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Sow and piglet productivity and sow reproductive performance in farrowing pens with temporary crating or farrowing crates on a commercial New Zealand pig farm

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ABSTRACT

The use of a pen during lactation provides sows with more space so they can turn around freely. They are an alternative to the physically and behaviourally more restrictive farrowing crates. Previous studies have compared data from multiple pork production units using different farrowing accommodation types. This study was carried out on one commercial pig farm using two lactation systems. The objective was to examine the effect that the accommodation (pens with temporary crating until 4 days postpartum, or farrowing crates for the duration of lactation) had on the productivity of sows and piglets. Performance data was obtained from 394 sows (4706 live born piglets) in combination pens, and 338 sows (3987 live born piglets) in crates over 14 farrowing batches. Pre-weaning piglet mortality (PWM%) was significantly higher in the pen system (10.23%) than in the crate system (6.10%) ($P < 0.0001$). Penned sows were released from the temporary crate on the fourth day of lactation. A greater proportion of piglets died in the combination pens (38.8%) than in the crates (30.43%) during the period extending from the fourth day of lactation until weaning ($P < 0.0001$). Total pigs weaned per litter differed ($P = 0.0024$) between pen (10.54 ± 0.052) and crate systems (10.76 ± 0.065). The accommodation in which a sow farrowed and lactated had no significant effect on subsequent reproductive performance.

1. Introduction

In New Zealand, about 60% of all pork production units use farrowing crates (Welch, 2014). The remainder produce pork in extensive, outdoor systems. The Animal Welfare (Pigs) Code of Welfare (2010) Minimum Standard No. 10 limits the use of farrowing crates to a period that extends from 5 days before parturition until weaning occurs at a maximum of four weeks after farrowing (Anon (National Animal Welfare Advisory Committee), 2010). Farrowing crates were developed to improve production efficiency and minimise piglet mortality. Farrowing crates facilitate supervision, intervention and management of individual sows and piglets. These benefits however are offset by compromises to sow welfare. Crates limit the sow's ability to perform the pre-farrowing sequence of nest building behaviour (Wischner et al., 2009), which is largely unmodified in domesticated sows and is considered to be biologically significant (Edwards, 2008; Baxter et al., 2011). The implications of this restriction are that the sow may experience stress, and display altered or misdirected behaviour (Weber, 1984; Damm et al., 2003).

Farrowing pens were designed to address the conflict between compromised sow welfare and high piglet survival observed in crate systems. Previous research has shown that piglet survival is highly variable in farrowing pen systems. Higher piglet mortality from birth to weaning in pen-based vs. crate-based farrowing systems has been reported in Cronin

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and Smith (1992a); Blackshaw et al. (1994); Marchant et al. (2000) and Hales et al. (2014). Conversely, Weber et al. (2007); Pedersen et al. (2011) and KilBride et al. (2012) did not find a difference in piglet mortality from birth to weaning between farrowing pens and farrowing crates. The survival of piglets to weaning is one of the most important performance indicators of the farrowing and lactation period (Baxter et al., 2011). It is important that acceptable production levels are achieved in any new farrowing system, and that sow and piglet welfare is improved relative to that found in a farrowing crate.

Piglet mortality is an economic and a welfare issue. The majority of piglets that do not survive to weaning die within the first 3 days of life (Marchant et. al., 2000; KilBride et. al., 2012). The primary causes of death in this period are attributed to crushing by the sow and weakness/starvation (Dyck and Swierstra, 1987; Marchant et. al., 2000). Body movements performed by sows that can harm piglets have been described previously and have been shown to differ between farrowing systems e.g. farrowing crates and open pens (Weary et al., 1996, 1998). Temporarily confining sows for a short period of time around parturition can limit these dangerous body movements (Moustsen et al., 2013). Lower piglet mortality has been observed when sows were confined in a crate within a pen for 4 days after farrowing, relative to when sows were free to move unrestricted within a pen for the entire parturition and lactation period (Moustsen et. al., 2013). A crate in a pen used for a few days after parturition offers a compromise between confining the sow to reduce piglet mortality, whilst improving the sow's welfare during lactation period by allowing her more space to move around.

