ANIMAL WELFARE SCIENCE CENTRE

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Alternative Farrowing Systems

Identifying the gaps in knowledge

SEPTEMBER 15TH 2010

LECTURE THEATRE

DPI, ATTWOOD

Program

10.00	Paul Hemsworth, Director, AWSC, The University of Melbourne *Introduction and aims of today's seminar*
10.05	Greg Cronin, The University of Sydney / Hugh Payne, DAGFWA *An Australian perspective on non-crate farrowing systems*
10.45	Emma Baxter, Scottish Ag College *The PigSAFE pen design - derivation, principles and practicalities*
11.25	Sandra Edwards, Newcastle University *Commercial PigSAFE performance to date and how these fit in the UK/EU industry context*
12.05	*LUNCH*
12.50	Greg Cronin, The University of Sydney *The Norwegian UMB farrowing pen system and gaps in knowledge*
13.30	Melina Tensen, RSPCA Australia *RSPCA views on traditional and alternative farrowing systems*
13.45	Rebecca Morrison, Rivalea Australia *Industry perspective on housing of farrowing sows and gaps in knowledge*
14.00	Discussion – Alternative farrowing research priorities for Australia *Led by Paul Hemsworth*
15.00	*CLOSE*

An Australian perspective on non-crate farrowing systems

Hugh Payne, Department of Agriculture and Food Western Australia
Greg Cronin, Faculty of Veterinary Science, The University of Sydney

Abstract:

Over the last 5 decades, piglet survival has been improved through the use of farrowing crates for housing sows and litters around parturition and during lactation. Improvements have come through better structural design of the crate and floor, control over the shed thermal environment, sow and piglet management and stockmanship. Despite better survival and welfare outcomes for piglets, the housing of sows in crates is criticised on welfare grounds.

For example, pre-farrowing activity including nest-building behaviour is inhibited in farrowing crates, which denies one of the “Five Freedoms” – the freedom for sows to express normal behaviour.

The Australian pig industry funded research on alternatives to farrowing crates for sows from 1986 to 2006. A key outcome in 1993 was the development of the so-called ‘Werribee farrowing pen’, leading to investigation of this pen as a practical alternative to farrowing crates. The Werribee pen design was refined, manipulated and evaluated in a number of trials conducted at the Victorian Institute of Animal Science, Werribee, and on commercial farms. The research demonstrated that piglet survival in farrowing pens could be equivalent to that achieved in farrowing crates. However, there were some obvious limiting factors. The economics of building a new (conventional) farrowing shed for pens was unrealistic, so farrowing pens were fitted into available spaces, often in inappropriate sheds without insulation and climatic control necessary for farrowing accommodation. Further, the farrowing pen occupied about twice the space of conventional farrowing crates, herds lacked suitable genetics for farrowing in pens and the design of the pen required refinement to balance conflicting needs; for example, the provision of bedding material could not be managed in our typical effluent management systems. A most important observation however, was that the attitude of the stockperson managing the farrowing pens seemed to be a key determinant of whether the pen system succeeded or failed.

In an attempt to reduce the cost of providing the extra space required for loose farrowing systems, DAFWA adapted a Swedish group farrowing system for use in a low-cost shelter. Pre-weaning mortality was unacceptably high (28.4% of liveborn) and the system was deemed to be fundamentally flawed for a number of reasons. It became apparent during this failed attempt with group farrowing that the use of a Werribee-style farrowing pen may overcome most of the problems encountered with farrowing in a low-cost shelter. Thus, a large trial was conducted on a commercial farm to compare sow productivity in modified Werribee pens in a low-cost shelter with conventional farrowing crates in a modern controlled-environment building. The pens were retro-fitted, resulting in a sub-optimal design necessary to accommodate structural limitations of the existing shelter. Although highly acceptable levels of pre-weaning mortality were achieved in both farrowing systems, indicating exceptionally good stockmanship throughout the project, piglet losses were significantly higher in the pen system (10.2 vs. 6.3% of live born, respectively for pens and crates). Greatest losses occurred in the pens during summer (15.5%), possibly because of heat-induced behavioural changes in the sow and decreased use of protected creep areas by piglets. While the finding suggests that hot conditions may limit the successful use of farrowing pens in Australia, the incorporation of thermostat-controlled heaters in the piglet creep boxes and a larger, ventilated creep zone, may have averted some of the adverse effects recorded in summer.

