

Individual stalls versus group-housing and the welfare implications for pigs

By Laura Grogan

Introduction

The welfare needs of sows in intensive housing situations are currently not clearly defined. Individual stall-housing differs from group-housing in three areas; spatial restriction, lack of substrate for performing behaviours and relative isolation from conspecifics. Whether these differences constitute a welfare concern is under investigation by observing behavioural stereotypies supposedly related to stress, measuring physiological responses, and assessing health and production parameters. Importantly, implementation of welfare improvements is related to potential economic gain as illustrated by Grandin (2003). This paper evaluates three recent studies to identify current areas of contention related to intensive sow housing.

Discussion

Do sows have a welfare requirement for straw substrate and space to perform nest-building activities? Do sows need social interaction with conspecifics at different times during their reproductive cycle? Proponents of group-housing suggest that the stereotypic behaviours expressed by stalled sows such as bar-biting, snout-pressing and reduced postural movements are inappropriately expressed components of nest-building. Damm et al. (2003) evaluated spatial and substrate requirements in a crossover study with eight multiparous sows prior to parturition over two consecutive farrowings. They aimed to determine whether the larger Schmid pen providing straw-bedding had welfare advantages when compared with conventional stalls. From day 113 of gestation, half the sows were transferred to Schmid pens from traditional crates and behaviours were recorded continually by trained personnel until farrowing was complete. Welfare was assessed by heart rate and behaviour; nest-building components, repetitive stereotypies, and postural responses. The results showed that more elements of nest-building were performed in the enriched environment, while fewer stereotypies were exercised. Nest-building behaviour was restricted in stalls, possibly due to the lack of substrate. Previous studies have suggested that welfare implications of stalls versus group housing has more to do with design than space or substrate. However Damm et al. (2003) examined only Schmid pens and cannot provide conclusive evidence that the absolute provision of more spacious gestation environments enriched with straw-bedding improve animal welfare. Furthermore, Hartsock and Barczewski (1997) theorise that stereotypies are not a response to spatial restriction, but rather to inadequate provision of substrate, which has yet to be explored.

Sows in enriched environments are reported to show improved maternal behaviour, with earlier development of cyclic nursing (Thodberg et al. 2002; Cronin et al. 1996). Bates et al. (2003) correlated increased maternal welfare with improved piglet productivity, an important factor in the intensive pig industry. The study used 388 females progressing through either stalls or group pens in gestation and lactation respectively. Electronic walk-through sow feeders were implemented in pens reducing the competitive feeding tendencies identified in previous research. Percentage unsuccessful mating, return to oestrus within seven days of weaning, percent farrowed, litter birth-weights, litter wean-weight and number weaned were recorded for both stalls and pens. This study is limited in its methods of welfare assessment; ideally behaviour and physiology would also be measured since there is strong evidence that high production does not always indicate good welfare. The results indicated that a greater percentage of group-housed sows remained pregnant, subsequently farrowing with fewer stillborn piglets, greater litter birth-weight and faster return to oestrus than individually housed sows. Conversely, however, litter wean weight and weanling survival were considerably lower in group-housed sows than stalled sows. This suggests that sow and piglet welfare may be highest if group housing is used during gestation, and sows are individually housed during farrowing and lactation. Boyle et al. (2002) supported the use of group-housing during gestation with evidence of improved manoeuvrability and comfort of sows based on behaviour

and lower incidence of skin lesions. Ruis et al. (2001) discussed the stress-reducing effect of social cohesion during gestation, while Marchant-Forde (2002) explored the higher levels of savaging and aggression observed in lactating sows housed in pens. Bornett et al (2000) provided physiological evidence (cortisol and adrenaline concentrations) supporting the occurrence of aggression and social stress in pens.

