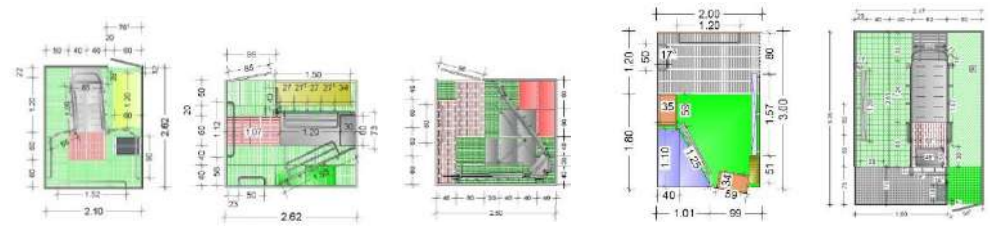
Wing: ▼ Activity (limited space & anti-crushing bars)

Trapez: ▲ Position changes during farrowing → optimize floor

SWAP: 😊 Activity & nest building

Final Evaluation by **Fachstelle**

+ Piglet mortality
+ Animal behaviour
+ Lesions



Pent Type	Wing	Kink	Trapez	SWAP	Pro Dromi
Area $\geq 5.5 \text{ m}^2$	+	+	+	+	+
Width $\geq 1.6 \text{ m}$	+	+	+	+	+
Floor $\geq 1/3$ solid	+	+	+	+	+
Crate adjustable in L & W	+	+	+	-	-
Assisted farrowing possible	+	+	+	+	+
Creep area	+	+	+	+	+

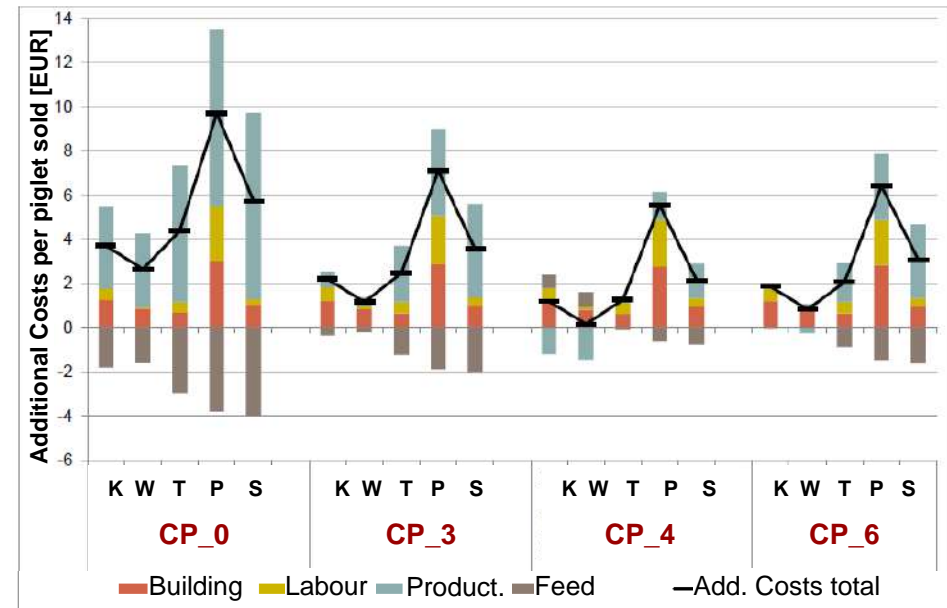


Additional Costs

Additional costs per sow and year compared to current situation calculated for research farms (Ø CP_4 & CP_6):



- Wing pen € 13.14
- Kink pen € 40.38
- Trapez pen € 43.09
- SWAP pen € 66.02
- Pro Dromi pen € 152.58



Mainly due to additional space of novel pen types!

Discussion

Constructive collaboration in **Pro-SA/U**

→ robust and feasible results!

- Crating until day 4 (AT: **-1 to 3** d p.p.? Individually or groupwise?)
- Pen design (floor, size and shape), nest building and material
- Mothering ability and viability of piglets (litter size!)
- Transition period (AT: 2033)
- Knowledge transfer ('open crate in mind!')
- Subsidies to cover additional costs (AT: 30 %)
- Enlargement of buildings and permission needed!
- Pig industry: R & D
- Society? Free farrowing, low piglet mortality!





Thank you for your attention!

LLS18 - Reflections on day 1 proceedings - Sandra Edwards

The discussions today indicate a change in emphasis from previous workshops. There now seems to be a general consensus that free farrowing is still far in the future for large scale commercial adoption and that temporary crating is a necessary intermediate step. This acceptance alters the focus of discussion – the critical point is no longer the farrowing period itself, but must now encompass the time of crate opening which several presentations have identified as being a high risk period for increased piglet mortality. This necessitates a better understanding of the effects of time and method of opening on sow and piglet behaviour. The presentations have used different periods of confinement and there is still uncertainty on which will be best. We should perhaps be taking this decision on a litter-specific basis rather than using an absolute rule, but this will require good guidelines and training if it is to be optimally applied.

Another clear message from today's presentations is the importance of the experience of both animals and people in these systems. There is clearly a learning and adaptation process for both animals and staff before free farrowing or loose lactation systems can deliver best outcomes, and it is important to take this into account when evaluating the results of scientific experiments or commercial performance. Reduced confinement calls for a different type of maternal behaviour, and different working practices and short-term results may not be fully representative of longer term outcomes.

In both free farrowing and temporary crating systems, it is clear that sow age is an important determinant of piglet mortality. Many reports today have highlighted that younger sows do better in these systems and there might be different reasons for this. Old sows come with a varied history – they may have farrowed previously in crates and adapted to this system. We have heard how changing system between parities is a risk factor, which is more likely to be present in older animals. However, this cannot be the whole story since, even in Swedish studies where sows have not been confined during farrowing for many generations, the parity effect is still pronounced. It may be an indirect effect of greater litter size, longer farrowing duration and poorer piglet quality in older sows, or a consequence of large body size with associated difficulty in manoeuvring in a restricted space and slow and careful descent when lying. With selection for prolific genotypes, sows may deteriorate at a younger age in respect of farrowing speed, leg and udder quality. It may be that adoption of reduced confinement necessitates a re-valuation of the optimum culling age in commercial herds – the break point between the cost of gilt rearing and the fall-off in number of quality weaned piglets may now be changing to favour younger herds. However, this has implications for other management considerations such as management of biosecurity and immune stability in the herd.

Hyperprolificacy is clearly another major issue. Many reports have highlighted the increase in piglet mortality with increasing litter size and this may be more challenging in systems with reduced confinement. An increased number of low birthweight piglets, longer farrowing duration and more fatigued sows and a greater need for cross-fostering and nurse sow routines increase the need for interventions by staff. It is very important to consider how easily necessary interventions can be done, and the nature and time course of interventions that will be required in reduced confinement systems.

When considering pen design, there has been a very clear message that designs need to be specific for system rather than a compromise between systems. There is a need to clearly differentiate the design criteria for free farrowing pens from those of temporary crating pens. In the latter case, we have to ask if these are crates that we open or pens that we temporarily close down. It would seem from today's discussions that pen space requirement for optimal performance will be significantly greater in free farrowing than in temporary confinement systems. The different types of pens will have different successful design criteria – for example, we have heard today that a sloped wall which is designed for, and works well in, a free farrowing pen is not appropriate when forming the wall of a temporary confinement crate where enforced proximity of the nursing sow requires greater space to allow suckling from under the wall. We need to be very careful when putting together elements from different systems because they may interact in unexpected ways.

In the past, piglet survival has been main point of discussion for free farrowing and loose lactation. A welcome change at this workshop has been the introduction of a wider range of issues which need to be considered for the system as a whole. We have been challenged as to whether we are evaluating welfare to the fullest extent. How important for the sow is lack of restriction at the time of nesting, and can we find better measures of welfare to demonstrate the true benefits of reduced confinement to sows and piglets? We have also had discussion of the importance of system design for worker safety, and for ease of operation of the daily work routines. If reduced confinement systems are not good places for people as well as for animals, we will never see good results. Pen hygiene has also been highlighted as an important design issue, not only because its role in the control of disease and hence reduced antibiotic use, but also because of its role in ammonia emissions and environmental impact.

Finally, we have had some mention of costings, though perhaps not enough. These discussions need to consider not only capital costs of building, but also running costs and the economic implications of performance change. These implications might not only be negative – we have discussed today the possibility that loose lactation might promote better nursing behaviour and higher milk yield, which will have a positive value. We therefore, when 'eating the elephant' need to think of not only the prime loin cuts (mortality) but also the lower value but significant volume parts of the carcass (health, weaning weight) and the market label of proving welfare benefits.

Welfare Pigs

Short introduction Axelborg Monday 30. April 2018



Pigfarmer Jonas Würtz Midtgård Go-gris I/S – jonas@go-gris.dk – Tlf.: +4540840510

Headlines

- About Go-gris I/S.
- The thoughts behind Welfare Pigs.
- Challenges.
- Opportunities.



About Go-gris I/S

- Partnership near Horsens.
- 1.000 sows full line.
- We buy gilts and seem.
- One box/sow (eat and rest) in dry period.
- 144 Combiflex loose housing farrowing pens.
- 94 traditional farrowing pens.
- Own feed mill. (mix with neighbor)
- 690 ha. land 80 % self-sufficient.
- 8 employs (multicultural)



Farrowing section (loose sows)



Farrowing pen (loose sows)

- 2,4 x 2,4 meter
- 0,76 m² bigger then traditional farrowing pen.



Dry sows



Thoughts behind Welfare Pigs



UK → UK +

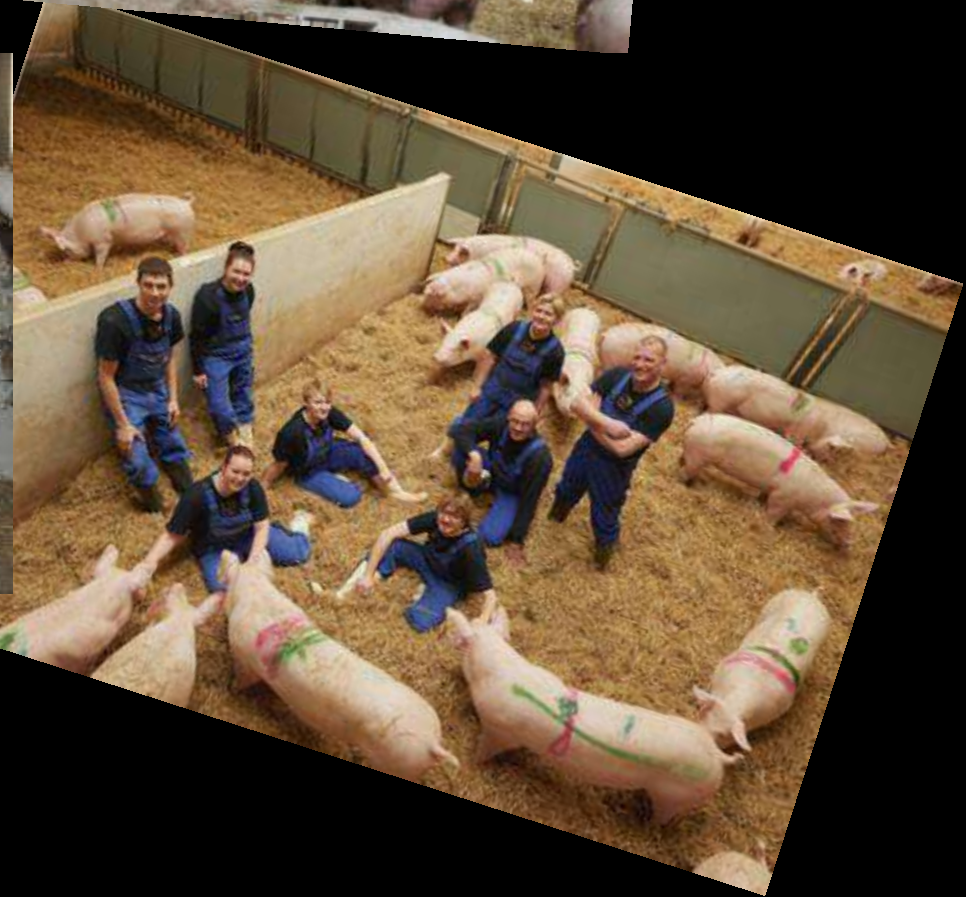


Traditional farrowing pen. Success since the 70's – but a pillow!

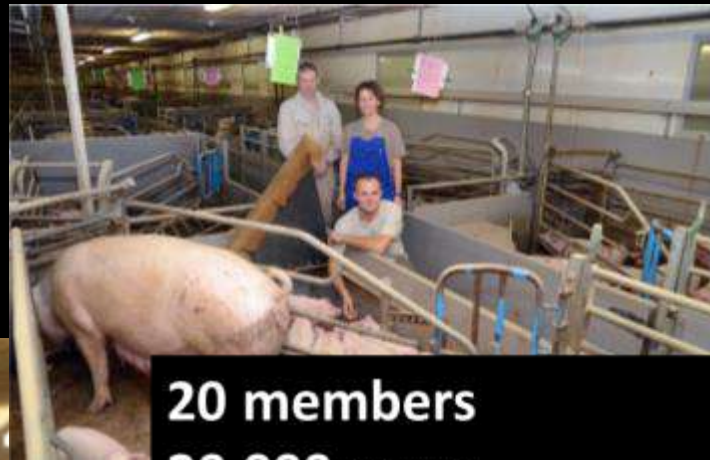




Welfare Pigs Team



Welfare Pigs Team



20 members
20.000 sows
660.000 weanerpiglets



Challenges



Challenges



Challenges





-Jeg har flere klar til næste tirsdag.

- Beklager, men markedet er mættet.

Opportunities

- Share knowledge between farmers.
- Tell the good story.
- Be openminded and honest.



Questions





Nobody can do everything;
Everybody can do something;
Together we can do it all

WORKSHOPS – PEN DESIGN

**Chief scientist Vivi Aarestrup Moustsen, PhD, MSc.,
SEGES Danish Pig Research Centre**

Affiliate Associate Professor of Animal Husbandry, Pigs, UCPH.

2018 04 30



PEN DESIGN - KNOWLEDGE

- Questions (next slide)
- No more than 5-6 at a table at a time
- Time for three tables each
- Outcome - recommendations and knowledge/research gaps

'1-2-more' - That is each round will be:

Individually - 1 person:

Three minutes

- think and write down your most important inputs on post-it;

In pairs - 2 persons:

Four minutes

- explain your ideas in pairs;

In the group - more:

Fifteen minutes

- discuss and group the inputs in the group

Each table has a 'chair' – who will help with time, the process – and try to make sure we cover more aspects as well as sum up the most important messages

PEN DESIGN – KNOWLEDGE TRANSFER

Table	Chair	Subject	Supplementary
1	Johan	Nestbuilding material, enrichment, rooting	Fullfill sow/piglet needs, commercially available, no risk of ASF or.....,
2	Janni	Confinement	Yes/no, if yes – when close/open (time of day, day...)
3	Marie-Louise	Reduction of early piglet mortality	Sow, piglets, pen, management
4	Peter T	Increase weaning weight and quality of piglets	Feeding of sow, feeding of piglets, health,
5	Lisbeth U.	Dry and clean floor	Sow dunging behaviour, piglet dunging behaviour, floor characteristics, pen design,
6	Trine	Relationship between sow, piglets and staff	Handling of sows, piglets, training of staff, access to pens, importance of 'noise level'
7	Kent	Miscellaneous 😊	Subjects not covered at the other tables – or just to many persons at a table to discuss a subject

PEN DESIGN – SUM UP

RECOMMENDATIONS/KNOWLEDGE AND RESEARCH GAPS

Table	Chair	Subject	Supplementary
1	Johan	Nestbuilding material, enrichment, rooting	Fullfill sow/piglet needs, commercially available, no risk of ASF or.....,
2	Janni	Confinement	Yes/no, if yes – when close/open (time of day, day...)
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Nobody can do everything;
Everybody can do something;
Together we can do it all

WORKSHOPS – PEN DESIGN

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SEGES Danish Pig Research Centre**

Affiliate Associate Professor of Animal Husbandry, Pigs, UCPH.

2018 04 30



PEN DESIGN - BUILDING

- Groups of 4-5 persons
- 55 minutes to build a pen
- 5 minutes to present the pen

Each group has:

One sow

A litter of new-born piglets

A litter of four week old piglets

Scale 1:10

Paper A3; 1cm : 10 cm



PEN DESIGN - BUILDING

Group	Members
1	Emma, Maria, Greg, Birgit, Jonas,
2	Sandra, Rebecka W., Charlotte, Monique, Janni
3	Lene, George, Gudrun, Anita, Kent
4	Kate, Hannes, Liesbeth B., Yuzhi, Lisbeth U
5	Penny, Irene, Jean-Loup, Peter T., Marie-Louise
6	Rebecca M, Sarah, Roland, Johan, Trine
7	Anne-Charlotte, Astrid, Yolande, Søren, Vivi

PEN DESIGN - BUILDING

- Present pens

Group	Members
1	Emma, Maria, Greg, Birgit, Jonas,
2	Sandra, Rebecka W., Charlotte, Monique, Janni
3	Lene, George, Gudrun, Anita, Kent
4	Kate, Hannes, Liesbeth B., Yuzhi, Lisbeth U
5	Penny, Irene, Jean-Loup, Peter T., Marie-Louise
6	Rebecca M, Sarah, Roland, Johan, Trine
7	Anne-Charlotte, Astrid, Yolande, Søren, Vivi



SNAPSHOTS – LOOSE LACTATING SOWS

Chief scientist Vivi Aarestrup Moustsen, PhD, MSc.,

SEGES Danish Pig Research Centre

Affiliate Associate Professor of Animal Husbandry, Pigs, UCPH.

2018 05 01



MY JOB – SIMPLE....

- Make loose housing competitive to systems with crates
- And acceptable by society and politicians
 - License to produce



WE WANT MORE LOOSE HOUSED SOWS

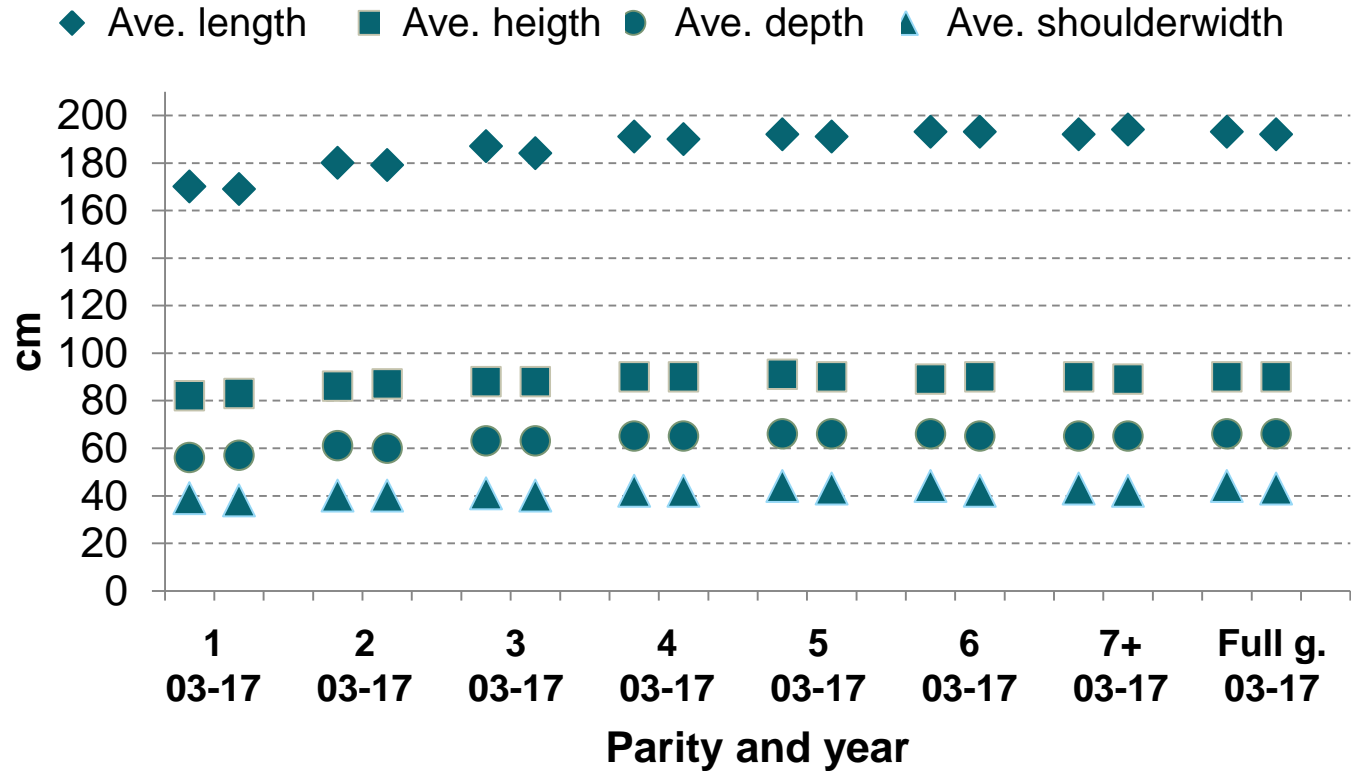
What are the barriers/challenges and how can we overcome them:

- £ Investment and running costs
- ♥ Welfare and productivity – piglet mortality
 - Address both sow, piglet, pen, staff....
- ☀ Environment
 - Larger pens, risk higher emissions
 - Loose animals – less control of dunging
 - Slats – and then even higher emissions
- 😊 Management
 - What works, attract staff, motivate staff, train staff....