Project funded by Australian Pork Limited

The PigSAFE pen design - derivation, principles and practicalities

Emma Baxter, Scottish Agricultural College, UK
Alistair B. Lawrence, Scottish Agricultural College, UK
Sandra A. Edwards, Newcastle University, UK

Abstract:

Designing suitable farrowing and lactation environments that maximise both sow and piglet welfare, whilst maintaining economically efficient and sustainable enterprises, is a continuing challenge.

Despite numerous attempts to develop an alternative indoor system to the farrowing crate, there is as yet no wide scale implementation of such a system at the commercial level. Preventing uptake are the valid concerns by farmers about piglet survival, ease of management and cost. Consequently the PIGSAFE project (Piglet and Sow Alternative Farrowing Environment) aims to develop an alternative to the farrowing crate that provides for the maximal sow and piglet welfare that can be achieved under commercial conditions.

The system aims to reconcile the 'triangle of needs' belonging to the farmer, the sow and her litter. In this context an extensive literature review was undertaken aiming to define the biological principles which underlie sow-piglet interactions appropriate for non-crate systems and to determine design criteria that might meet these biological needs. In addition a large database of information on existing non-crate farrowing systems was collated.

The physical and financial performance of these systems was summarised and the welfare attributes were evaluated based on how well they met the biological needs of the sow and her piglets as determined by the first objective. Economic modelling techniques were used to synthesise this knowledge and consultation with international experts and stakeholder groups on optimal design features assisted with designing a prototype that could be developed, refined and tested at experimental and commercial level.

The prototype design intended to meet biological needs of sows and piglets, as well as requirements for stockperson safety and management ease. This involves a basic nest area, with solid flooring to allow provision of nesting material and sloping walls against which the sow can slide more slowly to ground level for suckling, to lower the risk of piglets being trapped and killed. A heated creep area has easy access from the nest. A separate slatted dunging area is bounded by walls with barred panels to adjacent pens to discourage farrowing outside the nest. A feeding crate for the sow is included at one side of the pen, where the sow can be locked in to allow safe inspection or treatment of the piglets.

Important aspects of the design and management have been the subject of a series of experiments, resulting in refinement of the prototype and the conclusion that the detail of the design is key to its performance.

The PigSAFE project is funded by the UK Department for Environment, Food and Rural Affairs, in collaboration with the RSPCA, British Pig Executive and Quality Meat Scotland.

Performance of the PigSAFE system in the UK/EU industry context

Sandra A. Edwards, Newcastle University, UK
Emma Baxter, Scottish Agricultural College, UK
Alistair B. Lawrence, Scottish Agricultural College, UK

Abstract:

Concerns about the welfare of sows farrowing in crates have been developing within the EU for more than a decade. Successive scientific reports in 1997 and 2007 recommended that loose farrowing alternatives should be developed. However, concerns about piglet survival in non-crate systems have prevented any legislative moves, except in Sweden where use of farrowing crates is prohibited. In most other member states >90% of sows farrow in crates, with the UK being exceptional in now keeping 40% of breeding sows in outdoor systems. Within the UK, and increasingly elsewhere in Europe, very effective campaigns by animal welfare organisations have kept the farrowing crate issue before the public.

