Applied Animal Behaviour Science xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

Tail posture predicts tail biting outbreaks at pen level in weaner pigs

Helle Pelant Lahrmann[a,*], Christian Fink Hansen[a], Rick D'Eath[b], Marie Erika Busch[a,1], Björn Forkman[c]

[a] SEGES, Danish Pig Research Centre, Axeltorv 3, 1609 Copenhagen V, Denmark
[b] SRUC, West Mains Road, Edinburgh EH9 3JG, UK
[c] Department of Veterinary and Animal Sciences, University of Copenhagen, Grønnegårdsvej 8, 1870 Frederiksberg, Copenhagen, Denmark

ARTICLE INFO

Keywords:
Pigs
Tail posture
Behavioural change
Tail biting
Tail damage

ABSTRACT

Detecting a tail biting outbreak early is essential to reduce the risk of pigs getting severe tail damage. A few previous studies suggest that tail posture and behavioural differences can predict an upcoming outbreak. The aim of the present study was therefore to investigate if differences in tail posture and behaviour could be detected at pen level between upcoming tail biting pens (T-pens) and control pens (C-pens). The study included 2301 undocked weaner pigs in 74 pens (mean 31.1 pigs/pen; SD 1.5). Tails were scored three times weekly (wound freshness, wound severity and tail length) between 07:00 h–14:00 h from weaning until a tail biting outbreak. An outbreak (day 0) occurred when at least four pigs had a tail damage, regardless of wound freshness. On average 7.6 (SD 4.3) pigs had a damaged tail (scratches + wound) in T-pens on day 0. Tail posture and behaviour (activity, eating, explorative, pen mate and tail directed behaviour) were recorded in T-pens and in matched C-pens using scan sampling every half hour between 0800–1100 h 1700–2000 h on day -3, -2 and -1 prior to the tail biting outbreak in T-pens. Further, to investigate if changes in tail posture could be a measure for use under commercial conditions, tail posture was recorded by direct observation from outside the pen. The live observations were carried out just before tail scoring on each observation day until the outbreak. The video results showed more hanging/tucked tails in T-pens than in C-pens on each recording day ($P < 0.001$). In T-pens more tails were hanging on day -1 (33.2%) than on day -2 (24.8%) and day -3 (23.1%). Further, the number of tail damaged pigs on day 0 was correlated with tail posture on day -1, with more tails hanging in pens with 6–8 and > 8 tail damaged pigs than in pens with 4–5 tail damaged pigs ($P < 0.001$). Live observations of tail posture in T-pens also showed a higher prevalence of hanging tails on day 0 (30.0%; $P < 0.05$) than on day -3/-2 (17.2%), -5/-4 (15.4%) and -7/-6 (13.0%). No differences in any of the recorded behaviours were observed between T-pens and C-pens. In conclusion, lowered tails seem to be a promising and practical measure to detect damaging tail biting behaviour on pen level even when using live observations. However, there were no changes in activity, eating, exploration or tail-directed behaviours prior to a tail biting outbreak.

1. Introduction

Damage to pigs' tails due to tail biting has been observed in many different housing systems (Taylor et al., 2010; D'Eath et al., 2014). Today most pigs housed under conventional conditions are tail docked (EFSA, 2007), and research shows that tail docking reduces the prevalence of tail damage (Di Martino et al., 2015; Lahrmann et al., 2017). However, tail docking itself raises welfare and ethical concerns, and the European Commission recommends that pig producers reduce the need for tail docking by reducing the risk factors associated with tail biting and changing their management measures (EC, 2016).

If more pigs are to be housed with intact tails, it is essential that severe tail biting is prevented as discussed by D'Eath et al. (2016). Alongside reducing risk factors, a valuable approach to avoid severe tail biting outbreaks, is to detect and stop damaging tail biting behaviour in its very early stages (Schrøder-Petersen and Simonsen, 2001; D'Eath et al.,2014).

A review by Larsen et al. (2016) described a few experiments investigating whether behavioural changes can predict a tail biting outbreak. These experiments identified that changes in tail posture and activity level could be indicators of a future tail biting outbreak (Zonderland et al., 2009; Ursinus et al., 2014). In one study, pigs with their tails between their legs had a higher risk of having a tail wound 2–3 days later (Zonderland et al., 2009), and Ursinus et al. (2014)

* Corresponding author.
E-mail address: hla@seges.dk (H.P. Lahrmann).
[1] Present address: Chr. Hansen Ltd., Bøge Allé 10-12, 2970 Hørsholm, Denmark.

https://doi.org/10.1016/j.applanim.2017.12.006
Received 18 July 2017; Received in revised form 5 December 2017; Accepted 10 December 2017
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observed higher activity levels prior to a tail biting outbreak. These observations are supported by another small study with six tail biting pens, also suggesting that changes in tail posture and activity level might predict a tail biting outbreak (Statham et al., 2009).

So far only a few and minor studies have suggested that changes in behaviour occur prior to a tail biting outbreak either on pig or pen level. If changes in behaviour and tail posture are to be used in a commercial setting as an early warning sign of a tail biting outbreak, it is essential that these can be recognized on pen level. On commercial farms tail biting outbreaks are handled on pen level and individual differences between pigs in a pen will generally not be detected. If changes in behaviour can predict a tail biting outbreak in the early stages at the pen level, pig producers could use this measure in their daily management inspections to identify at risk pens and take steps to reduce tail biting behaviour. In addition, if certain behaviours or tail postures can predict a tail biting outbreak, this opens up the possibility to predict future tail biting outbreaks automatically by the use of sensor or camera technology (Larsen et al., 2016).

