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Chewable materials before weaning reduce tail biting in growing pigs

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ABSTRACT

Tail biting in pigs is a multi-factorial problem, and the early rearing environment has been proposed as a potential previously unidentified factor. The aim of this study was to test whether access to chewable material from birth to weaning reduces later tail biting. Undocked litters of 59 sows were allocated to two treatments. In the rope-and-paper treatment ($N = 30$), the farrowing pens were furnished from birth to weaning with 10 pieces of sisal rope and one plastic ball suspended on the wall, and the piglets were given newspaper and wood shavings twice a day. In the control treatment ($N = 29$), plastic ball and wood shavings were provided. The average group size was 11 piglets per pen. The piglets were weaned during week 4 after birth and transferred to growing pens, combining two or three litters from the same treatment to each pen, on average 18 pigs per pen. The growing pens were identical for both treatment groups: each had three pieces of sisal rope and a plastic chewing toy. Wood shavings were given twice a day. Behaviour was recorded on video during weeks 2, 3 and 9 after birth. Tail damage was scored during week 9. During weeks 2 and 3 after birth, oral-nasal manipulation of other piglets was less frequent in the rope-and-paper pens than in the controls ($P < 0.001$), while oral-nasal manipulation of objects was more frequent in the rope-and-paper pens ($P < 0.001$). Newspaper and sisal rope elicited more activity than the commercial pig ball ($P = 0.001$). During week 9, when both treatment groups had spent five weeks in identical post-weaning environments, oral-nasal manipulation of pen mates and objects no longer differed significantly between the treatment groups ($P > 0.1$), but there was a significant difference in tail damage. Severe tail damage (part of tail missing, or wounds with inflammation) had a mean prevalence of 9.8% in the pigs that had paper and ropes before weaning, and 32.1% in the controls ($P < 0.001$). Mild tail damage (healed or mild lesions) had a mean prevalence of 59.2% in the pigs with early experience of paper and ropes, and 44.7% in the controls ($P = 0.002$). In undamaged tails, there was no significant difference between the treatment groups ($P > 0.1$). It is concluded that providing chewable materials in early life has promising potential for reducing the severity of later tail biting.

1. Introduction

Tail biting is a problem for pig welfare and for the economics of pig production. In severe forms, it results in bleeding, partial amputation of the tail, and/or infection spreading to other parts of the body (Schrøder-Petersen and Simonsen, 2001). Tail biting can be triggered by e.g.

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deficiencies in the quality or quantity of feed, an adverse ambient temperature, insufficient ventilation, high stocking density, compromised health, genetic factors, lack of materials to chew and manipulate, or various combinations of the above (Schrøder-Petersen and Simonsen, 2001).

Lack of materials to manipulate is one of the main causes for the most common type of tail biting, the so-called two-stage tail biting, which starts with gentle manipulation of another pig's tail and proceeds to more intensive dental manipulation, bleeding and damage (Taylor et al., 2010). Straw is among the most effective materials in preventing tail biting, but its use on farms is limited because of the widespread use of slatted floors, which are incompatible with straw except in small quantities (Tuyttens, 2005). Although straw would fulfil pigs' needs better, enrichment objects are also used (van de Weerd and Day, 2009). They should be provided in sufficient numbers per pen, as pigs tend to synchronize their behaviour, especially at an early age (Docking et al., 2008). They also should be designed to improve welfare by enabling fulfilment of behavioural needs and by reducing abnormal behaviours and stress. To sustain the interest of pigs, objects have to be chewable, ingestible, deformable and/or destructible; or to involve an element of novelty, or to have an attractive odour (van de Weerd et al., 2003). However, frequency of object use alone does not equal improved welfare. In rats, it has been found that the presence of enrichment can improve welfare even when animals spend little time in direct contact with it (Abou-Ismail et al., 2010), and that frequent performance of a natural behaviour, such as excessive gnawing, can be an indication of stress (Sørensen et al., 2004).

