

Improved udder access prolongs duration of milk letdown and increases piglet weight gain

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ABSTRACT

Nursing-suckling behaviour and piglet weight gain were compared in traditional Danish farrowing crates and farrowing pens where sows were free to roam to determine if improved access to the udder could increase the milk intake of the piglets. The experiment was conducted in a Danish production herd, and behaviour and weight gain were registered on day 14, 15, 27 and 28 post-partum. The nursing-suckling behaviour was video recorded, and the duration of the milk letdown was used as an indicator of the milk intake of the piglets.

The milk letdown lasted 8.5 s for the sows housed in crates and 10.3 s for the sows housed in farrowing pens. The 1.8 s longer duration ($P < 0.001$) could be due to more peaceful piglets and calmer sows in the farrowing pens; the piglets had fewer teat fights ($P = 0.009$) and less piglets missed the milk letdowns ($P < 0.001$). The sows housed in farrowing pens terminated fewer nursings ($P < 0.001$), and thereby allowed the piglets to post-massage longer ($P < 0.001$). Litter size did not influence the duration of milk letdown. The piglets housed in the farrowing pens had a higher weight at day 28 post-partum ($P = 0.019$) compared with the piglets housed in crates. The higher weight indicated that the piglets in the farrowing pens with easier access to the udder had a higher milk intake.

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1. Introduction

The productivity of commercial piglet production largely depends on the number of weaned piglets per sow. However, producers also aim to produce large piglets at weaning with little variation in weight within litters. Weight at weaning is higher for piglets housed in farrowing pens than for piglets housed in crates (Biensen et al., 1996; Moustsen and Poulsen, 2004). This is most likely due to higher milk intake by the piglets in the farrowing pens. Milk is not present in the teats of the sow constantly, but only during milk letdown. The teats must be stimulated by the piglets before milk letdown can occur (Ellendorff et al., 1982; Gill and Thompson, 1956). Consequently, nursing in pigs follows a specific behavioural pattern that is normally divided into five phases (Whittemore and Fraser,

1974). In phase 1, the piglets gather by the udder to find their respective teat. The piglets massage the udder in phase 2, and in phase 3, they suckle with slow mouth movements. Milk letdown occurs in phase 4, lasting for 10–20 s (Brooks and Burke, 1998). Finally, in phase 5, the piglets massage the udder again. Nursings happen every 40–60 min (Hartmann et al., 1997), and the piglets digest approximately 45–55 g milk per nursing (Theil et al., 2007). So, the duration of the milk letdown can be determined by observing the behaviour of the piglets as they suckle with rapid mouth movements during milk letdown (Brooks and Burke, 1998; Hartmann et al., 1997).

Arey and Sancha (1996) and Cronin and Smith (1992a,b) showed that nursing and milk letdown lasted longer for sows housed in the farrowing pens than sows housed in the crates. This suggests that piglets housed in farrowing pens obtain more milk from their sows, resulting in a higher weight at weaning.

Stress has been linked with reduced milk production. Other species, such as sheep and cattle, have lower milk production and higher blood cortisol levels, when they were exposed to

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stress (Caroprese et al., 2010). Crates inhibit the sow's ability to move compared with a farrowing pen. Inhibition of the sow's to move may cause stress. However, changes in stress for sows housed in farrowing crates or pens could not be detected by blood cortisol levels (Jarvis et al. (2006). Cronin et al. (1991) only registered differences on day 28 post-partum. Sows housed in farrowing pens had a higher feed intake than sows housed in crates (Moustsen and Poulsen, 2004). However, Williams (1995) did not observe any correlation between feed intake of sows and milk production observed as weight gain by piglets. This was not surprising as sows mobilise body reserves for milk production when feed intake during lactation is low (Williams, 1995). Thus, it is highly unlikely that the sow or her capacity to produce milk is restricting weight gain in piglets when sows are housed in crates. It is more likely that the farrowing rails of crates take up too much space in the pens and restrict access of the piglets to the sow's udder. The restricted access increases competition for teats among the piglets, disturbing the sow and terminating more nursings before milk letdown.