DIMENSIONS

CROSS BRED SOWS 2003 AND 2017

2003: 322 sows
2017: 405 sows



BESIDES SOW DIMENSIONS - MOVEMENT

10 sows

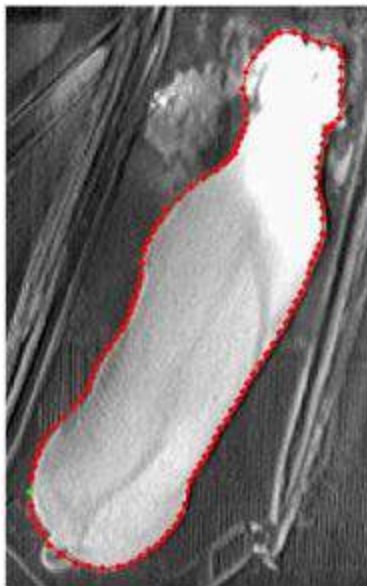


Figure 4.
Line around a standing
sow, before movement



Figure 5.
Frame around the sow
before movement was
initiated

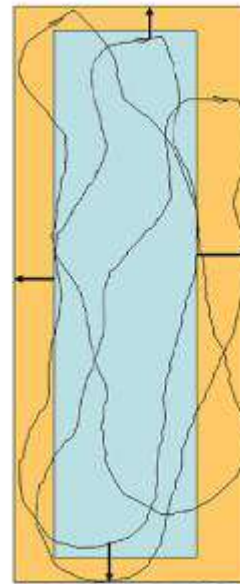


Figure 6.
Frame after movement –
showing area used during
up- and downwards
movement

*Mousten & Duus,
Meddelelse 733,
www.svineproduktion.dk*

NEST BUILDING

184/186/186 sows – total of 556 sows



Strategic supply of straw

Strawrack / + 5kg / + 10kg



- Reduced stillborn
 - From 1,9 to 1,4 piglets/litter



Did not work when

no scrubbers in



slurry channel

CLASSICAL MUSIC AND DAILY SCRATCHING

444 sows



- Scratch 15 seconds daily for 5-6 days prior to farrowing
 - Less likely to withdraw
- Treated sows easier to handle



CONFINED TWO OR FOUR DAYS



♥♥: Up to 2 days confinement
♥: Up to 4 days confinement



	Loose	♥♥	♥
Sows, no	21	21	21
Hours confined after farrowing, no	-	72	85
Dead piglets, no		62	48
Age at death, day	1,26	1,32	1,58
Weight at death, kg/piglet	1,14	1,15	1,22

PRELIMINARY RESULTS

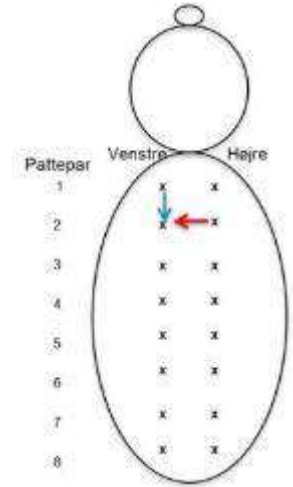


NURSING CAPACITY?



UDDER, GLANDS AND TEATS

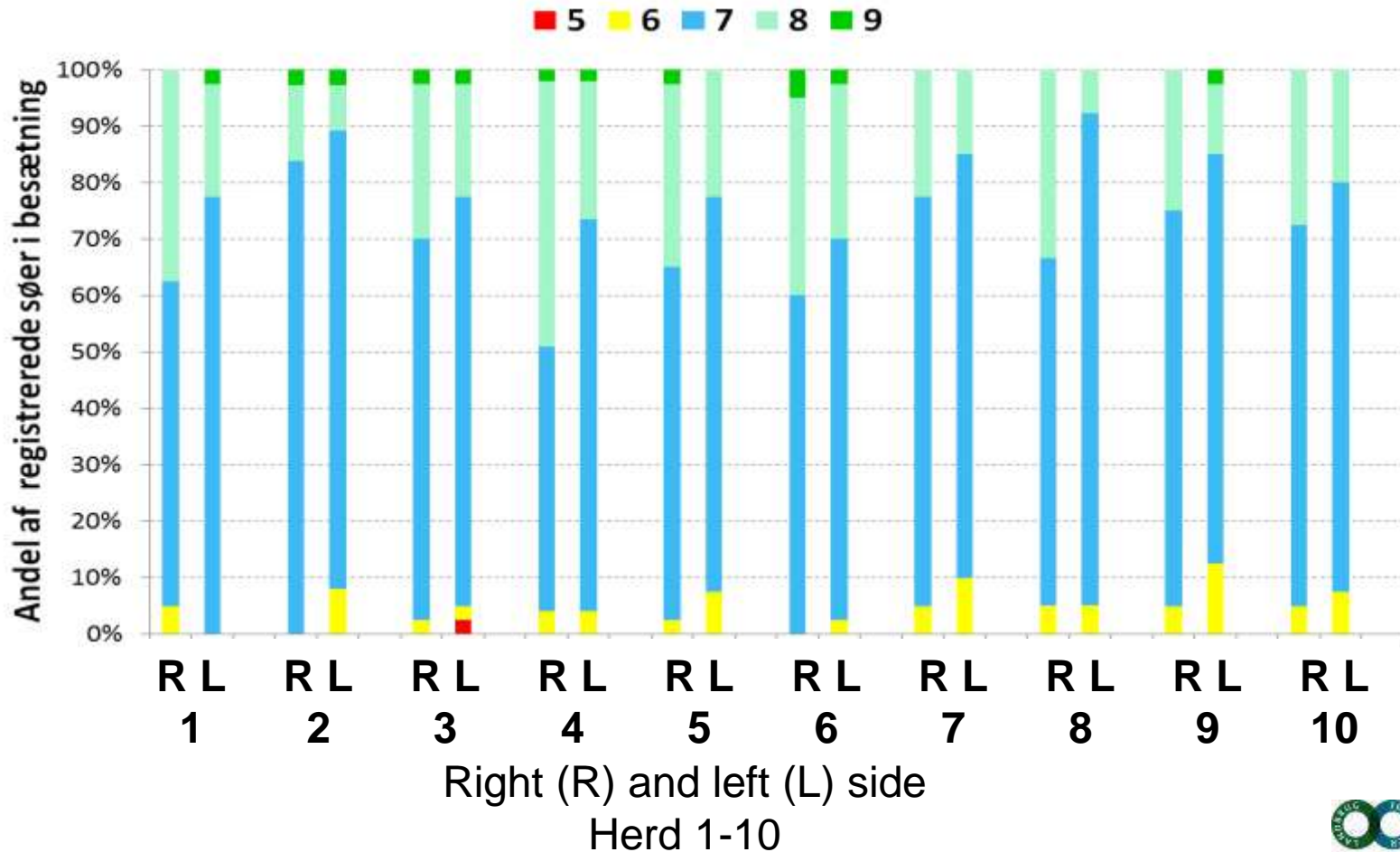
- 10 herds
- App. 40 sows per herd
- App. 8 days post farrowing
- Number of glands left and right
- Distance between teats
- Score glands and teats



Mod.e. Thorsen, AU

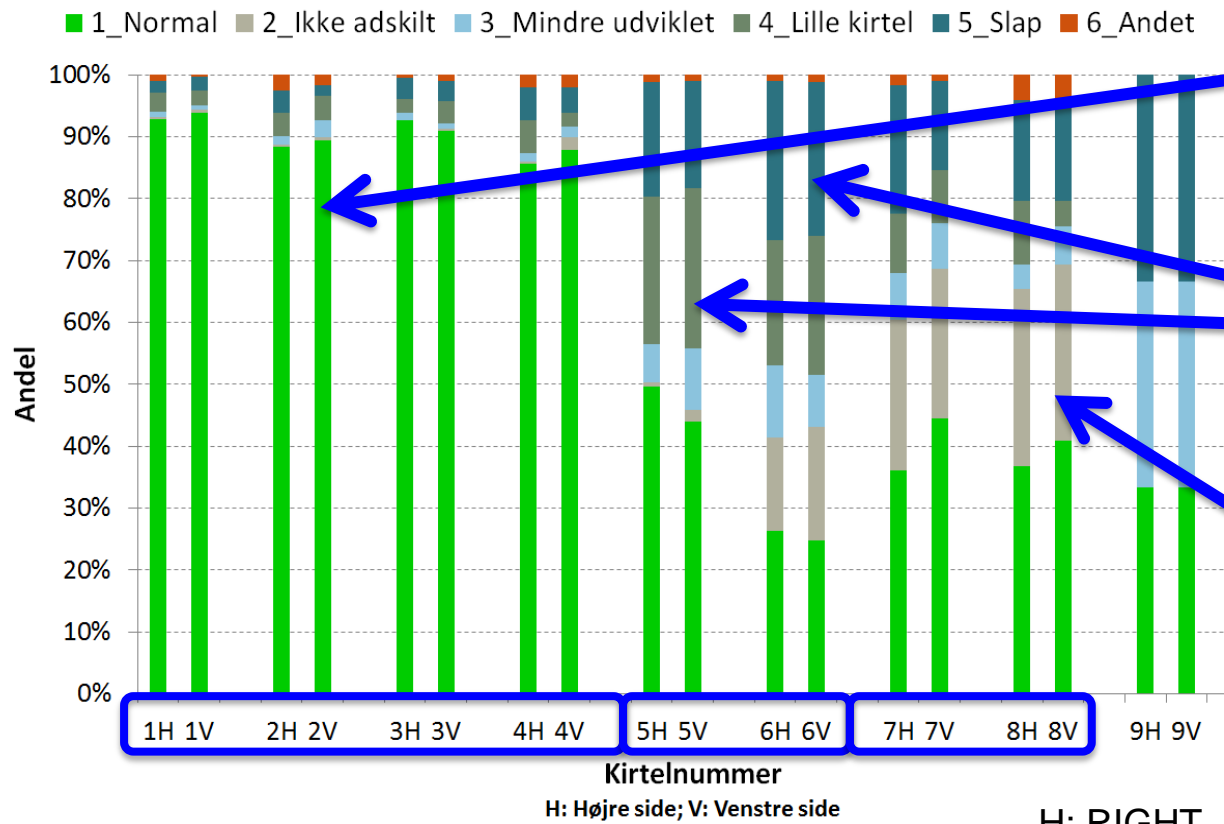
NUMBERS

405 sows



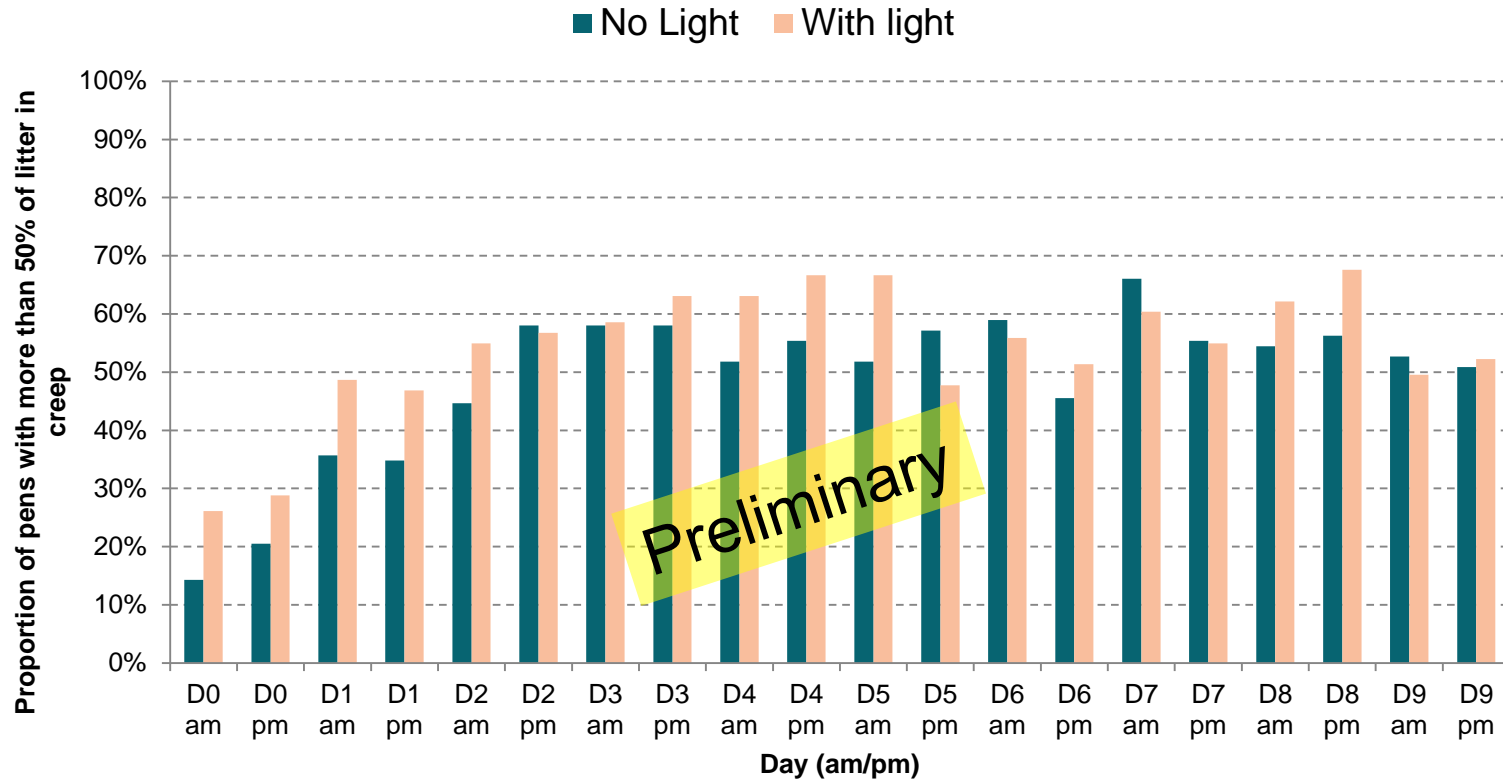
Medd.
1117

GLAND SCORE

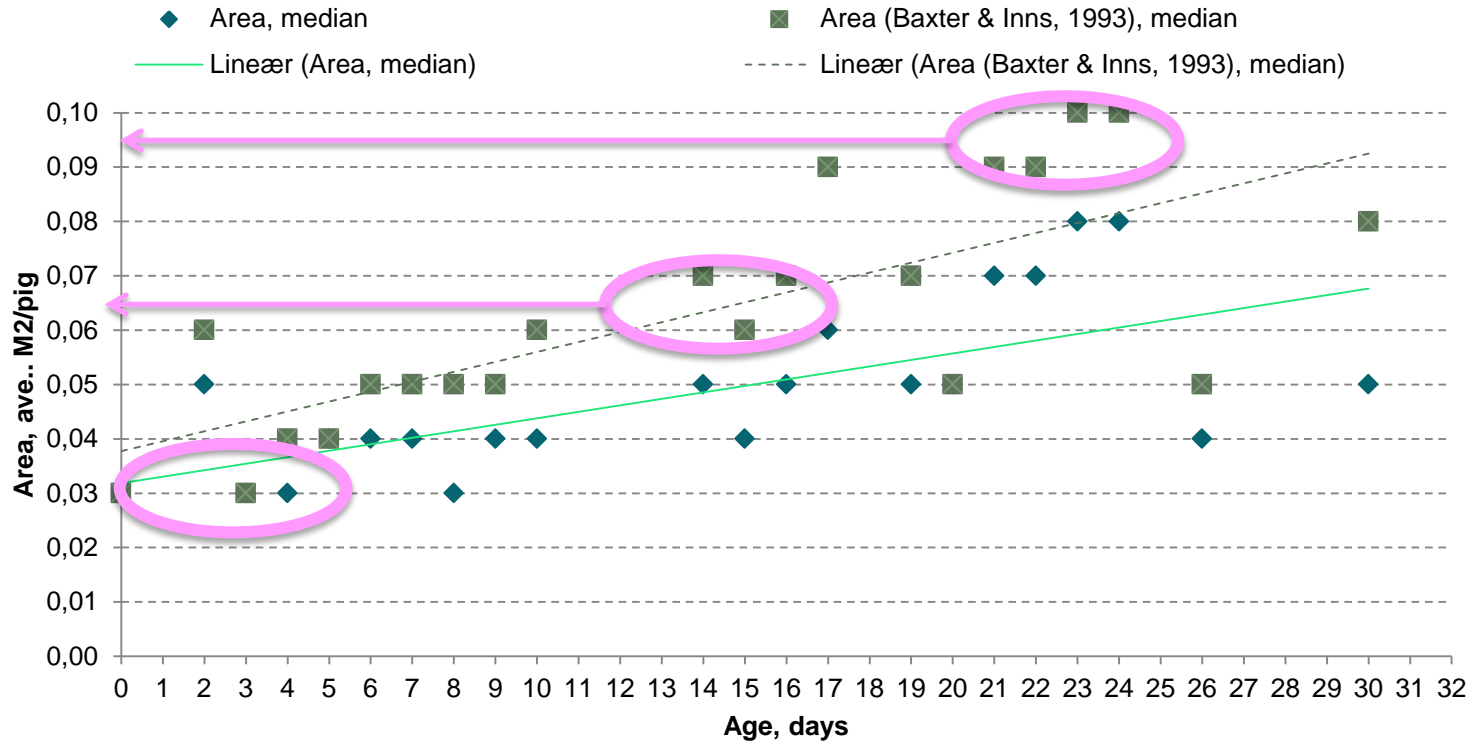


LIGHT OR NO LIGHT IN CREEP AREA

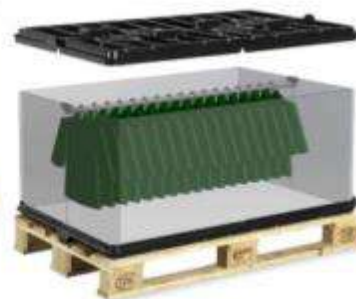
112/111 litters



SPACE REQUIREMENT



PALLET CONTAINER FOR CLOTHES TRANSPORT

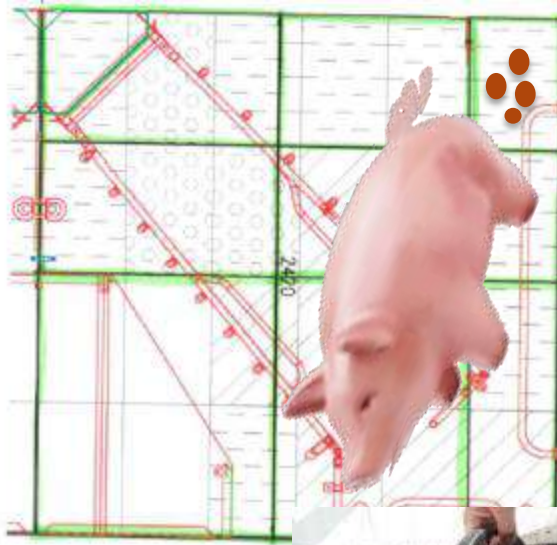


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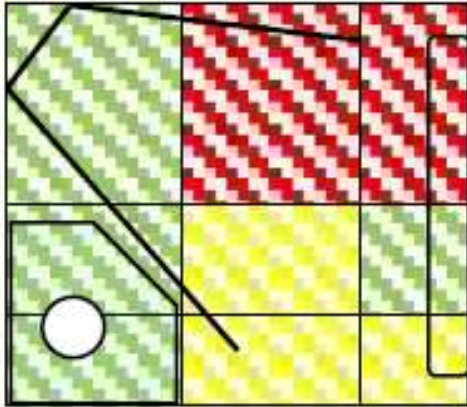
**LAGER OG TRANSPORT
STORAGE AND TRANSPORT**



TEMPORARY CONFINEMENT – CAN WE INCREASE SOLID FLOORING?