The aim of the present study was to investigate whether differences in tail posture and behaviour could be identified at the pen level between pens close to a tail biting outbreak and pens at least seven days away from an outbreak. The study was conducted at a commercial herd with undocked weaner pigs.

2. Material and methods

2.1. Ethical consideration

This experiment was conducted in accordance with the guidelines of the Danish Ministry of Justice, Act No. 382 (June 10, 1987) and Acts 333 (May 19, 1990), 726 (September 9, 1993) and 1016 (December 12, 2001) with respect to animal experimentation and care of animals under study.

2.2. Animals and housing

The study was carried out at a commercial Danish farm from November 2015 to February 2016. The subjects were 2301 undocked DanAvl crossbred ((Landrace × Large White) × Duroc) weaner pigs (7–30 kg) from four different farrowing batches with 55–60 litters per batch and 555–623 pigs per batch. Pigs were born in a loose house farrowing system (for pen design details, see Pedersen et al. (2015)). On day 3 or 4 after birth all the piglets were given iron injections (Uniferon, Pharmacosmos, Holbæk, Denmark), their teeth were ground and male piglets were surgically castrated, (with the use of a short-term analgesia). From approximately 14 days of age piglets were offered solid creep feed on the floor. Two days prior to weaning, pigs were ear tagged and their sexes recorded. At weaning, pigs were 27.7 (SD 2.8) days old and weighed 5.8 (SD 1.5) kg. At this point they were transported to a weaner facility close to the sow unit.

At weaning, pigs were sorted by size within batch and allocated to new pens with 31.1 (SD 1.5) pigs/pen. Recording of gender was missed for some pigs (2.1%). Gender distribution was 49.9% (SD 9.4) castrated males and 48.0% (SD 9.2) gilts per pen. The four experimental rooms consisted of 26 or 30 pens and 18 or 20 of these pens were included in the experiment in each batch. In total 74 pens were included in the study. Pens measured 4.85 × 2.18 m (length × width) with 7.1 m^2 solid floor and 3.5 m^2 cast iron slatted floor. Above the solid floor in the lying area a 2.16 m^2 adjustable covering was placed. Two adjacent pens shared a dry feed dispenser with two nipple drinkers, one placed in each side of the feed dispenser (MaxiMat, Skiold A/S, Sæby, Denmark). In addition, a separate water supply (drinking bowl) was placed next to the feed dispenser towards the slatted floor. Each pen was equipped with two wooden blocks hanging from a chain, not touching the floor. Pens were daily provided with approximately 350 g of finely chopped straw (Easy Strø, Dansk Dyrestimuli, Nykøbing Mors, Denmark) on the solid floor. Artificial lighting was turned on from 0600 h to 2200 h.

The ventilation system was based on negative pressure air flow from wall air inlets in one side of the building (SKOV A/S, Glyngøre, Denmark). At pigs' arrival, the room temperature was 24 °C and it was gradually lowered to 19 °C on day 42. Thermostatically controlled floor heating pipes were placed inside the floor in the lying area giving a floor temperature of 30 °C at the start of the study. The floor heating was turned off on day 14.

Pigs were fed three different commercial compound diets (ad libitum access) from 7 to 30 kg based on wheat, barley, soy protein, fish meal (the last ingredient only from 10 to 15 kg body weight), minerals and vitamins. The diets were formulated to fulfil the nutritive requirements of pigs at this age and genotype. Transition between feed compounds was done gradually over a 7 or 14 days period – depending on the age of the pigs. The age of onset of a diet transition depended on the average body weight in the pen. The experiment continued until a tail biting outbreak occurred in a pen or until the pigs were moved to the finisher barn 6.5 week after weaning.

Pigs' health was monitored once daily in the morning by the stock person, and pigs with clinical signs of disease were treated with antibiotics. Unthrifty animals and pigs with severe tail lesions (more than half the tail missing or swelling as sign of infection) were moved to hospital pens.

If a tail biting outbreak occurred (see definition in 2.3 below) new enrichment materials were added to the pens, and the biter/biters were removed from the pen if they could be identified. The pen left the study at this point, and could not re-enter the study for use as a control pen even though tail wounds had healed. Tail wound healing of tail bitten pigs was followed closely to ensure that damaging tail biting did not continue.

2.3. Tail scoring and tail posture

Of the total number of experimental animals 2259 pigs were tail scored in the farrowing stable and these pigs originated from 222 litters. From right after weaning, tail posture up (curly), down (hanging) or tucked (down and tucked into the body) and tail damage were scored three times weekly (Monday, Wednesday and Friday) until a tail biting outbreak occurred. After a tail biting outbreak, tails were scored once weekly until the end of the study (data not shown). To avoid affecting the tail posture, tail posture was scored from outside the pen before the observer entered each pen to score tail damages. Tail damage was assessed and scored using the scoring system described in Table 1.

2.4. Tail biting outbreak

A tail biting outbreak occurred when at least four pigs in a pen (~13% of the pigs) had a tail damage score of at least a wound. The day of the tail biting outbreak was determined based on the three weekly tail scorings. The daily caretaker did not record any tail biting outbreaks during daily management routines between tail scoring days. We use a numbering convention throughout this paper such that the day of the outbreak is day 0, and the days prior to the outbreak are -1, -2, -3 and so on. Tail biting outbreaks occurred in 70 pens, leaving only four pens without an outbreak in the entire study period (6.5 week).

2.5. Video recordings

An overhead video camera (Dahua 2MP HD IR Dome, Dahua, Haarlemmermeer, Netherlands) was placed above all pens and timed to record from 0700 to 2100 h from weaning until a tail biting outbreak. Due to the poor quality of the video recordings, the first batch (18 pens) had to be excluded from the video material leaving 56 pens for further analysis.

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