In consequence, a number of smaller national retailers already source pigmeat only from non-crate systems whilst the major supermarket chains are also seeking to move in this direction. However, maintaining acceptable piglet survival in non-crate systems against a background of increasing sow prolificacy poses a considerable challenge, with mortality in Sweden 3.6% higher than the EU average. Good survival can be achieved in non-crate systems, with the UK national average for outdoor herds equalling or surpassing that for indoor herds over the last decade. Such results have yet to be replicated in commercial indoor non-crate systems, despite a number of different variants being tried on a small scale.

Preliminary results from the PigSAFE system show promise in this respect, despite the challenge posed in the development phase by very high litter sizes and restricted fostering possibilities on our research farms. Data from the first 152 litters weaned yielded a liveborn mortality of 14.9%, with the average of 10.9 piglets weaned per litter being in excess of UK top-third herd performance. Experimental comparison of different pen design features has shown no significant improvement in survival associated with roofing the nest, providing different levels of nesting substrate or heating of the nest floor. However, providing a larger nest area resulted in increased piglet mortality. Because of the greater pen size and complexity, capital cost of the PigSAFE system is expected to be ~50% greater than for a standard farrowing crate system, but current indications are that running costs and labour requirements will be similar.

A commercial within-farm comparison between the PigSAFE and crate systems is currently in progress at the two research sites, with further comparisons on commercial farms currently planned. We conclude that the system shows good promise of commercial feasibility, but more extensive testing is now needed to determine its robustness to variations in management and staff. History suggests that staff experience and attitude, as well as sow genotype, may have an important role to play in the commercial success of the system.

The PigSAFE project is funded by the UK Department for Environment, Food and Rural Affairs, in collaboration with the RSPCA, British Pig Executive and Quality Meat Scotland.

Travel supported by Australian Pork Limited

The Norwegian UMB farrowing pen system and gaps in knowledge

Greg Cronin, Faculty of Veterinary Science, The University of Sydney
and
Inger Lise Andersen and Knut Bøe, Dept of Animal and Aquacultural Sciences, Norwegian University of Life Sciences

Abstract:

The UMB farrowing pen comprises two compartments: a "nest area" and an activity/dunging area. The "nest area" is designed to be attractive for farrowing, whereas the activity area contains the sow feeder and drinker. A sprinkler system above the slatted floor in the activity area has been installed for cooling sows in Australia's hot weather. In nature, sows walk up to 6 km in the 1-3 days before farrowing. The UMB pen provides 7.92 m2 to enable locomotion before farrowing. Locomotion is partly motivated by the sow's need to find an isolated site for farrowing that provides protection from predators and bad weather. In addition, the site chosen by the sow is positioned to provide a view of approaching disturbances. A design principle of the UMB pen is that sows choose to farrow at the rear of the pen, in the "nest area", as "disturbances" such as stockpeople approach the pen from the front. The UMB "nest area" has solid side walls, affording the sow a visual barrier for privacy from neighbouring sow(s) whilst in the nest, and hence some sense of isolation from herd mates.

The sow's motivation to locomote before farrowing is probably also related to gathering nest-building material. The UMB pen provides wood shavings on the floor and hay/straw in a dispensing rack. While nest-building materials stimulate nest-building behaviour, the motivation to walk in search of nest-building material may also be satisfied. In addition, the UMB pen "nest area" is covered by a 30 mm-thick rubber mat for comfort of the sow and piglets, and to minimize the risk of sow lameness.

The importance of the sow choosing to farrow in the "nest area" for piglet survival cannot be understated. Design features of the "nest area" have been included specifically to promote piglet survival. For example, the UMB pen provides bedding for nest-building, sloping panels to support the sow when lying down and heated floor zones. Limited research has shown that by stimulating nest-building-like behaviour in sows, the duration of parturition is reduced. A consequence of a shorter parturition may be fewer intra-partum stillbirths and fewer unviable piglets. Straw/hay is also thought to improve gut health of the sow and increase suckling behaviour. Two other important features of the "nest area" are sloping panels along two walls and two, independently-controlled, heated-floor zones. Sows prefer to lie against sloping panels, and in combination with the ability to control temperature in different floor zones, it is theoretically possible to influence where the sow lies relative to her litter. Thus it should be possible to separate the sow and piglets within the "nest area" in the first week of life, when the piglets are most at risk of overlying without the need for a crate to restrain the sow.