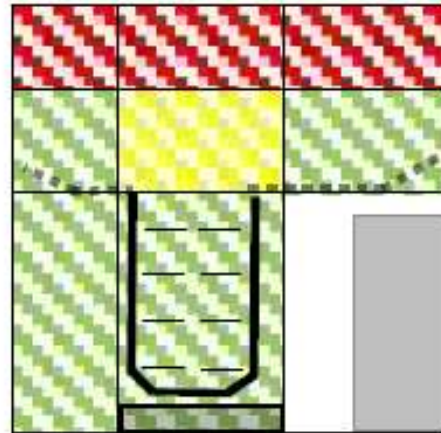


DUNGING – SOLID FLOOR - EMISSIONS



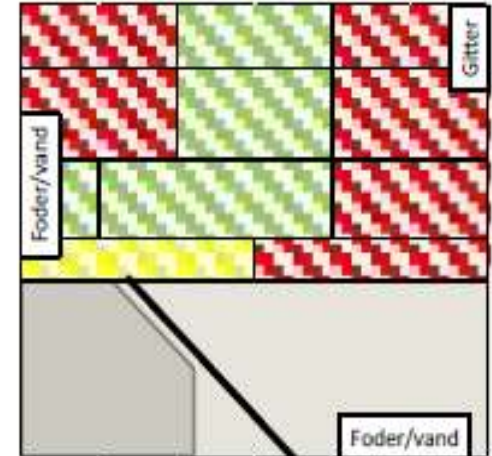
Farvekode:			
Kg/m ²	0-50	51-100	>101

Vissing



Farvekode:			
Kg/m ²	0-50	51-100	>101

Wing



Farvekode:			
Kg/m ²	0-50	51-100	>101

SWAP

FUTURE

Piglet survival and welfare

Higher neonatal survival when sows are loose

Flooring – piglet area

Productivity

Feeding of sows with (to?) high milk yield

Management – *stable productivity, short transition period, attractive job*

Successful management and care-taking of loose sows

Low environmental impact

Sow welfare and reduced emissions



FUTURE – SOWS ARE LOOSE

- Identify barriers/challenges and solve them
- How can we benefit from loose sows?
- When and where should we special attention and care?
- Pens for 14 or 20 piglets per litter?



Sows are top-athletes



LLS18 – seminar Copenhagen

Workshop Loose lactating sows

Logistic and health Also on large scale pig farms ??

SEGES, Danish Pig Research Center
30.04 and 01.05.2018

Johan Skovgaard

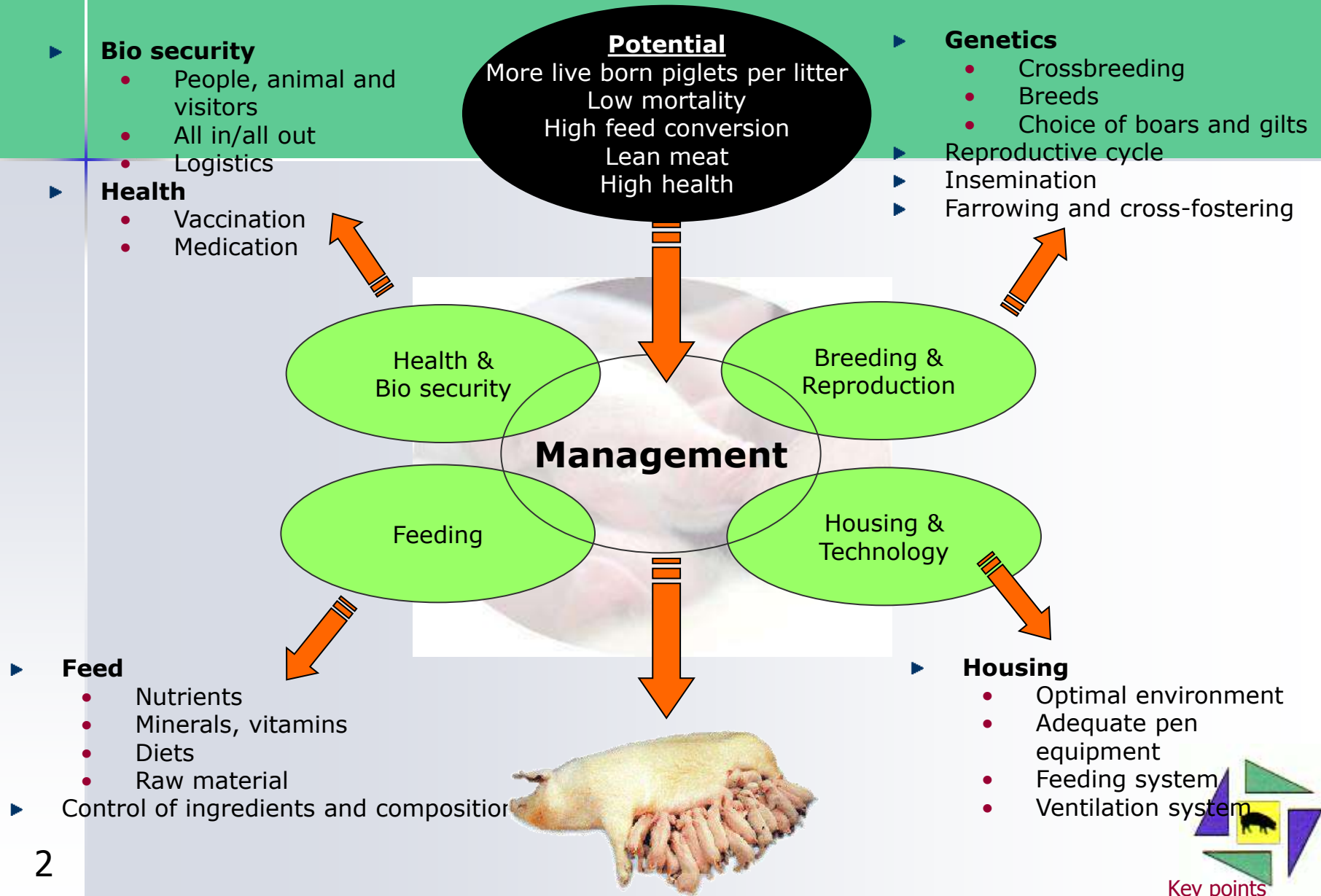
Skovgaard Agro Consult ApS (SAC)

Mobile: +45 2013 7633

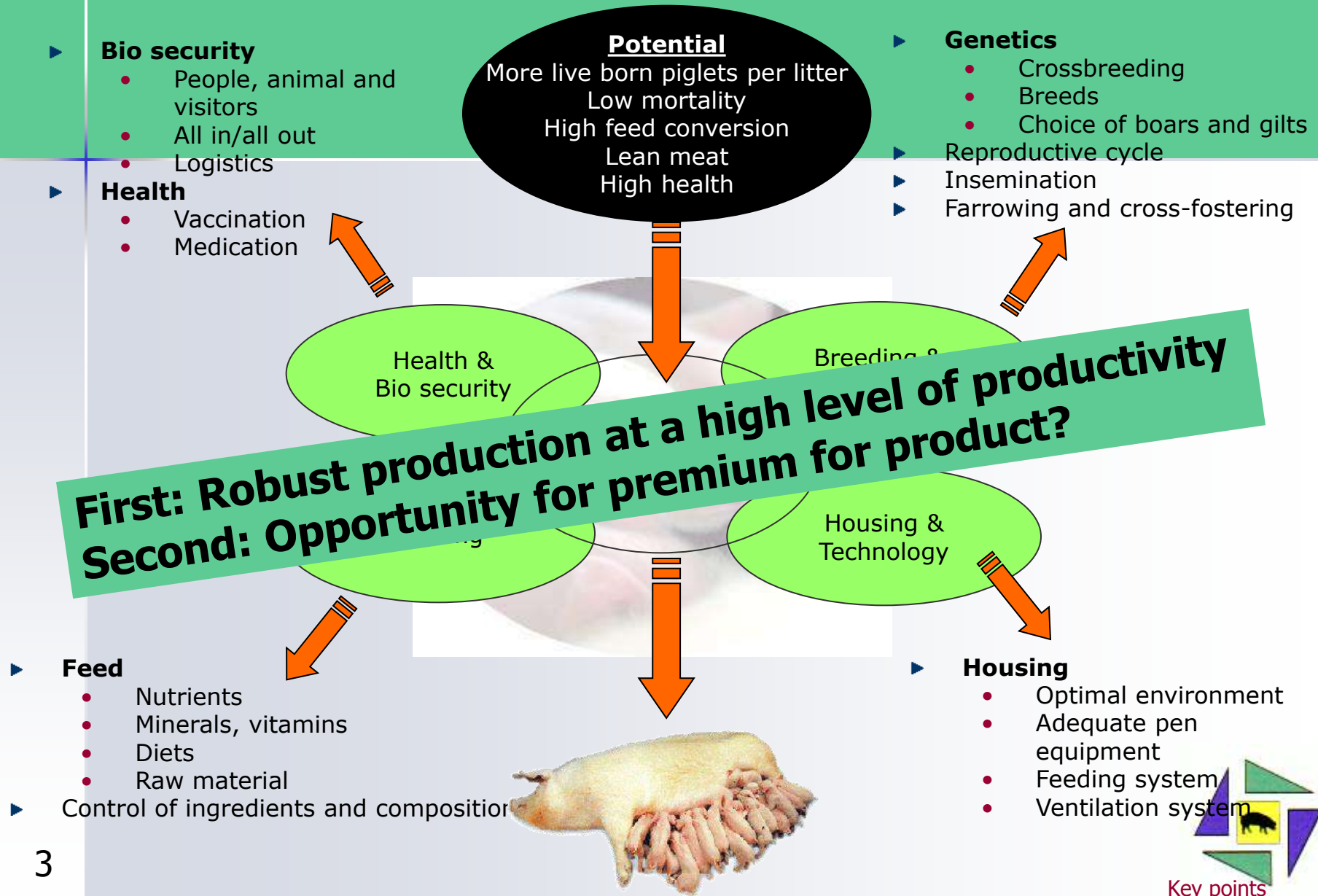
Mail: jsk@skovgaardagroconsult.dk



Key points in modern pig production



Key points in modern pig production



Health and logistics

To get – or to be free – of diseases

■ Health

- High health (no diseases) makes life easier for pigs and mankind
- Low level of antibiotics, easier work, higher productivity
- Higher welfare

■ Pig to pig (contamination)

- All diseases
- To be managed by all in / all out

■ Person to pig

- Biosecurity – is the best model
- Workers, suppliers, veterinarian (☺)

■ Air to pig

- Distance to neighbours (pig farmers)



Overall planning of big pig farms

Multi-site vs 1 or 2 sites

- Multi site (from USA)
 - All sows on one location
 - Weaners on another or 2 locations
 - Finisher on many locations
- 1 site production ("good old")
 - All sows, weaners and finishers on same location (one corridor)
- 2 sites production (Denmark / Germany)
 - Sows and weaners on same site
 - Finishers on one or several locations
- 2 sites production (Denmark / Danes Abroad)
 - Sows on one location
 - Weaners and finisher on one or several locations
 - Number of weaners fits to finisher production



Overall planning of big pig farms

Multi-site vs 1 or 2 sites

HEALTH

LOGISTIC

■ Multi site (from USA)

- All sows on one location
- Weaners on another or 2 locations
- Finisher on many locations

Very good

Lot of transport

■ 1 site production ("good old")

- All sows, weaners and finishers on same location (one corridor)

No good if

no transport

■ 2 sites production (Denmark / Germany)

- Sows and weaners on same site
- Finishers on one or several locations

Quite good

Some transport

■ 2 sites production (Denmark / Danes Abroad)

- Sows on one location
- Weaners and finisher on one or several locations
 - Number of weaners fits to finisher production

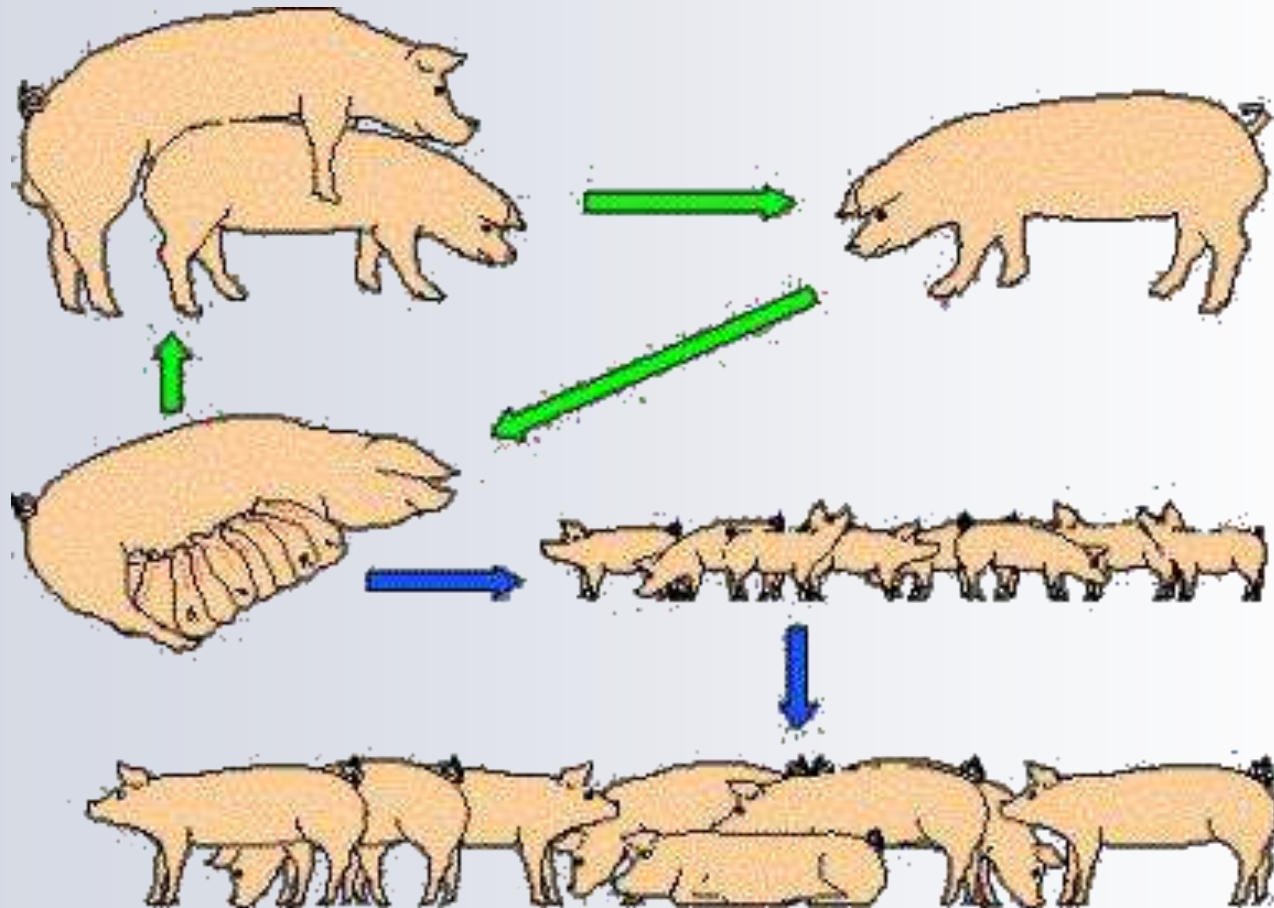
Very good

Little transport



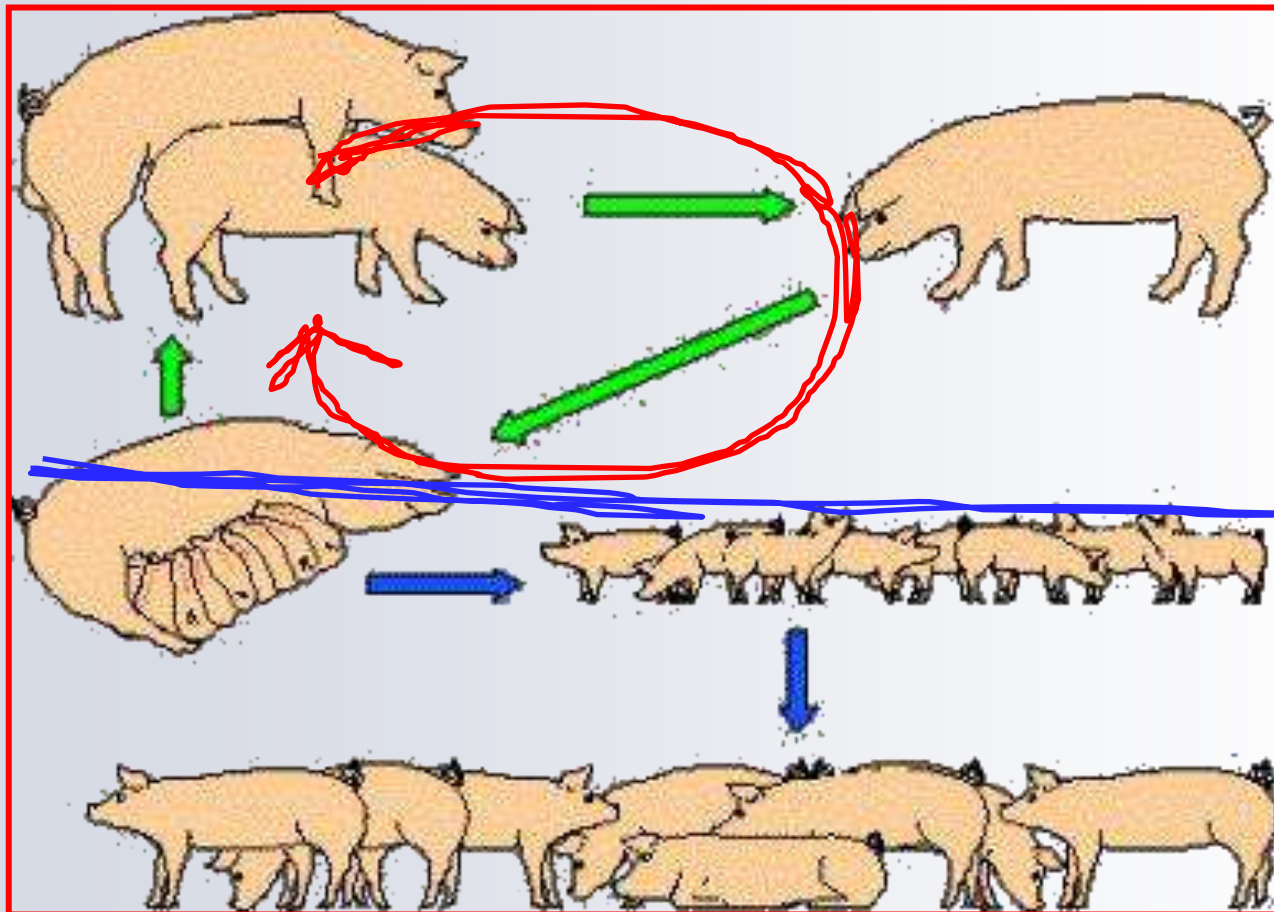
Dimension and production

- departments and system (Health & logistic)



Dimension and production

- departments and system (Health & logistic)



”around”

All in
all out



Design and layout of pig farms

- departments and system (Health & logistic)

1 site – DK 1.000 breeding herd (loose sows)

