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Influence of individual predisposition, maternal experience and lactation environment on the responses of pigs to weaning at two different ages

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Abstract

This study assessed the effect of predisposition to perform harmful social behaviour, maternal rearing environment, and lactation environment on the responses of pigs to weaning at 3 or 5 weeks of age. Predisposed and non-predisposed gilts were selected as dams for this study at 7 weeks of age. Selection was based on behaviour in a “tail chew” test and performance of harmful social behaviour towards penmates. The gilts were mated at puberty with boars of a similar predisposition, and farrowed at approximately 44 weeks of age. Half of the gilts of each predisposition were reared from the time of selection until farrowing in barren environments, and half in enriched environments. During lactation, gilts and litters were either housed in a similar environment to that which gilts had experienced during rearing, or in a different environment (i.e. in terms of being barren or enriched). Litters from each treatment group were weaned at either 3 weeks of age (early weaning), or 5 weeks

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of age. After weaning, piglets were regrouped and housed in slatted pens without access to substrates. Non-predisposition to perform harmful social behaviour was associated with reduced growth during the post-weaning period ($P < 0.01$), and increased belly nosing behaviour in response to early weaning ($P < 0.05$). These effects were not mitigated by maternal experience or lactation environment factors, and it is concluded that this type of selection may not be commercially viable. Rearing dams in barren rather than enriched environments led to reduced welfare in offspring. This was reflected in increased adrenocortical reactivity during the lactation period ($P < 0.01$), and increased belly nosing behaviour in response to early weaning ($P < 0.05$). The effect of barren maternal rearing environments on belly nosing behaviour by offspring was eliminated when pigs were housed in enriched lactation environments ($P < 0.01$). Enrichment during the lactation period also led to improved growth rates in the post-weaning period ($P < 0.01$). It is suggested that this effect was due to an enhanced ability to cope with the weaning process. Overall, the results show that both genetic and early environmental factors are important determinants of the responses of pigs to weaning. Adverse effects of barren maternal rearing environments may be overcome by housing pigs in enriched lactation environments.

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Keywords: Early weaning; Harmful social behaviour; Maternal experience; Pigs; Predisposition

1. Introduction

Under natural conditions, weaning is a gradual procedure that may not be complete until pigs are 17 weeks of age (Jensen and Recén, 1989). Under commercial conditions, however, weaning often occurs abruptly at a younger age (typically at 3–4 weeks of age), and this constitutes a considerable stressor for pigs (Worsaae and Schmidt, 1980). Evidence suggests that stress associated with weaning increases with decreasing weaning age (Metz and Gonyou, 1990; Weary and Fraser, 1997). This stress is related to nutritional changes to which pigs are exposed at weaning, and also to social and environmental changes that occur (Fraser et al., 1998). Increased stress in the post-weaning period is associated with a reduced immune capacity (Metz and Gonyou, 1990). In addition, pigs also show reduced productivity in the form of a post-weaning 'growth check' (Pluske et al., 1997).

Commercial weaning practices may also adversely affect pig behaviour, in terms of leading to persistent belly nosing (Dybkjær, 1992) and chewing of penmates (Gonyou et al., 1998). This type of behaviour has been termed 'harmful social behaviour' as it can lead to injury in conspecifics (Beattie et al., 1995). In addition to causing injury, harmful social behaviour is undesirable as it may lead to greater levels of restlessness and aggression within groups of pigs (Fraser, 1978; Metz and Gonyou, 1990). Research shows that harmful social behaviours developed in the post-weaning period persist into the growing/finishing period (Gonyou et al., 1998).

Pigs show considerable individual variation in their responses to commercial weaning practices (Fraser, 1978; Blackshaw, 1981). This is reflected in differences in levels of harmful social behaviour (Fraser, 1978), and in growth performance (O'Connell et al., 2004). Previous research suggests that this variation may reflect genetic differences (Hessing et al., 1994a,b; Foster et al., 1998), and/or differences in early environment factors (Beattie et al., 1996; Anisman et al., 1998). It is possible that these factors have

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