Reducing Piglet Crushing in Loose-farrowing Systems: Animal Welfare and Production Implications for Sows and Piglets

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Introduction

Issues surrounding the welfare of sows housed in conventional farrowing crates, such as unresolved aggression, restriction of movement and reduced ability to perform nest-building behaviours, have led to substantial research into alternative housing. Methods are continuously evolving to improve production efficiency and welfare, but there is still no single ideal system. Many farmers object to using loose-farrowing pens, based on the assumption that more piglets will be crushed than when sows are confined in crates (Pedersen *et al*., 2006). Previous studies have shown deaths from crushing to be proportionally greater in loose-farrowing pens, but overall piglet mortality in both systems to be similar (Weber *et al*., 2007). Accordingly, it is hypothesised that aspects of piglet welfare may be compromised for sow welfare benefits in loose-farrowing pens. The purpose of this paper is to review the current literature investigating factors that affect piglet mortality in loose-farrowing systems, ways in which piglet crushing can be reduced, and the welfare and production implications of this research.

Discussion

Knowledge of factors reducing piglet mortality can inform economic and welfare considerations, such as ensuring high productivity and avoiding pain caused by crushing. Burri *et al*. (2009) monitored the behaviour of 22 sows using time-lapse video to determine the influence of straw length, sow behaviour and room temperature on the incidence of dangerous situations for piglets in loose-farrowing pens. Long-stemmed or short-cut straw was provided to two groups of sows prior to farrowing. Long-stemmed straw was determined to be more appropriate for nest building, which aligns with earlier research, but straw length did not affect the percentage of piglets crushed (Damm *et al*., 2005). Importantly, sow behaviour had a major influence on crushing incidence, including frequency, speed and style of lying-down. After farrowing, piglets spent more time in the creep area and the occurrence of dangerous situations decreased. Higher room temperatures influenced the time it took for piglets to progress to the creep area, but was not associated with the incidence of dangerous situations. That said, the temperature range used by Burri *et al*. (2009) was quite limited, therefore future studies should assess a wider temperature range to determine if there is any correlation. As with other research, parity was associated positively with the number of crushed piglets and the birthweight of crushed piglets was markedly lower than that of weaned piglets (Andersen *et al*., 2009; Weber *et al*., 2009). From an animal welfare and production perspective, this study suggests that sows could be selected on their maternal and behavioural characteristics as a way of reducing crushing risk.

The sample size of the study by Burri *et al*. (2009) was relatively small. In contrast, Weber *et al*. (2009) studied a larger sample to determine piglet mortality risk factors relating to pen design, using loose-housed lactating sows on commercial farms (99 farms, 12,155 litters, 7,323 sows). The number of crushed piglets was 0.64 piglets per litter (5.6%), whereas the number of piglets that died for other reasons (runt, bitten to death, *E. coli* diarrhoea, various) was 0.72 piglets per litter (6.3%). Average total piglet mortality (11.8%) aligned with results from previous research comparing loose-farrowing systems to conventional crates (Wechsler & Weber, 2007). Piglet mortality was mainly attributed to sow-related characteristics (age, litter size and parity), rather than to farrowing pen design (pen size, sow confinement and piglet-protection bars) (Weber *et al*., 2009). The study was limited by not evaluating additional factors that potentially influence piglet mortality: hygiene, microclimate, early colostrum intake, sow body condition and vaccination. Similar to conclusions made by Burri *et al*. (2009), these authors proposed that measures to reduce piglet losses and improve piglet welfare should focus on selecting sows with reasonable litter size and birthweight uniformity.

Management practices ensuring good health, regardless of the housing system, are of critical importance to enhance piglet welfare. Despite considerable variation in sample size used by Weber *et al*. (2009) and Burri *et al*. (2009), both studies showed that sow-related characteristics had more influence on piglet crushing than pen design. However, Weber *et al*. (2009) highlighted that some crushed piglets would have died before weaning owing to starvation and weakness, and importantly the impact of microclimate was not assessed. In a study conducted recently by Anderson *et al*. (2009), the effects of placing newborn piglets under a heat lamp (HL), or both drying and placing them under a heat lamp (DHL) on piglet mortality in loose-farrowing pens were investigated. The sample of 67 sows and their litters were divided into three experimental groups (control, HL and DHL). All causes of postnatal mortality were significantly lower in the HL and DHL groups than in the control group. Crushing occurred in fewer litters in the DHL group (13.6%), compared with 34.8% in the HL group and 47.9% in the control group. Drying and placing piglets under a heat lamp reduces heat loss and stimulates blood circulation, thereby increasing vitality and ability to escape from a near-crushing event. It was concluded that different management types or human interference around farrowing has the potential to improve piglet welfare by decreasing the likelihood of crushing.

In the aforementioned studies, piglet mortality was correlated with larger litters. Therefore, improved management may be limited to increasing the number of surviving piglets (Andersen *et al*., 2009). Conversely, selection for moderate-sized litters may not compensate for production losses from reduced fecundity. Nevertheless, based on the studies discussed in this paper, piglet welfare is likely to be enhanced with improved management and selection of sows.

Conclusion

Recent studies regarding piglet welfare in loose-farrowing systems, particularly in reference to crushing, have concluded that sow behaviour has a greater influence than pen design. To improve piglet welfare and reduce mortality, sows should be selected for moderate-sized litters, less birthweight variability and more desirable maternal behaviour (Burri *et al*., 2009; Weber *et al*., 2009). In the short-term, management practices that provide an adequate microclimate and good hygiene have the potential to improve piglet welfare in loose-farrowing systems (Andersen *et al*., 2009).

References

Anderson, I.L., Haukvik, I.A., Bøe, K.E. (2009) Drying and warming immediately after birth may reduce piglet mortality in loose-housed sows. *Animal* 3:4, 592-597.

Burri, M., Wechsler, B., Gygax, L., Weber, R. (2009) Influence of straw length, sow behaviour and room temperature on the incidence of dangerous situations for piglets in a loose-farrowing system. *Applied Animal Behaviour Science* 117, 181-189.

Damm, B.I., Pedersen, L.J., Heiskanen, T., Nielson, N.P. (2005) Long-stemmed straw as an additional nesting material in modified Schmid pens in a commercial breeding unit: Effects on sow behaviour, and on piglet mortality and growth. *Applied Animal Behaviour Science* 92, 45-60.

Pedersen, L.J., Jørgensen, E., Heiskanen, T., Damm, B.L. (2006) Early piglet mortality in loose-housed sows related to sow and piglet behaviour and to the progress of parturition. *Applied Animal Behaviour Science* 96, 215-232.

Weber, R., Keil, N.M., Fehr, M., Horat, R. (2007) Piglet mortality on farms using farrowing systems with or without crates. *Animal Welfare* 16, 277-279.

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.

Wechsler, B., Weber, R. (2007) Loose-farrowing systems: challenges and solutions. *Animal Welfare*, 16, 295-307.