Gestation
insemination

Farrow

Gilts

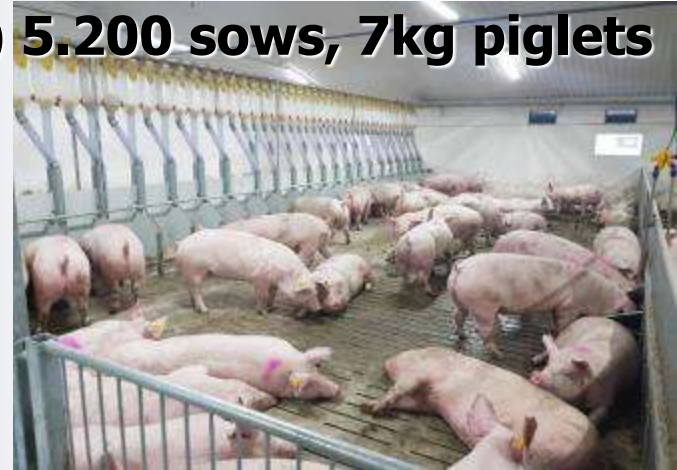
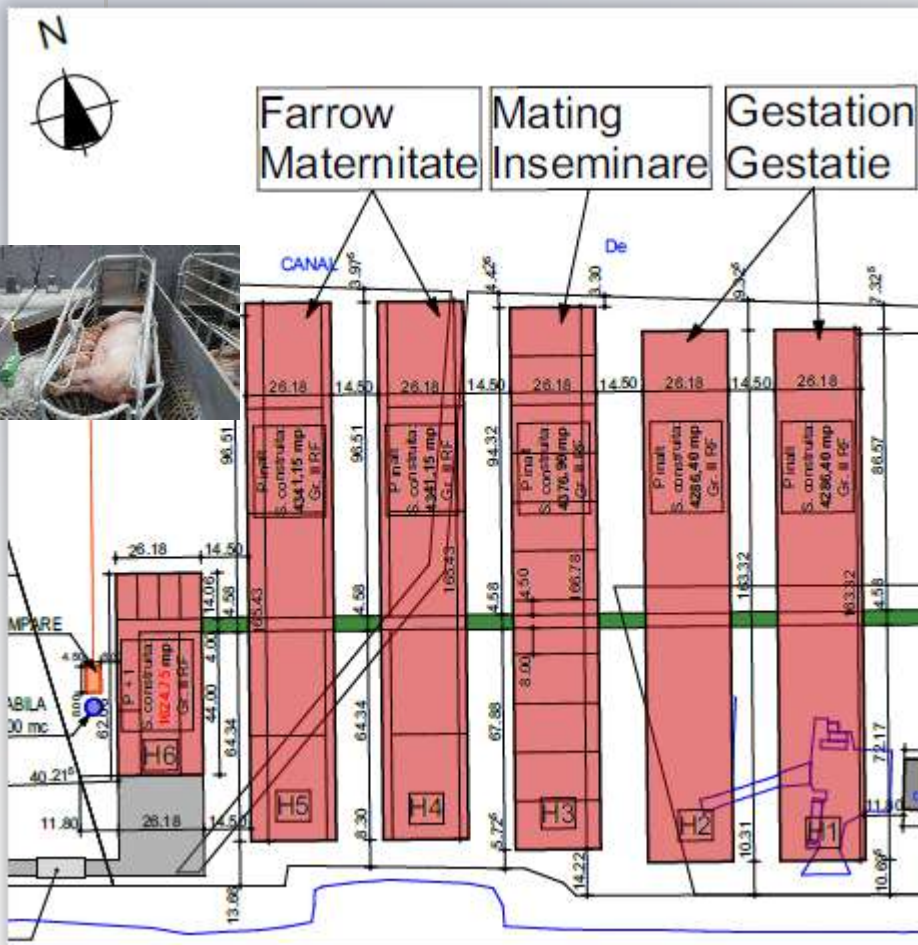
Weaner

Pigs out



Design and layout of pig farms - departments and system (Health & logistic)

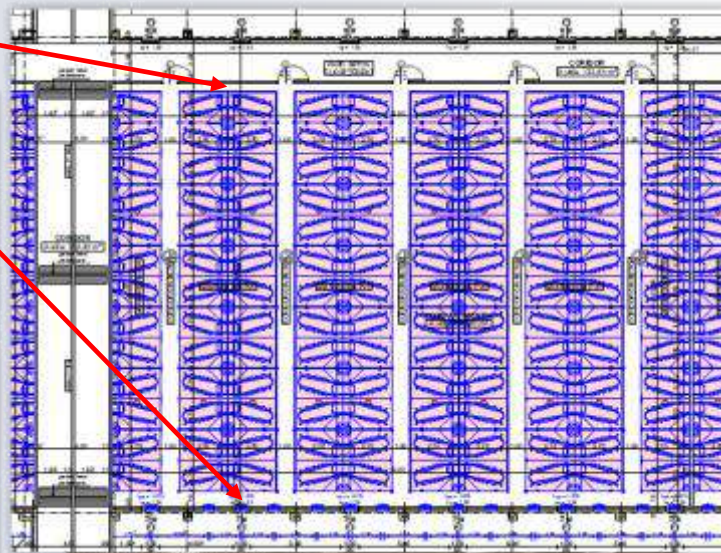
2 site – Romania (Premium Porc) 5.200 sows, 7kg piglets



Design and layout of pig farms

- Farrow department (Inside building logistic)

Passage inside – “all around” – farrow 24 H (Premium Porc)



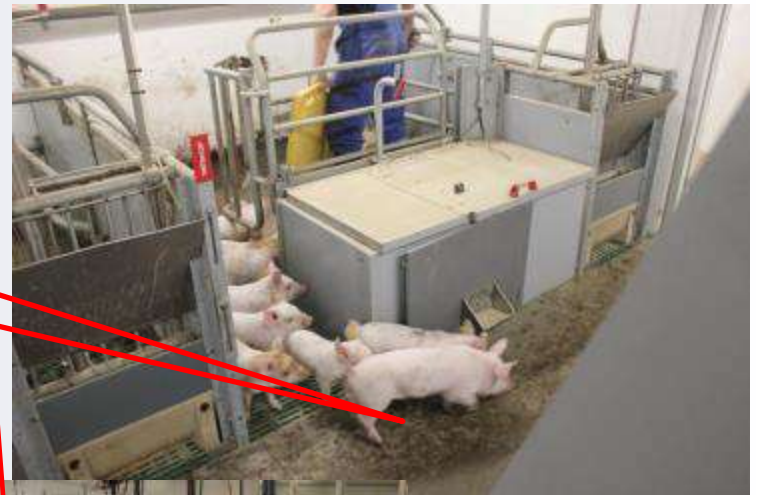
Design and layout of pig farms

- Farrow department (Inside building logistic)

Passage and gates to the pen



No gates in passage



Design and layout of pig farms

- Farrow department (Inside building logistic)

For designers of "loose pens"



Why or why not - loose lactating sows

On large scale pig farms

Why not loose lactating sows

- Not sure about production
 - Weaned pigs per sow per year
 - Mortality for piglets
 - If total loose – use of crates ??
- Higher investment
 - More space per sow
 - Design of pen (safe investment)
- Management
 - How to get skilled workers
- Higher profit for higher risk
 - Sales and marketing – whom ?



Why or why not - loose lactating sows

On big pig farms

Why not loose lactating sows

- Not sure about production
 - Weaned pigs per sow per year
 - Mortality for piglets
- Higher investment
 - More space per sow
 - Design of pen (safe investment)
- Management
 - How to get skilled workers
- Higher profit for higher risk
 - Sales and marketing – whom ?

Why loose lactating sows

- Production of the future
 - **More kg piglets per litter**
 - Specialised product
 - (High income area / Countries)
 - License to produce ??
- Safe investment
 - Will be ready when/if legislations..
- Management
 - Can attract best skilled workers
- Higher profit
 - If or when consumer is there



Loose lactating sows - big pig farms

GoodValley Group - Poland

5.000 sows – Loose sows incl. loose lactating sows

- 2013 – CO2 neutral pork 😊
- 2015 – Bara Farm (NE Poland)
- 2017 – OUA production



Loose lactating sows

- extra investments - establishment

- Area and costs
 - Minimum 500 €/m²
 - 1,000 €/farrow pen



Pen "design":	2.7 x 1.7 m	3,0 x 2,0 m
Pen area (net):	4.6 m ²	6,0 m ²
Pen area (total):	5,4 m ²	7,0 m ²
Difference:		1,6 – 2,2 m ²



Loose lactating sows - big pig farms

Labour, straw – extras ??

5.000 sows – cost of some items IF to be used

- Labour
 - If 10 seconds per pen per day
 - 1.300 farrowing pens
 - 3.6 hours per day
 - 1,316 hours per year = 0.8 “year worker” (20 to 30,000 €/Y)
- Lower production (higher mortality)
 - 2 piglets per sow per year
 - 7 kg piglet approx. 30 € = 150,000 €/Y
- Straw – as bedding and routing material
 - Same level as normal production
 - + ½ kg per day = 3.5 Euro per sow = 17,500 €/year
- Wash and cleaning – more work ??



Loose lactating sows - big pig farms

Education and training – staff in foreign countries

5.000 sows – is it possible to achieve high performance ??

■ IT IS A BIG YES

- Management, management and management
 - Standards, standard and standards
-
- Delta Agrar, Serbia (2 units of 1,200 and 1,500 sows)
 - 26 weeks in Denmark – theoretical + practical training
 - 1 Danish manager on site in 1 year
 - RBPI, Russia – 3 units of 6,200 sows (full line)
 - 1 Danish manager – prefer workers with NO PIG SKILLS
 - Premium Porc, Romania – 12.,500 sows (full line)
 - 1 Danish manager – plus lots of HR (feel part of a family)
 - All produce more than 35 weaned pigs per sow per year



Loose lactating sows - big pig farms

RISK – in welfares systems (health points)

STRAW – may be one of the challenges in Europe

- Dysentery (*Serpulina hyodysenteriae*)
 - Slurry brought on to farmland in spring
 - Bacteria on soil particles in the straw
- African Swine Fever (ASF)
 - Widely spread in wild boar population (Central and East Europe)
 - Faeces on straw ???
 - 12 month quarantine after disinfection for indoor production
- Bandholm mouse (Danish Island)
 - The mice (*Apodemus agrarius*)
 - Causes Leptospirose (first seen year 2000)
- Alternatives to straw
 - Jute sack from Holland



Loose lactating sows - big pig farms

Take home messages – what are the challenges

5.000 sows – is it possible to achieve high performance

■ Pig industry (farmers) need evidence

- Production results – also on high level
 - Results and experience is getting much more knowledge
 - Good examples from 1,000 sow units
- Higher demand for “welfare” pork = higher price

■ Educated and skilled pig workers

- So far too many have to make own “standards” as a start
- But – work on a farm with loose lactating sows
- Many design of pens and system – good and bad 😊
- Transfer of knowledge has been “done with success in traditional intensive pig production”

■ Big litter size

- Potential to handle this (have bigger pens and more space)



A photograph of a large, light-colored pig lying on its side in a farrowing crate. Several small piglets are lined up along its belly, nursing. The crate floor is made of metal grates, and there is some straw bedding on the left side. The background is a plain, light-colored wall.

**Thank you
Questions** 

Introducing loose farrowing systems and engaging stockpeople

Rebecca Morrison PhD

Animal Welfare and Science Programs Manager



Rivalea
A U S T R A L I A

Australian pig industry



Breeding herd size: 264,000 sows
Annual slaughter: 4.93 M pigs

Pig producers: 1,400

- 400 producers-90% production
- 1000 producers-10% production

Production systems:
Conventional housed ~ 90%
Outdoor housed ~ 10%

Pork consumption ~ 25 kg
Fresh ~ 9.2 kg
Processed ~ 15.3 kg
Imported processed ~ 70%



Rivalea Australia



- Rivalea is one of the largest producers in Australia producing approx. 18% of the national pork volume.
- 60% of pigs are grown out in ecoshelters.
- Quality + People + Integrity
- 1200 people. Our people are the single biggest contributors to the delivery of quality welfare.
- “Care for every pig, every day”





Demonstrate continued leadership in animal welfare



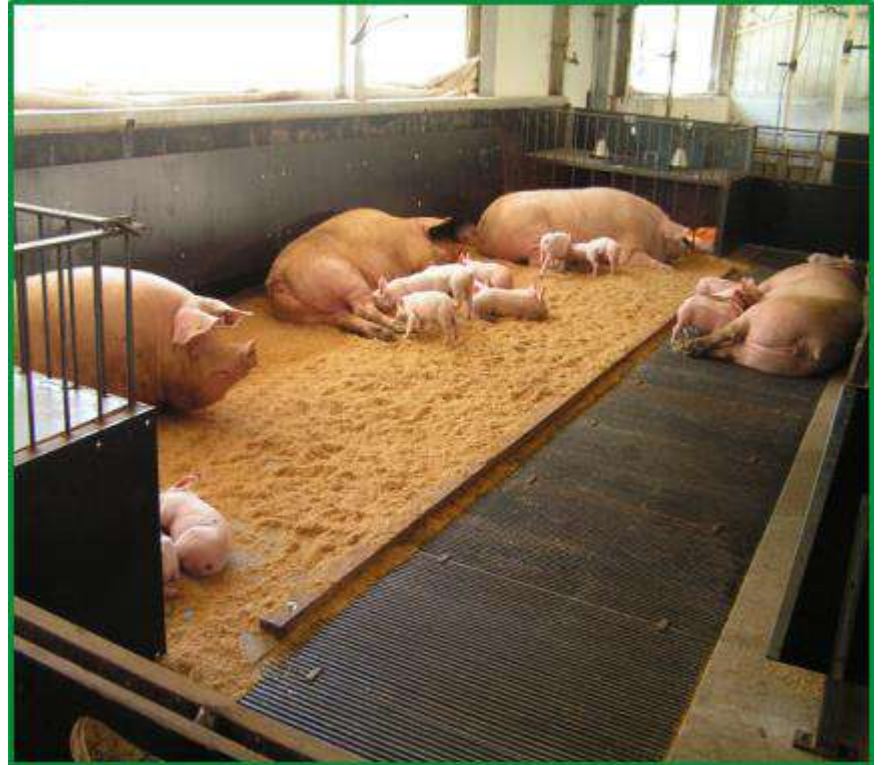
Rivalea farrowing systems



- Piglet Protection Pens are the main farrowing/lactation housing system
- 2 commercial free range farms
- Developing a number of loose farrowing systems
 - PigSAFE, SWAP, Group lactation







Our experiences/hurdles

- **Implementing systems from northern hemisphere (adapt to Australian climate)-especially summer**
 - Modification of systems, patience during 'debugging' phase
- **Utilising existing facilities and infrastructure (not green field site)**
 - 'footprint' of loose farrowing
- **Loose farrowing/lactation and Piglet Protection Pens on one farm/site**
 - Different SOPs, WIs, environmental control between sheds
- **Sows don't always come back through the same system-familiarity**
- **Work within a standard work day (not 24 hour coverage)**
- **Cultural change to a new system**
- **Piglet survival is variable and lower than PPP**

Strengths

- Investigating opportunity for enhanced welfare for sows and piglets
- Support to continue research
- Engage the experts- let's not 'reinvent the wheel'
- Performance improving over time



Engaging stockpeople...critical to success

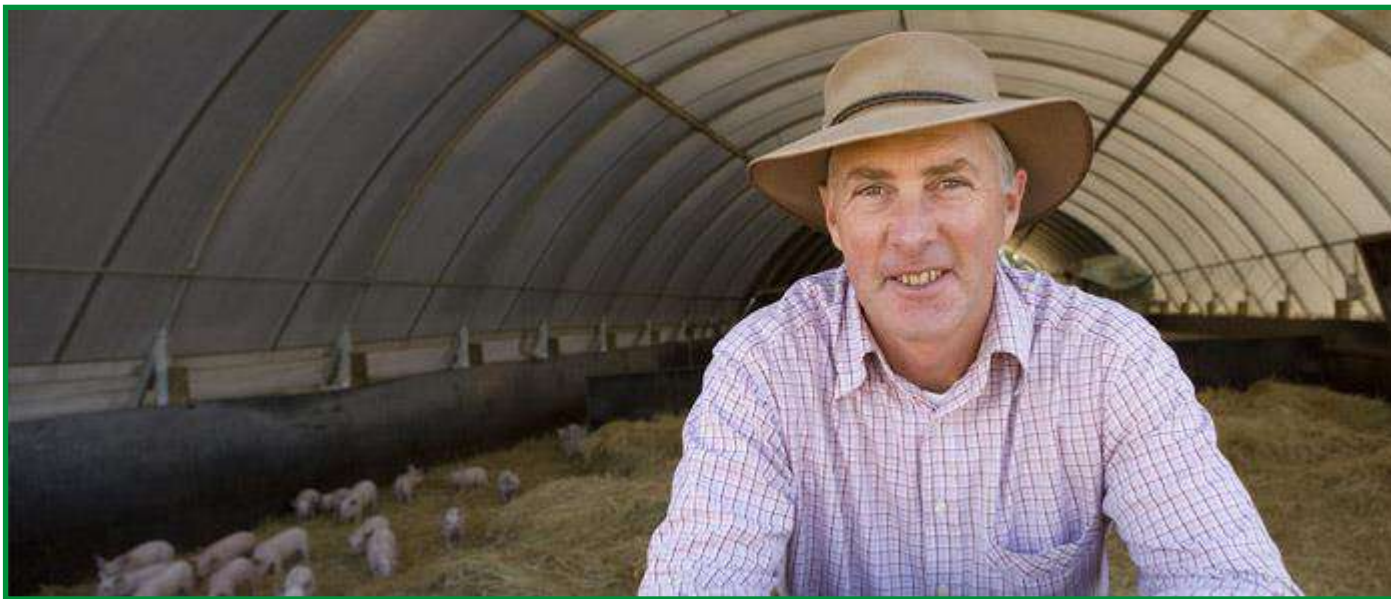
- **Animal Welfare Policy**
- **Support from senior management/role models**
- **Fostering a positive culture that is committed to high standards of welfare and innovation**
- **Training**
- **Reward and recognition**





Innovative, supportive senior management

- Demonstrate continued leadership in animal welfare. Role models
- “A desire to be different or ahead of the pack”
- “Let the stockpeople develop the working procedures – not the managers or researchers”
- “Be prepared to fail”; “If it feels right – take a risk”



Foster a positive culture committed to loose farrowing

- Select interested stockpeople to work in loose farrowing
- Select stockpeople that show empathy, attention to detail
- Provide opportunity to work in free-range
- Be adaptable/ willing to change process quickly
- Get stockpeople involved and try their ideas. Promote innovation
- Do risk assessments (e.g. Safety)
- Encourage discussion and communication
 - i.e. tool box talks, 2-way feedback
 - 'Discovery walks'
 - Explain the 'why'?



Give stockpeople the 'tools'

- Provide the correct equipment. Fix maintenance issues.
- 'Not negotiables'
 - e.g. nest building material
 - SWAP sows not confined until farrowing complete
- **Training**
 - SOPs, Work Instructions, Safety, QA.
 - Certificate and Diploma qualifications in Pig Production
 - 'Managing across generations', team effectiveness, 'emotional intelligence' etc.



Encourage positive interactions

- Reduce fear → calm sows more successful
- 'Treat' program
- Sows become familiar with stockperson
- Tricks n Treats



- Training program that targets key attitudes and behaviour of stockpeople
- Builds upon scientific findings from research on factors that affect the productivity and welfare of animals:
 - Minimises handling stress
 - Improves animal welfare and performance
 - Improves stockperson motivation, performance and job satisfaction



Reward and Recognition

- Reward teams with BBQ when achieve KPI's
- Animal Welfare Awards/Animal Welfare Champions
- Suggestion Box/DRIVE
- Promote in company publications, newsletters



Engaged stockpeople will help ensure success of loose farrowing and lactation systems.



Loose Lactation:

A farm assurance scheme perspective

Kate Parkes, RSPCA



RSPCA Assured (previously Freedom Food)

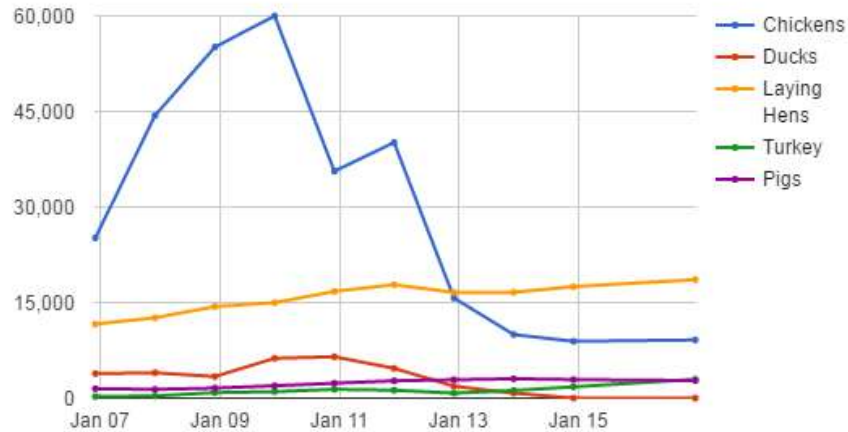
- Established in 1994
- Responding to consumer demand for higher welfare products
- UK's only assurance scheme dedicated to farm animal welfare
- Work to RSPCA welfare standards
- 9 species, 180 million + animals on the scheme



RSPCA Assured: pigs and poultry



Pigs & Poultry



Market penetration:

2016 = 24.8%

2017 = 27.2%

RSPCA Welfare Standards: living documents

RSPCA species technical advisory groups (STAGs) maintain standards in response to:

Scientific research



Practical experience:
RSPCA field & scientific staff
Industry
Vets
FF Assessors and members



**Legislation,
government codes,
FAWC
recommendations**



Best practice



The UK situation

- Indoor loose lactation systems are uncommon
 - 60% farrowing sows indoors; the vast majority in crates
- Loose lactation systems - outdoors
 - 40% UK sows farrow outdoors in individual arcs



RSPCA Farrowing Standards

Implementing changes

2005 - members can only confine sows for up to 5 days post farrowing.

2010 - New members accepted onto the scheme must provide free farrowing accommodation.

2014 - Farrowing crates completely withdrawn from the scheme for existing members.

2015 - detailed specifications for space allowance and bedding in free farrowing systems.