This study tested the premise that increased access to the sow's udder increases milk intake by piglets. We tested this premise by assessing nursing-suckling behaviour and piglet weight gain in two types of farrowing pens: a traditional Danish crate and a pen where the sows were free to roam during lactation. As indicators of milk intake we measured duration of nursings including massage periods and extended milk letdown; piglets missing milk letdowns; teat fights; sows terminating nursings, and piglet weight gain.

2. Material and methods

2.1. Experimental design

We measured the behaviour of sows and piglets during nursing and the weight gain in piglets when the piglets were farrowed in a traditional Danish crate and a pen where the sows were free to roam. These are referred to as 'farrowing pens' and 'crates'. The experiment included two treatments, where the sows were housed in eight farrowing pens or in eight crates. The experiment was conducted between January 2009 and April 2009 and was repeated three times.

2.2. Housing

The experiment was conducted in a Danish production herd (Silkeborggaard, Horsens, Denmark) with 750 sows and on-farm production of crossbred gilts. The batch-operating system was run on a weekly basis with approximately 35 farrowings per week. The piglets were weaned after 25–28 days. There were two systems for lactating sows in the herd: crates and pens for loose sows.

The experimental pens were located in two different farrowing units. The farrowing pens were located in a small farrowing unit containing 20 pens. Each measured 256 cm × 178 cm and were fitted with swing-side crates (Fig. 1). When these crates were closed, they inhibited the movement of the sow. The crate was only closed during parturition. After parturition, the sides of the crate were opened and attached to the sides of the pen, and the sow was able to move around in the pen. The creep area was covered

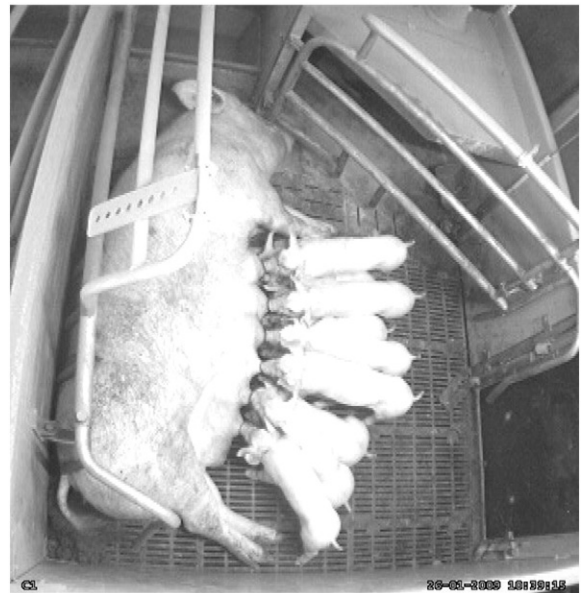


Fig. 1. Photo of the farrowing pen with swing-side crate.

and fitted with a solid floor. The floor in the sow lying area was partly slatted (40% opening) and partly drained (10% opening). The pens with crates measured 263 cm × 185 cm (Fig. 2) and were located in a farrowing unit containing 56 pens. The creep area was covered and with a solid floor. The floor in the sow lying area was fully slatted.

Both units had an equal pressure ventilation system and the same temperature strategy was used in both units.

Sows from both units were automatically fed the same liquid diet three times a day. In the unit with farrowing pens, two sows shared one feed valve and in the unit with crates, four sows shared one feed valve. The sows were provided extra dry feed after requirement. Feed was not provided to the piglets. Both sows and piglets had free access to water.

The same management routines were used in both units. Nesting material was provided in the form of straw every day until farrowing. Work routines, such as castration, tail docking, straw assignment and daily supervision, were the same in the two units.

2.3. Animals

A total of 50 Danish crossbred (Landrace × Yorkshire) sows were selected for the experiment. The sows were randomly allocated to the groups by the herd management. No first-parity sows were included in the experiment because first parity sows are smaller and do not occupy enough space in the crate for space to become a limiting factor. The average parity number of the sows was four in the farrowing pen and three in the crates. Eight out of the 50 sows were excluded from the experiment leaving 42 sows with 516 piglets. Some were excluded because they were infected with disease. Others were excluded because they stood up during the nursing, and it was thereby impossible to observe their behaviour. The litters were equalised to approximately 14 piglets in each litter on day one post-partum. In some cases, a litter was equalised to 13 piglets if the sows in one batch did not give birth to enough piglets. Piglets weighing

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