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Strategic use of straw increases nest building in loose housed farrowing sows

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ABSTRACT

In spite of domestication, sows are still genetically programmed to perform nesting behaviour close to farrowing. In order to facilitate nest building, a method for a strategic use of large quantities of straw has been developed by Swedish piglet producing farmers. The objectives of the present study were to quantify the effect of strategic use of 15–20 kg of chopped straw given once 2 days prior to expected date of farrowing, compared to small daily amounts (0.5–1 kg) and 2 kg close to farrowing (controls), on the nest building behaviour and the duration of farrowing. The behaviour from 18 h pre-partum until 1 h after birth of first piglet and the duration of farrowing was continuously observed in 138 video recordings from 4 commercial farms. On each farm, 20–34 sows (parity ≥ 2) were studied during one or two consecutive lactations. Compared to controls, strategic use of straw triggered the sows to start nest building earlier and increased the total time spent nest building pre-partum by 19% ($p = 0.039$). Sows given large amounts of straw also performed less nesting behaviours during the first hour after birth of the first piglet. This shows that nest building is affected not only by the presence of straw, but also by the quantity of straw provided, and that 2 kg of chopped straw seems to be too little to make the sow terminate nest building well in advance of farrowing. There was no significant effect of treatment on the duration of farrowing but a strong negative association was found between time spent nest building pre-partum and the duration of farrowing regardless of treatment. The model predicted a 1-h increase in total nest building time pre-partum to be associated with a 12% (95% CI = 4–19%) shorter duration of farrowing ($p = 0.004$).

1. Introduction

In spite of domestication, sows are still genetically programmed to perform nesting behaviour close to farrowing. In nature, the construction of a nest is crucial for the piglets' survival and it is regulated by both hormones (Algers and Uvnäs-Moberg, 2007) and environmental feedback (Jensen, 1993; Burne et al., 2000).

The importance of nest building is well-documented (Wischner et al., 2009; Vanheukelom et al., 2012). It has been demonstrated that housing which provides opportunities for sows to express their nest-building behaviour will decrease the duration of farrowing (Cronin et al., 1993; Thodberg et al., 1999; Oliviero et al., 2008). Prolonged farrowing (≥4–5 h) is not desirable since it is associated with an increased probability of stillbirths (Canario et al., 2006), a higher incidence of post-parturient disorders (Tummaruk and Sang-Gassanee, 2013) and decreased fertility (Oliviero

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et al., 2013). Worldwide, farrowing sows are however often confined in barren pens or crates which do not allow performing of nesting behaviour. EU Council Directive 2008/120/EC states that "*in the week before the expected farrowing time sows and gilts must be given suitable nesting material in sufficient quantity unless it is not technically feasible for the slurry system used in the establishment*". The quantity that should be regarded as "sufficient" is however not defined. In fact, the necessary amount and type of substrate remains to be determined (Baxter et al., 2011). With free access to straw, loose housed sows may use up to 25 kg for building a nest (Arey et al., 1991).

In Sweden, piglet producing farmers have developed a method for a strategic use of large quantities of straw for loose housed farrowing sows. These farmers supply their sows with 15–20 kg of chopped straw once 2 days prior to expected farrowing. Gradually the straw drains through the slatted floor (Westin et al., 2013) and is then replaced by a daily supply of 0.5–1 kg straw in accordance with common Swedish management routines. One purpose is to facilitate nest building in a partly slatted pen for loose housed sows. The method has been shown to be technically feasible (Westin et al., 2013), and to prevent bruising and increase weight gain in piglets (Westin et al., 2014).

The objectives of the present study were to quantify the effect of a large quantity of straw (15–20 kg) given before farrowing, compared to small daily amounts (0.5–1 kg), on: (a) the total sum of time spent on nest building behaviours performed within 18 h pre-partum and the sum of nest building performed within 1 h after birth of the first piglet; (b) the point in time when the sow have performed 50% of her total sum of nest building pre-partum, and (c) the duration of farrowing and the number of stillborn piglets.

We hypothesised that the strategic use of straw increases the time spent nest building pre-partum and decreases nest building activities after birth of the first piglet. We also hypothesised that an increase in nest building will lead to a shorter duration of farrowing and fewer stillborn piglets.

2. Materials and methods

This study was approved by the Ethical Committee on animal experiments in Gothenburg.

2.1. Farms, housing and management

The study was carried out in 2009 as four cohort trials on commercial piglet producing farms (A, B, C and D) in South-West Sweden (Table 1). The farms were selected based on the following criteria: (a) farm situated within 50 km from the university campus in Skara; (b) manure system capable of managing large quantities of straw; (c) piglet production based on batch-wise farrowing with at least 30 sows farrowing in the same batch; (d) all sows kept loose housed during farrowing and lactation; (e) farmer and stockpersons willing to participate in the study.

During gestation, sows were group-housed in deep-litter straw systems with individual feeding stalls. Sows entered the farrowing units 4–5 days before the first sow in the batch was expected to give birth. In the farrowing unit, all sows were loose housed in pens with solid concrete flooring in 50% of the total pen area and 50% slatted flooring. The slurry systems were based on liquid manure with mechanically operated scrapers directly under the slatted floor. Feeding and management were in accordance with the farms' regular routines.

2.2. Animals

On each farm, 20–34 sows (parity ≥ 2) were studied during one or two consecutive lactations in the spring (piglets born between March 10 and June 6) and autumn (piglets born between August 10 and November 3). In total, 159 farrowings were recorded (Table 1). All farrowings occurred spontaneously, i.e. without pharmaceutical induction.

Within each farrowing batch, 10 pens were allocated to receive a large amount of straw (15–20 kg, STRAW-treatment) while the adjacent ten pens received small amounts (0.5–1 kg, CONTROL-treatment). The farmer distributed the sows across pens without knowledge of pen assignment. Hence, treatment was randomised and sows were equally distributed between treatments. The 56 sows that remained in the batch for a second lactation switched treatment group.

2.3. Provision of straw

STRAW sows were provided with 15–20 kg of chopped straw 2 days prior to expected farrowing (Fig. 1). The straw

Table 1
Overview of animals and housing conditions on participating farms.

	Farm A	Farm B	Farm C	Farm D
Breeds of sows	Swedish Landrace × Yorkshire	Swedish Landrace × Yorkshire	Swedish Landrace	Swedish Landrace × Yorkshire
No. of sows in herd	600	540	266	594
No. of sows in study	34	23	20	28
No. of farrowings recorded	39	40	40	40
No. of farrowings observed	25	37	37	39
Size of farrowing pen	6.4 m^2 (2.0 m × 3.2 m)	6.2 m^2 (2.08 m × 2.97 m)	6.0 m^2 (1.97 m × 3.07 m)	6.2 m^2 (1.95 m × 3.2 m)
Available free space for the sow	4.6 m^2	4.5 m^2	4.9 m^2	4.6 m^2
Type of solid floor	Concrete	Concrete	Concrete	Concrete
Type of slatted floor	Cast iron	Cast iron	Plastic	Cast iron
Slat width	11 mm	15 mm	18 mm	11 mm
Width and length of slot openings	11 mm × 200 mm	10 mm × 200 mm	11 mm × 95 mm	10 mm × 200 mm