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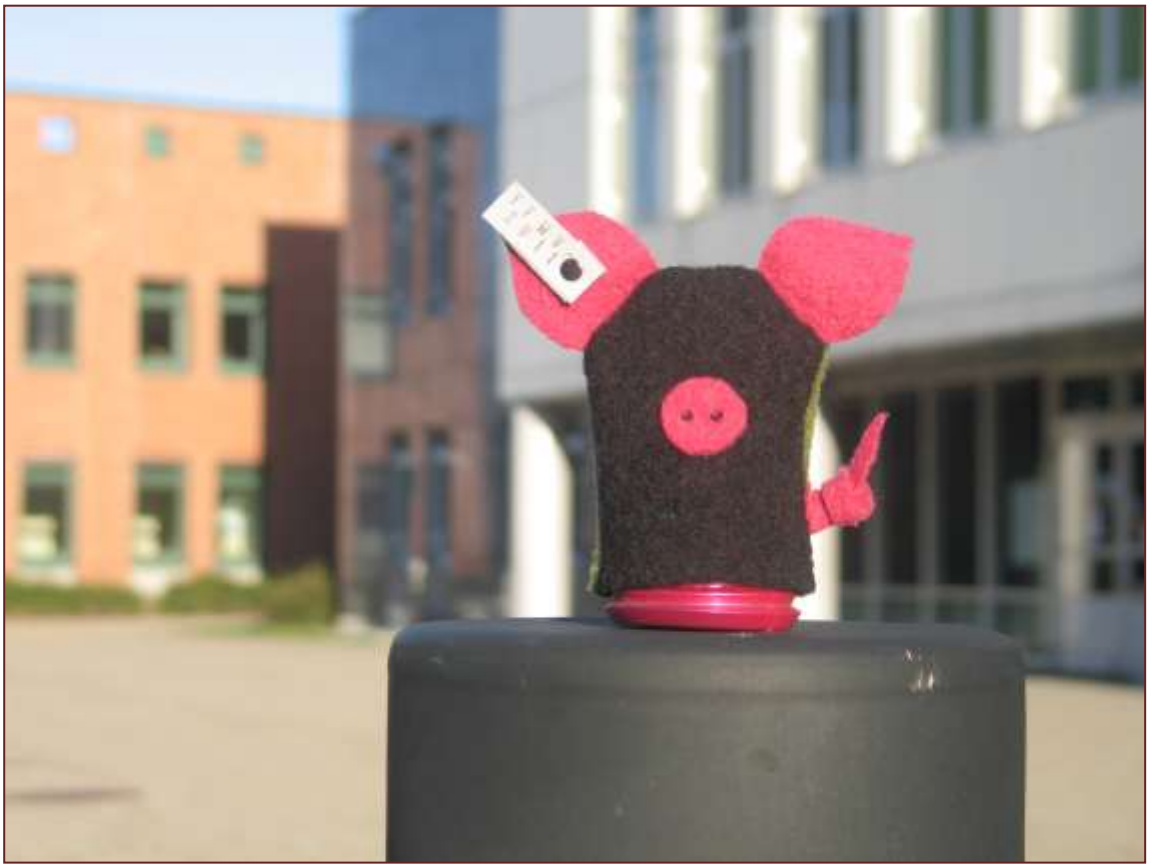

Report of the

Free Farrowing Workshop Vienna 2011

8 – 9 December, 2011, Vienna, Austria

edited by
Johannes Baumgartner

vetmeduni vienna

FFWV_2011

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Content

INTRODUCTION

In the last 50 years crates have become the predominant farrowing environment across the world, mainly due to a significant reduction of labour and investment costs compared to traditional free farrowing systems. Additionally the number of weaned piglets increased whilst piglet mortality remained at an 'acceptable' level. The robustness of the farrowing crate system to different management conditions contributed a substantial part to the specialisation and industrialisation of the pig sector.

More recently farrowing crates have been discussed critically by scientists and in wider society from a welfare point of view. In 2011 this issue dominated the public debate on animal welfare in Austria. The situation was characterised by a high level of emotions and a serious lack of knowledge and experiences on free farrowing systems.

Against this background, 32 experts (farmers, advisers, researchers, administration) from Switzerland, Czech Republic, Denmark, Germany, the Netherland, Norway United Kingdom and Austria met at the 'Free Farrowing Workshop Vienna 2011' (FFWV_2011) in order to gather scientific and experience-based knowledge and to discuss options, obstacles and questions regarding free farrowing systems. It can be considered as a follow-up-event of the highly successful meeting "Housing of farrowing and lactating sows in non-crate systems" in Copenhagen (Pedersen and Moustsen, 2008).

The programme of the FFWV_2011 was focussed on three topics:

- Animal related aspects of free farrowing systems
- Design of the farrowing environment (free farrowing vs. temporary crating)
- Aspects relevant at farm level and to a society in transition from crates to free farrowing systems.

The FFWV_2011 consisted of plenary talks and discussions and six workshops with short presentations and discussions. The programme and all presentations are available freely via internet: http://www.vu-wien.ac.at/institute-of-animal-husbandry-and-animal-welfare/infoservices/free-farrowing/?L=2

This report includes short manuscripts to most of the presentations as well as brief summaries of the workshop discussions of FFWV_2011. Many thanks go to the authors and all participants for their valuable input. There is some indication that the FFWV_2011 has helped to overcome the uncertainty in the Austrian farrowing crate debate which resulted in a revision of the Austrian Animal Welfare Regulation in 2012 (see annex to introduction). The organizers have to thank the University of Veterinary Medicine Vienna for hosting the FFWV_2011. Special thanks go to the International Society of Livestock Husbandry (IGN) for its generous financial support of the meeting.

Johannes Baumgartner

Pig industry in CH, CZ, DE, DK, NL, NO, SE, UK, AT and EU

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Scientific evidence indicates that housing of sows in farrowing crates causes a number of welfare problems (see EFSA, 2007; Spoolder et al. 2012) and consequently should be overcome. However, a serious and pertinent debate on a transition from farrowing crates to free farrowing systems housing cannot be held without reference to the current situation of the pig industry.

In preparation to the 'Free Farrowing Workshop Vienna 2011' it was decided to provide an overview of the pig industry in the home countries of the participants. One colleague of each country was asked to gather national data on pig production according to a questionnaire. Questions on the structure of pig industry, the situation of pork market, the housing conditions, the legal requirements, activity in research and development and public concerns had to be answered. If possible the situation in 1980, 1990, 2000 and 2010 should be described. Most data were provided by the relevant national authorities (ministries, producer organisations, statistical institutes etc.) and some were based on the experience of the respondents. This survey resulted in a brief report of the pig industry in Switzerland (CH), Czech Republic (CZ), Denmark (DK), Germany (DE), the Netherlands (NL), Sweden (SE), United Kingdom (UK), Norway (NO) and Austria (AT). Due to the inhomogeneous data sources and different basis of calculation the results have to be considered with some caution. Nevertheless the data provide an approximate overview of the different national situations and allow a comparison of different points of departure concerning the debate on free farrowing.

Relating to topic of the Free Farrowing Workshop Vienna 2011 it is important to know that the pig industries in Switzerland, Sweden and Norway are already based on free farrowing systems (see later). On the other hand the farrowing crate still is the predominant housing system in the rest of Europe.

Pig industry and pork market

Most sow units are located in Germany. In Austria and Switzerland with its small scaled agriculture there are three times as many sow units as in the huge pig industries of Denmark or the Netherlands. In each country a considerable decrease in the number of sow units could be observed in the last 20 years (Fig. 1) which was independent from the fact if sows are kept in free farrowing pens (CH, SE, NO) or in farrowing crates. When looking at the number of sows Germany is market leader again followed by Denmark and the Netherlands. Except Denmark the number of sows decreased from 1990 to 2010 by about 10 to 30 %.

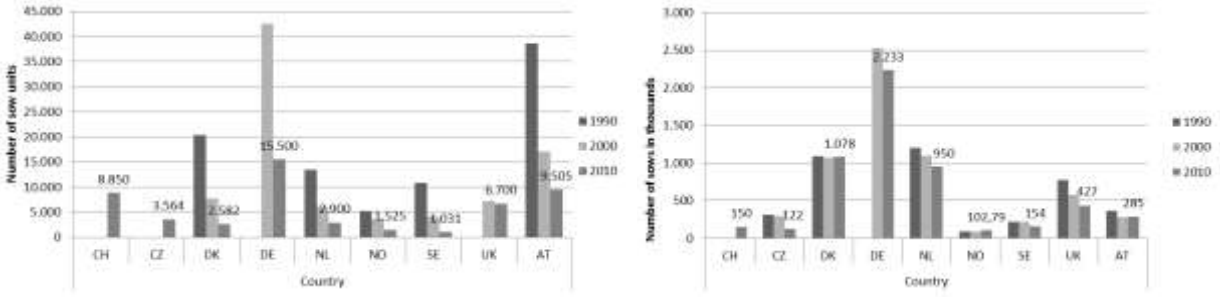

Figure 1. Number of sow units (left) and number of sows (right) in different countries in 1990, 2000 and 2010.

Almost 60 million pigs per year are slaughtered in Germany and 20 million in Denmark. The number of slaughter pigs increased considerably in Germany and decreased in the Netherlands and the UK while it kept stable in Austria (Fig. 2 left). The degree of self-sufficiency is extraordinary high in Denmark (>800 %) and the Netherlands (258 %) and is low in the UK (51 %) and Sweden (76 %). Pig industry of Austria and Germany produce about 110 % of its national consumption which is highest (ca. 55 kg pork/person/year) all over Europe (Fig. 2 right).

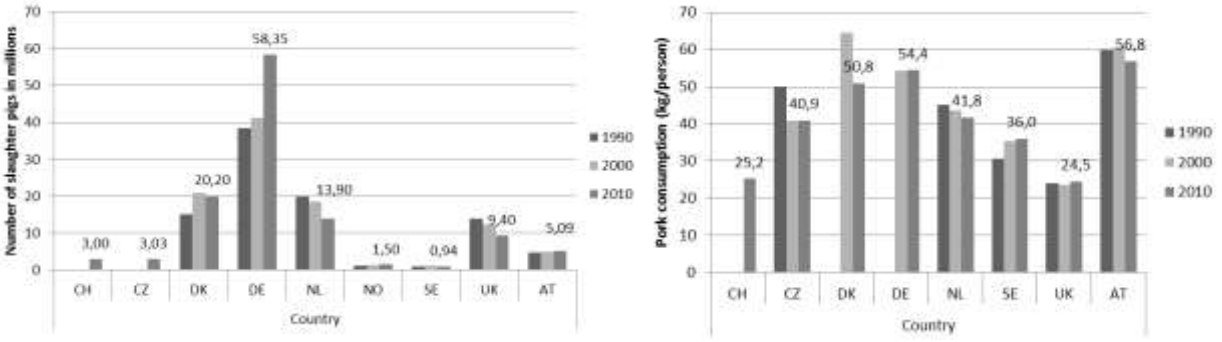

Figure 2. Number of slaughter pigs (left) and pork consumption (right) in different countries in 1990, 2000 and 2010.

Productivity data

Additionally to the sow welfare the piglet mortality is a crucial factor in the evaluation of housing systems for farrowing and lactating sows. National productivity data should provide an reliable indication of the effect of the farrowing environment on piglet mortality and the economic risk related to a transition to free farrowing systems.

The number of live born piglets per sow and litter in 2010 range from 14.5 (DK) to 11.6 (AT) and increased considerably since 1990 (10.2-10.9). Industries with free farrowing systems (CH, SE, NO) do not differ from countries with farrowing crates (Fig. 3). The number of total born piglets per litter gives is highest in DK (16.1; +4.6 piglets since 1990) and lowest in the UK (12.1; +0.5 since 1990), most countries had about 14 total born piglets per litter. It can be expected that the transition to free farrowing systems is more risky in pig industries with hyper-proliferative sows in terms of piglet mortality.

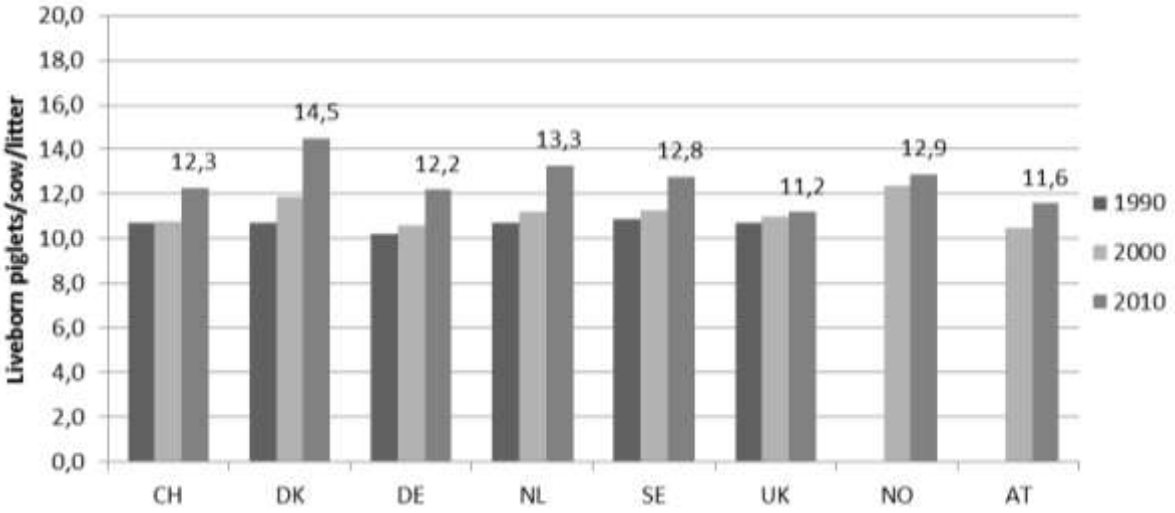

Figure 3. Number of live born piglets per sow per litter in different countries in 1990, 2000 and 2010.

Live born piglet mortality ranged from 12.6 % (NL, AT) to 17.2 % (SE). Industries with free farrowing systems like CH and NO do not differ from crate countries (Fig. 4). Most industries show an increase in live born mortality over the time which might be correlated to the increasing litter size in the last ten years (Fig. 3). In 2010 the number of weaned piglets per sow and year ranged from 21.2 (CZ) to 28.1 (DK). Sow units in the Switzerland (24.8) weaned more piglets per sow and year compared to those in DE (23.9), SE (23.5), NO and AT (23.2) and the UK (22.1).

In conclusion the productivity data indicate that high productivity in piglet production does not depend on crated systems.

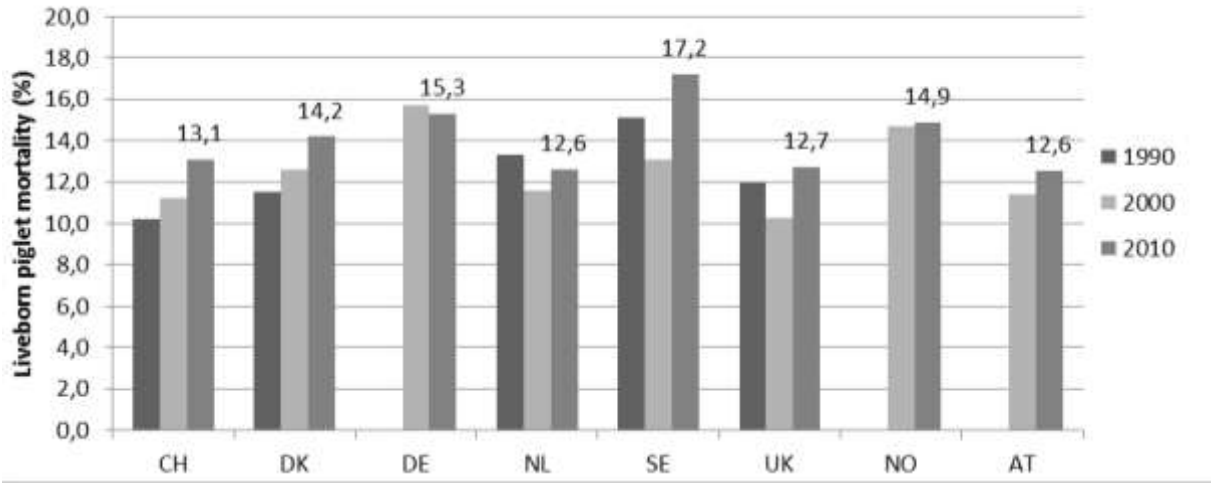

Figure 4. Live born piglet mortality (%) in different countries in 1990, 2000 and 2010.

Legal requirements

In most European countries permanent crating of sows in the farrowing environment is allowed which is in line with the Council Directive 2008/120/EC. In Switzerland, Sweden and Norway housing of farrowing sows in crates is permitted just in extraordinary circumstances (i.e. leg problems, aggressiveness against piglets) for a restricted period (3-5 days after farrowing) and it must be recorded. Participants from those countries reported that there is no specific free farrowing pen type in use, farrowing units with outdoor production and multi-suckling systems are not common. There is a small number of organic sow units in each country (1-2 % of total pig farms) which keep sows in free farrowing pens with an outdoor run.

Straw for nest building has to be provided to the farrowing sows in Switzerland, Sweden and Norway. In all other countries '…sows and gilts must be given suitable nesting material in sufficient quantity unless it is not technically feasible for the slurry system used in the establishment' according to the Council Directive 2008/120/EC

Organic material for proper exploration and manipulation like straw must be given to the pigs in Switzerland and Sweden. The minimum size of the farrowing accommodation (1.8-5.5 m²), the maximum amount of slatted floor in the farrowing environment (33-100 %; except creep area), slat width (9.0-12.0 mm) and crate length differ considerably between the countries (Table 1). A more detailed survey on the EU-Welfare legislation on pigs is provided by Mul et al. (2010; see http://edepot.wur.nl/136142)

Table 1. Legal requirements on the farrowing environment in different countries

	CH	CZ	DK	DE	NL	NO	SE	UK	AT+
Crate allowed	no*	yes	yes	yes	yes	no	no***	yes	yes
Minimum crate length (cm)	190	210	210	no	-	180	x	n/a	190
Minimum crate width (cm)	65	65	65/90	no	-		x	n/a	65
Minimum pen size (m^2)	5.50**	1.47+0.3	4,86	no	1.3+0.6m^2 avg 5.0m^2	6	6	n/a	4.0 or 5.0
Maximum slat width (mm)	9	10	no	11	12	12 (10 at birth)	11	11	10
Maximum proportion of slatted floor (%)	50	no	no	90		33	3 m^{2****}	n/a	>1.32m^2 solid
Straw for nest building requested	yes - long straw	no	yes	no	no	yes	yes	no	no
Material for exercising	yes - organic	yes	yes	yes	yes	yes	yes - organic	no	yes

* 3 days; only aggressive sows or leg problems; crating must be noticed
** 3.5 m^2 (built before 1997); 4.5 (built 1997-2008); 5.5 m^2 (built after 1.9.2008)
*** except aggressive sows
**** 25 % of lying area, which is 4.0 m^2 + 100 % of dunging area which is 2.0 m^2 = 3.0 m^2
\+ New regulation since 08.03.2012 (see below)

Annex: The new Austrian regulation of the farrowing environment (own translation)

In March 2012 an amended version of the First statute on animal husbandry (1. THVO, 2012) was put into force. Amongst others it includes new regulations of the specific requirements for the housing of sows in the farrowing environment:

Until the end of 2032 sows and gilts may be housed in farrowing crates in the period from five days before the expected time of farrowing until weaning of piglets. The minimum area of a farrowing pen has to be 4 m^2 resp. 5 m^2 per sow, depending on the average weight of the piglets (< 10 kg / > 10 kg).

As from 2033 farrowing pens have to enable sows and gilts to move around freely and to suckle piglets unhindered. The minimum area of a farrowing pen including the creep area has to be 5.5 m^2. Half of the pen area must be designed as a lying area for sow and piglets. The minimum width of a farrowing pen has to be 160 cm. One third of the pen area has to be equipped with solid floor. Floor elements with a void ration up to 5 % are regarded as solid. In order to prevent piglet crushing sows may be confined in crates routinely until the end of the 'critical period' of the piglets. Crates must be adjustable to individual sows and gilts both in length and width. Farrowing pens have to be equipped with facilities to protect the piglets i.e. anti-crushing bars. Enough space behind the sow must be provided to allow assistance at birth.

Until the end of 2017 farrowing systems must be evaluated in a project organized by the Federal Ministry of Health and the Federal Ministry of agriculture. The project aims to improve existing farrowing systems concerning animal welfare with regard to economy, work management, ecology and the development of the EU market. Especially the duration of the critical period of the piglets has to be investigated. A final evaluation of suitable farrowing systems has to be performed by the new Austrian certification authority for Animal Welfare which has to be established according to the Fachstellen-/HaltungssystemeVO (FstHVO, 2012).

