Improving Pig Welfare by Decreasing Social Hierarchy Stress

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Introduction

An appreciation and concern for the social behaviour of production animals is necessary because of the crowded nature of most production systems. In highly social species, such as pigs, interactions between familiar and unfamiliar conspecifics play a key role in the development of social behaviours and aggression (Kanaan *et al*., 2008; Stookey & Gonyou, 1994). Domestic pigs employ a dominance hierarchy social system wherein unfamiliar pigs establish social ranks through fighting and rank modification based on the outcomes of these fights (Meese & Ewbank, 1972). Frequent regroupings create social stress that may lead to physical trauma and compromise animal welfare. Problems like these affect growth rates and reproductive success and consequently the financial success of a pig producer (Coutellier *et al*., 2007; Stookey & Gonyou, 1994). Understanding and minimising the stress associated with regrouping has been a focus of recent research related to production pig welfare.

Discussion

Habituating young pigs to unfamiliar individuals may be one way to decrease aggression among piglets. A study by Kanaan *et al*., (2008) looked at co-mingling of litters and its effects on pre-weaning growth, specific welfare parameters and overall aggression among piglets. This study was based on the knowledge that when pigs are mixed and relocated the result is agonistic behaviour, biochemical changes and often declines in weight gain. These responses had previously been attributed to lack of social hierarchy among newly introduced animals, where fighting is used to appraise unfamiliar pigs and form new social ranks (Coutellier *et al*., 2007). In the 2008 study, 20 litters were co-mingled 13 days after birth, a total of 10 pairings. Researchers noted suckling behaviours, weight gains, coping abilities and agonistic behaviour.

The authors concluded that co-mingling of pre-weaned piglets has an effect on social behaviour while not affecting weight gain or suckling. Co-mingled piglets had increased ear injuries 2 days after co-minglings, but overall the primary effect of co-mingling was in decreasing aggression during stressful social situations and increasing the time spent in proximity to unfamiliar individuals during challenges (Kanaan *et al*., 2008).

If co-mingled piglets are less agonistic and more relaxed in close proximity to unfamiliar individuals, as this research suggests, it could be worth adopting in a system where aggression among young pigs is a welfare problem. Studies have shown that confined conditions, such as crowded pens and paddocks, create social pressures and consequently an increased occurrence of aggressive behaviour (Meese & Ewbank, 1972). Any efforts made to decrease the stress and possible physical trauma associated with these social challenges could increase animal welfare in intensive pig production systems.

Production pigs exhibit less agonistic behaviour as they age. This could be attributed to possible habituation to social challenges or it could be age-related (Coutellier *et al*., 2007). A recent project by Puppe *et al*., (2008) examined social hierarchies of pigs at different life stages. The researchers observed groups of weaners, growers and reproductive sows to investigate the formation of social hierarchies in these groups and to calculate predictive measures for the formation of social ranks.

Each of the groups in the study developed social hierarchies and showed some agonistic behaviour. There were only minimal differences between the weaner and grower groups with respect to aggression and fighting. The researchers attributed this to younger pigs learning to gauge the fighting ability of opponents and gaining additional experience on social cues. In contrast, the reproductive sow groups showed fewer agonistic interactions during hierarchy

formation. The authors postulated that sows depend less on aggressive interactions because, for them, fighting injuries have a potentially higher biological cost. Injuries can decrease reproductive success and it is possible that mature sows have developed alternative ranking mechanisms to minimise this risk. The study concluded that if young pigs are provided with repeated opportunities to socialise during key periods of growth, their social skills may be improved, which could help minimise aggressive behaviour attributable to hierarchy formation (Puppe *et al*., 2008).

Sows depend less on agonistic behaviour in new social situations, but social stress is one of the challenges pregnant sows face during gestation due to changes to group composition (Couret *et al*., 2009; Puppe *et al*., 2008). In an intensive production system, unfamiliar sows are often grouped together based on age and body weight (Couret *et al*., 2009). This necessitates the formation of a new social hierarchy each time they are regrouped and leads to aggression. Social stress and physical injuries are detrimental to the welfare of pregnant sows. Couret *et al*., (2009) recently examined the effect of social stress in pregnant gilts, looking specifically at behavioural, endocrine and immune responses.

The researchers impregnated 36 gilts and housed each separately for 4 months. They moved two unfamiliar pregnant gilts into a pen together and evaluated aggressive behaviour. Selected groups of pregnant gilts were exposed to repeated social challenges by changing pairs twice a week to form new pairs of unfamiliar animals. Associated with the social groupings, the gilts showed an increased cortisol response, stimulation of the hypothalamo-pituitary-adrenal axis and vigorous agonistic behaviour. The study noted that the outcome of conflicts seemed to influence the degree of cortisol release. Sows of high dominant success tended to have elevated cortisol concentrations for longer duration than less dominant gilts following social groupings. Overall, they found no measurable impact on pregnancy success, litter size or overall health of the piglets (Couret *et al*., 2009).

Of particular note was the observation that both the physiological stress responses and agonistic behaviours declined as the number of groupings increased. This may have resulted from habituation to repeated stress, adoption of new coping mechanisms or, as discussed in the study by Puppe *et al*., (2008), a more efficient strategy for establishing hierarchies that limited aggression and injury (Couret *et al*., 2009).

Conclusion

Research into social behaviours of domestic pigs has shown that the establishment of social hierarchies is a necessary but stress-inducing event for domestic pigs of all ages. Possible measures to decrease social hierarchy stress include co-mingling pre-weaned piglets, developing a better understanding of hierarchy formation, and considering social stress when re-grouping pregnant sows.

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