Developing standards - the challenge

- **Current designs** - what is in use on the RSPCA Assured scheme?
 - Solari opens
 - 'Simple pens'
 - Pigsafe
 - Outdoor arcs 'inside'
- Commercially applicable
 - **Size, retrofitting** etc.
- Approval of designs/systems?
- **Detailed** requirements vs **general** principles
- Auditability



RSPCA standards - general principles

“Farrowing accommodation must allow all sows to turn around easily at all times, without any hindrance from fixtures and fittings in the farrowing pen”

- Minimum space requirements
 - **Bedded lying area** at least 2.8m² (solid)
 - **Total minimum pen size** 5m²
 - Minimum **creep size** (separate) 0.7m² (solid) + 0.3m²
- Voluntary feeding stalls permitted
 - No equipment that confines the sow
- Clean **bedding** and **enrichment**
- **Nesting** material - **2kg** of **straw**, 48hrs prior to farrowing
- Supplementary **heating**, where necessary



Future proofing

- Standards - living documents
 - Phase in times, stepwise approach
- Detailed requirements vs general principles
- Dialogue
- Legislation?



Thank you

Welfare as an added value?

Jesper Lassen, Tove Christensen,
Jørgen D. Jensen, Sara V. Kondrup
& Peter Sandøe

University of Copenhagen
Department of Food and
Resource Economics

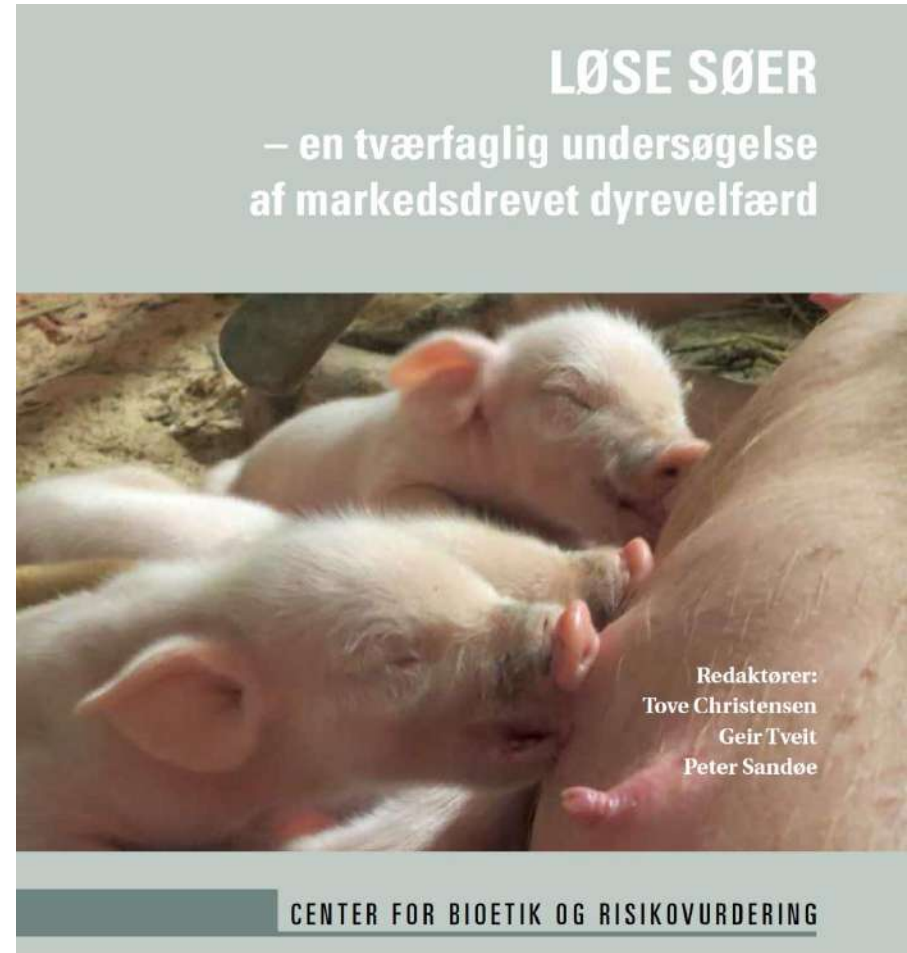
www.animaethics.net

UNIVERSITY OF COPENHAGEN



Project "Market driven animal welfare – loose sows"

Jesper Lassen (IFRO, UC)
Jørgen Dejgaard Jensen (IFRO, UC)
Sara Kondrup (IFRO, UC)
Tove Christensen (IFRO, UC)
Lars Esbjerg (MAPP, AU)
Peter Sandøe (IFRO, UC)



2014



Background

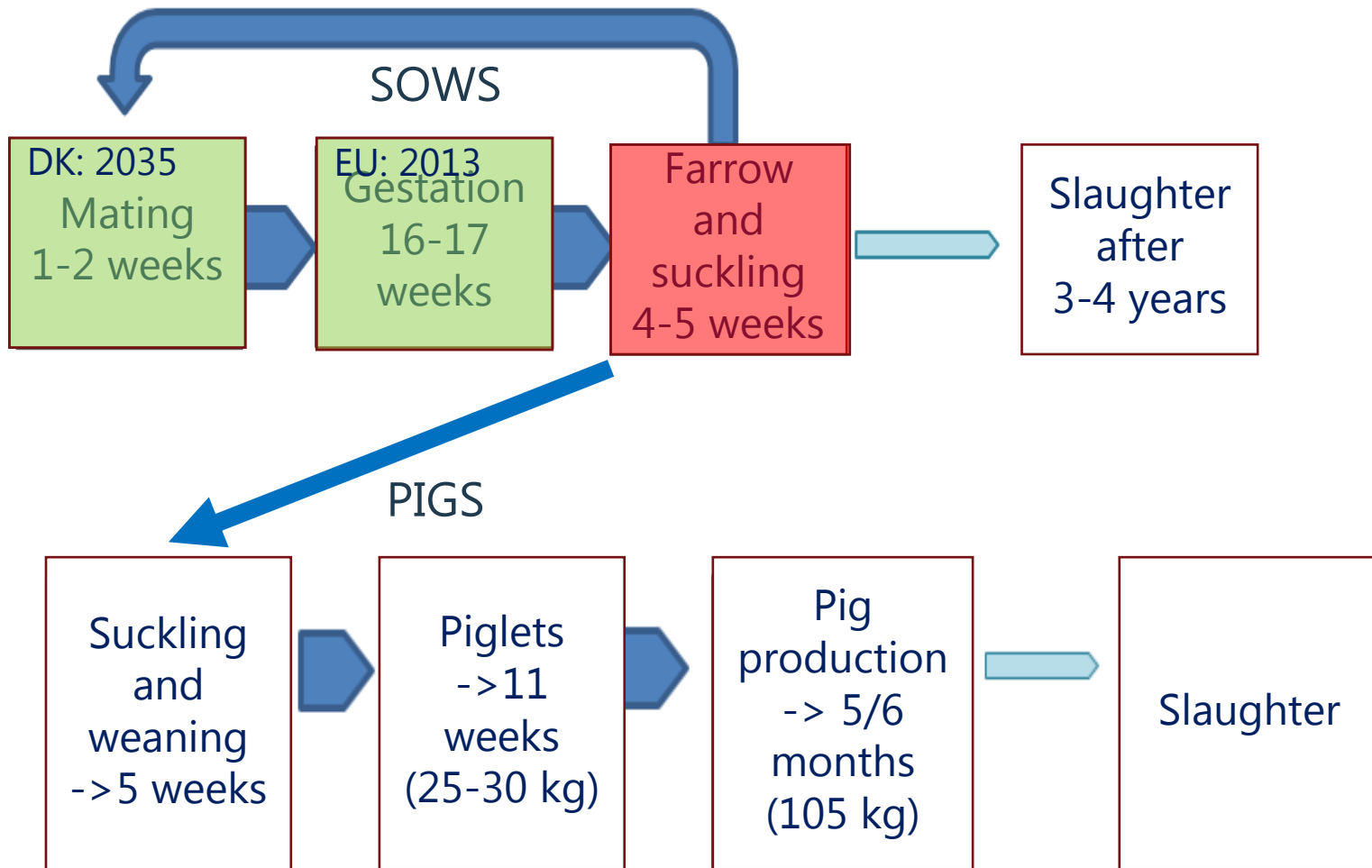
- Animal welfare can be improved in two ways
 - 1) Through legislation. National laws, EU law and international treaties.
 - 2) Through the market. Making consumer buy meat from animal friendly production systems
- 1) is – by many – seen as exhausted; what about 2)?
 - Barriers? Challenges?
 - De-Animalisation
 - Context (consumer/citizen)
 - Politicized consumption!?
- The success of market driven animal welfare depends on the willingness of consumers to act as citizens

Design

RQ1: what are the values people make use of when assessing the welfare of piglets and sows?

RQ2: what is the potential for improving sow and piglet welfare through market driven welfare?

Case study: sows



Design

RQ1: what are the values people make use of when assessing the welfare of pigs and sows?

RQ2: what is the potential for improving sow and piglet welfare through market driven welfare?

Method:

- 4 focus group interviews á 7 persons (2013)
 - Variation in age, gender and education
 - Geography (Cph; Rødding & Odense)
 - NOT representative
- Questionnaire based study (2013)

Pigs

What is welfare?

- Access to outdoor facilities
- Space, air and light
- Freedom
- Company
- Freedom from pain



... freedom. That is the only way to have a really good life for a pig. Not keeping them confined. And then, of course plenty of room and company

... If you have to keep them confined, then you should remember to provide feed and water and give them care. That's what they need – not to be ill-treated

Fixated sows

As far as possible from good welfare!

- Fixated sows
 - The opposite of outdoor access, space and freedom



The life of a sow

What is important?

- Space and freedom – always important!
- Lack of freedom and space are central backings in arguments against fixation and for loose sows

The most important phases:

- Farrowing and suckling -> the phases where the sows are not let loose!
- The natural and the correct
- Being together with the piglets

The life of a sow

What is important?

- Space and freedom – always important!
- Lack of freedom and space are central backings in arguments against fixation and for loose sows

Then I think ... suckling piglets should have more contact with the sow. It looks ugly, when you see a fixated sow, and all the piglets jumping around trying to get a tit and suckle - and then the mother is just lying there like something They might as well install a devise with tits!

The life of a sow What is important?

Perceptions depend on the box!



- Straw: presence and quantity
- Dirty?

Dilemma

Economy $\leftarrow \rightarrow$ animal welfare

Utopia

- A 'natural' pigs life
 - High level of animal welfare
- The alternative production systems

Reality

- A vicious circle
 - Prices on meat is decreasing
 - Expenses on the farm are increasing
 - Increased control
 - Consumers reluctant to pay for welfare
- Focus on efficiency and quantity rather than welfare
- Industrialized pork production



Dilemma

Economy $\leftarrow \rightarrow$ animal welfare



Rasmus: we could have a high level of animal welfare today; we should just stop producing in excess, like we are doing today.

Mette: But that may be a little hard to explain to a farmer – after all he also needs butter for the bread. They don't make a lot of money, do they!?

Rasmus: No, it is COOP that makes the profit

Jens: But are we prepared to pay a little more for (the meat) in COOP. When you are in the shop, looking into the cold counter and you see a roast pork costing 50 kr á kg and one that costs 150. Which one do you take?

Rasmus: No, no. of course not!

7 industrialized pork production

Conclusions from interviews

- Conventional systems are measured against free range systems - setting the norms for sow production.
- Space and outdoor access are most important requirements
- Fixated sows represent the worst aspects of conventional production systems
- People experience two dilemmas
 - Between economy and welfare
 - Between our right to meat and the sows' right to a decent life
- Market driven welfare depend largely on the ability to solve these dilemmas.

How often do you buy the following brands when you buy fresh pork?

Brand	Never	Seldom	Some times	Often	Allways	DN
Medium (Antonius)	19	22	28	10	1	19
Medium (go'e gris)	31	17	14	4	<1	34
Premium (Friland)	18	21	25	13	2	21
Premium (organic)	23	24	21	14	4	14
Medium (Bornholmer)	44	16	10	4	<1	26
Standard(100% danish)	10	7	17	27	17	22

N=2529

1 of 5 do not know which brand they usually buy



Do you think of the pig welfare when you buy the following products?

Product	Not at all	A little	Some	A lot	Very much	Don't buy
Pork roast	19	22	29	17	9	5
Minced meat	21	25	29	13	8	4
Cold sliced pork	26	30	25	8	5	6
Ready made dishes	23	23	15	5	3	32

N=2529

Fresh pork: 1 of 5 think a lot – 1 of 5 does not think ...

➔ Fewer think of animal welfare in more processed food



If you should pay more for pork, which 4 characteristics would be the most important for you?

Characteristic	Chosen (in %)
Outdoor access	51%
Danish	49%
More space indoor	46%
Fresh meat	48%
Loose sows	32%
Additional environmental concern	18%
No tale docking	10%
Easy to prepare	7%
No castration	5%



Imagine that all pork becomes more expensive because sows must be loose. How would you react?

Price increase	Stop buying pork	Buy less pork	No effect	Buy more pork	DN
10 % price premium	2%	23%	67%	5%	3%
50 % price premium	21%	53%	19%	1%	6%

N=348



72 % say they will pay 10% more – only 20% say they will pay 50% more





Consumers are not just consumers

Three consumer segments

- Do not care about animal welfare
- Animal welfare is very important
- Animal welfare is important– but ... (“worth the money”).

Super markets in Denmark and other countries often offer 3 categories (of pork)

- Discount
- Luxury (organic/free-range)
- Medium products (improved indoor conditions)

Conclusions from survey

- **There is a potential for improving piglet and sow welfare through market driven animal welfare**
- **However:**
 - **Different segments of consumers**
 - **For many a limited WTP**
 - **Many will not be aware**
- **Room for three levels of Animal Welfare, but also danger of confusion due to many labels**



Sted og dato
Dias 21



DRAGONS DEN

Chief scientist Vivi Aarestrup Moustsen, PhD, MSc.,

SEGES Danish Pig Research Centre

Affiliate Associate Professor of Animal Husbandry, Pigs, UCPH.

2018 05 01



DRAGONS DEN - PROFESSIONAL PEN DESIGNERS

- Can the same pen design be used in across the world - in eg Austria, Czech, Denmark, UK, Australia, US and China? Why – or why not?
- Can large scale herds have loose lactating sows in welfare friendly pens?
- Can we design pens which can work for larger litters (20+ piglets)?
- How to attract qualified employees? How to train new employees?
- How to develop and test management routines?
- How to voluntarily increase number of loose housed lactating sows?

DANISH DESIGN
AWARD



LEGO HOUSE

DRAGONS DEN

Simple – design a pen that is superior when it comes to meeting the needs of:

- sows', piglets', staff, consumers, retailers and welfare organizations

– and therefore have a market potential making it the best investment ever.



😊: Interesting

😊😊: Promising

😊😊😊: Think you should go ahead – but I'm not investing (yet)

😊😊😊😊: I'll invest

DRAGONS' DEN

Group	Members
1	Emma, Roland, Janni, Gudrun, Michael
2	George, Rebecca M., Irene, Jonas, Yuzhi
3	Penny, Astrid, Yolande, Birgith, Liesbeth B.,
4	Sarah, Charlotte, Monique, Marie Louise, (Vivi)
5	Rebecka W, Anita, Greg, Lisbeth U

DRAGONS' DEN – AND THE WINNER IS....

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1	Emma, Roland, Janni, Gudrun, Michael
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LLS18 - Reflections on the workshop proceedings - Sandra Edwards

This workshop has allowed us all to increase our knowledge, have fantastic discussions and widen our networks, and I'm sure it will initiate many future emails and contacts to continue the debate. My take-home impression from today is 'what a difference a day makes' and I think some, perhaps unpalatable, but important truths have surfaced. Yesterday I concluded that there was a growing consensus on the need for Temporary Confinement as a halfway step towards reduced confinement in commercial practice. However, today, when groups have proposed their future pen designs I see no Temporary Confinement systems, but only Free Farrowing. I think this has been influenced by the information we have received on the attitudes of consumers and NGOs to confinement, which tells us that any form of crating is unlikely to be accepted as part of a high welfare image.

It is obvious from today's presentations that the rational production decision of a Temporary Crating system to minimise piglet mortality and facilitate effective working routines may never be in accord with consumer demand for a more natural production system without confinement. Herein lies the significant challenge we face in moving towards reduced confinement systems. Such systems will have some degree of higher production cost, which must somehow be recovered if businesses are to remain competitive and continue in production. This extra cost recovery must come either from production benefits or from a market premium on the product. In the latter case, we can only expect a premium if we produce what consumers want and this seems to be true free farrowing.

How do we solve this dilemma? I think the answer in the short to medium term lies in the concept that we have heard about of a tiered market. At the top tier we have a low volume, high value premium category, and this is where Free Farrowing is likely to sit. We know that such systems can work in the right circumstances, with good system design, dedicated staff and the right type of sow. It is more likely that this combination will be found on family farms, perhaps not with the highest possible production level, and these farms can target the segment of the public that are willing to pay the extra costs because they are convinced by the welfare benefits of true free farrowing. The bottom tier is, of course, the highest volume and lowest cost category and will continue with the use of conventional crated systems for the immediate future. The middle 'improved conventional' tier is where significant progress might be made and the recently developed labelling schemes in several countries provide a vehicle for this. Production for this tier must have some welfare differentiation but not greatly increased production cost, and it is here that temporary crating can have a role. How big this market will become will depend on the willingness of consumers (or retailers) to accept some compromise and how great a cost differential from baseline is required. In this respect, we need to more fully research the true costs and benefits of the system as a whole, not just capital cost and piglet mortality. Do the welfare benefits of reduced confinement deliver additional elements of better lifetime health and performance for both sows and piglets? If we have to provide larger pens for loose lactation, will this also give performance benefits when rearing the much larger litters of the future? Whatever level a farm decides to target, it will be a long term decision. It will be difficult, and probably unsuccessful in production terms, to switch between lower cost temporary crating and free farrowing within the investment lifetime of a building. Temporary Crating may therefore be a transition phase to 'open the crate in the mind of the farmer' but it will not be a short term transition from Loose Lactation to Free Farrowing.

When decisions on purchase/investment are made, by either consumers or farmers, sow welfare is only a part of their consideration. Other societal issues, including antibiotic use, environmental impact, product quality, production aesthetics all have to be considered. We need to always adopt a whole-system system view – encompassing 'pens, pigs and people'. We can learn a lot from science,

but should not neglect what we can also learn from experience. This workshop has offered great opportunity not just for hearing new results from scientific research, but also for sharing of practical experience. The inclusion of more farmers and industry consultants has been of great benefit in this respect. Another development apparent at this workshop is that the constituency for reduced confinement during farrowing and lactation is growing in another respect. Over the sequence of workshops, now spanning more than 10 years, we have seen the participants change from a largely Northern Europe group of researchers to a true international group with participation from North America and Australasia. This is great as it allows us to discuss new challenges and opportunities in the subject area. I would therefore like to finish by thanking SEGES, and in particular Vivi Moustsen, for developing such a good programme and productive format for the workshop, and for providing great hospitality for our meeting.

LLS18 – Notes – presentations

Presenta- tion #	Notes
3	<p>Improving pig welfare in a country where all lactating sows are loose housed – Anne-Charlotte Olsson</p> <ul style="list-style-type: none"> - Sweden has only 1% production (2.5m pigs slaughtered 2016; 25% decrease in production since 1995). - 1988 move to loose sows - 6m² farrowing pen - 2017 - food production strategy - 17.1% mortality (birth to weaning) - discussion about moving to temporary crating in Sweden - study - compared temporary confinement vs loose farrowing; 6.5m² total area for both; 1/2 floor slats, 1/2 solid (concrete) - looked at causes of death (underweight (900 g); starvation; crushed; other) - 318 litters, 11.3 piglets weaned. - total mortality - 20.9%; mortality increased with sow age - weak significance for increased no. of weaned pigs when temporary confineing (0.4 pigs more weaned) - for 1st and 2nd litters there was no difference in mortality between systems; more 'middle aged' sows and older sows there were significantly more piglets crushed in the loose treatment. - no significant different in farrowing length between the two systems Farrowing problems – 7/157 for TC and 1/161 for L No economics Confinement: if people in barn, no confinement until farrowing. If milk in teat and think she farrows in the night – confine before you go home. Numbers on time in confinement coming up. Many differences – other than confinement – between systems. Heat lamp in confined sows – use all possible management procedure that could help increase survival. <i>Questions</i> -underweight defined in the study as 900g or below. - did not look at economic effects - pig farmers in Sweden do seem to want to have the option to use temporary confinement, particularly for problem or older sows - there may be some merit in this as shown by the results of the study - the temporary crating system had a heat lamp behind the sow - don't know if this could be a factor rather than temporary confinement per se.
4	<p>Presenting concrete results from experiments. Experience and problems with the pen design. What to do in the future with the temporary confinement? – Gudrun Illmann</p> <p>Aim is to improve the welfare of the sows. All farms are crated and crated sows are good, no talk about having loose sows. Now they are starting to talk about loose sows.</p> <p>Study: comparison of crated and temporary confined sows.</p>

Results, experience +problems, behaviour

Small study group (13 TC 4.6 m², 14 C 1.6 m²)

- Short term effect, 48 hours after opening crate
- Long term effect
- Behaviour (sow and piglet) and stress hormones (IgA and cortisol), production data

Results

Short term

- Increase activity, rolling
- Decrease IgA

Long term

- No effects, longer pre-massage in PC (fewer piglets attending)

Litter size had significant effects

- Longer pre-massage, shorter postmassage, greater nursing termination from sow
- More piglets missing milk ejection (also in the long term)

Loose housing had moderate positive effect on sow in short term. Similar mortality in 3 days.