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Council Directive 98/58/EC on the protection of animals kept for farming purposes; Council Directive 2008/120/EC, which lays down minimum standards for the protection of pigs.

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Workshop 1:

SOW

Maternal investment and piglet survival – behavioural traits and other maternal traits important for piglet survival

Maternal investment and piglet survival – behavioural traits and other maternal traits important for piglet survival

Inger Lise Andersen
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Fundamental decisions about reproduction – evolution of life histories

- Two fundamental decisions about reproduction (e.g. Clutton-Brock and Godfray, 1992) :
  - How much of the resources available to them should be spent on reproduction instead of their own continued growth and survival
  - How to devide the resources that they allocate to reproduction among their offspring

Trade off between current and future offspring

- Each reproductive effort is associated with a cost in terms of reduced future survival rate and fecundity (e.g. Williams, 1966; Gustafsson and Sutherland, 1988)
- How does the domestic sow fit into this picture??

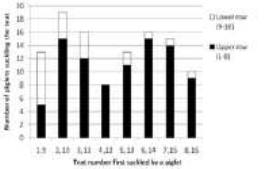
Maternal behaviour – effects of domestication

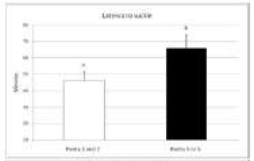
Maternal behaviour of free-ranging domestic sows is very similar to the maternal behaviour of wild boar crosses (Jensen et al., 1986; Gustafsson et al., 1999; Spinka et al., 2000)

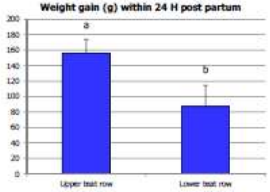
- Domestic sows invested more energy in the present litter

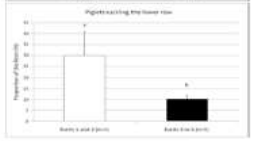
Access to the lower teat row

Longer latency to find a teat and suckle on the lower row of teats
Only 40 to 50 % of the functional teats were used during the first suckling









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Effects of parity on piglet mortality and maternal behaviour:

- Most causes of mortality increases with increased sow parity (e.g. Andersen et al., 2011)
- Savaging is more prevalent in primiparous gilts (Harris et al., 2003; Vangen et al., 2005; Chen et al., 2007)
- No or little effect on nursing behaviour (e.g. Andersen et al., 2011)
- Sow responsivesness and defensiveness declined from parity 1 to 4 in outdoor sows (Held et al., 2006)
- No effect on time spent with the piglets in a get-away system (Bøe et al., 1994)
- But: Just a few have studied this for more than two parities (Held et al., 2006; Andersen et al., 2011)

Trade -off between number and fitness of offspring

- Sows produce more offspring than normally raised, and pigs fit the pattern of 'facultative siblicide' to a large extent in that (e.g. Fraser et al., 1995):
  - producing an extra young only imply a small extra investment for the mother
  - intense sibling competition determines the number of offspring raised
  - size asymmetry ensures that the most vital young survive

But: in contrast to the many avian examples of fatal sibling competition, competition among piglets is sub-lethal in that it does not kill immediately

Trade -off between number and fitness of offspring

- **Overproduction of young may increase maternal fitness , either by (Forbes and Mock, 1998):**
  - allowing the mother to take advantage of a sudden increase in resource availability (when raising an extra young is suddenly affordable)
  - Availability of "extras" to replace offspring that die or develop poorly
- **From the perspective of the mother, maternal infanticide and sibling competition are two parallel mechanisms that have similar effects:**
  - By reducing the number of surviving offspring, the amount of resources available for the survivors increases and therfore also their survival prospects
  - So if sibling competition is essentially beneficial for the sow in ensuring that the largest and most vital piglet survive, then we should also predict low responsiveness to piglet fights and screams or that it might be some threshold value for the sow to respond

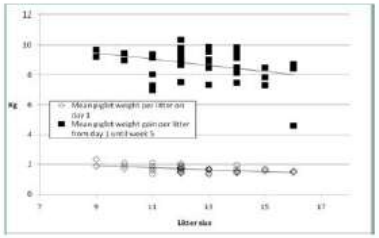
Competition among piglets (i.e. is screaming an honest signal of need?) and sow responses

- **The "handicap principle" predicts :**
  - Signals should be costly
  - Signals should be more intense for individuals in greater need
- **Alternative model (Bergstrom and Lachmann, 1998):**
  - Challenges the "handicap hypothesis" with their notion of "pooling equilibrium"
  - Signal when above a certain threshold
  - Could also be used for a certain proportion of the litter screaming
  - The mother responds to some kind of average state or average intensity

Results – piglet mortality and growth

	Litter size		Parity	
	$\chi^2_{3,35}$	P-value	$\chi^2_{3,35}$	P-value
Number of surviving piglets	0.6	0.45	1.3	0.73
Piglet mortality	96.4	<0.0001	54.4	<0.0001
Maternal crushing/no milk	65.0	<0.0001	3.9	0.27
Maternal crushing/milk	0.3	0.56	19.0	<0.001
No milk, i.e. starved	13.9	<0.001	18.7	<0.001
Other causes	16.0	<0.0001	8.7	<0.05

Number of surviving piglets did not change significantly with increasing litter size



Results – change in sow behaviour with increasing litter size:

- The sows tended to spend a larger proportion of their time standing or rooting
- The piglets were more often located in close proximity of the sow when she was not nursing
- **Primiparous sows appeared to adjust their investment with increasing litter size better in that they had a:**
  - sharper increase in proportion of nursings terminated by the sow over the lactation period
  - they increased their time spent standing, making it more difficult for the piglets to initiate nursings

Other effects of litter size:

- **Our EU-project (FP 6):**
  - The larger the litters, the more nursings were initiated by the piglets
  - Sows with larger litters sniff less on their piglets on day 1
  - Sows with large litters show a weaker response to piglets being handled (piglet handling test) and to recorded piglet screams (piglet scream test)

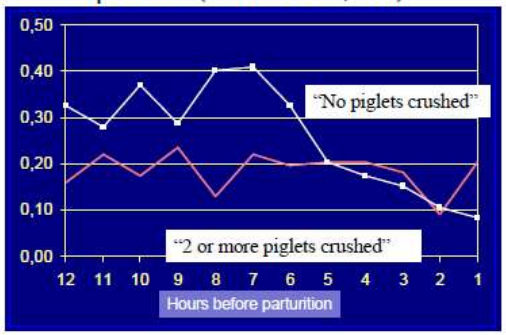
Behavioural traits associated with maternal care in sows and that may affect piglet survival

1. Nest building ★
2. Nursing (direct maternal investment)
3. Sow responsiveness to piglets being handled or to near-crushing events causing piglest to scream
4. Carfulness in lying down or walking around
5. Communication initiated by the sow and mother-young interactions shortly after birth outside the time of nursing ★
6. Fear ★
7. Infanticide

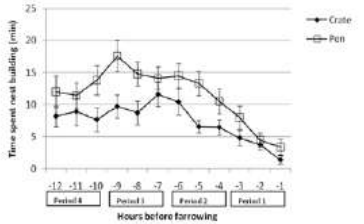
In Norway we recommend: free access to long straw 12 hours before expected farrowing

Field surveys in Norway: herds with less than 10% mortality use 2-3 kg of straw per sow

Proportion of time (% av obs) spent nest building the last 12 hours before parturition (Andersen et al., 2005)

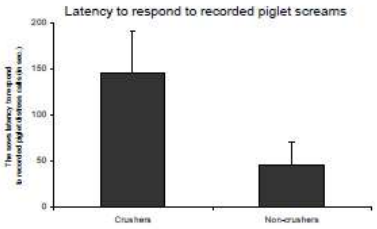


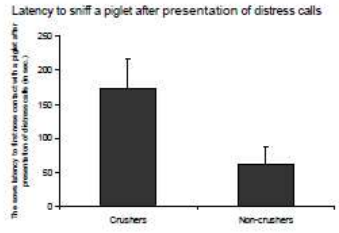
While the genetic basis for nest building is still unknown, there is a clear environmental effect (Pedersen, Vasdal and Andersen, 2011 – submitted):



	CRATE (n=23)	PEN (n=21)	$\chi^2_{1,39}$	P-value
Nest building (min)	101.2±12.6	148.8±16.0	5.5	<0.05
Number barbiting	42.3±4.9	2.2±1.0	14.0	<0.001
Number quick flop	5.4±1.1	2.3±0.8	4.7	<0.05
Posture changes after	22.0±3.8	32.8±5.3	5.7	<0.05

3. Sow responsiveness





Andersen et al., 2005

Genetic basis for maternal, behavioural traits and piglet survival traits

- The genetic effects on piglet mortality include direct maternal effects such as uterine factors (e.g. van Rens et al., 2005), the physical traits in the piglet itself (e.g. Knol et al., 2002) and the maternal behaviour of the sow (e.g. Arendonk et al., 1996)
- To estimate the genetic parameters for piglet mortality is challenging due to the large interaction between genotype and environment (e.g. Knol et al., 2002)
- Estimated heritabilities for postnatal piglet mortality and its component traits are around 0.04 for pre-weaning mortality (Knol et al., 2002), and ranging between 0.03 and 0.23 (Knol et al., 2002; Grandinson et al., 2000; Zumbach et al., 2009) for stillbirths
- In comparison, recent results show that heritability for number of piglets dying during the suckling period in the Norwegian Landrace is between 0.05 and 0.07 (Zumbach et al., 2009)

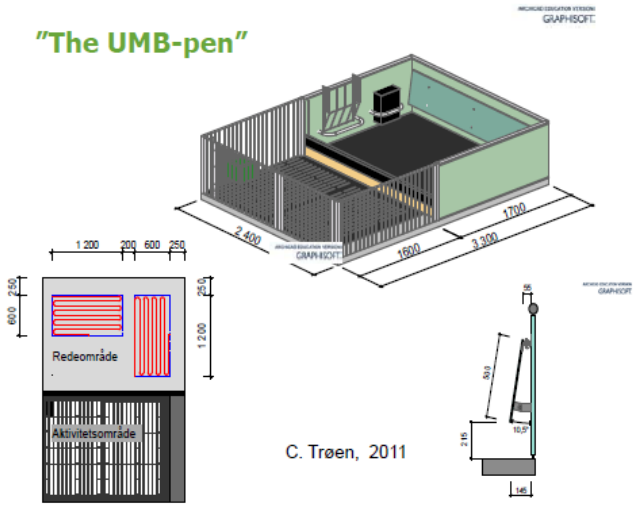
Genetic basis for maternal, behavioural traits and piglet survival traits

- The heritability for crushing has been estimated to 0.03 (Helbrugge et al., 2006; Gäde et al., 2008) and to 0.06 (Grandinson et al., 2002)
- For longevity, significant heritabilities are found (Poigner et al., 2009)
- Several studies conclude that selection for improved maternal behaviour can reduce piglet mortality (e.g. Vangen et al., 2005; Grandinson et al., 2003, 2005; Lensik et al., 2009)
- Fear of humans is genetically correlated to piglet survival (Grandinson et al., 2003), and the estimated heritability of fear of humans in gilts is quite significant (h^2=0.4; Hemsworth et al., 1990)

Genetic basis for maternal, behavioural traits and piglet survival traits

- Vangen et al (2005) also included the farmers own score of the sows behaviour towards the piglets on a scale from 1 to 7, if she was a good or a bad mother. However, the heritability of this score was very low.
- Chiang et al (2002) successfully developed a maternal care index in mice consisting of many different kinds of maternal interactions with the pups, and including nest building before birth, with a heritability of 0.24 and with a large variation in this index between individuals

"The UMB-pen"



Conclusions

It is essential to find which behavioural characteristics of the sow that is affected by life history traits and are directly related to piglet survival in a loose-housing environment: nest building activity, fearfulness, mother-offspring communication and relationship shortly after birth.

Less emphasis on litter size and more weight on: leg and udder quality, maternal, behavioural traits, in the breeding goal

Environment: Confident sows in a positive emotional state without painful leg problems and shoulder ulcers are likely to become the best mothers and the key to this state lies in satisfying the sows basic behavioural needs/ motivations

Thank you for your attention and good luck with your pig work!!

Sow behaviour in pens - maternal responsiveness towards piglets and stock person

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Loose housing farrowing systems are rarely used in commercial pig production. Two main arguments against loose-housing systems are based on the fear related to sow's maternal behaviour in pens: first, the fear of increased piglet losses caused by maternal crushing, and second, the fear of sow aggression towards piglets and/or stock person. Most of deaths of live-born piglets are caused by the sow crushing piglets when she changes posture with a peak during the first 24 h. Two aspects of the maternal behaviour seem to be more important in pens compared to crates in relation to crushing; sows in pens can move around and communicate freely with piglets which give them opportunity to perform more pre-lying behaviour and to be more responsive to screams of trapped piglets.

More pre-lying behaviour (e.g. rooting, pawing, sniffing and vocalization) might be functional by attracting piglets' attention and giving them enough time to move out of the danger zone near the sow (e.g. Marchant et al, 2001). However, recently it has been shown that more pre-lying behaviour attracted piglets to stay in close proximity to the sow but the nearness itself was not associated with piglet crushing (see Melišová et al, 2011). The results that newborn piglets stay near the sow is not new, in semi natural conditions piglets spend the first days after birth in the nest in close contact with the sow. Even the potential risk of crushing can be avoided by the piglets and sow behaviour. When a piglet gets trapped under the sow it starts to scream immediately. The piglet generally survives if the sow reacts in less than 1 min. Sows maintain their responsiveness towards piglet screams during the first 24 h in pens, even when the sows activity and her responsiveness towards piglets (e.g. to naso-nasal contacts) declines after birth. The responsiveness of sows to playback screams may be related to the survival of piglets. Sows that were more responsive in the piglet's screams test crushed fewer piglets than less responsive sows. Other studies did not confirm this result (see Illmann et al, 2008). However, the probability of sow responsiveness on piglet screams is only around 50 %, suggesting that other factors have been overlooked. The sow condition (lameness, sickness, high body weight) or the quality of the flooring (slipperiness) may decrease sow's response and affects piglet mortality. Further research should focus on these factors, specifically in pens.

Aggressive behaviour of farrowing sows towards their own offspring, known as savaging, can occur in the domestic pig. The incidence of savaging tended to be higher in gilts indicated by higher restlessness, greater frequency of posture changes from before parturition trough the expulsive phase. It has been suggested that savaging is a part of a more generalized behavioural pathology that included increased excitability and was not specifically piglet directed. Such sows should be removed from the herd.

Often a stockperson assists during parturition or has to manipulate with piglets in the pen. In general, careful handling of piglets in the home pen has a minimal effect on the sow responsiveness indicated by posture changes (see Chaloupková et al, 2008). However there is some evidence that sows in pens had a higher aggression score than sows in crates (Marchant-Forde, 2002). In that study 16% of sows were aggressive. Stock person – directed aggression was displayed consistently, both within the same lactation and between subsequent lactations. These results suggest that aggressive sows should be detected already during gestation and removed from the herd. In conclusion sows housed in pens show a suitable maternal behaviour to prevent piglet crushing. Further studies should focus on sow condition (health) and floor quality and their influence on sow responsiveness towards piglet's screams and piglet crushing. Sows which show aggression towards piglets and/ or stock person should not be housed in pens.

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Genetic aspects of mother abilities and piglet survival

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Actual Situation

Pig production has passed a very difficult economic situation in the last couple of years. Especially the piglet producers were hit very hard by the high production costs (feed) and the low market prices. This economic situation caused a high pressure on productivity. Only farms with high biological standards were able to survive this crisis. So productivity especially the number of piglets/sow/year was increased from 0.3 to 0.8 per year in different countries. This was reached by optimizing the management of the sow and the piglets and the genetic progress at the same time. Following this trend breeding programs focused on increasing piglet numbers per litter.

What do we have to consider?

For the design of a breeding program you have to consider the correlations to other traits when you put emphasis on one trait (e.g. litter size – number of piglet born). Several studies showed the reduction of birth weight of the individual piglet and the increasing variation within the litter by increasing litter size (Grandinson, 2003). The survival rate is reduced with small and weak piglets. To consider this fact breeding programs changed their strategy and are now recording traits which are including the survival rate of the piglet (e.g. number of piglets weaned or number of piglets after day 5). Other functional traits (e.g. number of teats, longevity of the sow) have to be adapted to this breeding strategy as well otherwise there is a risk to loose long term sustainability. The production management like feeding and housing (e.g. pen size) has to be adapted to the increased prolificacy as well (Grandinson et al, 2005).

Genetic aspects

For genetic improvement of piglet survival the first question is the definition of traits. Roehe et al (2004) defined piglet survival as:

1. Direct genetic effect of the piglet (potential of the own survival)
2. Maternal genetic effect on the sow‘s potential to provide optimal conditions of piglet survival

For integration these traits in a breeding program there is often the problem of available data and data quality. The best information would be the individual birth weight of the piglet, which would have a high heritability (h^2=0.25, Roehe et al, 2009) compared to other behaviour traits e.g. nursing and mother ability (Gäde et al, 2008). Individual birth weight is expensive to record and therefore not very often used in commercial breeding programs.

Conclusion and strategies

Animals have always been adapted to the new environment (e.g. group housing of sows). Baxter et al (2011) concluded that there is a genetic effect on environmental sensitivity. So it will be important to estimate genetic parameters under the conditions in which the animals will be kept. As environments change genetics and management has to be adapted at the same time. These changes will cause a cost and time intensive process for breeding programs. For sustainable breeding programs it is necessary to take the complexity of the animal itself into consideration.

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Discussion on Workshop 1: Sow

Rapporteur: C. Leeb
Chairman: L. J. Pedersen (LJP)

Introduction

The aim of this workshop was to summarise and discuss **sow related experiences and success factors** for free farrowing systems.

Statements (30 minutes in total)

1. Sow behaviour in pens - maternal responsiveness towards piglets and stock person (Gudrun Illmann GI)
2. MMA, lesions and other problems (Christine Leeb and Barbara Zehnder CL)
3. Genetic aspects of mother abilities and piglet survival (Peter Knapp PK)

Discussion on breeding programs following Peter Knapp's talk (15 min):

Question: So, there is no point in including behavioural traits in breeding strategies? (e.g. crushing incidence)?

- The question remains, how to do this right now, so far in Austria the number of piglets weaned is included, this trait summarises a lot of management and behavioural traits. It is hard to say, which behavioural trait would make sense and would be possible to record. It is not easy and also expensive. – Essential: KEEP it SIMPLE! Only few traits!

Question: So, there is no change in weights of different traits, should we just continue or should we shift to more functional traits?

- if there would be a clear solution on the definition of "functional traits" it would be possible, so far:
  - ***number of piglets weaned***, as it includes vitality of piglets and survival rate; it is a big difference to other breeding programs:
  - ***longevity*** could be included, maybe also in breeding goal; but so far no need to change, as it is in Austria average 6.6 litters/sow
  - ***"easy handling sows"*****:** demanded by our farmers, as no general use of nursery units etc. , the main stream approach is "keep it simple". 27/28 piglets are enough, the 30th piglet is very expensive

Question: Heritability of udder conformation in dairy cows very good, with good progress—also possible in sows?

- in sows no work known yet, only number of teats, but quality and position of teats would be important, in Austria 8:8 teats as goal, in other countries even higher- therefore too narrow teats, not enough space on udder
  - ***optimisation of udder*** as goal: optimal way
  - ***optimisation of birth weight*** of piglets lies around 1,6kg- below problems, also above problems; (function of Roehe)
  - the ***variability*** should be considered, but then
  - ***birth weight of individual piglets*** is necessary

Question: Is it more efficient to include parameters other than mortality? Replace Behavioural traits with number of weaned as behavioural traits are only partly related to mortality?

- Yes, include not only number of piglets at birth, but also some days later/at weaning (would need to be defined)
- When breeding for fertility the number of piglets weaned counts 70% and number of piglets born alive 30%, the correlation between the two parameters is > 0.91

Further comments:

- In Austria there are >1000 farm, which supply **computer based productivity data** on farm level, resulting on a vast amount of data from many different farms, currently we use these data to look at the degree of aggressions of sows around birth towards their piglets **(savaging)**, the incidence is in general very low, however, there are some lines, which can be removed as a solution for that problem.
- **Number of "good quality" piglets weaned** is relevant; The definition of "good quality" would mainly be a **target weight**; it is also relevant to animal welfare, as too small pigs are always suffering, weight within system important, not to compare systems, what line performs best within the same system.
- Weight is not the only quality parameter, **also fearfulness** is important, in free farrowing systems piglets are less fearful, better adapted to stress at slaughter (PSE), also important for consumer.