Studies in several species have shown that enriching the captive environment in early ontogeny can yield beneficial effects in later behaviour. Deer mice have an early sensitive period during which exposure to a complex environment reduces later abnormal behaviours more efficiently than the same exposure later in ontogeny (Powell et al., 2000). In laying hens, enrichment during the first weeks of life reduces later feather pecking (Blokhuis and Vanderhaar, 1992; Johnsen et al., 1998), an abnormal behaviour similar to tail-biting in pigs. The effect of early environment on later behaviour may be widespread among vertebrates, as it has also been found in fish such as salmon (Rodewald et al., 2011).

In pigs, the majority of research on enrichment has focused on the age after weaning, but the effects of pre-weaning environment on later behaviour have also been investigated (Vanheukelom et al., 2012). Outdoor-reared piglets show less agonistic behaviour than indoor-reared ones when transferred to indoor pens after weaning (Cox and Cooper, 2001; Hötzel et al., 2004), and indoor-reared piglets direct more oral-nasal manipulation at each other (Hötzel et al., 2004). Straw during first weeks reduces agonistic behaviour later in life (Chaloupková et al., 2007; Munsterhjelm et al., 2009), and pigs with pre-weaning experience of straw later have a less blunted cortisol rhythm later, possibly reflecting lower chronic stress (Munsterhjelm et al., 2010). Even a small quantity of straw in finishing pens may reduce tail biting when the pigs have had early experience of straw (Day et al., 2001), although this effect has not been found in other studies testing for it (van de Weerd et al., 2005; Statham et al., 2011). On farms, straw before weaning correlates with a lower prevalence of tail biting later (Moinard et al., 2003), but in the latter study it was not possible to discern the effects of straw given before or after weaning, as most of the farms with pre-weaning straw also used it post-weaning.

The aim of this study was to test whether pre-weaning access to chewable materials can reduce post-weaning tail-biting. It was hypothesized that piglets reared with chewable objects from birth to weaning would target more oral-nasal manipulation at objects, and less at other piglets, as compared to piglets reared without chewable objects. Secondly, it was hypothesized that this early experience would result in a lasting preference to manipulate inanimate objects rather than pigs. A third hypothesis was that pigs with early experience of chewable materials would show less tail biting later in life as compared to a control group.

2. Materials and methods

2.1. Animals and housing

The study was carried out on a commercial piglet-producing farm in western Finland. Farrowings took place with intervals of three weeks, with approximately 20 sows farrowing at a time. The litters in this study were obtained by selecting a total of 64 preparturient sows from five consecutive farrowing weeks. The selection criteria included the absence of clinically observable illness, lameness and major wounds, as well as a body condition assessment of neither underweight nor overweight. Whenever there were more sows fulfilling the selection criteria than needed for that week, priority was given to multiparous sows, in order to minimize variation in sow-piglet interactions caused by inexperience of gilts.

Five of the 64 litters had to be excluded from the study during lactation: one of the sows died, three sows were transferred to hospital pens or to slaughter, and one sow persistently attempted to escape from the farrowing crate, potentially affecting the behaviour of the piglets. Therefore, the litters of 59 sows were used in the study. Seven sows were of Norwegian Landrace and 52 were Yorkshire-Landrace crosses. Nine of the sows were primiparous and 50 were multiparous. The semen with which the sows had been inseminated was a commercially obtained mixture originating from several boars, the majority of which were Yorkshire-Landrace crosses.

Housing and husbandry followed conventional commercial practices, except for the chewable materials for piglets. The sows were crated during the entire lactation. Each farrowing pen had a floor area of 2 m × 2.5 m, including the farrowing crate. The pen floor outside the crate was a plastic-covered slatted floor, with a solid heated creep area of 0.4 m × 1 m. Inside the crate, the front half of the floor was slatted metal floor, and the rear half was solid concrete floor.

The mean number of live-born piglets was 12 piglets per litter, ranging from 4 to 18. Cross-fostering to even out litter sizes was carried out during the first days after birth, following ordinary commercial farming practices and

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