The aim of the present study was to compare the productivity of sows and piglets housed in farrowing crates or in combination pens (which confine sows in a crate from 3 days pre-farrowing until 4 days postpartum), and to determine whether the subsequent reproductive performance of sows was affected by the system (crate or combination pen) in which they had previously lactated.

2. Materials and methods

2.1. Animals and management

This study was carried out on a commercial farm in New Zealand with a herd of 1250 sows. Sows were Large White, Landrace, Duroc, and their crosses. Sow parity ranged from 1 to 10. Performance data was obtained from 394 sows (4706 live born piglets) in combination pens, and 338 sows (3987 live born piglets) in crates over 14 farrowing batches. Sows were mixed into groups of 10 at weaning. Whilst housed in groups, sows were bred by artificial insemination after detection of oestrus. All sows were loose-housed indoors in groups of approximately 10 sows for the duration of pregnancy.

Sows from the first four batches ($N=111$ in crates, 140 in pens) were weighed before being randomly allocated and moved to the farrowing accommodation 5 days before estimated parturition date (date of first mating + 115 days). Back fat measurements were taken at the P2 site (65 mm down the left side from the midline at the level of the head of the last rib) once sows were in the farrowing accommodation. Sow pre-farrowing weight ('empty' weight) was calculated by subtracting the weight of the conceptus products from the total weight of the sow, using the following equation (NRC (National Research Council), 1998):

Weight of conceptus = (N total piglets born) × 2.28 kg.

Farrowing accommodation on the farm included 30 swing-sided combination farrowing pens and 256 farrowing crates. The pens were manufactured by Vissing Agro of Denmark (Combi-Flex turn around farrowing pen). These pens measured 2.25 × 2.6 m (5.85 m^2 including creep area of 0.84 m^2) and were fitted with an internal farrowing crate that was temporarily used to confine sows pre-farrowing and in early lactation (Fig. 1). The floor was fully slatted. Each combination pen had a feed trough in one corner of the pen and a bowl drinker that was accessible to the sow and piglets at all times. The triangular creep was covered and heated via a plastic floor pad that was set at 32 °C at farrowing, and dropped 2 °C each week until weaning. Infrared lamps were not used in the combination pens. The creep areas had LED lights to attract piglets inside. The room had fan-assisted ventilation. For the first week post-farrowing room temperature averaged 25 °C in winter and 20 °C in summer.

The farrowing crates were manufactured by Big Dutchman®. Crate width was adjustable to accommodate variable sow size. Crate length was 2.0 m. The entire farrowing space (crate + creep and piglet areas) was approximately 3.84 m^2 (1.6 m × 2.4 m). Each crate had a creep area with a heated plastic floor pad for piglets which was set at 32 °C at farrowing, and dropped 2 °C each week until weaning. Infrared lamps provided supplementary heating for the first 5 days post-farrowing. The farrowing crates did not have covered creep areas. Room temperature for the first week post-farrowing averaged 25 °C in winter and 20 °C in summer.

Sows in the conventional crate treatment were confined from 5 days pre-farrowing until weaning. Sows in the combination pen system were confined inside the crate from 3 days pre-farrowing until the fourth day of lactation. This was a decision by farm management to allow safe handling

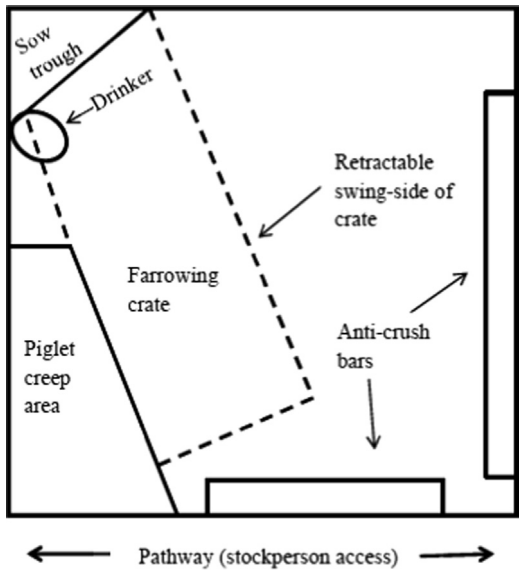

Fig. 1. The farrowing pen design.