General Discussion (60 minutes)

Fearfulness/aggressiveness of sows, fearfulness important to keep apart from aggression:

- **fearfulness** is related to her offspring (she does not feel comfortable with them); influences her way of interacting with human
- **aggressiveness** (good trait) defending offspring against intruder, which every good mother should do; level of Oxytocin related to level of aggression towards intruder; physiological link

Farmers have to interact with animals; therefore we also need other ways of dealing with this, e.g.

- understanding better the *communication* with sows, as this matters a lot, built on farmers experiences, which we could address in science
- *physical means*: such as bars to restrain sow, when handling animals

Fear is stimulus specific, fear of piglets and stockperson are different things, it is not functional to have fearful sows towards stockperson.

Stockmanship is crucial, as people handle very differently, main reason, how sows react to people

- Norwegian "**Satellite herds**", meaning from a "sow pool" of pregnant sows with same genetics going to different farrowing farms, huge differences, only effect is stockman.
- Can be seen during selection of gilts, they approach you or not.

Nursing behaviour as interesting trait?: In a study the intersuckling interval of Meishan sows was 10 min. shorter than in conventional systems; in another experiment it was shown, that a shorter interval did lead to an increase in weight gain; however, so far we are not able to understand quite well the condition around birth, such as high BCS, how it can it influence nursing behaviour; however, in other studies no effect, no possibility to distinguish between good/poor mothers; not much in literature.

Transition between anabolic/catabolic seems after birth also very relevant; sows, which do not manage to switch to catabolic have higher piglet mortality, did not lose weight, rather gained weight, have problems feeding piglets.

Frustrated nest building, can influence this transition from anabolic to catabolic; when not finished before farrowing starts.

Health status, lameness, condition influences maternal behaviour also strongly.

Stress around farrowing, in Holland piglets are not touched and not mixed in first 48h also no cross fostering (forbidden)- piglets stay together from birth to slaughter; in other countries intervention crucial, sows have huge litters and need human assistance; on a large study with 113 farms there were farms with 5-6% mortality and others with 20%, the main difference was what they did around

farrowing, best would be not to touch but sows produce much larger litters than they can take care of.
Interaction between sow and piglets matters, reaction of sow to noise/behaviour of piglets, if there is e.g. lot of fighting between piglets during nursing.

In the end the **number of piglets weaned plus weight** is what counts economically, so- weight at birth, plus after e.g. some days and at weaning (depending on breeding strategy)- then optimize.

Longevity: very important; many other factors have low heritability.
Sows have many problems: exhausted at birth, do not get up, not enough milk; increase in shoulder lesions, leg problems – related to high productivity – no optimal sow yet.

Breeding is a long term solution, for now **selecting individually on individual farms** leads to higher replacement rate; animals are adapted to farming system; conditioning of sows; older sows not so easy to keep in nice condition; free farrowing is easier with gilts, as aggressiveness increases with age, in the end only about 20% of sows fit for free farrowing- they need to be able to have 8-10 litters.

Relation between number live born and weaned - a farmer wants 12 live born and the same number weaned, the sow should do the job, we have created more work for farmer by the large litters.

How common is **killing of piglets at birth to adjust litter size**?
- in Austria there are farmers, who do kill, but they do not like to do it; depends also on killing device
- In NL no equipment, that's the main problem
- In UK euthanasia of very low viable piglets- cross fostering, now they are made viable via management; some sows are weaned earlier, used as nurse sows
- Norway: artificial milk feeding, also nursing sows- creates work

Large litters or optimal litter size? not possible to breed for optimal size; only **possible to breed for reduced variation**, now 20 piglets/litter**,** One opinion was, that there is not necessarily a connection between high numbers live born and high mortality, higher live born can also have low mortality; a lot to do with management; someone else stated, that problems might than be exported after lactation.
Currently several studies (PhD in UK) looking at "life histories", the long term consequences starting from intra uterine conditions, also including economic effects; also in DK work on welfare impact of large litter size, how to mitigate negative welfare challenges.

Conclusions (20minutes)
Do we need specific lines? We need different sow genetic, but not different piglet genetic; one opinion was, that we do not need another genetic, as sows will adjust to system in several years, however, the question was raised, if it would be faster, if we select for it. As this is the case, the conclusion was that we should do it.
The crucial question then will be the choice of **traits we should select for.**

Goals:
- Piglets up to fattening: in both **variation** is important to consider, even pigs are wanted
- **practical approach**: farmers will decide on sow and boar; also boar (e.g. Duroc and Pietrain may be different?) behaviour relevant; farmer also focuses on finishing pig, it is not possible to have gilts which fit to housing but produce piglets which do not fit the market

- There are always different genetics, fitting to **different environments and farmers**- DK as example- good sows, but not everywhere successful, there is no average sow - stockman important

Strategies:

- **breeding herds should change 5-10 years** before all the others; as long time for dissemination necessary; if you cannot observe the traits you are aiming at it is difficult to breed for them; it is crucial, that breeding herd keep their sows in the same kind of housing the sows will farrow later in
- **Different demands for different markets**
- **Is there a market for free farrowing sows?** Yes, e.g. in UK the genetic for outdoor farms is selected indoors, sows should be selected in the environment they are living in later
- also the **rearing period very important and keeping of pregnant sows;** this is a change, which has happened already, as group housing of pregnant sows- it would be a disaster, if pregnant sows *are* moved from stalls to free farrowing
- **farmer needs to understand**, how, what to observe in sows, how to interact

Challenges and open questions

- Most studies show low heritability of behavioural traits <0.1; 90% is management; In UK study higher heritability, something specific about their data
- Combined traits (Index) possible with better heritability?-we need high heritability for separate traits, before making an index

Workshop 2:

PIGLETS

Piglet vitality: determinants and consequences for survival

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It could be hypothesised that piglets born into loose farrowing systems require different characteristics to those born in crate systems in order to optimise survival, as they will receive fewer aids to survival in terms of targeted heat, protection from crushing and easy human intervention. This may be reflected in the different profiles of causes of mortality which have been reported, with piglets born in loose systems having a higher prevalence of mortality attributed to crushing, but lower prevalence of mortality from starvation or disease (Riart et al, 2000; Weber et al, 2007). Such results suggest that less viable piglets die more quickly because of increased susceptibility to crushing where environmental provision is poorer. It is therefore important to understand the inherent determinants of piglet viability which will be of greater importance under such conditions.

To understand the determinants of viability, behavioural and physiological characteristics of newborn piglets were measured and related to subsequent survival in different systems including farrowing crates, indoor loose farrowing pens and outdoor huts (Baxter et al, 2008, 2009, 2011). Firstly, comparison was made between stillborn piglets, excluding mummified piglets, and those piglets born alive. Stillborn piglets had lower birthweight, on average by 200g, but more interestingly had different body shape, as indicated by significantly lower ponderal index (weight/crown rump length3) and body mass index (weight/CRL2). These measures indicate that stillborn pigs were disproportionately long and thin, a characteristic of animals which have experienced inter-uterine growth retardation (IUGR). This indication was further supported by measures made on the placentae, which were individually tagged and characterised for each piglet. Stillborn piglets had poorer placental efficiency (placental weight relative to birthweight), and lower areola density on the placentae. As often reported previously, stillborn piglets were also born later in the birth order and in larger litters. Thus these results support the well-known effects of intra-partum hypoxia as a risk factor for stillbirth, but in addition highlight that piglets may be predisposed to stillbirth by events much earlier in gestation which influence placental quality and fetal supply of maternal resources. The importance of these prenatal survival indicators did not differ between different farrowing systems, indicating them to be more dependent on the biology of the dam and offspring than external factors.

The causes of postnatal mortality are known to be complex and interactive (Edwards, 2002), with the crushing-starvation-hypothermia complex underlying most deaths. This complex is influenced by the interacting contributory factors of the vitality of the piglet, the behaviour of the sow and the thermal challenge of the environment. When comparing piglets which were born alive but subsequently die with those which survived until weaning (Baxter et al, 2008, 2009, 2011), birthweight was again a critical factor, with dying piglets on average 230g lighter. This relationship between low birthweight and mortality has been frequently reported (e.g. Roehe and Kalm, 2000), and is important in both absolute terms and in relation to within-litter variation. One of the major reasons that low birthweight piglets have higher mortality risk, is their greater difficulty in maintaining body temperature. All piglets experience a drop in body temperature after birth as they transfer from the intra-uterine environment to an outside world which is typically 10-20 degrees colder, and the evaporation of birth fluids compounds this effect. The initial drop in temperature is more rapid and of greater magnitude in low birthweight piglets, whose greater surface area:volume ratio facilitates heat loss, and they take much longer to return to thermoneutrality (Pattison et al, 1990). The importance of this was clearly shown in the datasets of Baxter et al (2008, 2009, 2011), where piglets which subsequently died had a body temperature significantly lower than survivors at 2h after birth and more so at 24h. What was particularly interesting in these studies, was that dying piglets also had a significantly lower body temperature when measured immediately after birth, before significant heat loss would be expected to manifest itself. This might suggest that the metabolic

processes for heat generation were deficient in these piglets, either because of developmental impairment or birth trauma. Recent work at Newcastle (Adeleye et al, 2012) has shown that a long farrowing duration is significantly correlated with high blood lactate, indicative of hypoxia, but also with elevated blood glucose, suggesting poor utilisation of metabolic fuel, and is negatively correlated with birth rectal temperature.

Because of their lack of insulating fat and low metabolic reserves for heat generation, attainment of thermoneutrality by newborn piglets is dependent on colostrum intake (Herpin et al, 2002). Thus, in the studies of Baxter et al (2008, 2009, 2011), a very significant indicator of postnatal survival was the latency in showing the so-called landmark behaviours of udder location, teat location and suckling; piglets which subsequently died took on average ~20 minutes longer to first suckle. Whilst the behaviour and udder conformation of the dam can also play a role in this latency, the most critical factor seems to be the vigour of the newborn piglet itself. Herpin et al (1996) demonstrated the dramatic effect that asphyxia at birth had on piglet vigour, and the consequences for latency to suckle and subsequent mortality. Attempts to quantify and understand the underlying mechanisms determining neonatal vigour have been limited. Okere et al (1997) used a 3-point score based on heart rate, respiration onset, muscle tone, colour and speed of standing attempt. In our own work (Baxter et al, 2008) we used both a simple qualitative 4-point vigour score, based on the level of mobility of the piglet in the first 15 seconds of life, and a more sophisticated measure based on the strength and persistence with which the newborn piglet manipulated an artificial teat linked to a computer registration system. Both measures showed a significant relationship with subsequent survival. Most interestingly, this difference in measurement of vigour between pigs which subsequently survived or died could not be explained by birthweight alone, highlighting the possibility of separating vitality from birthweight in genetic or management interventions. Understanding how to achieve this will be of great importance when working with hyperprolific sow lines, where birthweight will be difficult to improve or even maintain in large litters.

Having established that good survival prospects are characterised by inherent vitality of the piglet, the next step is to determine possible interventions to manipulate this characteristic. This might be possible through genetic approaches, nutritional approaches or management approaches. Genetic traits of piglet vitality have not been directly characterised and selected for, although it is likely that selection for piglet survival will both directly and indirectly encompass such traits in promoting good piglet characteristics together with beneficial traits of the mother. Such beneficial maternal traits will include good behaviour and milk provision after parturition, but also the quality of the uterine environment which will impact on vitality. Estimates of direct and maternal heritabilities for piglet survival have generally been rather low (e.g. Blasco et al, 1995; Sorensen et al, 2000; Knol et al, 2002). However, modern genetic approaches harnessing BLUP in large populations make it feasible for international breeding companies to effectively select for these traits. In a recent experiment, comparison of a high survival selection line with a standard commercial control line from the same breeding company over 2 generations, selecting sires on the EBV for maternal effects in generation 1 to produce dams and for direct effects in generation 2 to produce slaughter pigs, showed a 3% (percentage points) improvement in survival (Roehe et al, 2010). More detailed investigation of differences between the lines suggested better thermoregulatory ability to be a component of the survival trait (Baxter et al 2009). Interestingly, although EBV calculation was based on records of animals in standard indoor conditions with crates, the test facility was an outdoor unit. The concordance between predicted and actual outcome suggested no GxE interactions, meaning that survival traits may be expressed independently of the housing system. Since survival showed a good genetic correlation with birthweight, which was a trait with higher heritability, this might be more quickly and easily measured as a proxy to improve survival (Roehe et al, 2010). In addition to selection for birthweight per se, selection for low within-litter variation in birthweight may also be possible and beneficial (Wolf et al, 2008).

A second approach to improving vitality focuses on nutritional intervention. Because of the demonstrable link between quality of the uterine environment and vitality, it is necessary to look far back into, or even before, pregnancy. Our work looking at nutritional effects on oocyte quality and

subsequent embryo development through the early stages of pregnancy showed that use of fermentable substrates prior to ovulation might influence the occurrence of IUGR piglets (Ferguson et al, 2006). More recent work has substantiated this effect on a much larger scale (van den Brand et al, 2006, 2009), showing that such nutritional intervention at the time of oocyte development can influence both birthweight and birthweight variability, with benefits for pre-weaning survival A second nutritional focus has been on placental development, since placental quality is an important determinant of subsequent piglet viability. It has been demonstrated that specific nutrients provided at the time of placental development can influence placental quality; specifically L-argenine supplementation has the capability to improve placental vascularisation (Hazeleger et al, 2007), embryo survival, birthweight and birthweight variability (Wu et al, 2010). Carnitine supplementation of sow diets has also been suggested to reduce the prevalence of low birthweight piglets (Eder et al 2001, 2002). Finally, and importantly as the pig industry adopts hyperprolific sows in which the scope for birthweight increase is limited, nutritional strategies can consider targeting vigour at a later developmental stage. Studies with premature, low viability human infants highlighted the role of deficiency in long chain n-3 fatty acids, which are essential for neural development. Subsequent studies have shown that supplementation of sow diets during gestation can increase DHA content of piglet brain and proportional brain weight (Rooke et al 2001a), reduce suckling latency and enhance colostrum intake (Rooke et al, 1998), and significantly reduce postnatal mortality (Rooke et al 2001b). An interesting aspect of this latter study was that the mortality reduction occurred in combination with a reduction in birthweight, again highlighting the possibility of strategies to separately target vigour without needing to affect weight.

Management interventions to reduce pre-weaning mortality can include reducing hypoxia by minimising the risk of prolonged parturition through correct sow body condition, alleviation of heat stress and herd parity profile (English and Edwards, 1996). Monitoring of the progress of parturition allows intervention to be made if the inter-birth interval is prolonged, and further beneficial activities at this time to dry piglets and assist suckling (Andersen et al, 2007). Provision of a thermal environment to minimise heat loss in the piglet, by positioning of supplementary heaters at the site of birth, and early strategic cross fostering, to match litter size to the number of functional teats and reduce within-litter weight variation, will further improve the survival prospects of less viable piglets (English and Edwards, 1996).

Conclusions

Regardless of the farrowing environment, piglet physiological maturity and vigour at birth is a key determinant of survival. Whilst related to birthweight, these factors can be dissociated and direct targeting of vigour will become increasingly important with adoption of hyperprolific sow lines. Whilst post farrowing management interventions can assist low vigour piglets, prevention of this condition requires intervention much earlier in pregnancy to reduce risk of a suboptimal placental provision and retarded growth and development. Both genetic and nutritional approaches offer possibilities in this respect.

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Physical characteristics of surviving piglets born in a loose farrowing system

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Farrowing crates are employed widely in pig production systems to reduce piglet mortality. However, this system imposes numerous behavioural and physical restrictions on the sow and raises serious welfare concerns. With increasing pressure to abolish farrowing crates and implement non-crate systems, investigations into improving piglet survival in non-crate systems are essential The importance of survival indicators may differ across production systems, suggesting that before introducing non-crate farrowing systems in large scale, characteristics of piglets at risk of dying in that farrowing environment should be identified. The aim of the current study was to investigate if individual physical characteristics of piglets born in farrowing pens could be used as indicators of survival from birth to weaning.

The study was conducted in a Danish 1200 sow piggery. All 3,402 piglets from 203 litters were ear tagged at birth and gender, birth weight (BW), and crown-rump length (CRL) recorded. The degree of intrauterine growth restriction (IUGR) was graded as normal (1), light IUGR (2) or IUGR (3) based on the shape of the head and subsequently, body mass index (BMI; BW/CRL2) and ponderal index (PI; BW/CRL3) was calculated. In addition, litter size, parity of the sow and gestation length was recorded.

Piglets were categorized into groups according to survivability: stillborn (STILL), dead pre-weaning (DEAD) or surviving to weaning (SURV). Piglets that died pre-weaning were subsequently categorized into dead day 0-1 (DEAD1) or dead day 2-26 (DEAD26).

Table 1. Physical characteristics of piglets born in farrowing pens (means ± SD)

	Stillborn	Died pre-weaning	Survived to weaning	P-value
n	256	534	2612	
Birth weight (kg)	1.12 ± 0.39^{a}	1.12 ± 0.38^{a}	1.44 ± 0.33^{b}	< 0.001
CRL (cm)	24.3 ± 3.4^{a}	23.3 ± 2.7^{b}	24.6 ± 2.1^{a}	< 0.001
BMI (kg/m^2)	18.3 ± 3.2^{a}	20.0 ± 4.0^{b}	23.7 ± 3.1^{c}	< 0.001
PI (kg/m^3)	75.9 ± 12.7^{a}	86.3 ± 16.3^{b}	96.9 ± 13.4^{c}	< 0.001
IUGR-score[1]	1.3 ± 0.5	1.4 ± 0.6	1.2 ± 0.4	< 0.009

^{a,b,c} means within a row with different superscripts differ significantly (P < 0.05); SD, standard deviation; CRL, crown-rump length; BMI, body mass index; PI, ponderal index; IUGR, intrauterine growth restriction.

In accordance with previous results (Baxter et al, 2009), results on individual characteristics showed that surviving piglets were heavier at birth compared with dying piglets (P<0.001), had a larger BMI (P<0.001) and larger PI (P<0.001; Table 1). The combination of variables that best described differences between SURV and DEAD were: BMI (P<0.001), gender (P<0.001) and parity of the sow (P<0.001). Contrary to previous reports (Jarvis et al, 2005), survivability of piglets increased if piglets were born to sows of parity three or more (P<0.001). Male piglets had increased risk of dying pre-weaning (odds ratio=1.5; P<0.001) and this effect of gender was present at both day 0-1 (P<0.001) and day 2-26 (P<0.001). Piglets in DEAD1 were lighter (P=0.007), had a smaller body mass index (P<0.001) and a higher IUGR-score (P=0.04) than piglets in DEAD26. Compared to STILL, DEAD1 were shorter (P<0.001), had a birth weight that deviated more from mean weight of the litter (P<0.001) and were more likely to be born after a gestation period of less than 116 days (P=0.008). The findings of this study suggested that physical characteristics could be applied as indicators of survivability in a non-crate system and, moreover, that the importance of characteristics were not equal in different periods of the pre-weaning period.

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Vitality and behaviour of newborn piglets

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In all newborn mammals vitality is important for quality of extrauterine adaptation, and growth and surviving in the suckling period. The vitality of porcine newborns is influenced by litter size and litter weight, birth weight of the individual newborn piglet, birth order within litter (birth rank), time and modus of cord rupture, parity of sow, infectious diseases of sows during pregnancy, housing conditions during pregnancy and farrowing, maternal or fetal malnutrition, length of delivery of total litter, and duration of expulsion-interval between consecutive piglets within a litter. As also in other ungulates the artificial partus induction with prostaglandine F2 alpha-analogue can decrease the vitality of the newborns, when the induction time is too early in the pregnancy.

The behaviour of newborn ungulates shows good criterions of their viability. In newborn piglets proven behavioural measures for their vitality are time interval between expulsion and time to first touch on udder, time interval between delivery and time to first colostrum intake and time interval between first touch udder and first colostrum intake. The vitality of an individual newborn piglet is decreased, when the time to first touch on udder is > 20 minutes and/or time to first milk intake is >40 minutes. This behavioural assessment of vitality of newborn piglets is non-invasive and easy to handle. It has proven since 30 years in several studies in more than 10 great commercial sow farms with different housing, farrowing, feeding and management conditions, on thousands litters with more than 20.000 individual newborns. Useful other criterions of viablity of newborn piglets could be the time interval between delivery and rupture of umbilical cord, and the share of piglets of a litter with intrauterine ruptured umbilical cords. Is the share of piglets with intrauterine ruptured cords > 30 % of a litter, then the litter has a decreased viability. Other, more clinical methods of assessment vitality of newborn piglets are the modified APGAR-Index (breathing, heartbeat, skin colour, muscle tension, reaction to pain) or the change of rectal temperature in the first time after delivery. Behavioural studies of others on newborn ungulates with long legs (for example horses, cattle, sheeps or goats) have shown, that time interval between delivery and time to first get up and start with teat seeking activity, and also time interval between expulsion and start of sucking reflex are furthermore useful behavioural criterions of newborn viability.

