

Piglets and Weaning: Improving Welfare of Piglets by means of Diet and Environment

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Word count: 1002

Introduction

Weaning piglets in intensive piggeries is an ongoing welfare concern. Stress, often encountered by these piglets, is defined as requiring the animal to make abnormal or extreme adjustments in its physiology or behaviour in order to cope with adverse aspects of its environment and management (Fraser *et al.*, 1975). Stressors encountered during weaning include abrupt change in diet and environment, mixing of non-littermates, lack of appropriate stimuli, separation from sow, as well as weaning at an age much earlier than natural (Gardener *et al.*, 2001). Such issues increase stress in piglets, manifested as reduced food intake, less growth, impaired gastrointestinal function, increase in undesirable behaviours and mortality (Oh *et al.*, 2010). This paper reviews three recent studies investigating dietary and environmental manipulation and its potential welfare implications for piglets during weaning.

Discussion

Natural weaning entails a gradual transition from sow's milk to solid food. In contrast, commercial weaning makes an abrupt transition (Gardener *et al.*, 2001) impacting on metabolism, growth and health of piglets (Araújo *et al.*, 2010). Araújo *et al.* (2010) investigated the effects of a dietary protein source on the behaviour of the piglets post-weaning. A total of 48 piglets were separated into three treatment groups: corn and soybean (CS), corn, soybean and milk powder (CSM), and corn, soybean and plasma (CSP). Piglets fed CSM or CSP diets showed greater weight gain and reduced prevalence of undesirable nosing and agonistic behaviour, suggesting reduced stress and, thus, better welfare. In comparison, piglets fed the CS diet showed higher manifestation of nosing and agonistic behaviour, spent less time at feeders and had lower weight gain. The increased time spent at the feeder and increased weight gain of piglets fed CSM or CSP diets is thought to be due to the palatability and digestibility of the protein source. Therefore, palatability and digestibility of post-weaning diet can be increased with protein supplementation and is a significant tool in facilitating the transition from milk to solid food. These results differed from Gardner *et al.* (2001), who found no significant influence of diet on the frequency and intensity of belly-nosing behaviour and time spent at the feeder. This may be explained by the difference in weaning ages of piglets. To reinforce Araújo *et al.*'s (2010) findings, further research on the influence of protein supplement at various weaning ages is necessary.

Oostindjer *et al.* (2010a) tackled abrupt change of diet during weaning by investigating prenatal flavour exposure and its effect on the preference of similarly flavoured food, growth, health and behaviour of newly weaned piglets. Piglets were prenatally and/or postnatally exposed to anise flavour via the maternal diet: not exposed (CC), exposed postnatally (CF), exposed prenatally (FC), exposed pre- and postnatally (FF). They were offered both flavoured and unflavoured food post-weaning. Prenatally exposed piglets (FC, FF) showed greater food intake and growth post-weaning, reduced prevalence of stress-related behaviours (mounting, vocalisation, escaping, aggression and oral manipulation) and reduced diarrhoea compared with piglets without prenatal exposure (CC, CF). The reduced prevalence of diarrhoea indicates improved health and thus welfare of piglets. Moreover, it was found that postnatal exposure without prenatal exposure did not have any significant effect on growth, health or behaviour. Piglets also consumed less anise-flavoured food compared to control food indicating no preference for similar flavoured food. Thus the effects of prenatal exposure are likely to be established by reduction in stress due to the presence of a familiar flavour or an increased acceptance of similar food types (generalisation). This study suggests that prenatal flavour exposure is a more valuable tool than postnatal exposure. Limitations include the fact that there might not have been 100% uptake of anise-flavoured food by sows pre- and postnatally possibly affecting the concentrations passed on to piglets. Additionally, there was

no control over suckling frequency and volume of milk ingested by individual piglets, so piglets may have been exposed to different concentrations of anise-flavour via maternal diet.

Instead of outdoor rearing as a form of enrichment, Oostindjer *et al.* (2010b) investigated the effects of indoor loose housing of the sow during lactation and enrichment of the pen pre- and post-weaning on the performance of newly weaned piglets. Pre-weaning piglets were housed in enriched (increased pen size, wood shavings, peat, branches and straw) or barren pens with confined or loose sows. Piglets were subsequently mixed at weaning and relocated into enriched or barren pens. Piglets exposed to pre- and post-weaning enrichment showed increased food intake and growth. Additionally, results showed that loose-housed sows promoted growth of piglets during the pre-weaning period. Nevertheless, it was found that post-weaning enrichment is beneficial for piglets independent of pre-weaning treatments. Post-weaning enriched piglets also had fewer days of diarrhoea, whereas more piglets from barren environments had diarrhoea for one day or more. These results indicate beneficial outcomes of post-weaning enrichment and, to a lesser extent, pre-weaning enrichment, so the post-weaning environment is crucial in improving the welfare of piglets.

The environmental enrichment in this study mimics to a certain extent that of an outdoor pen, which may explain the increased growth rate of the piglets, through increased exploratory, social and feeding behaviours (Johnson *et al.*, 2001). However, the extent of this interpretation is limited as this study measured only production performance and prevalence of diarrhoea. To strengthen the results of this study, observation of explorative, social and feeding behaviours at weaning could be implemented. Additionally, due to the lack of evidence from this study, we cannot conclude that loose-housing of sows is proved beneficial for piglets at weaning. Since previous studies indicate otherwise, further research into loose sow housing conditions and the effect on piglets during lactation is needed.

Conclusion

These studies show that a variety of management techniques can be implemented to improve growth rate, adaptation to weaning, reduction of undesired behaviours and gastrointestinal disturbances, resulting in less stress and thus also improving welfare for piglets. Protein supplementation, prenatal exposure to flavour and environmental enrichment have all emerged as significant tools in improving the management of piglets and thus welfare during weaning.

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