Litter size effects are a challenge

Further:

Detailed sow activity, quality of activity.

Long term effects – cognition studies etc.

Next step – improvements of pen:

Pen increased to 6 m².

Sloped wall issues – disaster in first attempt. Improve dimensions according to space requirements.

Protective bars on the nest, really important.

Enlarged crate.

Has been working for 2 months – very small group still but indications of mortality issues.

Mortality increases after opening – nervous sows??

Video example of crushing – sow flopping down in the middle of pen.

Weaning weight is good, mortality is still a problem when opening. Litter size and parity seems not to be reason for mortality.

TC good step before using pens. Further research focus on long lasting effects. Low mortality is not enough for good housing, sow welfare must be good as well.

Use this group more – others might have done experience.

Questions:

Roland: Sow didn't show she wants to lie down – that gives less crushings. Maybe the sows stop showing signs when the pen is too small? Study they are doing.

Emma: Is space defined? No obvious lines between dunging and nest area. Is priorities for the sow more metabolic – nursing – at 25 days they might still be catabolic. Maybe not many differences in activity. GI: Sows have better control of weaning but not clear results.

Rebecca Morrison: Same issues with sloped wall – changed wall so sows could fit.

Sandra: Farmers opinion after TC experience? GI: He is not happy with crushed piglets and not much support for the studies (funding?).

Any difference in weaning weight? GI: in the literature weaning weight is higher but then LS is also smaller. If litter size is higher, we probably don't see weight difference.

	<p>Charlotte (?): post weaning benefits? Fights between sows differ between housing systems (previous study) up to slaughter. Those long term benefits should be shown.</p> <p>Johan: Both groups missed milk ejections – effect on weaning weight? GI: No. Didn't follow individual piglets to see if those that missed were smaller. New study: smaller piglets fight more for milk, improve their weight gain during lactation.</p>
<p>5</p>	<p>Selecting the right sow, where to go from here? – Emma Baxter</p> <ul style="list-style-type: none"> • Will talk about various characteristics of sows, do we need to select perfect sows, how to select perfect sows? • FreeSow data – effects of parity – commercial sows, 3297 sows, on 3 farms <ul style="list-style-type: none"> ○ Regardless of other factors, higher parity sows had higher mortality ○ Farrowing duration longer in higher parity sows – tend to be bigger, legs less good (= crushing) ○ Litter size – influencing piglet mortality – NB interaction with fostering. Very large litters – very high piglet mortality – increased small piglets, harder to control herself in lying safely • Body movements – crushing (C0 – no crushing, C1 – 1 crushed, C2+ - 2 or more crushed), pre-lying behaviour (sniffing, pawing, rooting, lying vertically) and numbers of piglets cleared pre-lying in 0.5m around the sows. <ul style="list-style-type: none"> ○ Difference between non-crushers and crushers not significant, but non-crushers were less restless – more lying, greater inter-lying interval, non-crushers tended to respond more to piglet screams when they did crush. ○ Conclusion – no influence of pre-lying, mixed results in the literature, propose the 'faff-factor' – sows that take too long pre-lying could be influencing the non-significant results. Better measurements, e.g. Ocepek et al 2017 took more details in a carefulness score. Non-crushers responded better but weak result – could be that over-responsiveness could be bad. • Does farrowing environment influence current and future performance? Lots of different systems on one farm with sows going in different systems could have an influence. <ul style="list-style-type: none"> ○ Past data on 753 sows – crates, straw pens, temporary crating (360-farrower) ○ Pre- and post-processing mortality ○ Inter- and intra-parity consistency ○ Data in King et al 2018, Animal – in press ○ Interaction between current and future system – most positive = straw pen to straw pen and farrowing crate to farrowing crate, but lower for temporary crating to temporary crating, worst for temporary crating to farrowing crate and farrowing crate to temporary crating – therefore consistency is important, especially for P1 to P2 sows. ○ Category of piglet mortality in first parity not predictive of second ○ Sows had larger litters in second farrowing when housed in the straw pen for first – positive on reproductive behaviour ○ Conclusion – consistency important, relevant when farms trying different systems on the same sows. • Temperament tests on 216 gilts before insemination – quick responses to handling, response to startle bucket and voluntary and forced human approach, followed gilts to farrow in crates or free-farrowing <ul style="list-style-type: none"> ○ Most consistency between temperament tests? See slide ○ No relationships between temperament test and KPIs ○ But tests did relate to farrowing behaviour – exit order and ease of removal from the pen were linked to farrowing duration. ○ Conclusion – fear early in life linked to farrowing behaviour. • Udder conformation on performance – Balzani et al 2016 <ul style="list-style-type: none"> ○ 4 measures of udder conformation – teat distance, teat base to midline, length and width of teat, orientation, functionality. ○ Sources of variation – breeds and parity. ○ Location at the udder = front middle back ○ P1 had smaller udder dimensions

	<ul style="list-style-type: none"> ○ LW X LR breeds difference ○ Udder morphology vs piglet behaviour – latency to suckle shorter on the back teats ○ Maternal characteristics were more important ○ Heritability of udder traits – many are moderately to highly heritable ● Do we need to select for the perfect sow? <ul style="list-style-type: none"> ○ Distribution of sows that crush – e.g. most sows do fine in these systems, sows adapt with time but also the staff. ○ Breeding for high survival – quick and easy traits to select for – genomum – numbers weaned on Scottish outdoor units – selected boars for high survival, mated with outdoor sows – just selected for numbers weaned – 3% improvement in survival in a short time. Which survival traits influenced? – high survival selection reduced crushing. ○ Target calmness, carefulness – other traits? ○ Increased numbers weaned worked well – but could also select for nursing ability, colostrum quality. ○ Look for animals that are least problematic. ○ Interactions with parity, litter size, system (and staff) ● Questions <ul style="list-style-type: none"> ○ LBol – you can keep existing breeds but select the right sows from these? Yes, pink pigs can do this ○ Sweden – select for good mothers but also good sow-human interaction, should be more selection traits in breeding programme. ○ Leg problems – ability to move sows and mortality could be influencing? Gilts had OK legs, and problems would be culled-out, but we know leg problems are an issue in free-farrowing or loose-lactation systems. ○ SE comment on previous – we are looking at data on details of legs and mortality, not a clean story. ○ YS – pre-lying behaviour – piglets responding to the sows behaviour? Piglets are responding well to suckling, but if the ‘faffers’ are not acting properly, crushing a risk. ○ GI – important to have a simple test to indicate problems for farmers. The sows that come out last are the problem – extremes – very fearful/nervous, could be reactive and not cope well. If farmers have 2 systems, put nervous sows in crates. ○ YL – selecting for litter size at weaning good – but many factors involved and cross-fostering an issue. What about combinations of traits? Combination of dead piglets with numbers weaned as the survival trait. But, nucleus herds mostly in crates, how to convert to alternative systems? ○ LBol – what to do with nervous/aggressive sows? VM – tried playing classical music, ear scratching – one herd had positive results, other herd no difference but sows were already well handled. Handling sows pre-farrowing to reduce nervousness – getting sows confident with the staff and the other way round before farrowing. ○ Litter size – small piglets – effort into the viability needed. Need a combination of udder traits, milk production, fatigue from large litters, as well as robust even piglets. Hard to evaluate traits with cross fostering, nurse sows etc. with large litters. Mixing genetic potential.
6	<p>How much milk can a sow produce – and how to feed a high yielding sow – Peter Theil</p> <p>Limiting factors for milk yield: milk pre-cursors, production, Blood flow: 4300 L/d day -10, 12700 L/d d17. Increase in blood flow not necessarily increase in MY.</p> <p>Dietary impact on MY – large variation between sows.</p> <p>Difference between requirement for energy and lysine – optimal ratio different to achieve using only one diet.</p> <p>Two-component feeding: according to maintenance in beginning, according to milk production in lactation. Appetite regulated because feed doesn't match requirement?</p>

	<p>Colostrum intake – lowest ingesting piglets have 70% mortality rate, highest 10%. Effect of fibre – stillbirth reduced. Energy status very important. Time from feeding to farrowing is important – more than 3 h increases stillbirth.</p>
<p>7</p>	<p>Test of ten pen designs – what did we learn? Where do we go from here? Lisbeth Ulrich Hansen</p> <ul style="list-style-type: none"> - testing 10 different farrowing pens - invited manufacturers to submit their pens for testing - looking at management and sow use NOT piglet mortality - 5 fully slatted floor pens - 360 farrower included specifically because it is small (same footprint as a farrowing crate) - 5 part-slatted floor pens - 1 no confinement at all (Soren Juul) - focus areas of study: <ul style="list-style-type: none"> # transfer sows to the pen # working conditions/staff safety # piglet use of creep area # injuries - sows and piglets #hygiene # ease of weaning sows and piglets - all systems have positive and negatives, but key points made: <ul style="list-style-type: none"> # piglet knee injuries vary a lot but more are seen on solid floor than slatted. This will be an area for future work # shoulder problems are also linked to floor type. This will be an area for future work. - What is important for farmer, consumer etc. will depend on what you are most interested in. The design most 'suitable' will depend on whether you are trying to satisfy primarily the farmer, sow or consumer. <p><i>Questions</i></p> <ul style="list-style-type: none"> - farmers were used to working with loose systems - sows were randomly selected for pen treatment; did not keep track of which pen they had previously farrowed in.
<p>8</p>	<p>Austria restricts crating of sows in farrowing pens to the 'critical period' of piglets life – Johannes Baumgartner</p> <ul style="list-style-type: none"> • 2.9M pigs, including 280000 sows, 25,000 farms! 5.4M pigs/yr, high consumption • 2011 – emotional debate on farrowing crates between the sow welfare vs the piglet protection factions. • Started more serious discussion on farrowing and the Free-Farrowing Workshop was hosted in Vienna in 2011 • 3 months later – new regulations permitted farrowing crates until 2033, from 5 days pre-farrow no less than 4m² and 1/3 solid floor. After 2033 – free movement of sow crating to critical period with research to come dictating what the 'critical period' is. Details include a floor space of more than 5.5m² (more on slides.....) • Pro SAU project to investigate the critical period: <ul style="list-style-type: none"> ○ 5 pen types (PT) pre-selected and combined with 4 temporary crating (TC) periods d-1 to d5 (CP_6), d-1 to d3 (CP_4), d-1 to d1 (CP_3), no confinement (CP_0). ○ 3 research farms and 6 practical farms were included. ○ Pens were – wing pen (5.5m²) – fully slatted with solid covered creep, straw for rooting, trapezoid pen (5.5m²); kink pen (5.5m²); SWAP pen (6m²) - Danish; Pro dromi (7.4m²) – Dutch.

- Study spanned 31 months – with a total of 164 pens – measurements included productivity, behaviour, skin lesions, dissection of piglets (for more accurate cause of death), pen dirtiness, workload/economy/market.
- Cause of death – mainly crushing, some euthanised, runts, and non-viable piglets.
- When did deaths occur? Mostly in first week – the critical period.
- Significant effect of all crating periods on mortality compared with no crating. No difference between pen types.
- Effect of crating period = higher lesions on sows with long crating, but opposite effect on the piglets, with lower lesions with longer crating. However, no consistent effect of pen type on sow lesions – more effect of the floor-type with room for improvement of the floor to reduce lesions.
- Sow teat lesions – CP_4 and CP_6 = higher teat lesions, SWAP – higher risk of teat lesions less than Wing pens. Concrete solid floor a higher risk for knee lesions, and pro-dromi performed better than wing pen.
- Behaviour – nest building reduced with crating and increased posture changes during nest building phase; farrowing activity decreased with crating but increased sitting and lying on side. Increased activity when released on d6. Nest building in SWAP Pen >T,W,K,P, farrowing posture changes T>S.
- Conclusions on behaviour – high motivation of sows to nest build and move after d1 post-farrowing. No effect of crating on farrowing duration, dangerous position changes in CP_3 on d1 post-farrowing. Crate farrowing sows after nest building and before start of birth, open crate at d4 post-farrowing. Wing reduced activity – no space and anti-crushing bars, Trapeze – rolling increased, SWAP worked well for sows in terms of activity and nest building.
- Fachstelle – final evaluation/decision of all pens – certified wing, kink and trapez pens, but required changes to SWAP and pro-dromi.
- Costs – additional costs involved – highest for the larger pens due to space use and costs of the equipment. CP_4 had best results in terms of cost.
- This project was a constructive collaboration. Crating until d-1 to d3 is a good compromise for the industry. How to fulfil need for nest building and provide material, mothering ability and viability of piglets important (including large litter sizes – creates a lot of problems especially for small farms with less options to cross foster or have nurse sows)
- Transition period, knowledge transfer important, subsidies to cover the cost (e.g. 30% of investment costs covered), enlargements of building and permission needed. Pig industry needs to do its own R&D, will society accept temporary crating? – free-farrowing vs piglet mortality (total crate ban could come and piglet mortality will be a problem)
- Questions
 - Clarification on time of crating – varied was d-1 from *estimated* due date so some were nest building etc at the time of crating.
 - RM – how was 'free-movement' defined as some systems seem very restricted? Must be able to turn around without bumping into anything – no detail on optimising how the sows move and lie. This restricted space is positive for piglet mortality.
 - AvB– behaviour vs space, pre-lying behaviour, sows lying down unsupported? Sows in this study were limited in space, most crushing linked to rolling and lying down behaviour. When CP0, most crushing events happened in the middle of the pen, as piglets fall asleep next to the sow, when she rolls from side-to-side. Follow-up – would you recommend 5.5m² or increase (Germany looking into 7-7.5m²)? Even the industry are thinking more than 5.5m² is needed, so 5.5m² legal minimum by 6m² or more recommended especially when completely free-farrowing.
 - EB – always a problem with the control as they are designed to be temp crating, as designed to be for that purpose, how can you compare CP0 when the pen is designed for temporary crating not free-farrowing? Perhaps not future-proofed if no-confinement required in a short time, with no money for investment! Quality of the space important – larger with defined spaces for FF. One step to open minds to loose-housing, then will get into the right frame of mine.

	<ul style="list-style-type: none"> ○ RW – Same problem in Sweden – they are using designs for temp crating not free-farrowing!! ○ GI – when is the mortality? What % mortality when the sow is loose? Most farms got better results in temp crating than permanent crating. Need to look in detail at the report!
15	<p>Snapshots from PRC's most recent and upcoming work regarding loose housing of lactating sows – Vivi Aarestrup Moustsen</p> <ul style="list-style-type: none"> • Making systems competitive with crates and acceptable to society is the challenge • Need to address barriers/challenges – investment and running costs, welfare and productivity (piglet mortality), environment (risk of higher emissions) (control of dunging behaviour for hygiene/emissions), management (motive, train and attract staff) – all needed to get loose sows. • How big should the pen be? Need accurate dimensions of the size of the sows. <ul style="list-style-type: none"> ○ Measured 322 sows in 2003 and 405 in 2017 for parity 1 to 7+ - sows were similar in dimension between 2003 and 2017. • Not only dimensions, sows need to be able to move. Created an algorithm to show space use for pen designs. • Nest building – used Swedish information testing strategic use of a large volume of straw given at one point = reduced still births. Instead used a straw rack with 5kg or 10kg, reduced stillborn from 1.9 to 1.4 piglets. However, lots of straw did not work with the scraper/slurry system! • Also consider risk of disease with straw, which might not be able to be used in many countries. • Tested classical music and daily scratching to socialise the sows! Idea was to create some continuity for the sows. Music was a challenge to get through the other noise. Proven in other species to calm the animals, e.g. dogs who have a similar hearing to pigs. Scratching meant sows were less likely to withdraw when approached. • When to let sows loose? New Danish labelling scheme, 2 hearts = 2 days, 1 heart = 4 days. How to avoid peak in crushing? Masters student looked at the difference between 2 and 4 day release. <ul style="list-style-type: none"> ○ 4 days, piglets more likely to be in creep, but sows more active, 2 days, sows less active but piglets might not be in the creep. ○ 44 ½ vs 85 days vs no confinement – preliminary results does show highly mortality. • How to minimise risk when releasing the sows? Make sure piglets are fed? • Nursing capacity – good udders needed to nurse 15-16 piglets. If poor udders need supplementary milk. Looked at udder morphology in 10 herds <ul style="list-style-type: none"> ○ ~40 sows per herd and 8 days post farrowing. ○ Across all herds, more teats on right than left side. ○ Teats towards the back of the udder less well formed. Need to connect the development with milk production from different glands. Distance between teats and the height. • Light in the creep area – morning and afternoon – piglets using the creep earlier with light in the creep. • Space in the creep – piglet measurements (length, body depth), triple the space needed from the when they were born to weaning. 2-storey creep area to also adjust microclimate as piglets age. • Increasing solid flooring in temporary confinement? How to change dunging location from confined vs loose. Dung weights made to try to collect 90% of dunging in one corner. Vissing vs wing vs SWAP. Only the wing pen managed to get dunging in the right place. • Future – keep working on piglet mortality, productivity – feed the sows to high milk yield, attract good people by looking into successful management, reduced emissions.

	<ul style="list-style-type: none"> Identify barriers, keep looking at benefits of loose sows, when to give most attention/care, pens designed for 14-20 piglets.
16	<p>Logistics and health, and impact of eg. using 10 seconds extra per pen per day or 0.5 extra square meter per pen – Johan Skovgaard</p> <p>Consultant perspective.</p> <p>4 key points, management in the middle. How will the commercial producer succeed? Robust production system, high level of production and hopefully a premium for the pork. High health makes life easier for pigs and man – health and logistics go hand in hand – better performance, better welfare.</p> <p>Contamination from pig to pig, person to pig (clean people in contact with pigs, shower in – clean inside), air to pig (virus, get the right site location).</p> <p>Planning of farms – multisite (all sows on one location, weaners on others, finishers on many sites), 2-site (sows on one – weaner/grower on another, sows+weaners on one - finishers on another), 1-site (sows on one, weaners/growers on another site).</p> <ul style="list-style-type: none"> - Where to place the weaners? Better off with the farrowing staff or the grower staff? - High health status increase transport of pigs, people and feed on multisite. <p>Dimensions and production – how much washing and cleaning on different sites.</p> <p>Planning pig farms – logistics</p> <ul style="list-style-type: none"> - Invisible barriers on farm – change boots - Buffer sections to collect runt piglets - First breeder farm with TC – 8% mortality <ul style="list-style-type: none"> Two rules – look at the pigs and think Always opens in the morning, no more than 10 pens because it makes too much noise - Romanian farm (Premium Porc) - Central corridor split into two – moving a lot of piglets - 24 h supervision during farrowing, passageway all around the crates, stay in section when working <p>Internal logistics</p> <ul style="list-style-type: none"> - Many procedures should be doable by 1 person - Easy access to pen + creep, easy to assist at farrowing, easy weaning <p>Why or why not loose lactating</p> <ul style="list-style-type: none"> - Production concerns. Too high mortality - Higher investment. More space, correct design of pen (safe investment, requirements today vs. tomorrow) - Management. How to get the right people? - Higher profit for higher risk - Number of heads is more important than half a kg of pig – kg piglets per litter - Ready for potential legal changes <p>Poland – GoodValley</p> <ul style="list-style-type: none"> - 5000 sows – fully loose housed - CO2 neutral (biogas plant connected), OUA production - 1000 euro per pen – more space per pen - 10 s extra work per pen per day = 0.8 year worker - 2 piglets less per sow /year

	<ul style="list-style-type: none"> - High performance? Big yes. Management & standards!! Unskilled workers don't have bad habits. <ul style="list-style-type: none"> o Pig industry need evidence, more knowledge, good examples from 1000 sow units o Education of workers - Straw may be a challenge (ASF, Dysentery, Leptosirose)
<p style="text-align: center;">17</p>	<p>Experience in introduction of new loose farrowing systems and engaging employees – Rebecca Morrison</p> <p>Aus pig production: 264.000 sows, 5 mio. Finishers Gestation stall free, majority don't castrate. 42.000 sows, 18% of pork volume, most finishers grown in ecosheds, 'care for every pig' programme – education of employees. Company decision to be leaders in animal welfare, investigating free farrowing systems.</p> <ul style="list-style-type: none"> - PigSAFE, SWAP, group lactation, simple loose sow design <p>Experiences – hurdles</p> <ul style="list-style-type: none"> - Systems developed for northern hemisphere, different breeds, LS, size of sows etc. Weather. - Using existing sheds can sometimes be even more expensive than green field projects - All systems at one site – challenge for stock people - Sows don't come back to same system - Standard work day, no 24 h coverage for night supervision - Cultural change; many people have worked there for many years – not ready to change - Survival lower and more variable than crates <p>Strengths</p> <ul style="list-style-type: none"> - Engaged experts, developing systems, use and learn from others <p>Engaging people is crucial to success Company policy on animal welfare – obligation to work towards aims set up. Supportive senior management; be prepared to fail Foster positive culture; select people that wants to work in free farrowing, adaptable managers, work with free range sows to learn about sow behavior, invite people and engage in discussion on free farrowing, give stockpeople the tools they need, training of staff, certification in pig production Encourage positive interactions; 'treat programme' with treats next to boots – pop in pocket and hand to pigs, train pigs to do tricks. ProHand Reward teams that do good – achieve KPI's.</p>
<p style="text-align: center;">18</p>	<p>Welfare in pig production – an NGOs perspective – Kate Parkes, RSPCA</p> <ul style="list-style-type: none"> • RSPCA assured took over the freedom food label for better brand recognition with RSPCA in the name. • Established in 1994, rebranded 3 years ago – response to demand for higher welfare products, UK's only scheme dedicated to animal welfare, works to RSPCA welfare standards. • 9 species in the scheme, including 180M animals – land animals + salmon and trout.