Because of the inverse relationship between newborn vitality and postnatal mortality the behavioural assessment of viability can be used to identify the main focus of postnatal loss causes. Is the vitality of newborns low and the early mortality (< 3 d) high, then loss causes will be to find in prenatal or partal periode. When vitality of newborns is good, but the early mortality high, then loss causes will be to find in management or environmental factors. Is the newborn viability high and there are only a late mortality (>7…21 d), then causes of death are often infectious illnesses.

On the example of the effects of iodine deficiency, sometimes seen in single litters or very often in herds, it can be shown the relationship between vitality and newborn behaviour. In this case piglets were born with high birthweight (fat-neck-piglets) and high risk to asphyxiate. Their movement activity is low and the time for first touch on udder is long. They are drinking in the first postpartal two hours no colostrum or have a very long time to first milk intake. These behavioural symptoms are caused prenatal by no intrauterine training to coordinate breath, sucking and swallowing.

Free farrowing calls for unhurt, attentive and highly mobile piglets

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An ideal farrowing environment has to provide optimal conditions for piglets and should enable the farmer to succeed in the market without compromising the welfare of sows by confinement. A higher risk of piglet crushing is considered one of the major obstacles for free farrowing systems. Crushing results from an imbalanced interaction between sow, piglets and farrowing environment including the stockman. New born piglets are the weakest link in the chain as they are tiny, weak and clumsy. Their integument (skin and claws) is still very soft (from the liquid milieu in the uterus). Prompt access to the udder and an appropriate thermal environment are essential to stay alive even for vital piglets. Hence they have to move target-orientated and quickly and have to compete against a large number of litter mates. And they have to be attentive towards the behaviour of the mother which is more important in free farrowing environments compared to crated systems.

Piglets are well adapted to soft and elastic floor conditions (farrowing nest and forest soil) but not to the hard, rough and perforated contact surfaces of concrete and slatted floors. A number of studies indicate a high prevalence of heel bruising (up to 90 %), coronet erosion (up to 35 %), lesions at carpal joints (up to 55 %) and lameness (up to 10 %) in piglets during the first week of live. Injuries at claws and limbs cause pain, limit mobility, affect alertness and impair resistance to disease. These adverse effects increase the risk of injured piglets to get crushed by the mother especially in free farrowing systems.

Piglets have permanent and intensive contact to the floor. Their demand on the floor depends on the behaviour which is performed. It is different when running, exploring, sucking, lying and eliminating. In general the floor has to be non-harmful, non-slippery, dry, clean, thermally insulated and durable. Provision of adequate materials for exploration (i. e. straw, hay, compost, peat, wood shavings) should be possible and labour demands low. Solid concrete floors are less harmful to the claws of piglets and better enable the provision of straw compared to slatted floors. On the other hand they can cause a higher incidence of skin lesions at carpal and tarsal joints (mainly during suckling) and a greater work load for cleaning. The abrasiveness of the surface, slat width (should be not greater than 9 mm), shape of openings (oval with rounded edges is beneficial) and void ratio are key features of the floor regarding to the effect to the animals.

Sows in a free farrowing environment can move around and choose the place for farrowing, suckling, lying and defecating freely. Thus it is more challenging to create floor conditions which meet the multiple needs of piglets, sows and farmer at the same time. Pen dimensions, zoning in functional areas, equipment and climate must be used to direct the behaviour of the animals. This should result in predictable places for different behaviours and consequently in an adequate arrangement of solid and slatted floor elements. If it works, the place of birth and suckling can be equipped with a low abrasive solid floor that does not cause lesions at claws and skin.

Conclusion

- Inadequate flooring affects mobility and attentiveness of piglets towards the sow which results in a higher risk to get crushed especially in a free farrowing environment.
- Due to the unconfined sow it is more challenging to create an optimal floor in a free farrowing pen compared to crated systems. The floor concept has to be based on the behaviour of the animals.

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Discussion on Workshop 2: Piglets

Rapporteur: W. Hagmueller
Chairman: E. v. Borell

General statements on experience with free farrowing systems in different countries

- Viability is very complex and not only affected by birth weight; other parameters should be taken into account such as body mass index, APGAR score or Ponderal Index.
- Design of functional areas is more important in free farrowing situations than in crate systems
- Total mortality in free farrowing systems is not different to crate systems, stillbirth is even lower (Switzerland). Causes of piglet losses depend on system differences: starvation is highest in crates, crushing highest in loose systems, total loss equal (Germany). Higher piglet losses in loose systems, despite highly motivated farmers; a rapid change to free farrowing systems would lead to frustration amongst farmers (Denmark).
- There seems to be a difference between farmers experience and scientific data concerning piglet mortality.
- Large litters probably increase the problem of piglet losses (general accordance).

Factors influencing viability of piglets pre-farrowing

Nutrition of the sow: not much is known about the influence of nutrition on piglet´s viability. Nutrition affects birth weight and litter size; in gestating sows fibre components influence behaviour and faeces composition; a special diet for pre-farrowing sows (fibre type, Arginine, Iodin, L-Carnitine, …) may be required.

Factors influencing piglet´s survival

- Pen size: in large pens newly born piglets can “get lost” when exploring the pen; small pens don´t allow a structural separation between lying-, feeding-, and dunging-area.
- Air temperature / floor temperature
- Flooring: no slatted floor (maximum: 5 % slats– for drainage); surface of solid floor is extremely important (joint lesions, slipping, splay leg, …); rubber mats are used with different results (e.g. abrasions of carpal joints in the first day of life).
- Cleanliness of the pen: location of dunging area is as important as location of feeding trough; sows often defecate right after leaving the trough.
- heated floor for the first days after farrowing,
- Nest building material: less stillborn piglets and faster farrowing was detected in systems with sufficient nest building material; length of straw was discussed (long, cut, straw meal) but not solved conclusively; straw, hay, sawdust or other organic materials are required;
- Social behaviour between sow and piglets in the first hours: not possible in crate systems; temporary crating (after 6-12 hours after farrowing) could be one alternative
- Behaviour of the mother: lying down and rolling over are crucial for piglet mortality – most piglets get crushed in the middle of the pen; a pole in the middle of the pen resulted in lower mortality, but didn´t achieve positive results after removing the pole some days after farrowing (Netherlands).
- Observation of farrowing: there is evidence, that drying piglets and placing them at the udder could decrease mortality.
- Colostrum intake right after birth: quality and quantity of colostrum matters; not only to improve immune status but also for sufficient energy intake. Split suckling could be a solution in order to guarantee sufficient colostrum intake for late born piglets of large litters – means extra labour.

Risk factors during farrowing

- Cold, wet floor
- Slatted floor (lesions on carpal joints)
- Low air temperature
- Insufficient colostrum intake
- Nutrition of the sow affects piglets (e.g. MMA – loose sows don´t suffer from MMA that much due to more exercise, roughage, fibre, …)
- Behaviour of the sow around farrowing (lying down, rolling over)
- Large litters with high proportion of under weighed piglets
- Distance from birth location to creep area / teat
- Immune status / health status / nutrition of the mother
- Viability of piglets
- Farrowing environment: stress for the sow during farrowing caused by caretaker yields in longer farrowing duration and higher amount of stillborn piglets

Expected economic benefits on free farrowing systems

- Less stillborn piglets
- More milk production due to higher feed intake
- Increasing litter weight
- Cheaper buildings (less material)
- Less energy input (temperature of the building)

Open and answered questions

1. Should we allow farrowing on slatted floor?
   - Skin lesions, temperature drop → NO
   - Good hygiene, cheap, easy to clean → YES
2. How do nursing sows fit into loose systems?
   - Especially in Denmark nursing sows are a big issue. Question is how to get the loose sow to accept the new piglets.
3. Do we need different types of piglets? Did we select piglets that get along well with crate systems? Do nowadays piglets react properly only to crated sows?
   - Most participants of the workshop negated this.

Concluding remarks

„Free farrowing systems are not as tolerant (robust) as crated systems."

„The main issue on free farrowing is to improve the welfare of the sow without forgetting the farmer and the piglets. "

„There is a triangle sow - piglet - farmer. For the last years researchers focussed mainly on sow welfare and forgot about the piglets and the farmers."

„The balance in crated systems is a compromise between farmers and piglets. When you bring in animal welfare issues (on the sow side), the balance will change."

„We might also need a new balance in market. Maybe the fight between food and feed will change a lot in our actual structures. Welfare should get more attention as an issue of the EU, because if changes in systems are made on a national level (for example Sweden) this country will lose the competition against others (for example against Denmark)."

Workshop 3:

FREE FARROWING ENVIRONMENT

Free farrowing systems

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of Economic Affairs FDEA
Agroscope Reckenholz-Tänikon Research Station ART

Free farrowing systems

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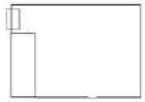
Agroscope

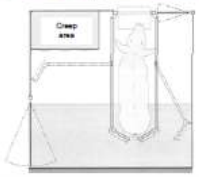
Basic designs for free farrowing

- **Crates that can be opened**
  - with minimum control of th sow
  - with no control of the sow
  - 5.5 - 6 m²
- **No possibility of confinement**
  - no separation of lying / dunging area > 6 m²
  - with separation of lying / dunging area 7.0 - 7.5 m²



Agroscope

Crates that can be opened - minimal control of the sow



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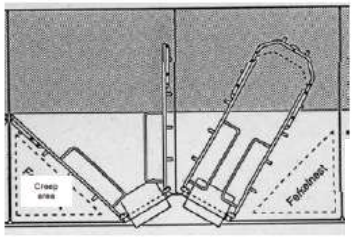
Crates that can be opened - no control of the sow



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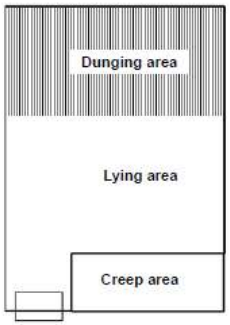
Pens with no possibility of confinement
No separation between lying and dunging area



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Free farrowing systems
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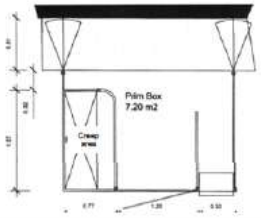

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Free farrowing systems
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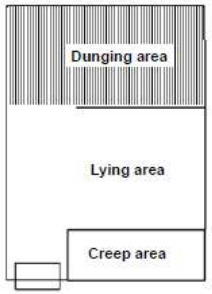
Pens with no possibility of confinement
With separation between lying and dunging area



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Free farrowing systems
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Free farrowing systems
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Free farrowing systems
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Pens for non isolated rooms (with separation between lying and dunging area)

Free farrowing systems
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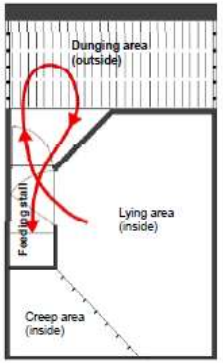

Free farrowing systems
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Creep area inside the pen

Free farrowing systems
Roland Weber | © Agroscope Reckenholz-Tänikon Research Station ART 12

Details for free farrowing

See also:
Baxter, E.M., Lawrence, A.B., Edwards, S.A., 2011.
Alternative farrowing systems: design criteria for farrowing systems based on the biological needs of sows and piglets.
Animal 5, 580-600.

Influence of pen size in free farrowing

Different free farrowing systems compared with crates:

		Pen size (m^2)	Losses total	Losses crushed
≤ 5 m^2	Blackshaw et al. (1994)	3.9	↗↗	↗↗
	Marciarowicz (2000)	4.4	→	no info
	Haus Düsse (1995-96)	4.6 4.4	↗ ↗	↗ ↗
	Kamphues (2004)	5.0	↗	↗
> 5 m^2	Stabenow (2001)	6.0	→	→
	Fritsche and Kempkens (1999)	6.5	↘	no info
	Arkenau et al. (1999)	7.0	→	↗
	Hessel et al. (2000)	7.0	→	↗
	Schmid and Weber (1992)	7.0	→	↗
	Weber and Schick (1996)	7.3 7.0	→ →	↗ ↗
	Cronin et al. (2000)	7.2	→	no info
	Anonymous (1999)	7.6 7.8	↘ → (↘)	no info
	Hofstetter (1998)	5.3 - 8.1	→ - ↗	↗
	Steiner (2001)	>6.5	↗	↗
	Weber et al. (2007) 482 / 173 farms	**5.1 - 12.2**	→	↗

↗ = increased / → = unchanged / ↘ = decreased in free farrowing

→Pens > 5 m^2: no higher overall losses than in crates

Sufficient space for the sow

(Baxter, E.M., Lawrence, A.B., Edwards, S.A., 2011.
Alternative farrowing systems: design criteria for farrowing systems based on the biological needs of sows and piglets. Animal 5, 580-600)

Sow needs to be able to:

- circle around during nest building
- lie latterally during parturition and suckling
- turn around to contact the piglets during parturition and group the piglets before lying down

→ 2.79 m^2 / sow and 1.21- 1.31 m for udder access

Influence of substrate (nest building)

- Substrate allows nest building → motivation can be satisfied → several authors proposed that high nest building activity reduces risk of crushing
- Nest building material must allow:
  - pawing
  - rooting
  - carrying

Influence of piglet protection facilities

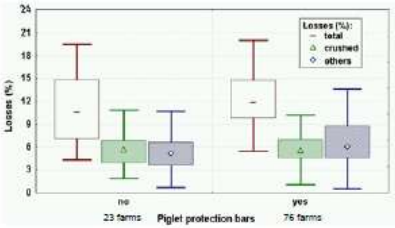
- Piglet protection facilities can prevent crushings
- Solid sloped or vertical walls are prefered over farrowing rails

On the other hand:

Most piglets are crushed in the middle of the pen and not at a wall

No influence of piglet protection utilities found in a large survey of free farrowing in Switzerland:

(Weber, R., Keil, N.M., Fehr, M., Horat, R., 2009. Factors affecting piglet mortality in loose farrowing systems on commercial farms. Livestock Science 124, 216-222)



	p-values		
	total	crushed	others
Farrowing rails	0.09	0.87	0.08

n.s.

Other factors

- Pen should be structured → sow can distinguish between lying and dunging area
- Air inlet should be over the dunging area → no air draught in the lying area
- Farmers and advisers say that the temperature in a farrowing room should be not to warm even in wintertime (16 °C is better than 25 °C) → enough litter is required
- Cast iron floors in the dunging area instead of concrete slatted floors → dunging area should not be to comfortable to lie on

→ More cleanliness of the pen

Other important factors (not dependent from farrowing system)

- Litter size at birth
  - Increased losses in large litters
- Birthweight
  - Underweight piglets have a higher risc to be crushed or die later as runts

What farmers, advisers and manufacturers also recommend

- Creep area at the service corridor → piglets could be enclosed in the creep area and handeled from the service corridor and not from the pen
- When ever possible, let the sow alone during parturition and short afterwards → sows get "nervous" when people are permanently around them during parturition → naturally they want to be alone
- Drinking facilities in the dunging area

Influence of management (personality of the stockperson)

From a study on farms with crates:
(Ravel et al., 1996: Influence of management, housing and personality of the stockperson on preweaning performances on independent and integrated swine farms in Quebec. Preventive Veterinary Medicine, 29, 1, 37-57)

- Indepentent farms:
  - High performance: stockpersons high self-discipline
  - Poor performances: stockpersons exaggeratedly self-assured and sensitive
- Integrated farms:
  - High performance: stockpersons high self-discipline, warmth and emotional stable
  - Poor performances: stockpersons rather bold, suspecting and tense

→ If personality is important for farrowing crates then it is even much more important for free farrowing

"Dead-end-systems"

- To small
- No substrate
- And so on ……

Mushroom-pen (D / A)

VIP (DK)

Vario-Fit (D)

Ulrich-pen (D)

Circle-pen (D)

How should we classify loose farrowing systems to analyse critical components for success?

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Statement 1: ''Unless we can standardise our description of systems, we cannot do meaningful meta-analysis across different studies''

A wide variety of different designs of loose farrowing pen have been developed in research or in practice (Baxter *et al*, 2012). To determine the factors which contribute to the success or failure of loose farrowing systems, epidemiological studies and meta-analyses of datasets have been attempted (e.g. O'Reilly *et al*, 2006; Weber *et al*, 2009; Baxter *et al*, 2012). However, the full potential to exploit such data is seriously limited by the lack of comparable details on design and management across studies. It is suggested that the following details should be included as standard in any future reports, and statements are proposed which summarise current hypotheses in need of testing.

Pen size: Total pen area, Nest area, Shape - linear dimensions, Creep area, Dunging/exercise area.

Statement 2: ''A small nest is more important than a big pen''

Whilst a minimum total pen size has been suggested to reduce mortality (Weber *et al*, 2009), it is also apparent that too large a nest can increase mortality (Cronin et a *et al*, 1998; Baxter *et al*, 2011).

Layout: Pen subdivision (walls, thresholds), Relative location of functional areas, Creep location, Feed & water location.

Statement 3: ''Subdivision of functional areas promotes optimal farrowing orientation''

By using the natural behaviour of the sow to farrow in an enclosed place and face out towards potential threats, the location of piglet delivery can be predicted and appropriate facilities provided (Baxter *et al*, 2011a).

Construction materials: Flooring (per functional area), Material, Solid:void ratio, Insulation/ heating.

Statement 4: ''Good nest drainage is more important than solid flooring''

While solid flooring is necessary to allow provision of substrate for nest building, poor drainage creates hygiene problems in the nest which can predispose piglets to chilling and infectious disease. A drained floor with low void area may give a compromise solution.

Walls: Wall height, Material (solid-open areas), Sloped walls, Protection rails, Doors (pigs & people).

Statement 5: ''Sloped walls are more effective than farrowing rails''

Whilst legislation requires that pens are fitted with piglet protection, this can take many forms. Sloped walls give more support to sows during lying than farrowing rails (Baxter, 1991), are preferred by sows (Damm *et al*, 2006), and can therefore be used to guide farrowing orientation, and give better escape possibilities for piglets with less risk of becoming trapped (Marchant *et al*, 2001).

Microenvironments: Heating/cooling, Ventilation, Heat source, Ambient & Local temperatures.

Statement 6: ''An accessible creep is more important than a heated floor''

The benefits of a heated nest floor have been shown in some (Malmkvist *et al*, 2006) but not all (Baxter *et al*, 2011a) studies, and a heated creep area has been suggested to be of no benefit because it is not used in early life (Vasdal *et al*, 2010). However, with careful pen design and high creep accessibility, it should be possible to exploit the thermal and protective benefits of a creep area for both piglet welfare and ease of management.

Lighting: Level, spectrum, contrasts

Statement 7 ''Dark nests and light creeps aid fast piglet learning''

Preference experiments have suggested that piglets prefer dark to light areas (Parfet & Gonyou, 1991), but farmers recommend well lit creeps to promote early occupation. Piglets may perceive lighting contrast, and learn an association between light and temperature reinforcement.

Substrate: Nesting material (type/ quantity), Replenishment rate.

Statement 8: "Little and often is as good as deep bedding"

Deep bedding provides thermal and physical protection for piglets (Baxter *et al*, 2011b), but is labour intensive to provide and maintain hygiene in individual pens and can interfere with mechanised liquid manure management. Relatively small amounts of straw can deliver the same enrichment benefits as larger quantities for nesting sows (Baxter *et al*, 2011b; Edwards *et al*, 2012) and exploration in piglets (Kelly *et al*, 2000), while novelty of frequent replenishment stimulates interest.

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Research should focus on developing and documenting potential benefits of the free farrowing systems in order to pay for the cost of more space

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The free farrowing systems will most likely be the future way of keeping sows within some years due to welfare concerns from the consumers and society in general It is clear that this production method takes up more space and therefore is more costly. I suggest that we focus research on developing all the potential of the systems that can help pay for the increased cost. In the following I will give some examples where scientific evidence points towards improved health and productivity beyond what can be achieved in the crate system and thus suggests the possibility of better production economics in the free farrowing system than in the crate system. I will also give examples of production/management methods that are specific for loose farrowing systems and therefore not yet exploited commercially.

Firstly, the freedom of the sows to move around makes it possible to create thermal and other zones in the farrowing pen, which allow for better hygiene and improves the animals' possibility to cope with the thermal environment. By using the sows' innate motivation to defecate away from the nest and food, good hygiene can be achieved even in pens where only part of the floor is slatted, through clever positioning of the feed trough, open and closed walls and solid vs. slatted floor area. This will reduce time for cleaning pens. Sows will also use a slatted floor area for thermoregulation without compromising the hygiene and are thus less sensible to heat stress, something that may be seen as reduced health problems or even reduced occurrences of sudden death. In that way, the free farrowing systems are more robust towards climatic changes and even allow for better heat supply to the new born piglets around birth. Better heat supply can be given as floor heating, extra straw or radiant heating to the nesting area of the pen. Many studies have shown that hypothermia during the first 1 to 2 h of life is an important risk factor for neonatal mortality and solving this problem will therefore increase survival of neonatal piglets. It thus seems likely that hypothermia of neonatal piglets can more easily be avoided in free farrowing pens without compromising thermal comfort in the sows.