As mentioned above, nest-building behaviour is stimulated by giving the sow access to straw/hay. The provision of a dispensing rack in the UMB pen, from which the sow can work to obtain straw/hay, satisfies the motivation for nest-building material, limits waste of straw/hay and reduces its spread into the slatted floor area. However, the motivation to perform nest-building may not be adequately satisfied if the "nest area" is too narrow. If the sow has difficulty in (comfortably?) turning around while nest-building, sow behaviour during the birth process may be disrupted and suckling behaviour may be adversely affected. The width of the UMB farrowing pen is 2.4 m, providing sufficient space for the longest sows to turn around comfortably whilst performing nest-building behaviour.

Research is in progress to improve our understanding of how to manage the UMB farrowing pen under Australian climatic conditions. Important questions concern the interaction between ambient temperature, floor temperature in the two heated zones in the "nest area" and sow and piglet lying behaviour. Genetic selection based on piglet survival in the UMB pens has also been identified as a high priority.

Travel supported by Australian Pork Limited

RSPCA views on traditional and alternative farrowing systems

Melina Tensen and Bidda Jones, RSPCA Australia

Abstract:

In the pig industry, survival of piglets is an integral component of profitability. The traditional farrowing crate is designed to ensure that piglets are better protected from crushing by the sow. The traditional farrowing system also allows the producer to have better control of temperature, particularly for the piglets, and better monitoring of the sow and her piglets during and after the birthing process. However, from an animal welfare perspective, the confinement of the sow results in frustration of highly motivated behaviours such as seeking a sheltered nesting site and collecting materials for a nest. The restriction of movement leads to difficulty standing up and lying down and increases the risk of limb and body injuries.

Improvements to animal welfare on farm are often influenced by what seem to be conflicting interests – animal welfare versus productivity and profitability. From a producer perspective, alternative farrowing systems must perform similarly in terms of pre-weaning piglet survival and be able to be installed and operated without excessive cost. From an animal welfare perspective, the farrowing system should be designed to meet the needs of the piglets without compromising the needs of the sow.

While acknowledging that traditional farrowing crates provide the producer with the ability to control the conditions around farrowing and a proven means of increasing piglet survival, the RSPCA supports the development of alternative farrowing systems that provide the sow freedom of movement and the ability to satisfy her behavioural, social and physiological needs. Rather than viewing these needs as conflicting with profitability, they should be seen as essential to the success of alternative farrowing systems.

Industry perspective on housing of farrowing sows and gaps in knowledge

Rebecca Morrison, Rivalea (Australia)

Abstract:

Commercially-viable, non-crated farrowing systems that take sow and piglet welfare into consideration need to be developed, as the use of farrowing crates to restrict sow movement is being increasingly questioned. Opponents criticise farrowing crates because they are designed to restrict sow movement. Sow activity increases before farrowing and sows will gather branches and grass to form a 'farrowing nest'. Some argue that thwarting pre-farrowing 'nesting' activities constitutes a welfare problem. However, farrowing crates are designed to protect piglets from being crushed and killed by the sow. The highest incidence of piglet mortality and injury occur during the first three days of life, with unrestricted movement of the sow being a major contributing factor. Rivalea Australia is leading the way in the Australian pork industry in terms of researching and investigating non-crated farrowing systems. We are consolidating information on the alternatives to farrowing crates, seeking advice and trialling appropriate, practical systems that may be commercially-viable. Some of the non-crated systems we are investigating included free range, deep-bedded group lactation and farrowing pens.