	<ul style="list-style-type: none"> • Number of pigs on the scheme remained static over the years, gone down from 24.8% in 2016 to 19.4% in 2017 – not sure why this has happened? 70% Scottish salmon are on the scheme and high number of laying hens, pig number 3 in terms of % of population • Each species has a technical advisory group (STAGs) to maintain the standards in relation to – research, practical experience, legislation, codes, FAWC, recommendations and best practice. • UK situation – 60% sows indoor with the majority in crates, but the 40% outdoors are already loose farrowing and lactation. • RSPCA farrowing standards <ul style="list-style-type: none"> ○ 1994 didn't have standards on farrowing, could use crates ○ 2005 – changed to restrict confinement to 5 days ○ then in 2010 decided to phase out temp crating to no confinement for new members, with a 5 year phase in for existing members (at the time only had about 2 members that had indoor farrowing anyway!) ○ rule was sows needed to be able to turn around freely at all times, but needed more details! • Developing details – the challenge. <ul style="list-style-type: none"> ○ Current designs – solari pens, simple rectangular pens, Pigsafe, outdoor arcs taken indoors ○ Commercially applicable – must be easy to retrofit, or put in new, planning permission hard in the UK, need to be aware and practical ○ Approval of systems – don't outright approve specific systems ○ Details standards vs general principles – key requirements met allowing for different designs ○ Need to be easily audited – no ambiguity about interpretation of the requirements. • Went with the general principles idea <ul style="list-style-type: none"> ○ Minimum space – bedded lying area = 2.8 m2 must be solid, with a total of 5m2 including the lying area, minimum creep size must be 0.7m2 solid + 0.3m2 not accessible to the sow, e.g. can be under the sloped wall ○ Voluntary feeding stalls permitted but not to crate the sows ○ More details on website • Future proofing <ul style="list-style-type: none"> ○ Standards are living documents that evolve – new research might change things, but would have phase in/stepwise ○ Have these 'must have' general principles rather than overly restrictive details ○ Need dialogue between people ○ Legislation could come into place than could change the standards • Questions <ul style="list-style-type: none"> ○ Weaning age? Follow legislation. Increasing age is on the radar but not imminent. ○ How often audited? Once a year + a possible 2nd random check, must have 4 times year vet visit. ○ No scope for temp crating in the scheme? No, won't go back to allowing temp crates ○ Long tails? Only dock in exceptional circumstances, if docked only 1/3 of length.
19	<p>Welfare as an added value – Peter Sandøe</p> <p>Market driven animal welfare – social science perspective on free farrowing</p> <p>Background; 2-3 decades ago everyone looked at legislation, following the bramble committee, then EU commission took over. What will come from the EU in the future? People are becoming more aware of the market; enriched cage for battery hens was good from a scientific perspective but people didn't pay and caged eggs are out all together.</p>

People don't want to be reminded that the meat was a living animal. Humans have double standards – what you say you do and what actually do is not the same. Concerned citizens vs. not concerned consumers.

Study with 2 questions: what are the values people make use of when assessing welfare for sows and piglets, potential for improving sow and piglet welfare through market driven welfare.

Case study on sows: Eventually farrowing unit will be legislated. Danish consumers.

What is welfare?

- Access to outdoor areas
- Space, air, light
- Freedom
- Company
- Freedom of pain
- Feed, water

Fixed sows are the opposite of welfare; not farming but industry, birth machine, mean production.

Important phases: farrowing and suckling.

The life of a sow – what is important? They like straw, not dirty.

Dilemma of high export; consumer awareness of double standards and dilemma of farmers also having to make money. Economy vs. animal welfare

Conclusions from interviews...slide.

Questionnaire

- Consumer habits – what do you buy? 1 of 5 don't know what they buy, do you think of animal welfare when you buy? The more processed, the less thought on animal welfare.
- To pay more – what is important? Outdoor, Danish, more space, fresh meat, loose sows, environmental concern, tail docking, easy prep, no castration
- 72% will pay 10% more, 20% will pay 50% more. Somewhere in the middle is what we have to work with.
- Consumers are not just consumers; no care for AW, AW very important, AW important – but...
- Super markets offer three categories; free farrowing belong to middle segment.

Questions

Do people trust that when they pay more it goes to the farmer. No – that why we need organisations like RSPCA to ensure the farmer as well.

Thoughts on limited access to outdoor – will indoor systems be rejected by consumers like enriched cages? Small part of production to pay for the full package – outdoor. Make indoor look like something we want to see. Even enriched cages are still cages – not aesthetically good.

Welfare producers are looking at a very small premium



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INTRODUCTION

- Late cross-fostering, after 24h post-partum, is performed when individual piglets are growing poorly or increasingly as nurse sows are required amongst super-prolific herds
- Late cross-fostering may be more challenging in free farrowing systems as sows have more freedom to attack piglets, become restless and reduce nursing behaviour
- Piglet growth can become compromised due to sow behavioural responses and intra-litter aggression whilst re-establishing the teat order
- No previous research has investigated the effect of late cross-fostering on post-weaning piglet weight gain and behaviour from different farrowing systems

Research questions

- Do sow responses to cross-fostered piglets differ between penned and crated sows?
- Is piglet weight gain compromised more in penned than crated cross-fostered piglets?
- Does cross-fostering or rearing environment affect piglet weight gain post-weaning?

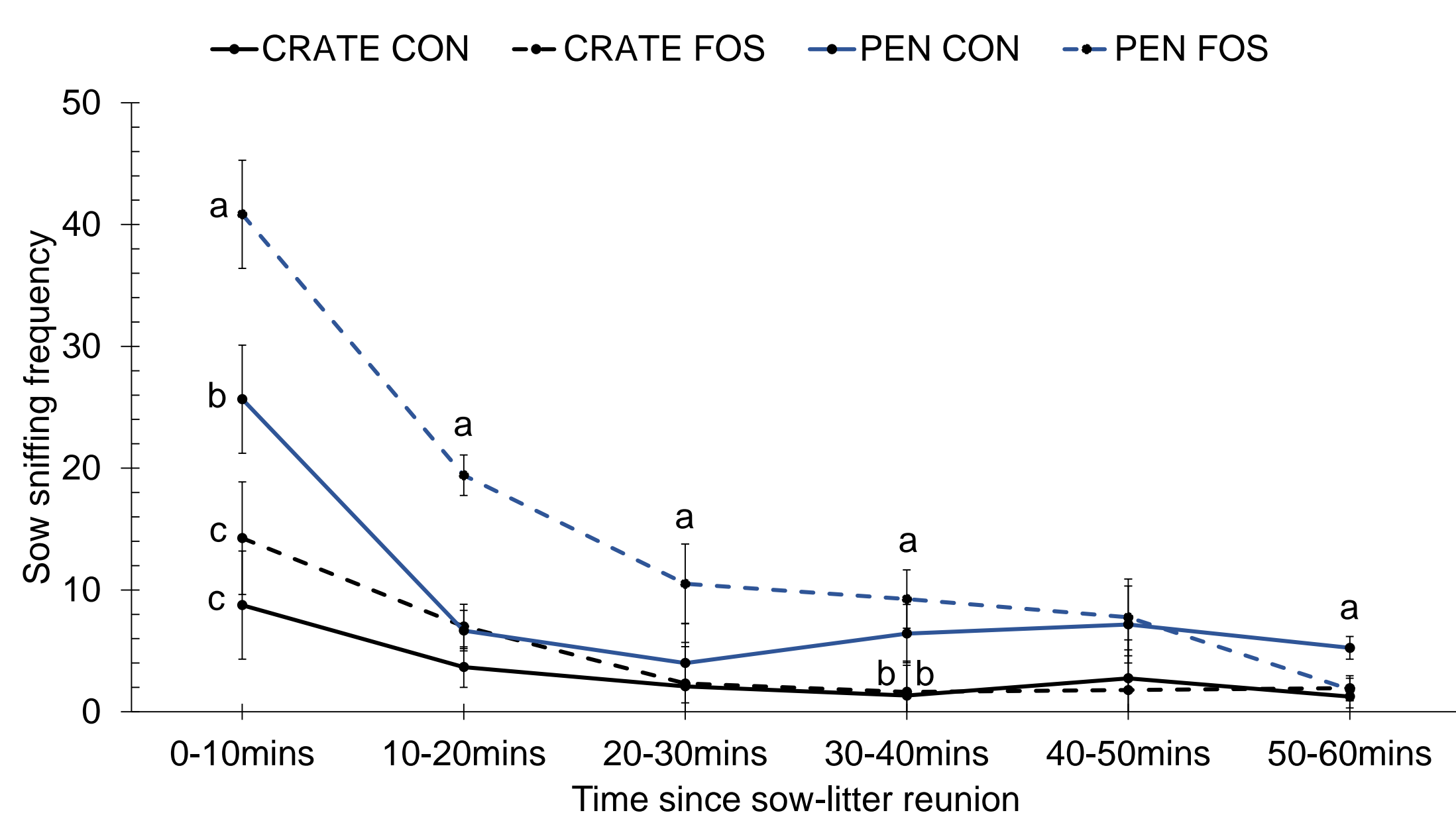


© Can stock photo

RESULTS

Sow behaviour

Sow sniffing of piglets during 60mins after sow-litter reunion (Day6)



Sow nursing behaviour (Day6 and Day7)

Behavioural observation	Housing (H) and Treatment (T) combination				P value		
	CRATE CON	CRATE FOS	PEN CON	PEN FOS	H	T	H*T
Day6 (60mins)							
Successful nurse latency [†]	9.19 ^a ± 10.29	113.14 ^b ± 10.29	19.74 ^a ± 10.29	59.08 ^c ± 10.29	0.05	0.001	0.01
Sow-terminated freq.	1.50 ^a ± 0.40	1.50 ^a ± 0.40	2.33 ± 0.40	2.58 ^b ± 0.40	0.05	-	-
Focal piglets present	2.92 ^a ± 0.25	2.34 ± 0.26	2.18 ^b ± 0.25	1.63 ^b ± 0.25	0.01	0.05	-
Day7 (300mins)							
Successful nursing freq.	4.48 ^a ± 0.64	4.48 ^a ± 0.64	4.58 ^a ± 0.64	3.18 ^b ± 0.64	-	-	-
Sow-terminated freq.	5.84 ± 1.34	5.44 ^a ± 1.34	5.84 ± 1.34	8.34 ^b ± 1.34	-	-	-
Focal piglets present	2.99 ^{ab} ± 0.14	3.36 ^{bc} ± 0.16	2.90 ^a ± 0.14	3.63 ^c ± 0.13	-	0.001	-

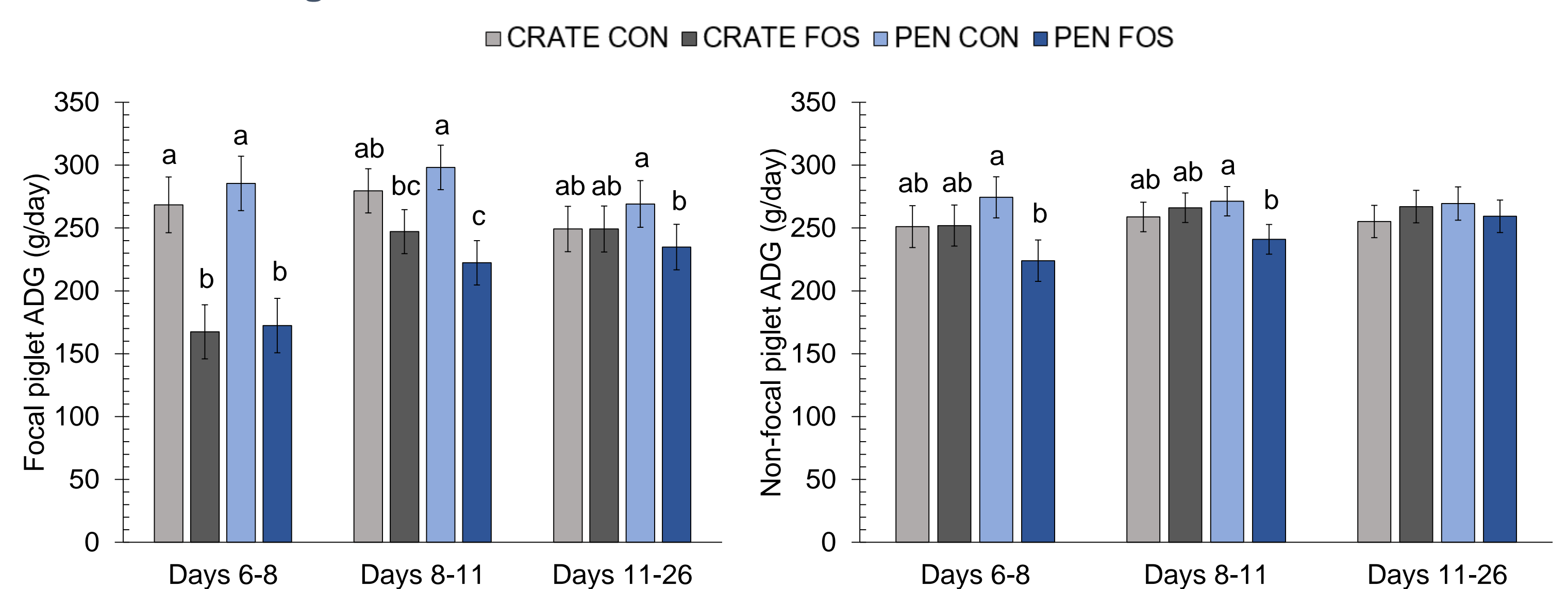
[†] in minutes, observation longer than 60mins where required

METHODS

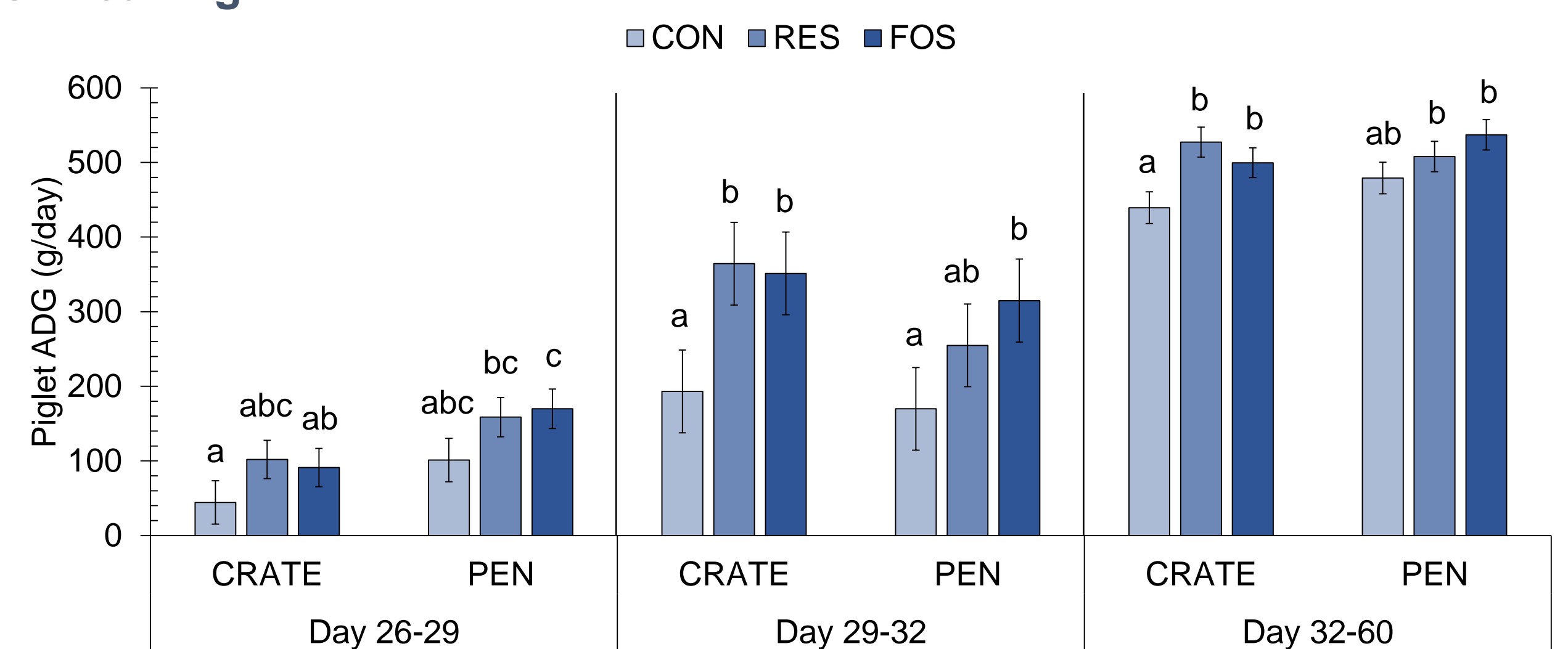
- On Day6 post-partum, two litters were collected within the same housing (PEN or CRATE) and treatment combination (FOS or CON)
- Piglets were individually weighed, sexed and ear-tagged for future identification
- Four median-sized focal piglets (two of each sex) were numbered on their back and either exchanged between the two litters (FOS) or returned to the same litter (CON). Non-focal resident piglets (RES) remained with their own sow amongst FOS litters
- All piglets individually weighed throughout lactation (Day6, Day8, Day11, Day26; n=547) and weaner period (Day29, Day32, Day60; n=108)
- Sow behaviours were analysed continuously for one hour following litter reunion and for five hours on the following day, including:
 - Frequency of sniffing piglets
 - Sow nursing latency, frequency and success
 - Focal piglet presence at the udder at the start of a nursing bout

Piglet weight gain

Pre-weaning



Post-weaning



- Total weight gain during weaner period (Day26-Day60) lower amongst CON than FOS ($P < 0.01$) and RES piglets ($P < 0.01$)
- Total weight gain during weaner and lactation (Day6-Day60) lower amongst CON than FOS ($P < 0.05$) and RES piglets ($P < 0.01$)

CONCLUSIONS

- Sow behaviour is more disrupted by late cross-fostering in free farrowing pens
- Cross-foster piglet weight gain is significantly reduced after fostering in both farrowing systems, and throughout lactation amongst penned focal piglets
- Weight gain of resident piglets is also reduced in penned cross-foster litters, suggesting sow nursing behaviour is affected for a number of days
- However, the weight gain of cross-fostered and resident piglets from both farrowing systems is increased post-weaning, possibly due to increased creep feed intake during lactation making the transition to a weaner diet easier

ACKNOWLEDGEMENTS

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- This work was funded by The Perry Foundation



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INTRODUCTION

- Temporary crates (Figure 1) remain closed until 4-7 days post-partum to protect piglets from crushing during their most vulnerable life stage
- However, anecdotal reports from farms utilising temporary crating indicate piglet mortality increases in response to crate opening
- There are no studies confirming if the post-opening period (24-48h after crate opening) is a higher risk period for piglet mortality
- Opening crates individually, instead of simultaneously, may minimise sow arousal from crate opening disturbance in neighbouring pens
- Opening crates in the afternoon, with no subsequent stockperson disturbance, may reduce sow restlessness and disruption

RESEARCH QUESTIONS

- Does litter mortality increase during the post-opening period?
- Can alternative crate opening procedures reduce litter mortality?
- How do alternative crate opening procedures affect sow behaviour?