Besides the possibility to make zones for the sows, the freedom to move around also improves behaviour and physiology of importance for sow health and piglet survival It has been shown that sows are subjected to less stress during the nest building phase and parturition in free farrowing systems. They express more intense nesting behaviour and the increased activity in general results in easier parturition and less farrowing problems. This has been shown as shorter birth intervals between piglets, fewer stillborn piglets, and a lower risk of farrowing related sow diseases. In addition, the larger space and ability to move also result in higher feed intake and lower weight loss during lactation. Since weight loss affects reproduction in next cycle we may also expect loose housed sows to show better pregnancy rate and maybe even higher litter size. Also the piglets' weight gain has been shown to increase when sows are given more space. Whether it is a consequence of more space during suckling, or caused by higher milk production due to improved appetite and sow health is unknown. The higher weaning weights will most likely result in fewer problems after weaning and less cost for feed.

Freedom to move around also allows for more behavioural expression of the sows. When behaviour and motivation can be shown more clearly, the opportunity to use behavioural expression to detect deviating patterns is greater. Therefore, it is more likely that automated surveillance systems can be successfully developed in free farrowing systems compared to crate systems. Such systems can be used to solve problems related to neonatal piglet mortality and are thus likely to reduce mortality rate. As examples, birth prediction using sensors can be used for automated control of the thermal environment at the pen level assuring a warm birth environment for neonatal piglets, with reduced energy costs and less risk of heat stress in the sows. Birth detection can prevent stillbirth and can reduce sow diseases caused by prolonged and difficult farrowing. Also systems can be developed to

detect deviating sow behaviour as early indicators of health problems such as MMA, lameness, or pain caused by farrowing problems.

To sum up, there are several areas where potentials exist for dealing with the higher cost for more space in the free farrowing system. These are less cost for diseased sows, fewer stillborn piglets, and death due to hypothermia, less cost after weaning since litters are heavier with fewer runt piglets demanding less expensive weaner feed. Many potential have been documented in small scale experiments and needs to be taken out in large scale tests and further developed for use under commercial conditions. There may be even further potential in using the farrowing pen for finishing the litter to slaughter. These benefits are less known and exploited. Keeping the weaned piglets in the farrowing pen can be expected to result in less weaning stress, less cost for antibiotics for weaning diarrhea, less time spent cleaning, less time spent moving animals, and less disease problems in general Also facilities that are essential in the farrowing pen can be used for the slaughter pigs at one installation such as video surveillance, establishment of thermal zones, and handling of straw and nesting materials.

In conclusion, by exploiting and developing all the potential fully to a commercial scale, it may be that the final economics of the free farrowing pen will not be much different from the better known crate system. However, this needs to be done.

Successfactors Pro Dromi 2

Success factor

- Professional process of development
  - 14 farmers are in charge (500-1000 sows)
  - 300 farmers think with them (online test)
  - Government and animal protection groups think with them
  - Help of researchers

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Success factor

- Farmer: I can see that Pro Dromi is not mate by researchers or equipment producers but by farmers, it was love at the first view
- Inspiration by realisation
  - Research farm: baby is born
  - After 1 year: 1-2 pens on 5-10 farms: adolescent is growing, find the success factors
  - The results of these farms is more important as the results on research institutes, farmers tells farmers
- Seeing = believing and motivation = success
- Quick insight in profit

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- Comfort sow -pigs
  - Easy play
  - Easy nesting
  - Easy front
- Climate
  - Easy climate
  - Easy front
  - Easy baby climate
- No stepping in the pen anymore, comfort farmer
  - Easy catch
  - Easy front

Pro Dromi

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Easy nesting, use of scent

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Sleeping with piglets contact and control of the pigs in the nesting area

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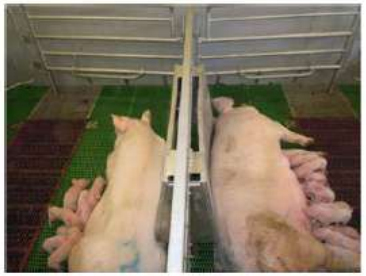
Micro climate - choice for sow & pigelts



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Easy play

- Learning social skills
- Learning to chew, eat pellets en les problem after weaning
- Learning to eat pellets from the sow, eat together at te same time
- Rest for the sow, last 2 weeks lactation period

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Discussion on Workshop 3: Free Farrowing Systems

Rapporteur: Herman Vermeer
Chairman: Bo Algers

Reactions to presentations:

- Norwegian experiences show that shape of functional areas does matter (wide nest): >6-7 m^2 pen size depending on parity
- Production results from "Pro Dromi" show less peripartal losses, less crushing in first 48 h, but total mortality at weaning not different
- Cost of enrichment/nesting material is relatively low and compensated by better results
- Enrichment (replacement of straw) can reduce length of parturition
- Is the nesting material (jute bag) still dry after manipulation? Yes: than it can improve drying of piglets
- Environmental enrichment can also prevent piglets to manipulate mother

General discussion on the design of free farrowing pens:

- Functional areas: a wider nest (1.8 versus 2.4 m) gives more successful nursings
- Temporary (floor) heating in the nest area is important to minimise post-partum temperature drop in piglets
- A specific creep for the piglets is not necessary, but a warm place is. Piglets learn that light is associated with heat, but light itself does not attract piglets to the creep.
- Straw as nesting material can be provided via a rack, but from the floor is preferred by the sow
- Swedish experiences with 15 kg instead of 0,5 kg long straw around farrowing are very positive for nest building behaviour of the sow and quicker birth process, farmers adopt it
- Size of pen: Danish and Norwegian experiences show that at least 6-7 m2 is necessary to separate functional zones
- Creep area of piglet nest could be integrated in the lying area of the sow, in the first 24 h the piglets will not lie separated from the sow. Creep area decreases sow lying area and restricts movements. Often creep is too large compared to remaining lying and dunging area for the sow.
- Specific micro climate for piglets and sow is necessary. Room temperature should not be adapted to the piglets needs to prevent the sows from heat stress.
- Function of nesting material (straw) is also to insulate the piglets and to let them dry up within the first two hours after birth. If no straw is available a heat source is necessary and radiation is preferred above floor heating. Preferably controlled on an individual pen level. The temperature drop in the newborn piglets is less with radiant heating because the drying up process is quicker. The room temperature can be lowered then.
- The use of straw must be limited if it has to fit into the present systems with suboptimal ways to remove straw and manure. New systems without obstacles for straw application are needed.
- A (partly) solid floor is also necessary to reduce ammonia emissions from the slurry pit. This is especially the case in DK and NL.
- Smell and learning to eat together with the mother seems to be important, but is later in life and maybe worth a specific workshop on aspects around weaning.
- Why is there a partition between the lying and dunging area in the FAT2 pen instead of threshold? Better separation of functional zones, but takes more space
- The presence of stockpeople always results in better results and with a good human-animal relation this shouldn't disturb the farrowing sows. Drying the piglets and attendance results in less mortality.
- In free farrowing pens surveillance is easier and of more importance compared to systems with crates.
- Sloped walls instead of protection rails seem to work well, closed pen partitions around the nest area and open around dunging/activity area contribute to separation of functional areas

Main conclusions from the discussion:

- Sow and piglets need functional zones: lying/nesting, dunging, eating (not in nest),
- Floor quality: Solid, drained, dry, soft, grip (no slip = better responsiveness of sow)
- Nesting material and environmental enrichment available
- Human surveillance

These conditions cannot be met in a system with temporary crates, although this might be attractive for commercial farms for a transition period. They can also not be seen as independent measures, they are closely related. Floor quality is also important to prevent shoulder wounds, maybe rubber coatings could be an improvement. So a definition of solid floor is necessary.

Workshop 4:

TEMPORARY CRATING

Farrowing systems with temporary crating

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So we can either 'wait' for systems with loose farrowing sows to be more robust and competitive as the systems with crates already are or we can ask ourselves if systems with temporary crating can be a faster track to improved sow welfare without compromising piglet survival and piglet welfare?

Why temporary crating?

In Europe all pregnant sows are loosed housed by January 1st 2013 or least expected to be so and according to the EFSA-report from 2007 (EFSA, 2007) and 2012 (EFSA, 2012) it is recommended that lactating sows should be loosed housed as well. In addition, there has been a significant increase in scientific results from experiments with loose farrowing sows during the last ten years but only few pig producers have implemented these systems. So even though 'everyone' is likely to agree that is natural for sows to be loose, the majority of sows in farrowing units continue to be crated (Baxter et al, 2012). The main reasons why farmers hesitate to implement pens for loose farrowing sows are the uncertainty regarding piglet mortality and the cost of investment.

Experiments and experience clearly indicate increased risk of piglets being crushed when sows are loose (Moustsen & Lahrmann, 2010; Moustsen et al, 2012). Experiences from Danish production herds with pens for loose farrowing sows indicate that an average higher neonatal piglet mortality in pens with loose farrowing sows is coherent with a higher share of the loose sows that have two or more dead piglets from litter equalisation to weaning compared to the crated sows (Moustsen et al, 2012).

Pens for loose lactating sows are larger than farrowing pens with crates (Baxter et al, 2012). Pens where farrowing and lactating sows are kept loose are larger than pens with crated sows resulting in an increase in investment (Baxter et al, 2012) which to be competitive to a crate-system needs to either produce two piglets more a litter or for all piglets to weigh an average of 1.5 kg extra at weaning (Justitsministeriet, 2010).

The export of pork from EU is approximately 25 % of the global export. A country like Denmark exports 1.7 million tonnes of pork, 7.6 million piglets of 30 kg and 380.000 slaughter pigs annually which equals approximately 90 % of the national pork production. To maintain pig production in Europe implementation of welfare initiatives must be balanced against maintaining competitiveness in the global market.

Temporary crating in selected countries

If loose housing or temporary crating is a possible track to follow to improve sow welfare without compromising piglet welfare – are there experiences from other countries that we can use in development of systems with loose sows in other countries.

UK has significant outdoor production with approximately 30 % of the sows being housed outdoors (Baxter et al, 2012), but there are very few indoor units with loose farrowing sows or with temporary crating. A farm with loose farrowing pens are experiencing increased labour input to keep pens clean compared to farrowing crates – and farms using temporary crating have decided on fully slatted flooring to maintain a high level of hygiene. But fully slatted flooring makes it more difficult to maintain nesting material in the pen.

In Norway, crating of lactating sows is prohibited, however if the sows are very restless they may be crated from farrowing and until seven days later. When building new farrowing units or rebuilding existing units pens should be made so crating is not needed (Lovdata, 2003) The experience from Norway is that the use of temporary crating differ between different parts of the country.

In Sweden, crating is prohibited. However, the lactating sows' possibility to move around may be restrained during the first days after farrowing if the sow is aggressive or showing abnormal behaviour which are constituting a risk for the piglets. In addition, the sows may be crated during

cleaning of the pen, treatment of the sow or other management jobs if the staff's safety is at risk because of the behaviour of the sow (Statens Jordbrugsverks Forfatningssamling, 2010). The experience from Sweden is that a significant proportion of the herds are using crates (Olsson et al, 2009).

In Switzerland, farrowing pens must enable the sows to turn around (Der Schweizerische Bundesrat, 2012). From case to case it can be decided to crate sows during farrowing or in case of leg-problems (Zehnder, 2011).

In the report from EFSA (2012) it is concluded, that the use of loose farrowing systems should be implemented only if piglet mortality in them is no greater than the mean level of mortality where the sows are kept in non-loose farrowing systems. Efforts should be made to reduce piglet mortality. In addition, EFSA (2012) states that given the significant developments in the design of loose-farrowing systems, the use of those systems should be encouraged if they have a net benefit for sow and piglet welfare. Efforts should be made to further reduce piglet mortality in loose-farrowing systems….'.

Temporary crating in Denmark 2011 - from crate to loose

In Denmark, the farrowing pens with crates have a partly solid floor in order to provide a lying area for the sow, to maintain nesting material and to reduce the environmental impact. The last being that when there is a solid floor, the surface of the slurry channels decreases and the ammonia emission decreases.

Temporary crating has been carried out by simply opening up the crate, allowing the sow to turn around freely. But both Andersen & Pedersen (2011) and Moutsen & Lahrmann (2009) showed that sows move away from the feeding trough when they urinate and defecate. So opening up the crate in a pen with partly solid floor presented a number of challenges, especially related to hygiene. When working from crate to loose, this explicit behaviour causes problems with the hygiene – when we have partly solid floor - as the majority of eliminations takes place on the solid floor.

One solution is only using fully slatted floors which ensure a good hygiene both when the sow is crated and loose as practiced in UK, Germany and Holland. Fully slatted floors do, however, make it more difficult to maintain nest building material in the pen and stimulation of nest building behaviour before farrowing is therefore limited. Sows should be able to perform nest building as it can reduce the number of stillbirths and has furthermore been shown to reduce the risk of crushing (Baxter et al, 2011). Neither of these two options for temporary crating is therefore perceived as satisfactory as it compromises either the hygiene or the ability of the sow to perform nest building.

Temporary crating in Denmark 2012 and onwards - from loose to crate

In a system with temporary crating, sows are loose for the majority of the time they are in this unit. So pen outlay can be based on the design criteria for loose housed sows with considerations of the possibilities of an optional crate. This way of thinking – from loose to crate – is also associated with a number of challenges, but is expected to yield a better outcome for both sow and piglets than the approach 'from crate to loose'.

The design of systems with temporary crating should follow the thinking 'from loose to temporary crating' and the requirements of e.g. space given the dimensions of the sows, the number of piglets within a litter, the weaning age – and thereby size of piglets when they take up the most space and the behavioural patterns of the sows and piglets. It becomes clear that it is not possible to use existing footprint from crate systems. A Dutch approach is a two-pen system, where the sows farrow in a crate and then the sow and her litter is moved to another pen after a few days, when it's possible to optimize each type of pen. The Danish approach is a one-pen solution. First, the aim is let the sow be loose before farrowing in order to provide opportunity for nest building. Second, it'll require labour (costs) to move the sows and their litters and to clean pens – if they like in the Dutch system are to be moved after farrowing.

Future

We will continue to work for systems for loose farrowing sows to become robust and for production in such systems to be competitive in a global market. However, given the increase in investment and

uncertainty in production level it will take time. The time depending on market forces – will there be enough consumers willing to pay sufficient in premium for the production to be competitive.

However, using benefits of loose housing systems in connection with possibilities of temporary crating it might be possible to significantly increase level of sow welfare without compromising piglet welfare in the years to come.

We need scientific evidence of the impact of crating the sow balanced with the survival of piglets. When and for how long should the sows be crated so impact on the sow welfare is limited but at the same time the piglets' survival rate is at high as possible?

Because of promising but not robust results for loose farrowing sows – the aim is to develop a pen with temporary crating where the sows are free to nest build, the piglet mortality is at the same level or lower than in crates, the weaning weight is higher than in crates – and not the less the balance of welfare for sows and piglets are at the same or higher level than in free farrowing pens and without question at a higher level than in crates.

Acknowledgements

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Pen concept with temporary crating

Josef Troxler[1] and Barbara Zehnder[2]
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Introduction

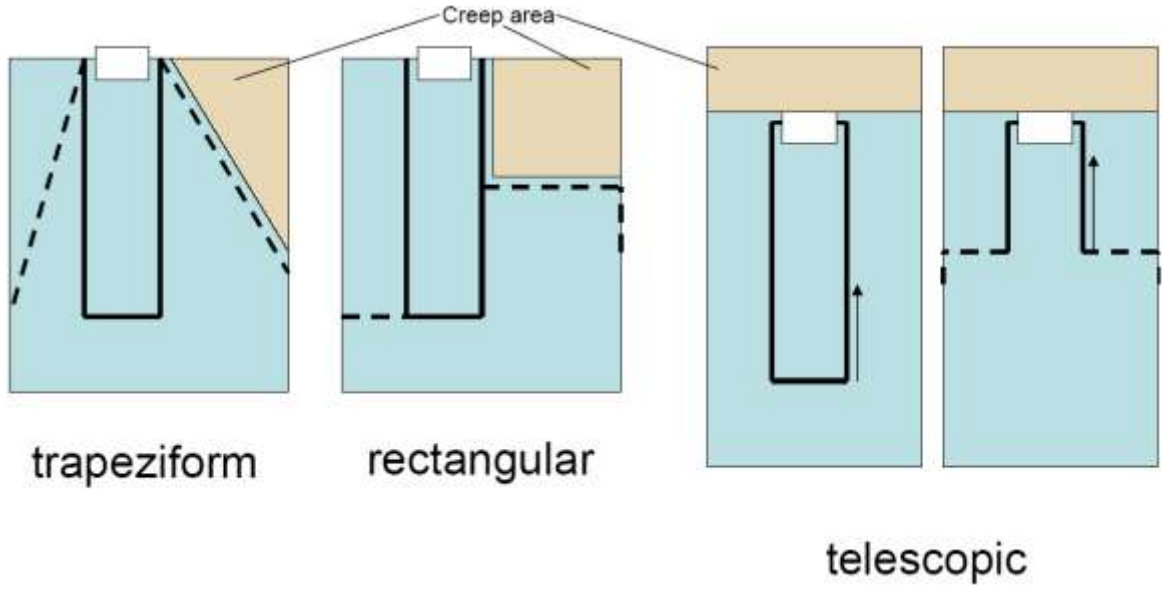
In some situations temporary crating seems to be a helpful solution against crushing piglets. In the view of farmers it is a necessary condition to produce piglets successfully.

Under welfare aspects questions are given about the behaviour needs of the sow (nesting behaviour, separation dunging area, sow-piglets-interaction, duration of fixation and place per sow) and under practical aspects how the sow handling and pen management are used.

Solutions

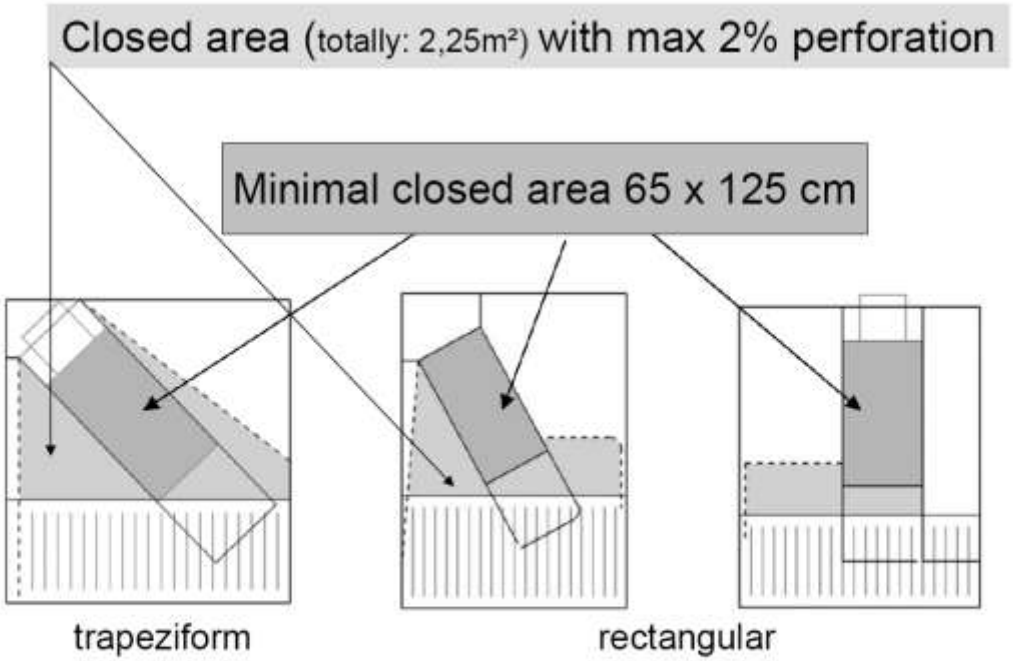
The pen concept with temporary crating shows in practice 3 types of farrowing pens:

- Crate with trapezoidal opening
- Crate with rectangular opening
- Crate with telescopic crate.



Welfare aspects

- The place for the sow to turn around easily is a question of pen design (minimal diameter for turn area >2 m
- dunging area perforated
- Nesting material (straw), the dunging system has to be adapted to the nesting material
- Floor surfaces not slippery
- Climate condition (microclimate with higher temperature for piglets in the creep, lower in the sow area)
- Opened walls of the crates protect the piglets against crushing



Closed and perforated areas by the swiss animal protection act
min. pen surface 5,5m²

Duration of fixation

During nest building time the sow should be not fixed. The critical time is one to three days after delivery. More research is necessary about behaviour and temperament of sow.

