Applied Animal Behaviour Science 117 (2009) 181–189

Contents lists available at ScienceDirect

Applied Animal Behaviour Science

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

Influence of straw length, sow behaviour and room temperature on the incidence of dangerous situations for piglets in a loose farrowing system

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ARTICLE INFO

Article history:
Accepted 11 December 2008
Available online 23 January 2009

Keywords:
Loose farrowing system
Maternal behaviour
Nest building
Piglet mortality

ABSTRACT

Crushing of piglets can be a major problem in loose-housing farrowing systems. In this study, we investigated the influence of straw of different lengths provided as nest-building material, sow behaviour and room temperature on the incidence of dangerous situations for the piglets. Piglets were defined as in danger of being crushed if they were trapped by the sow's body or if they jumped aside in response to the lying down or rolling behaviour of the sow.

The behaviour of 22 Large White sows and their piglets was video-recorded from 10 h before farrowing until 72 h afterwards. The sows were kept in loose farrowing pens equipped with a creep area and a heating lamp. For a period of 5 days (48 h before the expected farrowing until 72 h after farrowing) 11 sows each had access to either 2 kg of long-stemmed straw or 2 kg of short-cut straw provided on the floor.

Sows in pens with short-cut straw manipulated the pen equipment more frequently during the 10 h before farrowing than sows in pens with long-stemmed straw ($P = 0.02$). The number of dangerous situations was associated positively with the time the sow spent nest-building during farrowing ($P < 0.01$) and with the occurrence of events in which she laid down laterally without leaning against a wall and with more than two piglets present during the first 3 days after farrowing ($P = 0.04$). The incidence of dangerous situations also decreased over the first days after farrowing ($P < 0.001$), increased with the time the sow spent moving around before lying down ($P = 0.04$), and was inversely related to the duration of the lying-down movement ($P = 0.05$). Moreover, the more piglets there were present during a lying-down movement the higher was the incidence ($P = 0.02$), especially if they were not grouped on only one side of the sow's body ($P = 0.03$). Room temperature was associated positively with the time it took the piglets to get to the creep area after birth ($P = 0.01$) and negatively with the time they spent there ($P = 0.02$) but did not affect the incidence of dangerous situations. Straw length had no significant influence on the total pre-weaning piglet mortality or the proportion of piglets crushed.

In conclusion, we found that sow behaviour was hardly affected by straw length but had a major influence on the occurrence of situations with a risk of crushing piglets.

1. Introduction

Crushing of piglets by the sow can account for a significant portion of total pre-weaning mortality in loose farrowing systems. For example, Blackshaw and Hagelsø (1990) and Marchant et al. (2000) reported markedly

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doi:10.1016/j.applanim.2008.12.005

higher piglet losses in loose farrowing than crate systems, mainly due to a higher incidence of crushing in the first few days after farrowing. Other studies did not find a significant difference in pre-weaning mortality between loose farrowing systems and crates (e.g. Weber, 2000; Weber et al., 2007). However, in these studies, too, the proportion of crushed piglets was higher in pens with loose-housed sows, whereas the proportion of piglets that died for other reasons was higher in crates. Consequently, knowledge of factors reducing the risk of crushing is important to ensure high productivity in loose farrowing systems and to avoid suffering in piglets due to traumas caused by crushing. In this study, we investigated three factors that might affect the incidence of dangerous situations for piglets and crushing: sow behaviour, quality of nest-building material (straw length) and room temperature.