METHODOLOGY

- Three crate opening treatments were tested:

ALL - all crates within accommodation opened on the same morning when average litter age seven days (standard practice on study farm)

AM – crates opened individually in morning when litter seven days old

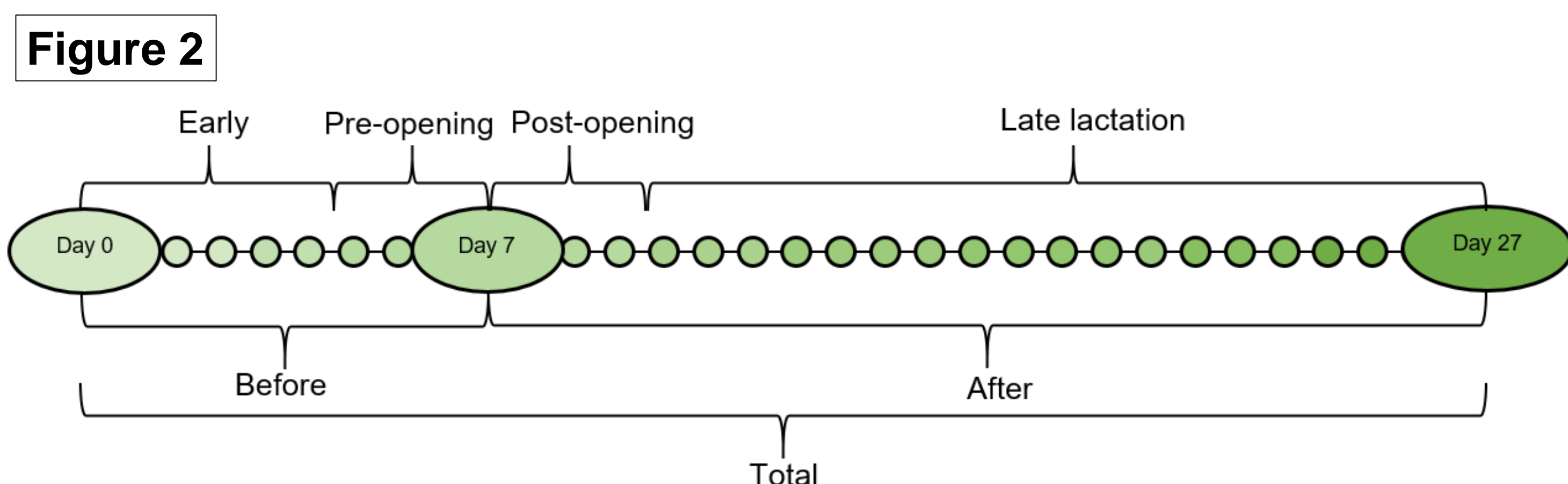
PM – crates opened individually in afternoon when litter seven days old

- Two housing types (Figure 1) - pens positioned with neighbouring sows front-to-front in cabins (left) and side-to-side in rooms (right)



Figure 1

- Mortality recorded separately for each stage of lactation (Figure 2)
- Continuous behavioural sampling from subset of sows for six hours after crate opening, and same time period on day before and after:
 - Posture frequencies
 - Posture durations
 - Lying behaviour (sniffing piglets before and use of support during)



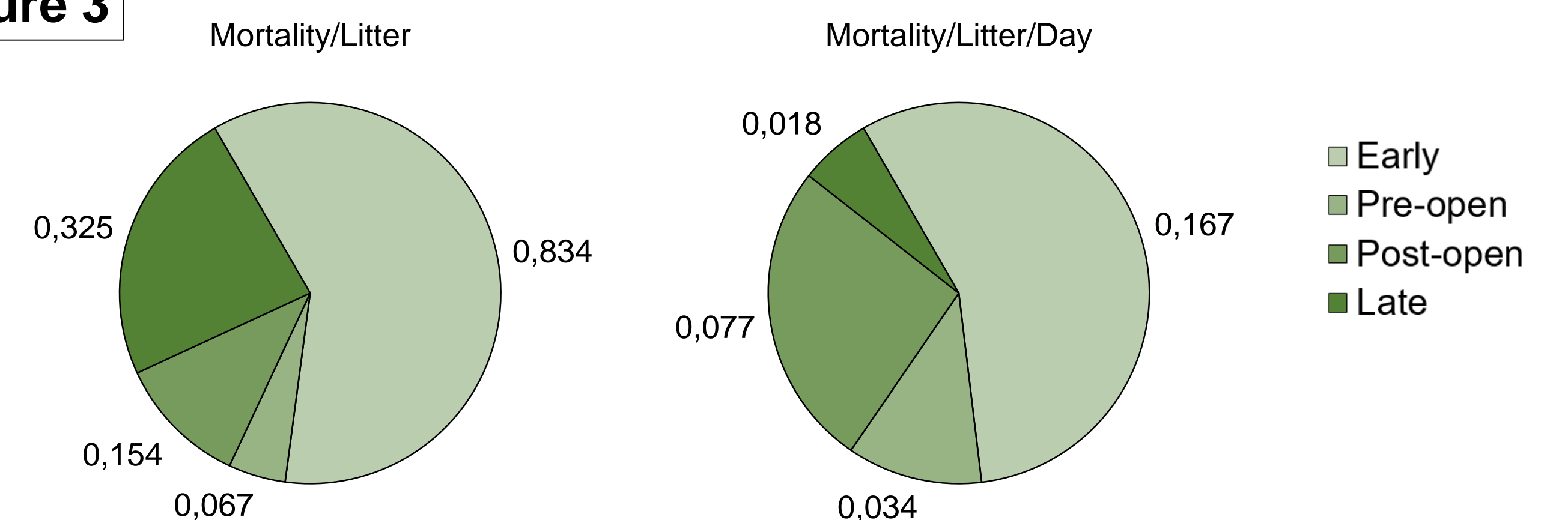
King RL, Baxter EM, Matheson SM and Edwards SA (2018). Temporary crate opening procedure affects immediate post-opening piglet mortality and sow behaviour. *Animal*, *in press*.

RESULTS

Litter mortality (n=416)

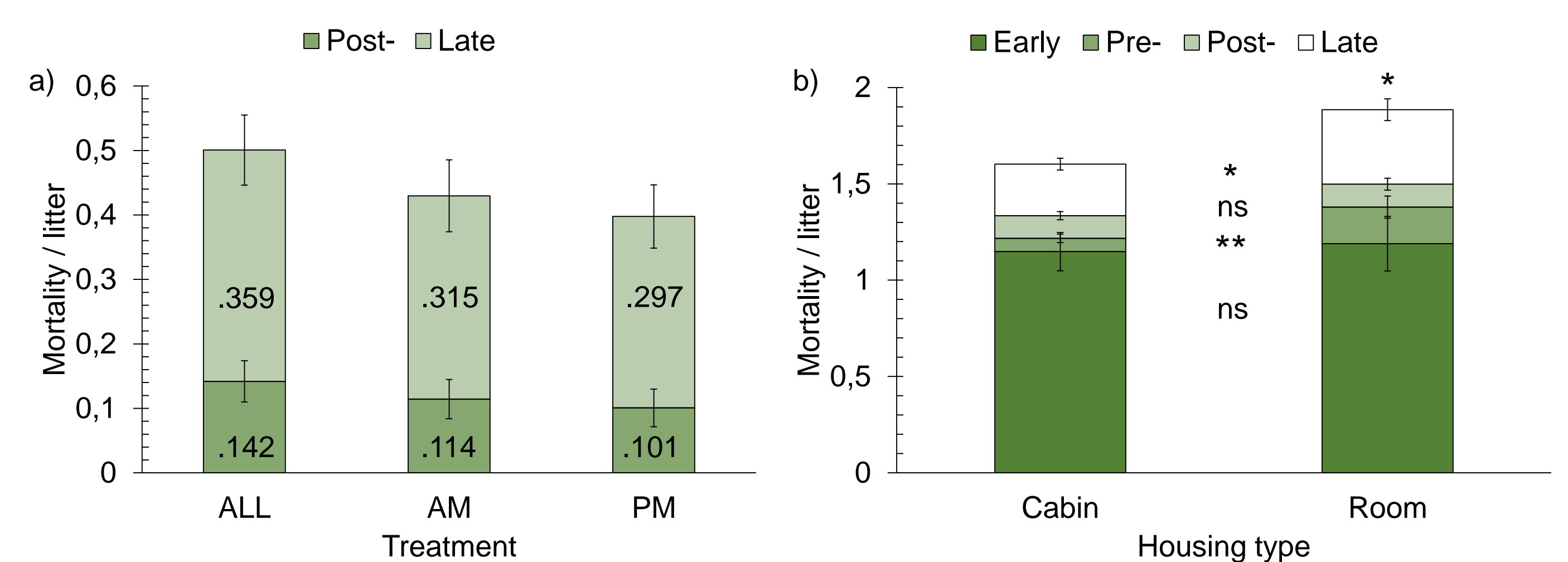
- Across treatments, mortality/litter was higher during the post-open than pre-open period ($P < 0.001$; Wilcoxon signed rank test; Figure 3)

Figure 3



- Treatment affected post-opening mortality ($P < 0.05$), and therefore across the after opening period ($P = 0.052$; Figure 4a)
- Post-opening mortality higher amongst parity 6+ sows than other sow parities (0.26 ± 0.06 vs. 0.10 ± 0.04 parities 1-5 combined)
- Pre-opening ($P < 0.01$), late ($P < 0.05$) and therefore total piglet mortality ($P < 0.05$) were higher in the rooms than cabins (Figure 4b)

Figure 4



Sow behaviour (n=15)

- Frequency and percentage of lies preceded by sniffing piglets or using support whilst lying unaffected by day or treatment
- Frequency of stand-to-lie higher for ALL than both AM ($P < 0.05$) and PM ($P < 0.05$) on the day before crate opening
- Total standing duration higher on day of crate opening than following day for AM ($P < 0.05$) and PM ($P < 0.05$) but not ALL

CONCLUSIONS

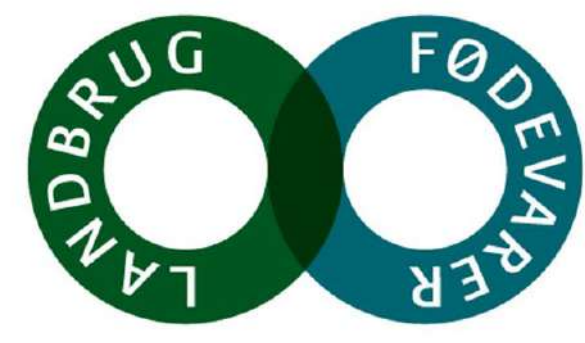
- Piglet mortality risk per day higher immediately after crate opening than during later lactation and immediately preceding crate opening
- Opening crates individually resulted in lower piglet mortality, similarly for morning and afternoon crate opening treatments
- Individual opening may increase pre-opening sow activity, habituating sows and piglets to post-opening sow behaviour changes
- Future installations of temporary crates should consider the impact of excessive sow contact between neighbouring pens

ACKNOWLEDGEMENTS

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Impact of playing classical music and scratching on avoidance distance in loose housed farrowing sows

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Abstract

Worldwide, an increasing number of large scale farms practise loose-housed sows in all units, including the farrowing unit. However, loose housing of farrowing sows can lead to an unacceptable proportion of the neonatal piglets being crushed by the sow.

As an attempt to reduce piglet mortality by making the sows more calm and since then less likely to accidentally crush piglets, sows were exposed to classical music and/or scratched daily.

Scratching significantly increased the proportion of sows letting an unfamiliar person touch them, whereas there was no effect of music. There was an effect of herd.

Introduction

Neonatal piglet mortality, partly caused by crushing, causes economic loss and reduced welfare.

Studies have shown that reactivity of the sow can influence the number of piglets being crushed. The effect of handling/scratching on sow reactivity has previously been found to result in more calm sows.

Since handling takes time we also investigated an alternative method, enrichment through sound - classical music.

The hypothesis is that classical music and/or scratching has a calming effect on sows and will result in a shorter avoidance distance.

Methods and Materials

Data were collected in two commercial herds with sows loose housed individually in farrowing pens.

A split-plot design was used, with section as whole plot (Plus Music (PM) and No Music (NM)) and farrowing pen as subplot ((Plus Scratch (PS) and No Scratch (NS)).

The PS-sows were scratched in the neck area by the farm staff once daily for 15 seconds.

Music played continuously from 6 am to 6 pm from 5 days before expected farrowing until 5 days after farrowing. The playlist used was "100 calm classics for study and concentration". Three speakers were placed in the section, to allow even distribution of music throughout the section.

To test the reactivity of the sows, a forced approach test was done by an unfamiliar person the day of placement in the farrowing pen and before treatment was initiated, the day before expected farrowing and day 5 post farrowing.

The test person crouched in front of the sow and tried to touch her head. The sows were scored 0 if they could be touched and did not withdraw, 1 if they initially withdrew but could be touched within 15s, 2 if they withdrew and could not be touched within 15s.

A Glimmix model (SAS) that included farm, music, scratching, batch and the day of avoidance was used to analyse the results.

Results

Scratching resulted in a significant decrease in avoidance behaviour in line with the hypothesis (PS=0.63 (SE: 0.03), NS=0.74 (SE: 0.03), $p=0.02$) whereas music had no significant effect (PM=0.68 (SE: 0.03), NM=0.68 (SE: 0.03)). There was an interaction between herd and day of scoring ($P<0.0001$).

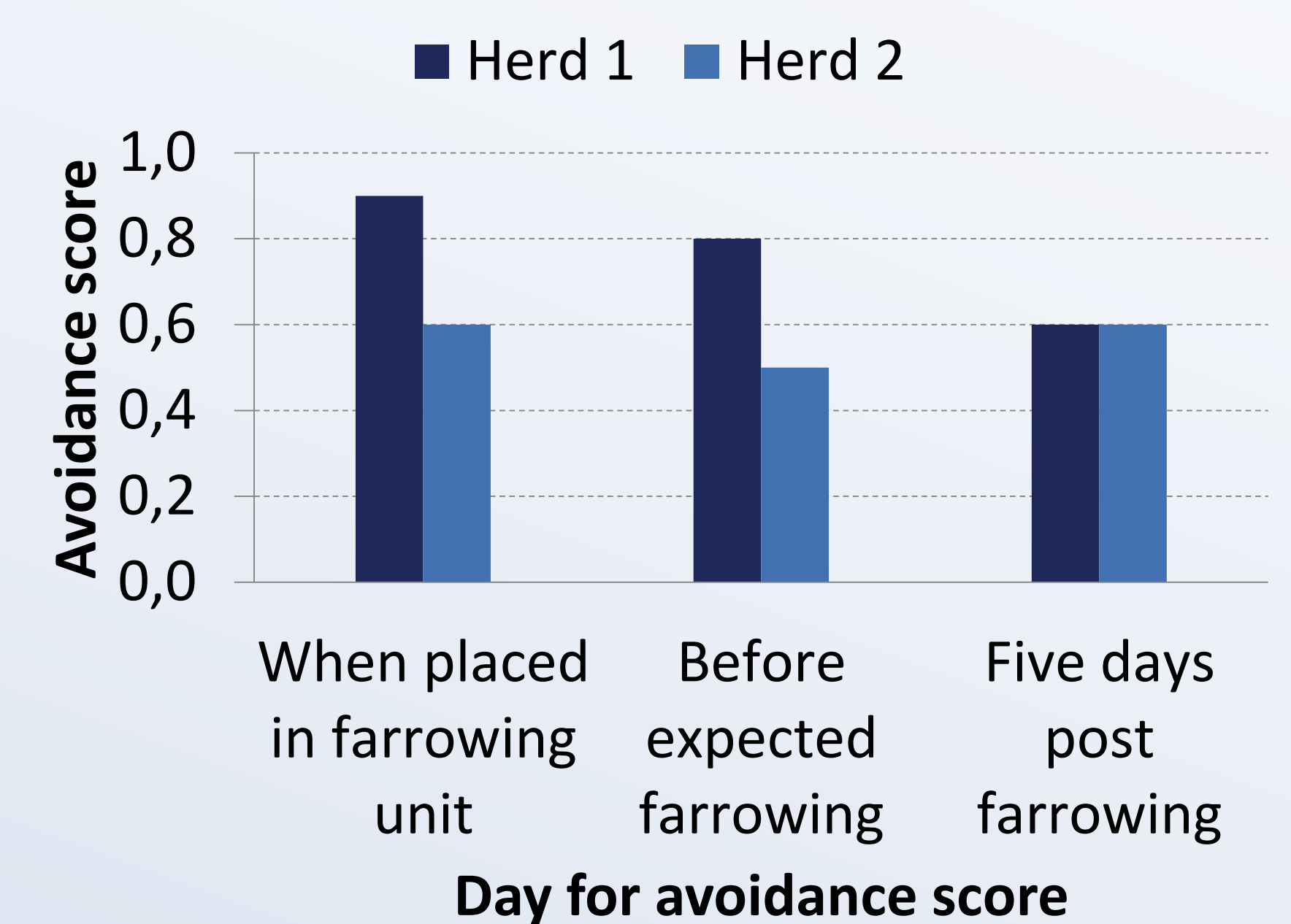


Figure 1. Avoidance score for sows in two herds.

Discussion

It cannot be excluded that other noises reduced the possible impact of the music.

Personal on farm, when asked about the effect of the two treatments, stated that they found sows in all treatment groups less reactive and easier to handle than sows in the non-treatment group. Also they did not consider the treatments as time-consuming or annoying.

Sows in herd 1 withdrew more often from the test person in the first registration and became more confident for the second and third registration. Whereas sows in herd 2 already at the first registration were less likely to withdraw and remained at a similar level for the following two registrations.

Conclusions

Overall, sows that were scratched 15 seconds daily for 5-6 days were less likely to withdraw when an unfamiliar person came in to the pen. The initial level of avoidance distance in the herd influenced the impact of the positive handling. The farm personal found treated sows easier to handle.

Table 1. Number of sows per herd, average parity, and litter size (NM: No Music; PM: Plus Music; NS: No Scratch; PS: Plus Scratch).

	Herd 1				Herd 2			
	NM ¹	PM ¹	NS ¹	PS ¹	NM ¹	PM ¹	NS ¹	PS ¹
Sows, no	57	58	58	57	54	54	54	54
Average parity	3.4	3.4	3.5	3.2	3.5	3.6	3.1	3.5
Total born, no/litter	19.0	20.2	18.8	18.7	17.3	18.5	17.3	16.8



Pen used in trial



Sow listening to music

PROHEALTH consortium

Newcastle University · accelompment AG · Aviagen Ltd · Conseil et Compétences en Productions Animales (CCPA Group) · Coren S.C.G. · European Forum of Farm Animal Breeders · Ghent University · Institut National de la Recherche Agronomique (INRA) · JSR Genetics Ltd · Luke – Natural Resources Institute Finland · Poultry Health Services Ltd · PigCHAMP Pro Europa S.L. · SEGES P/S - Danish Pig Research Centre · The University of Nottingham · Tivix Europe SP ZOO · University of Copenhagen · University of Reading · Vedanko BVBA · Veterinary Research Institute · Vitatrace Nutrition Ltd · Warsaw University of Life Sciences (WULS-SGGW) · Zoetis International Services Sas



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www.fp7-prohealth.eu

Supplementary

LLS18 – link to websites

Proceedings from workshops in 2008, 2011 can be found at:

https://www.sruc.ac.uk/freefarrowing/info/2/research/45/free_farrowing_workshops

Results from tests in Austria (pen and period of confinement) and Denmark (pens)

Austrian test of pens for loose lactating sows

☒ ProSAU - there is a link at this site <https://www.lko.at/bewegungsbuchten-im-abferkelbereich+2500+2629063>

Danish test of pens for loose lactating sows

☒ Showroom (<http://www.pigresearchcentre.dk/Research/Sow%20and%20piglets/1803.aspx>)

Other websites

<https://www.freefarrowing.org/>

The Danish Better Animal Welfare Brand

https://www.foedevarestyrelsen.dk/english/Animal/AnimalWelfare/Pages/New_animal_welfare_label_will_win_the_hearts_of_Danes.aspx

https://www.foedevarestyrelsen.dk/SiteCollectionDocuments/26_Kampagne/Dyrevelf%C3%A6rdsm%C3%A6rket/Factsheet_animal-welfare_label.pdf

<https://www.foedevarestyrelsen.dk/kampagner/Bedre-dyrevelfaerd/Sider/forside.aspx>

The Danish organization for pig producers with loose lactating sows

<http://www.welfare-pigs.dk/>

Video from Michael Nielsen (farm visited)

<https://vimeo.com/139911985> you'll see a video (in Danish) from an open farm arrangement in the herd.

Video from farm with SWAP-pens

<http://svineproduktion.dk/Viden/I-stalden/Staldsystem/Stiindretning/Farestald>