In some case it is helpful to have the possibility for fixation (catching piglets for castration or treatments).

Pen design

It must be considered, that controlling of sow and piglets and entering in the pen is easy. Under hygiene aspects the control and cleaning of the feeding trough for sow and piglets must be guaranteed.

Theory and practice in Switzerland

In Switzerland the legal situation is as follows: Crates are forbidden in farrowing units with two exceptions when crating is allowed for a restricted time of 3 days:

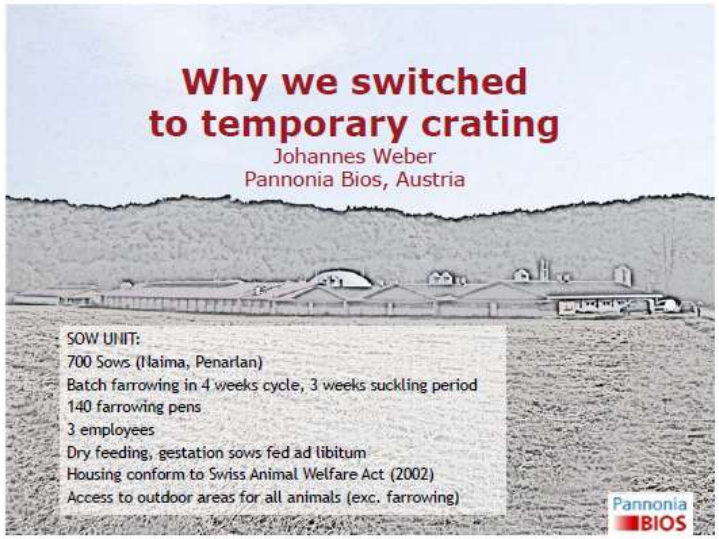
- leg problems of the sow and
- aggressiveness of the sow towards the piglets.

Crating must be documented like medical treatments.

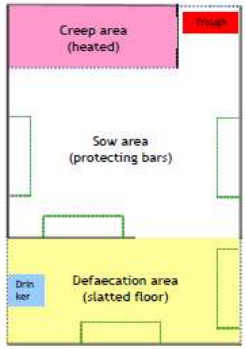
On farm the situation is still slightly different- there are several farms using „crate systems“ routinely- especially during the first three days of life, when the risk for crushing piglets is highest. The duration and frequency of crating sows in Switzerland is unknown, as this is very difficult to monitor.

Generally it can be said, that Swiss farmers have come to terms with free farrowing systems and are mostly convinced of its benefits.

Why we switched to temporary crating



Why we switched to temporary crating ....



Dead piglets ø 23 % (19% - 28%)

Piglets with injuries ~ 3 %

Additional work:
- More cleaning necessary
- Add. Stuff for management and treatment

Quality of animal control (blind spots)

„Suitable" employee

Hygienic problems

No higher prices - so far

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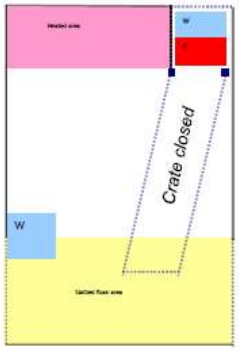
How we did it ....



Possibility for free farrowing

Suitabel for old sows, used to free farrowing

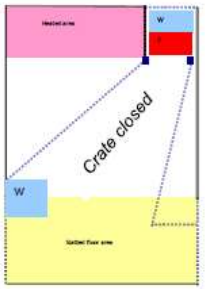
Minimal investment costs

System fits to existing structures (feeding lines, slatted floors ...)

Adaption of the system during production

Pannonia BIOS

What we expect ....



Approx. 15 % lost piglets

At least +1 piglet/litter (= 1.500 /year)

Better working conditions

Better hygienic status in farrowing unit

More „balanced" sows

Finally a few personal remarks:

- Consumers are focussed on animal welfare
- New regulations - without farmers ?
- Consumers want to pay more ?

Pannonia BIOS

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Discussion on Workshop 4 – Temporary crating

Rapporteur: D. Verhovsek
Chairman: C. Fink Hansen

Introduction

The aim of this workshop was to find out the importance of temporary crates within the discussion of free farrowing systems and to consider the challenges and their possible solutions which are given by this type of free farrowing pen.

Summary of Discussion

During this workshop the following main seven topics were discussed:

- acceptance by the public and the farmers
- welfare aspects
- duration of fixation
- measurements of stress levels and welfare of the sows
- pen size
- flooring

The first issue was how to get farrowing pens with temporary crates accepted by the public in means of improved welfare. The public opinion probably cannot see any improvement for the sows in pens where crates are still used even only for a short time. Danish welfare organisations for instance believe that some of the farmers will not open the crates after birth and the sows are going to be confined during the whole suckling period. This possibility will be definitely a risk for the welfare of the sows, because controlling the farmers if they really open the crate will be very difficult. One solution of this problem could be that fixed management operation procedures have to be documented by the farmers.

But to convince the farmers that opening the crate could also be a benefit for them was considered as a better solution. Some studies were mentioned which show a better weight gain in free farrowing systems which could be a good economic argument. It was confirmed, that we need economic reasons for the farmers to move from the crate to temporary crating and that temporary crating could be the first step to get the farmers accustomed to free farrowing pens.

Farmers who are convinced of the system will do a better job.

There was an agreement that we should not only be concerned about the public opinion and the needs of the farmers but above all we should focus on the needs of the sows and piglets.

So the question was what would we have to ask the sows and the piglets to design an adequate farrowing pen?

J. Troxler, Vetmeduni Vienna, explained that few days before farrowing there are two basic needs of the sows. One is the separation of lying and dunging area and the second is nest building behaviour. He also mentioned that R. Weber, Research Station – FAT Tänikon, found out, that in the time before farrowing sows are less clean in the lying area but after birth the sows separate the lying and dunging area very well if there is the right temperature in the pen.

So in the opinion of J. Troxler the moment of confining the sows in the crates must be considered very carefully and that in the view of the welfare the sows cannot be crated during the nest building period. He suggested to crate the sow when she gets into the farrowing pen, to open the crate in the beginning of nest building activity for 12 to 24 hours and then to close the crate for birth.

E. von Borell, Martin- Luther University Halle- Wittenberg, made the point that there are works which show the importance of keeping the sows loose during birth. In that time it is supposed to have less posture changes and less piglets crushed. But J. Troxler mentioned studies done at the Vetmeduni Vienna which show that in the time after the first piglets were born sows use to stand up and that could be a risk for crushing the newborns.

There was an agreement that on the moment and duration of confining the sow further research must be done.

In the discussion about nest building behaviour there was also a focus on nest building material

There is no doubt that one of the most important things for the welfare of the sow is to give her the possibility to carry out nest building activity.

Therefore she needs an adequate material. There was an agreement that sawdust is too small and straw or hay are the most common materials used for nest building. But it is known that using straw is difficult because of the drainage system and it is a challenge for the flooring, which was also one of the points of the discussion. In some country in Europe it is already difficult and rather expensive for the farmers to get straw like in the Netherlands, where they recently try to use pieces of jute-bags as nesting material

Another important aspect of nest building behaviour is the motivation of the sow, which is controlled by internal and external stimuli. So the sow tries to do nest building activity even when there is no nest building material in the pen, which leads to bar biting and more posture changes. But there was also the question, how intense is the frustration of the sow, if she has nest building material, but is crated. Which should be the parameters to be looked at for the attempt to answer this question?

The possibility to measure cortisol-levels was talked through. E. von Borell, Martin-Luther-University Halle-Wittenberg, could not see any reason in cortisol measures, because they are expansive and afflicted with methodical problems. For him the better way would be to look at the behaviour of the sow and to measure the heart-rate.

In the discussion it was always indicated not forget to consider the welfare aspects of the piglets. So what would be the best parameters for this issue?

It was mentioned that we have to look at piglet mortality and injuries but also at piglet behaviour like successful suckling and milk intake.

But to implement the needs of the sows and the piglets we have to search for the adequate pen size and compatible design. It was mentioned that for instance in Switzerland the minimal pen size is 5.5 m^3 and even this size is almost too small for temporary crating. But on the other hand in conventional systems farmers are forced to invest in farrowing pens up to 5 m^3 because also the sows became bigger. So there is not such a big gap between these two systems anymore.

One grate challenge for the construction of farrowing pens with temporary crating is the flooring. We need flooring that can handle nest building material, does not cause injuries and is very hygienic.

When we use straw or hay for the nest material we need a solid floor where you have a hygienic problem with the faeces. Different possibilities how to design the pen were discussed. One suggestion was to keep the sow loose for the birth process so that she can keep the lying area clean and give birth on solid floor with bedding where the newborn piglets then find a better environment in the matter of climate and hygiene. This could be an argument to crate the sow after birth. To help the sow keep clean the lying area a threshold between lying and dunging area about 30 cm could be installed. Another suggestion was to use a temporary feeder which is fixed after birth near the dunging area. But this could be a problem for a good access to the trough to clean it. J. Troxler, Vetmeduni Vienna, also raised concerns over the position of the trough near the dunging area. He explained that the course of movements of the sow is to go to the dunging area after getting up and therefore this position of the trough would not be the best one. He also mentioned studies which show that we have a higher hygiene in the rectangular form of the temporary crating pens than in the trapezoid form. Maybe one detail which could be discussed in more depth is to assemble a sprinkle system to keep the slatted floor wet.

But the discussion about flooring showed that a lot of further research must be done on this issue.

Conclusion

To find the best possible conditions for the sows and the piglets in farrowing pens with temporary crating the following aspects have to be considered more deeply:

- minimal pen size – ensure place for the sow to turn around
- nest building material
- duration of fixation- pre and post farrowing
- flooring
- piglet behaviour – mortality, suckling behaviour, injuries,

For further research questions the whole period of the stay in the farrowing pen should be divided into 4 phases:

Nest building / birth process / the first days when crate is closed / time crate is opened

Workshop 5:

DEMANDS ON FARM LEVEL

Process for success for farmers acceptance

Process for success for farmers acceptation

Anita Hoofs

Varkens Innovatie Centrum Sterksel

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- What do we want ?

- How do we get it
  - Fundamental knowledge
  - Practical knowledge: success factors, how to handle it
  - Chance attitude farmers (motivation)
  - Farmers who tell it

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2009

- 14 farmers 500-1000 sows
- Plans for new bulding or renovation
- Plus for people,planet en profit
- Get some money from the government
  - 25.000 euro
  - Motivation government: farmers in charge may be better than researchers in charge who write books for the bookcase

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14 farmers: farrowing period

- Current farrowing pens are not fulfil
  - Current farrowing pen is one big compromise between needs of the farmer, sow and piglets
- Innovation is necessary
- How to do?
  - example senseo coffee machine
    - Insight: with one push one button we want one cup of coffee

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Varkens Innovatie Centrum

Anita Hoofs
Varkens Innovatie Centrum Sterksel
Wageningen-UR
Livestock Research, Animal Welfare
the Netherlands
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Aim innovation for the 14 farmers

- Total improvement in 2-3 years of the housing of lactations sows and her piglets
  - Better for sows, piglets and farmers
  - better in the eye's of consumers
- 50 % farmers serious consider to buy it

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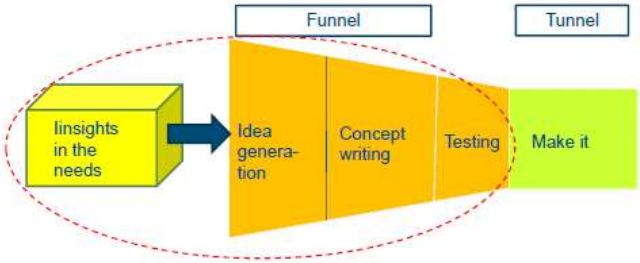
Het innovation proces

1 insight is more worth than 1000 ideas !



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Online Test: 300 farmers

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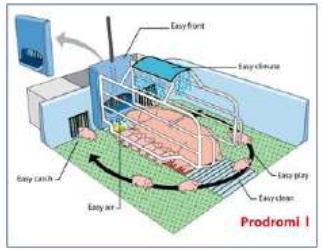
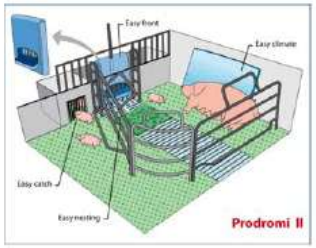
Two designs

Pro Dromi

Pro Dromi I
- Crate

Pro Dromi II
- Lose sows





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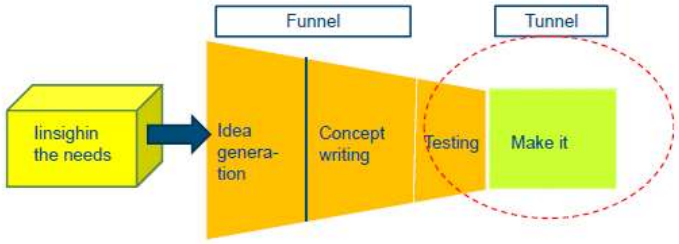
Het innovation proces



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- Comfort sow -pigs
  - Easy play
  - Easy nesting
  - Easy front
- Climate
  - Easy climate
  - Easy front
  - Easy baby climate
  - Easy air
- No stepping in the pen anymore, comfort farmer
  - Easy catch
  - Easy front

Pro Dromi

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Nesting material

- Material: biologic decomposable
  - Stroh ball
  - Jute sac
  - rope

- Preference

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Research

- eight easy's
  - fine-tuning
  - be valid

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Pro Dromi

- First birthday Pro Dromi
- Symposium 14-12-2011
- Pro Dromi: With more comfort to more profit.
- 200 people
  - Farmers, advisers, veterinaries, students, government, retail
  - First results

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Conclusions

- It is not only technical knowledge but also the process who leads to success for farmers acceptation en implementation
- Sell it !!

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Management requirements - the German situation and criteria for self-control

Management requirements: German situation and on-farm self-control

TiHaL

Eberhard (Ebby) von Borell
Institute of Agricultural & Nutritional Sciences

Free Farrowing Workshop 8./9. December 2011 Vienna

Free Post-Farrowing?

Martin-Luther-Universität Halle-Wittenberg

Standard Farrowing Pen in Germany

TiHaL

Pen size: 3.9 – 5.0 m²

Legal Requirements

TiHaL

- Tierschutz-Nutztierhaltungs-Verordnung (Farm Animal Welfare Regulation)

§ 23:
(1) …
(2) Farrowing pens must contain protection devices that prevent crushing of suckling piglets.
(3) …
(4) …

Labor Security (Accident Prevention Regulation)

TiHaL

§ 11:

- Farrowing crates have to be designed in that way that sows can be restrained during catching and treatment of piglets (i.e. by catching/locking rails),
- Pens must not be entered for feeding.

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Stockmanship and attitudes – thoughts on further aspects of successful free farrowing systems

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Much discussion on (the viability of) free farrowing systems has centered around piglet mortality and housing design aspects. More recent research into the crucial aspect of piglet survival has shown that other also management related factors such as thermoregulation or colostrum intake play an important role in the prevention of piglet losses. Indeed the handling and management of freely farrowing sows requires other skills. The sow is not secluded in the farrowing crate anymore and handling requires a different quality of human-animal relationship. Other (e.g. behavioural) problems have to be identified at an early stage and routine measures are less likely to be applied. Free farrowing systems also require somewhat higher labour input especially when using bedding or nest-building material. At the same time farm sizes are increasing and hired labour becomes increasingly important in most European countries. All these aspects underline that skilled stockmanship is (even more) one of the key factors in future free farrowing systems.

One of the crucial aspects in this regard are the skills and experience farm managers and stockpeople have. A lack of experience might also explain the high variation in results of especially early experimental studies on free farrowing systems (i.e. regarding piglet mortality or number of piglets weaned). One may expect, that in many cases experimental setups with ‚new' housing systems were superimposed on the personnel which had only been used to the standard production system before. On the other hand, field data from countries with a longer-term tradition of free farrowing systems are promising. E.g. Weber et al (2009) did not find a difference in piglet mortality between farms with free farrowing systems and farms with standard farrowing crates, which could at least partly be attributed to the fact that experience has been built up since the ban of farrowing crates had been agreed upon.

Another important factor relates to the stockpersons' attitudes. Recent work has shown that farmer attitude toward improvement of animal welfare correlated with production parameters on sow farms (Kauppinen et al, 2012). It remains to be shown that modifying stockperson attitudes and behaviour through training leads to improved production results in the ‚alternative' free farrowing systems thus potentially leading to the development of standardized training programmes. However, in the meantime different approaches to disseminate knowledge and to increase motivation are possible though. This includes the training of advisory services and the exchange of knowledge via user-adequate sources of information and communication (e.g. websites, webblogs, social networks). Common learning as experienced in farmer groups or stable schools (Vaarst et al, 2007) may also be regarded promising participatory approaches. Last but not least education at all levels such as agricultural technical colleges, university curricula in veterinary medicine and animal sciences as well as professional lifelong learning should take account of the specific management aspects of free farrowing systems that contribute to making these systems viable.

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Free farrowing – dangerous for farmers and vets?

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Despite many prejudices the risk of injury for farmers is relatively small in free farrowing systems in Switzerland:

- During birth, there are very rarely problems.
- To manage piglets (e.g. vaccinations), provisions are made to lock piglets into the creep area to be able to catch them or alternatively to remove the sow/lock her into the dunging area.
- To clean the pen, a dunging area, which can be separated with a movable wall from the lying area is ideal, to allow working undisturbed. If this is not possible, in most cases the pen is cleaned during feeding time.
- During feeding time of the sow it is common to shut piglets into the creep area during the first three days of life to reduce crushing as much as possible.

Risk of injury for vets is low, as they are rarely entering the pen: Only in severe cases of MMA they might need to enter the pen. Vaccinations are carried out by farmers in Switzerland, which is mostly done during feeding, when sows are distracted.

Discussion on Workshop 5: Demands on farm level

Rapporteur: Anne Raats
Chairman: Christine Leeb

How to make the change to free farrowing and what are the qualities of management and stockmanship?

How to make the change?

Different groups should be brought together to transfer knowledge and opinions. Especially farmers need to be reached. They can learn from each other and see how things work in practice, starting on a small scale. This can for instance be done by:

- Discuss current farrowing pens: let farmers take pictures and make movies in their stables. By experiencing together, more awareness will be created than with force.
- The system gives feedback, often farmers do not like to work in this old situation.
- Discuss the advantages and disadvantages of these pens, which probably lead to finding more disadvantages of the old pens.
- Specialists from other field should be hired, for instance in innovation or marketing processes. The question "why" is very important in this. Different views from different fields make it easier to think out of the box.
- Motivation is more important than mind, so farmers should think about when they are satisfied.
- Not only emotions are important, but also the outcome. When a farmer "does well" by a better quality, this often leads to better results as well.

Other important stakeholders:

- Vets: vets should not be underestimated in the process, because farmers have trust in them. However, not all vets have enough knowledge about loose housing systems. Therefore, they should be educated in this.
- Scientists: scientists sometimes steer too much or come too often with improvement strategies when things are not working. However, social scientists may have a different view than animal scientists.
- Stable designers: transfer of knowledge can be important here. Further, by teaching them, they can also teach the farmers.

Development and encouragement

Many farmers do not know about issues like behavioural problems. Therefore, it is questioned how well farmers are educated and how awareness can be raised of such issues. On overall, the new generation is educated well. It is important to know what is important for them to know. Because of differences in education and experiences, courses of different levels should be developed when making teaching modules for farmers. Meetings to share knowledge can also be effective. Farmers should be involved in the process, otherwise they may feel overruled. Respect should be created between parties. The person who brings the message is important in this, as mentioned earlier.

The majority of the farmers want as much profit as possible. Economic factors are therefore an important motivation in deciding to change to loose housing farrowing systems. Loose housing is obligatory in organic farms. There is a market for this meat where consumers are willing to pay more for it. However, reasons to buy this are often other than animal welfare. Besides, only a small number of farms can be converted because organic farming of all monogastric animals is not realistic with the high meat consumption nowadays. The benefits-cost data should therefore be made clear. Instead of "does it cost more", it is more important to think about how to make the system cheaper. Most farmers do not want an increase in welfare without an increase in production.

For a successful method for loose housing sows, data of success factors are needed. Now there are too many openings, therefore it is essential to look at success stories which factors are truly

important. Factors can be amongst others less stillborns and a higher weaning weight. Clear benefits of the systems are still not well proven. For instance straw can be seen as a success factor due to the opportunity to perform nest building behaviour, but also brings in extra work, costs and concerns of contamination.