With regard to aggression and social stress, Geverink et al. (2003) investigate individual personality parameters (behavioural, physiological and pathological) which may lead to selective breeding for pig behavioural phenotypes more suitably adapted for different commercial systems. This study focused on improved welfare of individuals by investigating the relationship between a "personality" test and indicators of welfare in either stalls or pens, including behavioural stereotypies, circadian rhythm of cortisol, heart rate response to feeding, and gross pathology after slaughter. The personality test ("backtest") measures the number of times a piglet restrained on its back will attempt to rise, with higher numbers attributed to proactive or high resistance (HR) personalities, and lower numbers regarded as more reactive or low resistance (LR) personalities. Seventy-two female piglets were backtested and grown under controlled conditions until seven months old, at which age half were transferred to individual stalls. The animals were slaughtered at 14 months for post-mortem examination of heart, lungs and stomach. The stall-housed HR pigs displayed more bar-biting, lower cortisol and lower heart rate than stall-housed LR pigs. Generally, stall-housed animals had lower cortisol levels than group housed, and stomach lesions were more pronounced. The researchers attribute hypocortisolism to chronic stress; supporting this by reference to human studies. More research is needed for interpretation of physiological results. The results indicate that individual differences in pig personality become exacerbated in stall-housing. The animal welfare implications are that individual stalling causes higher stress, and that the backtest may improve welfare by facilitating selection of animals more able to cope with their environment.

Conclusion

Important conclusions from the current research link directly to improved productivity and hence should be widely accepted within the industry. These include the provision of straw to gestating sows that are preferably housed in groups to promote social cohesion and better fertility rates to farrowing. At farrowing, sows should be transferred to individual stalls to avoid aggression but be provided with sufficient space and substrate for nesting behaviours to be performed. Further research is needed towards optimising the four key parameters of welfare; behaviour, physiology, health and production; and improved welfare within groups of pigs based on personality traits.

References

Bates, R.O., Edwards, D.B. and Korthals, R.L. (2003) Sow performance when housed either in groups with electronic sow feeders or stalls. *Livestock Production Science*. 79, 29-35.

Bornett, H.L.I., Morgan, C.A., Lawrence, A.B. and Mann, J. (2000) The effect of group housing on feeding patterns and social behaviour of previously individually housed growing pigs. *Applied Animal Behaviour Science*. 70:2, 127-141.

Boyle, L.A., Leonard, F.C., Lynch, P.B. and Brophy, P. (2002) Effect of gestation housing on behaviour and skin lesions of sows in farrowing crates. *Applied Animal Behaviour Science*. 76:2, 119-134.

Cronin, G.M., Simpson, G.J. and Hemsworth, P.H. (1996) The effects of the gestation and farrowing environments on sow and piglet behaviour and piglet survival and growth in early lactation. *Applied Animal Behaviour Science*. 46:3-4, 175-192.

Damm, B.I., Lisborg, L., Vestergaard, K.S. and Vanicek, J. (2003) Nest-building, behavioural disturbances and heart rate in farrowing sows kept in crates and Schmid pens. *Livestock Production Science*. 80, 175-187.

Geverink, N.A., Schouten, W.G.P., Gort, G. and Wiegant, V.M. (2003) Individual differences in behaviour, physiology and pathology in breeding gilts housed in groups or stalls. *Applied Animal Behaviour Science* 81, 29-41.

Grandin, T. (2003) The welfare of pigs during transport and slaughter. *Pig News and Information*. 24:3, 83N-90N.

Hartsock, T.G. and Barczewski, R.A. (1997) Parturition behaviour in swine: effects of pen size. *Journal of Animal Science*. 75:11, 2899-2904.

Marchant-Forde, J.N. (2002) Piglet- and stockperson-directed sow aggression after farrowing and the relationship with a pre-farrowing, human approach test. *Applied Animal Behaviour Science*. 75:2, 115-132.

Ruis, M.A.W., de Groot, J., te Brake, J.H.A., Ekkel, E.D., van de Burgwal, J.A., Erkens, J.H.F., Engel, B., Buist, W.G., Blokhuis, H.J. and Koolhaas, J.M. (2001) Behavioural and physiological consequences of acute social defeat in growing gilts: effects of the social environment. *Applied Animal Behaviour Science*. 70:3, 201-225.

Thodberg, K., Jensen, K.H. and Herskin, M.S. (2002) Nursing behaviour, postpartum activity and reactivity in sows: effects of farrowing environment, previous experience and temperament. *Applied Animal Behaviour Science*. 77:1, 53-76.