Several studies have shown that sow behaviour has an influence on the incidence of situations with a risk of crushing piglets. Wechsler and Hegglin (1997) reported that situations in which the sow let her hindquarters fall to one side instead of lowering them vertically, or in which the lying sow rolled her body longitudinally from a vertical to a lateral position, were especially dangerous for the piglets in a loose farrowing system. They also found that the percentage of live-born piglets in which crushing was the primary cause of death correlated with the sow's responsiveness to piglet distress calls played back immediately after lying down. Marchant et al. (2001) observed that more dangerous situations arose if the sow lay down with only little piglet-directed pre-lying behaviour. Similarly, Andersen et al. (2005) reported that sows not crushing any of their piglets nosed the piglets more frequently during posture changes and responded sooner to piglet distress calls. Finally, Spinka et al. (2000) found substantial variability in maternal behaviour of sows and identified three factors to characterise maternal behaviour. The first factor was associated with a low frequency of major posture changes and careful lying-down behaviour. The second factor included high reaction scores to playbacks of piglet distress calls, and the third concerned nursing activity.

Provision of nest-building material has been shown to have an effect on maternal behaviour likely to reduce the risk of crushing. In a study of Herskin et al. (1998), sows changed positions fewer times in the first 24 h after delivery of the last piglet and reacted faster to piglet distress calls on the first 3 days after farrowing when offered sand and straw rather than no nest-building material. Thodberg et al. (1999) reported that sows provided with straw showed less nest-building behaviour during farrowing compared to sows without straw. Reduced nest-building activity is likely to be associated with fewer lying-down events and, consequently, fewer situations bearing a risk of crushing. Damm et al. (2005) varied both quality and quantity of nest-building material and compared the behaviour of sows provided with 4 kg of chopped straw at introduction into the farrowing pen and sows offered the same amount of chopped straw at introduction plus an additional 2.5 kg of long-stemmed straw from 2 days before expected farrowing until 3 days after farrowing. Data collected from 4 h pre-partum until 6 h postpartum did not show a significant difference between treatments in the frequency of nest-building behaviour and lying in lateral recumbency without changing posture.

Loose farrowing systems are equipped with a heated creep area to provide the piglets with an adequate microclimate and reduce the incidence of crushing. The creep area is installed next to the area where the sow is expected to farrow to ensure that the piglets attend the creep area soon after birth and rest there, away from the sow's body. However, with increasing room temperature piglets spend less time in the creep area (Schormann and Hoy, 2006), and it is not known whether this is associated with an increased incidence of situations bearing a risk of crushing.

The aim of this study was to determine the influence of straw length, sow behaviour and room temperature on the incidence of dangerous situations for the piglets during farrowing and over the first 3 days of life in a loose farrowing system. We hypothesised, that (a) sows provided with long-stemmed straw as nest-building material would show more careful behaviour than those offered short-cut straw, (b) less dangerous situations arise for the piglets if the sow shows careful behaviour and (c) room temperature influences the incidence of dangerous situations by affecting the number of piglets present during position changes of the sow.

2. Material and methods

2.1. Animals and housing

The study was conducted at the Agroscope Reckenholz-Tänikon Research Station ART in Tänikon from December 2006 to July 2007. The behaviour of 22 Large White sows (parity 1–11) and their litters was observed. During gestation the sows were loose-housed in groups of four to eight. About a week before the expected farrowing, they were moved individually into loose-housing farrowing pens (FAT2-pens, Fig. 1) with a floor area of 7.36 m^2. The pens were partitioned by a timber wall (1.1 m high) into a nesting area with a feeding place and concrete floor and a dunging area with a partly slatted floor. Next to the nesting area, a creep area (1.5 m × 0.6 m) with a 250-W heating lamp was installed. The creep area was separated from the nesting area by iron bars. The bars allowed piglets to enter the creep area but prevented the sow from putting her head through. The sows were fed with liquid food twice a day and a handful of hay in the morning. Water was provided by nipple drinkers in the dunging area. Dung was removed from the pens twice a day.

Nest-building material was provided in the nesting area. The sows were let into the pen approximately on day 107 of pregnancy and given short-cut straw until day 111. On day 112, 11 sows each were randomly selected and provided with either 2 kg of long-stemmed or 2 kg of short-cut wheat straw. All sows had access to the assigned straw quality for at least up to 2 days before farrowing. Until 3 days after farrowing, soiled or eaten straws were