Further, it is important to all work by the same rules, which workers have to follow. On the other side, protocols need to offer the opportunity to be made farm-specific at the same time. Each farm has its own characteristics and procedures, depending on different factors. For instance, smaller farms allow better contact with the sows, while large farms often have better protocols. Where more scientific work is needed, needs to be made clear.

Final remarks

Stockmanship is of crucial importance, in which new skills are important to let them pay attention to what the sow is doing. A change in attitude is needed, for instance sows should more be seen as animals instead of production materials. Other stakeholders should be educated in this as well.

It needs to become clear which changes are needed to make free farrowing be more attractive to use. When this is known, a well-thought education program should be made. Education protocols of good quality are vital for this goal With funds of the European Union, one good-quality program should be developed. In this program, awareness about animal welfare should be created on all levels. Not only for farmers but also for amongst others citizens and other stakeholders.

Summarizing sheet

<u>Stockmanship = key factor</u>

- Management protocols, farm-specific
- Safety aspects
- Quality + quantity of labour
- Motivation, attitude, observational skills

<u>Improvement, development</u>

Education:

- Teaching the teachers
- Problem awareness for farmers
- Choice of teachers
- Teaching materials (e.g. movies, pictures)
- Farmers teaching farmers (e.g. excursions)
- Demonstrating economic success
- Exchange between countries/stakeholders*

Encouragement:

- Success factors*
- Economic benefits*
- Star system

* knowledge gap

Workshop 6:

TRANSITION PROCESS

Austria: Regulations on farrowing crates in the light of the Animal Welfare Act

Regina Binder

1. Introduction

Although in line with the Austrian Animal Welfare Act (AWA, 2005) environmental conditions of animals kept in human custody have to be adequate to the animals' physiological and ethological needs, it is – according to a statutory regulation – permitted to crate sows one week before farrowing until weaning. This (alleged) inconsistency within animal welfare legislation has resulted in a topical and still ongoing discussion on the crating of sows in Austria. The following article provides an overview of the relevant Austrian regulations and of the major steps of the current debate.

2. Development and regulatory framework of Austrian animal welfare legislation

Until 2004 the legislative competence with regard to animal welfare issues rested with each Austrian state. Thus, by the end of the 1990ies, animal welfare issues in Austria were regulated by 10 animal welfare acts,[1] which were specified by nearly 40 statutes. In 2005, however, the Austrian constitutional law was amended and the Federal Animal Welfare Act (AWA)[2] went into force, providing a general legal framework for the husbandry and handling of animals in the whole of Austria.

The minimum requirements for the keeping of animal species primarily used for farming purposes are laid down in the 1st statute on animal husbandry[3], transponding the relevant EU-regulations[4] into domestic law.

3. Animal welfare regulations relevant for farrowing crates

With regard to crating the following provisions are especially important:[5]

3.1. Animal Welfare Act: General principles of animal welfare

3.1.1. Prohibition of cruelty to animals

In line with the general clause of § 5 subpara. 1 AWA it is prohibited to inflict unjustified pain, suffering[6] or harm on an animal

According to the more specific provision of § 5 subpara 2 nr. 10 AWA it is especially regarded as a misdemeanour in line with the cited general clause to expose an animal harmful conditions, e.g. a constraint of movement, if these conditions cause pain, suffering or harm in the affected animals.

3.1.2. General requirements for the housing of animals

In line with § 13 subpara. 2 AWA, determining the "p*rinciples of animal husbandry"* and applying to all species and categories of animals, – among other parameters – space and freedom of movement have to be adequate to the animals' physiological and ethological needs. Moreover, according to § 13 subpara. 3 AWA, the animals' somatic functions and behaviour must not be disturbed and their

[1] In the state of Salzburg two animal welfare acts had been passed, one "general" animal welfare act (*Salzburger Tierschutzgesetz*, 1999) and another animal welfare act applying to farm animals (*Salzburger Nutztierschutzgesetz*, 1997).

[2] *Bundesgesetz über den Schutz der Tiere (Tierschutzgesetz – TSchG*), BGBl. I Nr. 118/2004, as amended by BGBl. I Nr. 80/2010.

[3] Statute of the Minister of Health on the minimum requirements for the keeping of horses and other equines, pigs, cattle, sheep, goats, hoofed game, llamas, rabbits, poultry, ostrichs and fishes (1st statute on animal husbandry), BGBl. II Nr. 485/2004 as amended by BGBl. II Nr. 219/2010 (*Verordnung der Bundesministerin für Gesundheit und Frauen über die Mindestanforderungen für die Haltung von Pferden und Pferdeartigen, Schweinen, Rindern, Schafen, Ziegen, Schalenwild, Lamas, Kaninchen, Hausgeflügel, Straußen und Nutzfischen, 1. Tierhaltungsverordnung).*

[4] Council Directive 98/58/EC on the protection of animals kept for farming purposes; Council Directive 2008/120/EC, which lays down minimum standards for the protection of pigs.

[5] For the original German wording see www.vetmeduni.ac.at/tierschutzrecht

[6] Including severe anxiety.

ability to adapt must not be overstrained. In order to comply with these requirements it is necessary to take into account the knowledge on the animals' behavioural needs. Consequently, § 24 subpara. 1 AWA determines that in the process of issuing statutory regulations scientific knowledge must be taken into consideration. On the other hand, according to the same provision, it is also obligatory to pay regard to the economic effects of the minimum requirements laid down on statutory level. Within the wider context of the AWA, especially considering the AWA's objectives,[7] this obligation, however, must not result in disregarding basic principles of animal welfare.

Finally § 16 AWA determines that "[…] [an] animal's freedom of movement must not be constrained in a way which inflicts pain, suffering or harm on the animal"

3.2. First statute on animal husbandry: Specific requirements for the housing of pigs

According to annex 5 of the 1st statute on animal husbandry gilts and sows may be separated from conspecifics and, as a matter of routine, housed in farrowing crates

- one week before the expected time of farrowing,
- during the process of farrowing and
- during the whole period of suckling, i.e. until weaning.

The minimum area of the farrowing pen has to be 4 m² resp. 5 m² / sow, depending on the average weight of the brood.[8]

4. Crating and sow welfare

Although it is often maintained that crating has to be regarded as a necessary measurement to protect piglets from being crushed or injured by the sows, it should not be denied that crating may severely compromise the well-being of the sows.

Thus in 2009 the attention of the Austrian Ombudsman Board (AOB)[9] was drawn to the regulations of the AWA on the one hand and the statutory provisions on crating on the other hand. The AOB, a body established at the end of the 1970ies to investigate administrative malpractice and legal deficiencies, officially reviewed the statutory regulations in the light of the AWA's framework.[10] On the basis of expert statements the AOB finally issued the opinion that the statutory provisions on crating do not comply with §§ 5, 13 and 16 of the AWA. Thus, in the autumn of 2010 and based on art. 148c of the Austrian Constitution, the AOB recommended the competent minister to amend the relevant parts of the statute.[11]

In March 2011 a draft to amend annex 5 of the 1st statute on animal husbandry was submitted by the Minister of Health, basically oriented towards the Swiss model, which restricts the legitimacy of crating to such instances which are associated with an increased risk of injury or death of the piglets. Thus, in line with the relevant Swiss provision[12] sows may only be crated during delivery "in individual instances, if the animal behaves aggressively towards the piglets or has got limb problems."[13] The draft presented by the Austrian Minister of Health in March 2011[14] adopts these principles, extending the term "period of delivery" by defining it as time span starting with the onset of nest building behaviour and ending at the longest at the end of the third day after farrowing.

In line with § 24 subpara. 1 AWA a consensus between the Minister of Health and the Minister of Agriculture and the Environment is necessary to pass the amendment. If no compromise can be

[7] Cf. § 1 AWA: "The subject Federal Act aims at the protection of life and well-being of animals based on man's responsibility for the animal as a fellow-creature."
[8] < 10 kg / > 10 kg of piglets' weight.
[9] *Volksanwaltschaft,* http://volksanwaltschaft.gv.at/en
[10] Art. 148a subpara. 2 of B-VG.
[11] VA-BD-GU/0037-A/1/2009, Sept. 27th 2010.
[12] Art. 50 Statute on Animal Welfare, April, 23rd 2008 (http://www.admin.ch/ch/d/sr/455_1/index.html).
[13] With regard to this provision it must be stated, however, that it is not quite clear if aggression and lameness of the sows are meant to illustrate "individual instances" justifying the crating of sows or if there are other, unspecified circumstances which may as well justify the use of this husbandry system.
[14] BMG-74100/0007-II/B/10/2011, February 3rd 2011.

attained, the statutory regulations may be reviewed by the Austrian Constitutional Court, who could repeal the statutory regulations.

Until the editorial deadline for this paper[15] neither a final version of a statute amendment nor a definite result of the political negotiations is known.

5. European Union

In line with Council Directive 2008/120/EC sows and gilts must be "kept in groups during a period starting from four weeks after the service to one week before the expected time of farrowing". Thus under EU secondary law it is legitimate to house sows in farrowing crates one week before the expected date of farrowing until weaning. Even if – as it is the case – the Austrian statute only transponds minimum requirements laid down by EU secondary law it is, however, generally acknowledged that domestic statutory regulations have to comply with the relevant legal provisions of the respective member state.

In this context it should be noted that on the European level there is an unresolved conflict between primary and secondary law which is similar to the Austrian situation: According to Art. 13 of the "Treaty on the Functioning of the European Union",[16] which can be traced back to the Treaty of Amsterdam, the Union as well as the member states are obliged to "[…] pay full regard to the welfare requirements of animals as sentient beings […]" within different fields of policies including agriculture.

It should therefore – also on EU-level – be questioned if the admissibility of crating under Council Directive 2008/120/EC can be regarded as compatible with the high aspirations of EU primary law. It remains to be seen if and how the EU guidelines on the protection of pigs, which are to be issued in 2013,[17] will address the problem of farrowing crates.

6. Conclusion

From the legal perspective the recent development related to the animal welfare provisions on the crating of sows and gilts is most interesting, because it touched upon essential questions relating to EU primary and secondary law and the relationship between non-compulsory EU-legislation and the domestic law of the member states. The most difficult question which must be addressed in the process of lawmaking is how to achieve a statutory regulation on breeding sows which is acceptable from the economic point of view and at same time does not violate the regulatory framework of the AWA. Thus the question is: How can animal welfare interests and the "human factor" be balanced to generate a statutory regulation of the farrowing conditions which corresponds with the basic principles determined by the AWA?

From an animal welfare point of view the crucial problem is that on the one hand the welfare of the sows is impaired by crating while on the other hand the piglets' lives may be threatened by free farrowing. In this context legal provisions should of course aim at the best welfare effects on both sows and piglets.

Foreign examples, especially the models practiced in the in Denmark, Sweden and Switzerland, have been demonstrating for a considerable period of time that it is, also from a practical point of view, possible to ban crating in the long run or at least to restrict the use farrowing crates to specific, precisely defined circumstances. It will, of course, be necessary to implement a forthcoming transition process carefully, considering an appropriate transition period, potent means to disseminate knowledge, possible subsidies, and – last but not least – effective monitoring instruments.

[15] February, 15th 2012.

[16] Treaty of Amsterdam amending the Treaty on European Union, the Treaties establishing the European Communities and certain related acts - Protocol annexed to the Treaty of the European Community - Protocol on protection and welfare of animals. Official Journal C 340 , 10/11/1997 p. 0110.

[17] Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the European Union Strategy for the Protection and Welfare of Animals 2012-2015.

Swedish experiences of loose housing of farrowing sows

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The purpose of this paper is to describe some common Swedish housing systems that are in line with the national regulations on keeping sows loose housed. The development of the Swedish regulations and pig production should be seen in the light of Sweden becoming a member in the European Union. The Swedish pig production increased during the period 1991-1998 which encompasses the year when Sweden joined the EU in 1995. Swedish pork consumption increased from 30,6 to 36,0 kg per capita from 1990 to 2005. Much of that increase was balanced by the increase in import, mainly from Denmark and Germany (Cederberg et al, 2009), fig 1.

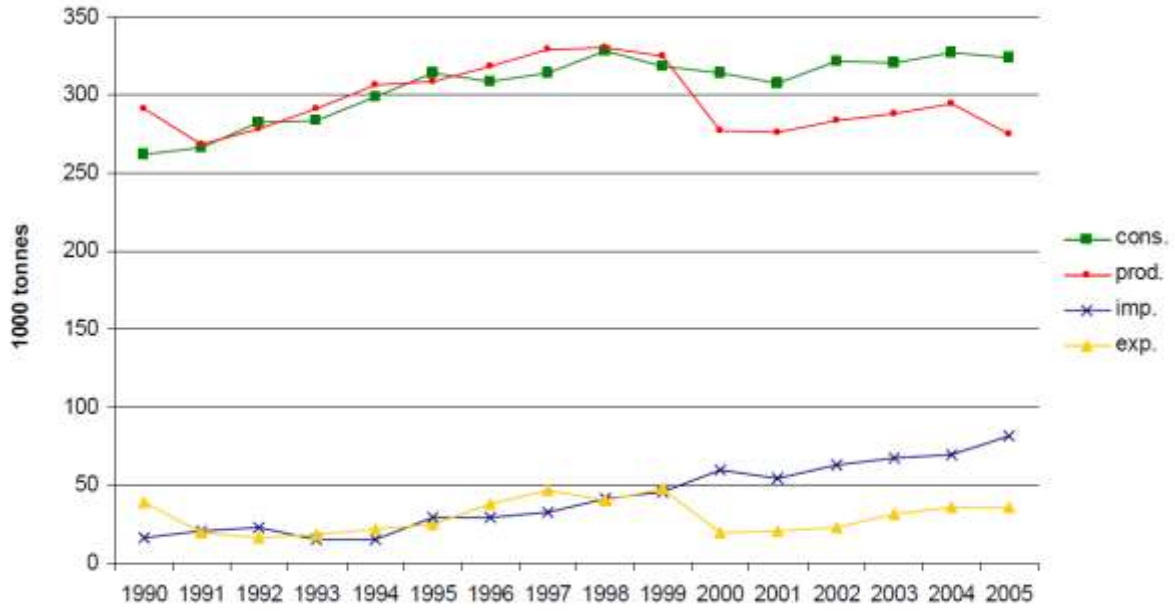

Figure 1. Total Swedish production, consumption, import and export of pork, carcass weight (1000 tonnes), (Cederberg et al, 2009).

Changes in regulations

In 1988, the Swedish animal welfare law with its regulations state that sows must be kept loose as pregnant as well as farrowing and lactating sows. Since 2007, new regulations emphasize even more the importance of the sow to be able to perform nest building behaviour and have access to straw. Only in special, individual cases a nursing sow is allowed to be confined:

Swedish regulations DFS 2007:5 (L100), Chapter 3, §3: "A nursing sow's freedom of movement may be confined during the first days after farrowing by the use of a gate or similar construction if she shows aggressive or abnormal behaviour behaviour which forms a threat to injure her piglets. A gate or corresponding equipment may also be used during management procedures if the behaviour of the sow is a threat to injury of the manager or during handling of the sow for care and treatment. Group housed sows and gilts may be confined in stanchions at feeding or when handled for care and treatment" (my translation).

Material for nest building must be provided: §8: "During the week before farrowing sows and gilts shall have access to litter which allows them to carry out nest building behaviour" (my translation).

The possibilities of using drained flooring is regulated as well as the use and size of the areas: §10: "At least ¾ of the lying area in a pen with litter for a nursing sow shall be flooring which is not drained. This part of the lying area shall be a homogenous rectangular area covering the whole width

of the pen. The other part of the lying area may be a drained floor with a slot width of maximum 11 mm and a slat with of minimum 11mm. If the drained floor is made of concrete, the slat with should be minimum 80mm" (my translation). §11 "Before farrowing, sows and gilts shall be able to use the area in the farrowing pen so that they can perform nest building behaviour" (my translation). §19 Minimum area for farrowing pen: Lying area 4 m2, total area 6 m2. See e.g. fig 2.

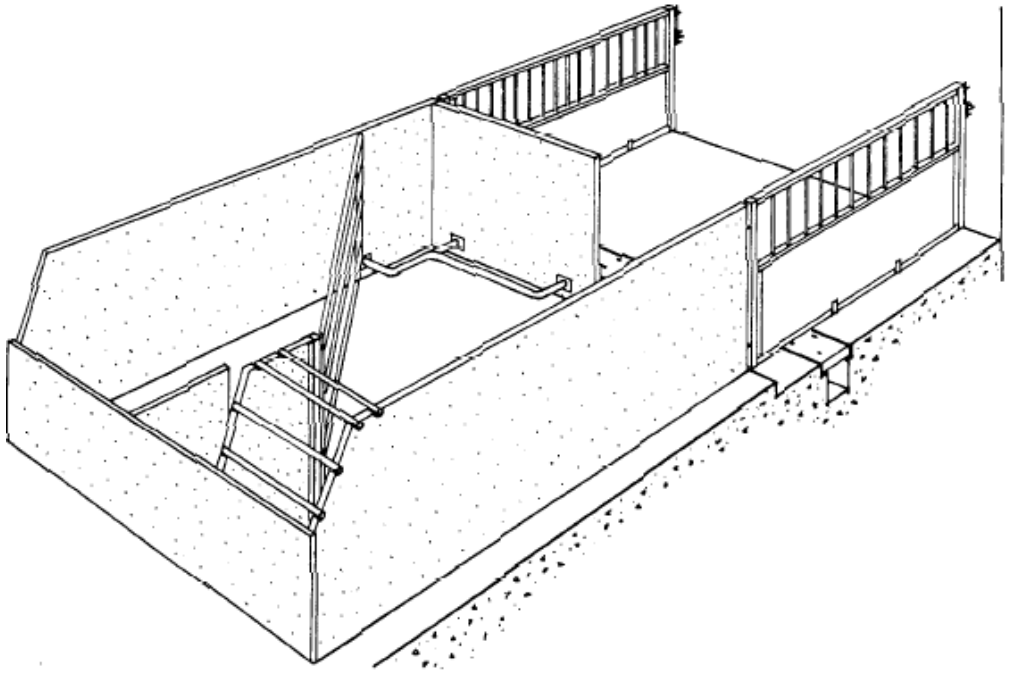

Figure 2. A typical Swedish farrowing pen.

Recent trends in piglet production in Sweden

Today, farmers commonly choose to use drained flooring on 25% of the lying area, often by the use of cast iron, which is considered to have the advantages of a more stable and less slippery surface, which the sow is more willing to tread on, and which is easier to clean. The disadvantage is that it is more abrasive to the piglets' feet and front knees. Recent and ongoing studies suggest that by the use of large quantities of straw, these disadvantages can be limited. Common problems facing the pig producer today is piglet mortality, feet and leg injuries in piglets and their consequences as well as shoulder lesions in sows.

In the piglet production, piglet mortality decreased between 1993-2000 but has since increased (PigWin, 2008) (Fig.3).

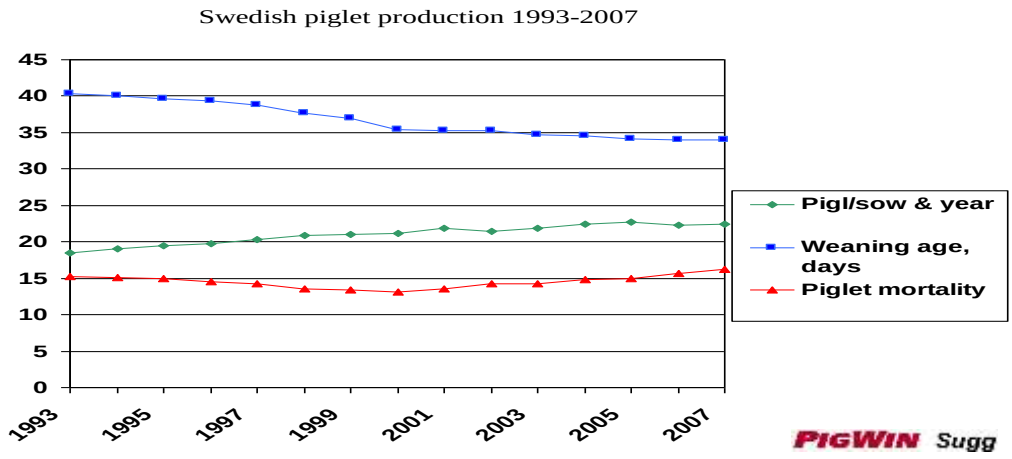

Figure 3. Swedish piglet production 1993 – 2007 (PigWin 2008)

There is considerable variation between farms in production records (PigWin, 2011) showing a potential (Best 25%) for improvements by the application of better housing and management (Tab. 1).