Rebecca is a Research Scientist at Rivalea. She conducted her PhD (Behaviour and welfare of pigs in deep-bedded, group housing systems) with Prof. Paul Hemsworth and Dr. Greg Cronin at the University of Melbourne. Rebecca has worked at the University of Minnesota as the Sustainable Swine Production Systems Scientist, working and researching a range of non-crated farrowing systems.

The Animal Welfare Science Centre

Who we are

The AWSC comprises four collaborative partners –

- **Department of Primary Industries, Victoria** (Future Farming Systems Research Division)
- **The University of Melbourne** (School of Land and Environment and Faculty of Veterinary Science)
- **Monash University** (School of Psychology and Psychiatry and School of Biomedical Sciences)
- **The Ohio State University** (Department of Animal Sciences and College of Veterinary Medicine)

In 2009, the AWSC together with the Centre for Animal Welfare and Ethics of The University of Queensland (CAWE), the Animal Welfare Unit of CSIRO and 2 New Zealand organisations, (Massey University's Animal Welfare Science & Bioethics Centre and AgResearch) were designated as an OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis.

Our scientific research and teaching capacity in animal welfare science is considerable and we have made many important national and international contributions to animal welfare research, teaching and training.

What we do

The Centre conducts research in three program areas:

1. Welfare methodology where we develop and validate methods to measure animal welfare.
2. Housing and husbandry effects on animal welfare.
3. Attitudinal effects:
   - 3.1. The effects of the attitudes of stockpeople, animal handlers and animal owners on the welfare of their animals.
   - 3.2. The effects of attitudes to animal welfare on consumer and community behaviour.

These programs support the fourth program area:

4. Tertiary, post-graduate and industry education and training.

Through these programs, the Centre aims to:

- Undertake research to inform government and industry in the development of animal welfare policy

The Centre's activities are guided by our vision and mission:

Our Vision

"Animal welfare and its constant improvement are societal and cultural norms"

Our Mission

"To contribute to improved animal welfare as a world leading provider of expert information, advice and education underpinned by rigorous research"

The need

Human-domestic animal relationships involve human management and control of animals. The management of animals by humans is basically governed by two important principles which apply to a range of animal uses from individual pets to livestock production. The first principle is management to comply with the objectives of human profit, benefits or pleasure, and the second is management responsibilities under a duty of humane care of animals. The latter is based on the widely-held view in our community that the use of animals by humans is acceptable provided that such use is humane.

Lack of awareness of factual information means that many people are ignorant of the conditions under which animals are kept, how they are treated and their species-specific requirements. The animal welfare movement is increasingly influencing society's views on animal use and the acceptability of various animal management options. While consumer and public attitudes to animal welfare are likely to be influential in determining society's use of animals, science has a critical role in underpinning governments' decisions, on behalf of the community, on animal use and the attendant conditions and compromises.

Therefore there are four key areas of activity necessary to rationally address animal welfare:

- **animal welfare science**
- **understanding public and consumer attitudes to animal welfare**
- **public education**
- **industry education**

It is important to gain an understanding of public and consumer attitudes. Reliable and valid measures for monitoring community attitudes about animal welfare will assist Governments, industry and scientific and community groups in establishing research, education and regulatory policy in animal welfare. It is clear that policy makers and the livestock industries need to be able to respond to these community concerns either through appropriate public education programs, supporting research and/or by changing industry practices.

Research on contentious welfare issues is required to underpin welfare standards. Furthermore, through public education, science has a critical role in underpinning society's decisions on animal use and the attendant conditions and compromises.

While research can be utilised to underpin the establishment, amendment or validation of industry welfare standards and practices, it is critical to deliver industry education, through staff selection and training strategies, and modify legislation, codes of practice and/or welfare QA programs to achieve these welfare standards.

The Animal Welfare Science Centre has built upon key discipline strengths of animal behaviour, stress physiology, veterinary science and psychology and their importance in studying human-animal interactions, animal housing and husbandry and community attitudes/behaviour.

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