Table 1. Piglet production – averages (Pig Win, 2011)

In total 67 282 sows, 171 herds	2010		
	Total	Best 25%	Worst 25%
Average nr of sows and gilts	277	355	184
Produced piglets/sow and year	23.5	25.9	19.1
Nr of litters/sow and year	2.20	2.28	2.05
Proportion of gilt litters, %	23.9	22,8	28.4
Live born/litter	12.8	13.3	12.3
Born dead/litter	1.05	0.99	1.1
Nr of weaned/litter	10.6	11.4	9.8
Weaning age, days	33.8	32.5	35.7
Piglet mortality, birth-weaning, %	17.2	14.6	19.8
Returns, %	8.3	5.2	12.2
Daily growth from weaning-delivery, g	453	458	446

The use of individual pens for the farrowing/lactating sow may be simple pens of approximately 2.0 x 3.0 m with anti-crushing rails around the walls and a heated creep area for the piglets (Fig. 4, left). Traditionally the pens had access to a dunging alley with scrapes but in newer systems the floor is mostly partly slatted. Beneath the slatted flooring scrapes or liquid manure systems are used. The type of manure handling system influences the possibility to use straw during farrowing. Slats are either made of concrete, iron or a plastic material. These pens sometimes contain a temporary crate structure made by moving a partition into place at the time of farrowing (Fig. 4, right). This reduces the total space available when the sow is loose.

Figure 4. To the left: Farrowing pen with anti-crush rails. To the right: Farrowing pen with gates that can be used for contemporary fixation of the sow (Photo: R. Westin)

Since the development of crates to house sows in confinement in the late 50-ies, it has been argued that the modern pig does not necessarily build nests when approaching the time of farrowing due to a high degree of domestication and that it, therefore, does not need an environment which allows it to do so. Most of the sow breeding nowadays is done with the use of farrowing crates in which the sow is kept through farrowing and lactation, without any possibility to turn around and without any loose material such as straw for nest building and where she is kept. Studies on nest building of domestic sows were first investigated under semi-natural conditions in the 1980-ies (Stolba and

Wood-Gush, 1989; Jensen, 1986; Algers and Jensen, 1990). They showed that e.g. Swedish landrace sows, with experience from four prior farrowings in confinement crates, were perfectly able to locate suitable nest sites and to build farrowing nests, a behaviour more or less identical with that of the wild boar (Gustafsson et al, 1999). Since then, the study of maternal behaviour has been intensified, such that, to date a significant body of knowledge has built on the hormonal regulation of sow maternal behavior (for review, see e.g. Algers and Uvnäs-Moberg, 2007). Experienced farmers regularly select for sows with good maternal behavior and culls sows that do not perform well as mothers.

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The Transition process - the Danish model

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A primary focus of The Danish Pig Industry is pig welfare, where one specific aim is 10 % of the lactating sows being loose housed within a 10 year period – equivalent to 300,000 pens. Today there are app. 1,500 pens. In 2010, an expert-group appointed by the Ministry of Justice published a comprehensive report presenting welfare issues in relation to housing of pigs. Regarding housing of lactating sows the expert-group concluded that although there were new research results, the number of pens and the experience from loose farrowing systems in Danish commercial production herds were insufficient to recommend legislation in this area. However, the expert-group suggested a voluntarily transition period of ten years in which the number of pens should increase to approximately 10 % of the lactating sows being loose housed. The expert-group recommended an incentive structure to support early adopters.

During the last ten years, a number of research projects have been carried out. Mainly at the University of Aarhus but also in collaboration with the Danish Animal Welfare Society, private companies and the Pig Research Centre. This lead to a list of criteria for success regarding fulfilling the 'needs' of sows, piglets and staff.

In existing units, farmers who were about to increase their herd size and had an interest in loose housing would set up 4-40 pens to try it out. Dimensions of and within the pen were based on measures of sows and piglets and on the behaviour they should be able to perform according to the list of criteria. The pens would be based on as many as the listed of criteria as possible within the given facilities. This gave the farmers a 'hands on' impression of having loose farrowing sows but with 'damage-control' since they only had a relative low number of pens. The limitations were that 1) the sows did not farrow in the system at each farrowing; 2) the sows might be crated during the rest of the reproduction cycle: 3) it did not become a routine to manage loose sows because of the relative few pens within a herd and 4) it was difficult to obtain optimal climatic conditions. A few farmers set up full scale production with loose farrowing sows. Full scale facilities definitively motivate the farmers to optimize their management routines because it will have detrimental impact for the welfare of the pigs and the economy of the farmer if they do not succeed. However, in a full scale production system it is almost impossible to modify pen designs if the pens are not functioning to the farmers' satisfaction and farrowing pens cannot be converted to crates.

One herd with a small scale set up of 14 pens in a new build facility is showing promising results and function of the pens. However, there are indications of increase in proportion of litters with higher piglet mortality compared to crates and also the investment is higher making the loose housing system non-competitive to crates at the moment. Temporary crating might be a way to obtain a high net benefit for sows and piglets. However, because of the defaecation behaviour of the sows, pens with temporary crating are either with fully slatted floors making provision of nesting material difficult or the hygiene is unsatisfactory.

The transition process described above is quite similar to the successful transition from housing of gestating sows in stalls to loose housing systems. There too were early adopters who were keen to get their systems running. Next step was a period of voluntary conversion from stalls to loose driven by market forces. Then over a period of approximately 10 years 10 % of the pregnant sows were loose housed, so there was significant experience from production herds and a basis for legislation. Decision on legislation was followed by a transition period before being required in all herds.

Links to further information

- http://vsp.lf.dk/Publikationer/Kilder/Notater/2009/0925.aspx (in Danish)
- http://web.agrsci.dk/djfpublikation/djfpdf/intrhus11.pdf
- http://jm.schultzboghandel.dk/upload/microsites/jm/ebooks/andre_publ/arbejdsgrupperapport%20om%20hold%20af%20svin.pdf (in Danish)

Acknowledgements

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The Transition process - the Swiss model

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Mid 80s

In the context of the authorisation procedure for mass produced housing systems in Switzerland farrowing systems with crates were tested. The results showed that such systems are not in accordance with animal welfare.

Research on free farrowing systems was initiated.

Late 80s

The first commercial pens with crates that can be opened were developed and tested (Friedli et al, 1994). They were available in the early 90s. From there on more or less all newly installed farrowing pens in Switzerland were pens with crates that can be opened.

Parallel three different pens without the possibility of confinement (Schmid-pen, FAT1 and FAT2) were developed, tested on Agroscope Reckenholz-Tänikon Research Station and installed in the first farms.

The tests showed no significant differences in losses (overall, crushed and others) between crates, crates that can be opened and the three newly developed free farrowing systems (Schmid and Weber, 1992; Weber and Schick, 1996; Weber, 2000).

Mid 90s

The two biggest retailers started label-programs which became very successful. Crating of sows during farrowing is not allowed in these programs. A lot of farmers changed to free farrowing systems.

Change to free farrowing

In 1997 it was included in the Swiss animal welfare ordinance that: "Farrowing pens shall be designed to provide sufficient space for the mother sow to turn around freely. While giving birth, the sow may be enclosed in a crate in exceptional cases." The transitional period ended at the end of June 2007. The last sentence of the prescription was changed 2008 to: "While giving birth, the sow may be enclosed in a crate in individual cases (aggressive against piglets or leg problems)".

A comparison of 482 farms which had still farrowing crates and 173 farms which had free farrowing systems with data from the years 2002 and 2003 showed no significant differences in overall piglet losses (Weber et al, 2007).

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Discussion on Workshop 6: Transition process

Rapporteur: Johannes Baumgartner
Chairman: Herwig Grimm

The guiding idea of this workshop was to define obstacles and reasons that hinder the realization of free farrowing systems first. In a second step, possible solutions and means to overcome those obstacles were discussed. In order to build up on the knowledge gained in different countries, the Swedish, the Danish and the Swiss situation were presented at the beginning of the workshop.

Discussion on the transition process

Experience from the Swedish transition process to free farrowing systems shows that the first few farmers who try out new systems are usually dedicated people who know that they have to invest a lot - not only money but also a lot of thinking and creativeness. It is always this type of pioneer who makes a new system run. Thus the results of a new system are good in the first period. After this initial period many farmers have problems within the new system. They always look for new options, trying to be good farmers but they perform very poor. All of the sudden the output of the new system is very poor. A new system can only survive if it goes over that critical second period when many farmers invest and try out. At that time the robustness of a new system can be evaluated seriously. What was also found is that some farmers are more vocal and better in communication and knowledge transfer than the others. In the transition process of a new system it is very important to make sure that the first farmers who really know how to run the system are those who communicate and disseminate knowledge and not those who have problems with the system. The period, when those who cannot manage the new system are very vocal has to be survived. In the transition process you have to make sure that the good farmers disseminate the knowledge and experience.

The UK situation

The transition process in the UK is voluntary. But farmers who want to sell their pigs in the UK have to consider the power of the market. There is huge pressure from animal welfare organisations which does not primarily intend to eradicate farrowing crates by law but it forces retailers to make changes. What has particularly made a difference in the UK is the Freedom Food scheme which is run by the bigger animal welfare organisation. At the beginning all members were outdoor pig farmers. In a compromise they allowed indoor farmers in the scheme if they crated the sows for not more than five days. At the beginning of 2011 they changed their policy to 'no farrowing crates at all'! The big switch has been that one big retailer decided to only source from the Freedom Food label. And suddenly a lot more of indoor farmers without farrowing crate are needed and they are not there. The retailer offers a premium (~5 cents a kilo) and some market security, which is a bigger thing for farmers. So suddenly there are a lot of individual farmers and marketing chains who are starting to ask: could we change to loose farrowing systems? Farmers are growing nervous but they also are looking for possibilities. The government also wants to support this process and has announced to give a little bit of subsidy for building loose systems. And this makes quiet a difference. Last year a lot of farmers said: we would like to try up this system but it is too expensive. We need money to cover the difference in the investment costs between building with farrowing crates and building with loose farrowing systems. Last year there was no money but perhaps now they get one. People will trying out a few pens maybe in one room and looking at the success of these people we could see if pig chain changes quite quickly or a complete stop.

The importance of consumers and retailers

The consumer behaviour is changing in Austria too. Consumers are conscious about the origin and the kind of production of fresh meat. But this market is decreasing because of an increasing number of single households and its demand for prefinished products. On the other hand the market for restaurants, hotels, large kitchens and food industry is growing. And these buyers seem to care just for price and stability. In Sweden the problem with large kitchens is more or less the same. But the

buyers do care about quality but they don't see how to make specifications according to the EU-regulations. And they do have an interest in buying quality food with high animal welfare standards. A major problem is that the EU does not regulate the declaration of the origin of the constituents of prepared products and sausages (which is the case in fresh meat). Retailers are not keen to make a welfare label on their products. Different retailers have their own labelling and the consumers may be confused. So a huge challenge from the food industry towards more transparency cannot be expected. On the other hand these companies are part of a corporate social responsibility. The self-image a retailer wants to have is becoming more important. They don't want to have any embarrassment on animal welfare issues. Most consumers do not understand much about a certain label but they give the responsibility to the retailers.

Even when a retailer gets more money for a better welfare product it is not certain that the farmer who invested in better housing gets more money. It is dangerous to expect more money coming from the consumers and that it ends in the farmer's pocket after having passed the retailers and the slaughter houses. The history tells us that the first farmers who do new things get some significant premium. But when enough farmers do it the premium disappears. Experience from Sweden shows that only a few farmers earn some extra money but most of it ends by the retailers. Some Swedish retailers pay a premium to the farmers because they believe that the delivery could be a problem in the long run if they knock them out. Maybe it is the character of economy to keep the farmer starving as much as they could. In conclusion extra money for a higher animal welfare standard is considered as a nice additional advantage but pig industry should mainly focus on making higher welfare systems more competitive, to make it work in the conventional market and not only in niche markets.

Communication and dissemination

Communication is an important issue in the transition process. Especially farmers should be taken into charge. The information on new systems and regulations has to be communicated within agriculture and to the public. Most farmers have been educated with cages and this system was developed to a high productivity. It must be the aim of scientists and animal welfare organisations to give the farmers adequate proposals. Farmers (and vets) are prepared for a change but time is needed to get their minds set for the change and to utilise their creativity. We need the message spread that it will change towards free farrowing and it will be soon! This message should wake up the creativity of the farmers. The general attitude of the communication has to be positive and constructive. The Austrian public debate on a ban of farrowing crates was mainly a political battle with a lot of incorrect information and negative emotions on the one hand and a dramatic lack of serious communication between experts and to the farmers on the other hand. This situation resulted in scared Austrian farmers with limited interest to switch to a new system. Additionally the farmers were threatened by a transition period of only 4 years. That does not work if we want them to be constructive and supportive. There should be an adequate transition period to develop new competitive systems and to change minds. If there is uncertainty the farmers will oppose.

Is everything solved on scientific level?

Is this the case in crated systems? There will ever be problems to be solved and there will not be the only way out. We should better ask: is it possible to switch to free farrowing systems? Instead of saying this is the right system or that one. We should support those few farmers who want to make a try and support them in the very best way and then listen to them and broadcast their message. There are scientifically well documented principles how to develop a good free farrowing pen. We know these elements that should be working from small scale experiments. But we are still missing a kind of robustness of loose farrowing systems. We need information on free farrowing systems at different farm levels (large scale farms) and at different management procedures.

The robustness of a housing system is dependent from the degree it obeys the nature of the animals. According to Francis Bacon "Nature must be obeyed to be controlled". The more the biology of the animals is obeyed the fewer problems (health, behaviour, productivity) you will have. Thus we appropriate technical and management solutions should be applied to make sure that biology works

in an optimal way. As we live in a non-ideal world the biological needs of the animal cannot be fulfilled in an optimal way. Thus we need compromises and we have to be aware of the consequence of these compromises before we continue. The variation of the animals has also to be taken into account too, there is no average animal!

How long will it take for scientist to come out with robust systems?

This question is hard to answer without large scale farms to test it. If the test farms are there and if you have good and interested farmers who dare tomorrow, who do their very best, you will be able to evaluate these farms in two years minimum. If there are no farms a preparation period of one to three years prior to the evaluation period is needed to convince farmers and to plan. So five years in total are needed to get reliable results and to develop robust systems. After this time you can start to switch to the new systems with as transition period that is orientated on the investment cycle of the buildings. Scientists have to assist and support the process and to interact with the farmers. Scientists are necessary for developing and evaluation of systems. In cooperation with the farmers the scientists have to define which system is working. At the end it will be defined by the most productive farmer.

Adequate educational programs needed

It is certain that the transition process has to be accompanied by adequate educational programmes. As a result of an investigation on the new Swedish Animal Welfare act (see web page of Swedish government) it has been concluded that anyone who has animal in his/her care and have economic interest in it should have appropriate competence and education. With the DG SANCO program "Everyone is responsible" the EU wants to stimulate awareness and knowledge on animal welfare for all EU citizens (see http://ec.europa.eu/food/animal/welfare/docs/aw_newsletter_01_June2010_en.pdf). There is obviously a need for educational material on animal welfare. It should promote awareness on animal welfare from pupil to slaughter man. The essential values for each species and each situation must be defined properly and there must be peer reviewed quality assurance programme. It is crucial to disseminate this information in a modern way (i.e. e-learning). EU-money should be spent on that quality certified education program.

In Norway the pig breeder association offers an educational program for pig farmers (modules for pig production, fattening and economy. Skills on animal welfare, management and production are trained. This kind of programs should be mandatory in the EU. That would improve the image of farmers who are housing animals.

Education on animal welfare is important for the veterinarians too. Most vet students are very enthusiastic on animal welfare. But when vets start to work in praxis and facing to the economic situation they change priorities and attitudes about animal welfare quickly. Another problem arises from the fact that herd sizes become bigger and housing of animals becomes more challenging. But the education programmes do not change as quickly as necessary.

Summary

It is concluded that the transition from crates to free farrowing systems will be a very complex, challenging and long lasting process. The main transition, however, has to take place in the mind set of farmers, vets, advisers, building companies and consumers. At the end it has to result in a new balance between sows, piglets, farmers and society. Scientist should support and assist this process and not just to tell people involved what is right or wrong. The main responsibility of scientist is to provide and disseminate serious information.

CONCLUDING REMARKS TO THE FREE FARROWING WORKSHOP VIENNA 2011

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This workshop has provided a very constructive two days, and I would highlight two things in particular: one is the exchange of the most recent information, which is always a very important process, and the other is the constructive disagreements. I emphasize '**constructive'** disagreements because I think this is where we all learn. If we do not have consensus, we know the information is not yet perfect and, by discussing these points, our understanding will move forward.

What I learned from Anita Hoofs during the workshop is that the marketing is just as important as the product. The first rule in marketing is to have a slogan: something that will stay in the mind. So my slogan for these conclusions is "**the 3 Ms": Materials, Motivation and Means**.

1. Materials

Do we have the raw materials we need to change from crates to free farrowing? These are the necessary knowledge and equipment to enable free farrowing to be adopted without compromising animal welfare and physical performance.

My conclusion from these 2 days is yes because:

i) Some countries have already adopted such systems in law with acceptable outcomes.

ii) Whilst others may view the situation in these countries as atypical (small family farms, relatively insignificant pig industry), in all these doubting countries there are individual farms running loose farrowing successfully.

iii) At a research level, there are now several different systems giving good results and a growing degree of consensus on the important features, showing we have the scientific understanding for principles of successful design.

Whilst there is no doubt that detailed knowledge and new technologies will continue to develop, we do have functional designs now.

I think an important message is that, in these materials, there is no single blueprint for success. This depends on the complex interactions between buildings, pigs and humans, which together constitute the system in practice. Each of these elements can be different on different farms, indicating that different solutions for successful adoption might be appropriate. It is these interactions which determine the robustness of a given design and the extent to which widespread adoption across different farm types (size, quality of labour, type of sow, climate) might be successful.

So the materials are there.

2. Motivation

Given that successful designs exist, their uptake depends on the motivation of farmers. Three reasons for uptake can be distinguished:

i) Belief in the rightness of the system: farmers who believe that this is the right solution for the proper keeping of sows and, for this reason, choose to adopt it. They are highly likely to make it work successfully for the animals, and are willing to accept the effort and cost involved because it is their personal wish (as long as they can maintain an acceptable living from their business).

ii) Attraction of potential increased profit: farmers who see a business opportunity which will be beneficial. These may be entrepreneurs who perceive a premium niche market which can increase product price and/or secure market access at a good profit. They are likely to make the system work because they again (for different reasons) have a strong personal incentive.

In this category can also be considered farmers who can obtain a subsidy to invest in new buildings (the market here is society through government investment, rather than the consumer

through product premium). Such farmers may be less likely to invest effort in success as the drivers cease once investment is made, unless they are also in the previous categories.

iii) Obligation to implement the system without believing in it. In this category we have farmers obliged by legislation to make change. The consequences of this for success, and therefore for improved animal welfare, are unlikely to be good, as a negative attitude is detrimental to constructive adoption of new and challenging systems.

Also in this category, can be included employed labour obliged to implement management decisions in which they were not involved and do not support. Whilst the farmer may be motivated, the staff who must run the system on a day-to-day basis are a more important determinant of success.

So the materials are there, but the motivations are different and how people apply those materials can lead to different outcomes.

3. Means

If we have functional systems, and (some) farmers willing to consider their adoption, what are the practical barriers preventing greater uptake.

i) The conservative nature of many farmers. In an uncertain financial environment of farming, people feel safer to stay with tried and tested systems which are within their "comfort zone". Unless they see reason to change, why venture into the unknown.

ii) The financial implications of change. Free farrowing systems will have higher capital cost. This must be recovered from improved performance (some possibility), reduced workload (unlikely), or better price (some possibility in some countries). It is unrealistic (and unjust) to force farmers to take risks with their livelihood (and that of their families). I would like to have heard a little bit more in these two days about the financial aspects of making this transition to free farrowing. How much more would farmers in different situations need to get for their pig meat to make this an attractive proposition?

The cost benefit analysis depends on each farmer's perception of the opportunities for gain and the risks of failure. This depends on each individual, the information they receive, their trust in the source of information and their assessment of how it relates to them. Early adopters see the opportunities and are confident in managing the risks. Their success, or failure, informs the second generation of adopters and the system either multiplies or dwindles in consequence. This suggests that "evolution not revolution" is the best way forward, with successful farmers, who are capable of taking on and mastering the initial challenges, disseminating the factors which refine the system and its practical implementation. Asking the less capable farmers to adopt before this refinement occurs may lead to unnecessary failure and disillusion. However, as the current gestation housing transition has shown, there may need to be some ultimate application of external pressure and deadlines to motivate change in laggards once robust systems have been demonstrated. So: Evolution yes, but evolution with some degree of ultimate urgency.

In summary, I would highlight the sentiment expressed by a workshop participant that change must ultimately occur "in the head, and not just in the stable". Even when we have the technical solutions, as many researchers believe we have, it is the belief of those who must implement the system which is necessary for success.