

# Differences in Maternal Behavior Between Meishan and Yorkshire Gilts

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## ASL-R1380

### Summary and Implications

The Meishan breed from China reportedly has a lower incidence of maternal crushing compared to American breeds of sows. The objective of this study is to quantify the differences in maternal behavior that may result in less piglet crushing. Six Meishan and four Yorkshire gilts were observed and video-recorded for 48 hours after farrowing. Time spent lying, standing, sitting, and kneeling, and the number of head turns, body turns, position changes, grunts, teeth grinds, chomps, roots, bar bites, urinations, defecations, drinking, and eating were recorded. Production data were also recorded.

As expected, there were differences in birth weights, seven day weights, and weight gain ( $P < .06$ ). Meishans tended to spend more time lying at 16 hours post-partum ( $P < .07$ ), and performed more body turns in the first 12 hours post-partum ( $P < .09$ ). Yorkshire sows tended to spend more time sitting and kneeling ( $P < .08$ ).

### Introduction

Prewaning mortality continues to be a problem in the pork industry. Piglet mortality varies with different housing and husbandry methods, and ranges from 15-25% (Fraser, 1984; Curtis et al. 1989; Blackshaw and Hagelso, 1990; Blackshaw et al., 1994). Crushing by the sow accounts for a large part of this mortality. It is estimated that 3 to 6% (Baeckstroem, 1973; Svendsen et al., 1986) of pigs born are crushed by the sow. Most losses from crushing occur within 36 hours post-partum (Svendsen et al., 1986).

Recent research has investigated the design of the sow's housing in reducing preweaning mortality (Curtis et al., 1989; Blackshaw et al., 1994). Farrowing crates are the prevalent form of housing, but animal welfare concerns have renewed interest in the farrowing pen. Most studies indicate that piglet death is less in crates than in pens. Blackshaw et al. (1994) reported mortality in farrowing crates of 14%, and in farrowing pens of 32%. Baeckstroem (1973) reported crushing of 3.4% in crates and 5.9% in

pens. Further, Curtis et al. (1989) found more crushing in wide crates than in narrow crates.

Physical ability of the sow may have an effect on crushing. The larger the sow, the less physical control she may have over her body in the given space. The percentage of pigs crushed has been found to be positively correlated with sow body length (Rudd and Marchant, 1995). Sows kept in crates also receive less exercise compared to sows kept in pens, resulting in reduced cardiovascular and muscular fitness. All these factors may increase their difficulty in lying down carefully.

A sow's maternal behavior is also a factor in piglet mortality. Feral sows perform pre-lying behavior that is designed to remove pigs from the lying area (Rudd et al., 1995). This pre-lying behavior, consisting of rooting through the bedding and vocalizing to the pigs, may decrease piglet mortality. Modern genetic selection of breeding stock has emphasized growth characteristics and not maternal behavior. Therefore, maternal behavior varies widely between sows. Crates were introduced to decrease the number of pigs crushed by the sow. Rudd and Marchant (1995) proposed that crates compensate for careless lying behavior, but they inhibit careful lying behavior. Blackshaw and Hagelso (1990) reported that 79% of sows rooted before lying down on day one after farrowing when housed in pens. Sows confined to crates are hindered from performing pre-lying behaviors such as rooting. Activity level of the sow has also been found to affect piglet mortality. Svendsen et al. (1986) found that most traumas to pigs occur when the sow changes position; standing up, lying down, walking, etc. This suggests that a sow that spends more time lying quietly is less prone to crushing her pigs than a sow that is more active.

There has been some variation in crushing mortality due to breed differences. Curtis et al. (1989) found that Duroc-sired sows crushed fewer pigs than Landrace or Hampshire sired sows. Meishan pigs have been found to have a 5% advantage in piglet survival rate over Large White sows (Bidanel, et al., 1990). Meunier-Salaun et al. (1991) reported that Meishan sows had 13.6 pigs born alive, and weaned 12.4 pigs, while Large White sows farrowed 8.6 live pigs, and weaned 7.4. The superior production of the Meishan has been attributed to behavioral characteristics and a greater number of teats.

The objective of this study is to identify and quantify the differences between Meishan and Yorkshire maternal behavior that may influence the rate of crushing.

### Materials and Methods

Six Meishan and four Yorkshire gilts were moved into .6 by 2.1 meter farrowing pens in the same room 14 days before their due date. These gilts were video taped using time lapse photography for 48 hours after farrowing.

Additionally, they were directly observed for 12 hours after farrowing, with 15 minute observations every four hours from 12 to 24 hours post-farrowing. During these observations, time spent lying, standing, sitting, and kneeling was recorded, as well as the number of head turns, body turns, position changes, grunts, teeth grinds, chomps, roots, bar bites, urinations, defecations, eating and drinking. The video tapes were used to record the time the gilts spent lying, sitting, standing, and kneeling, and the number of head turns, body turns, position changes, roots, bar bites, eating, and drinking from 12 to 48 hours post-partum. A body turn was defined as a 90 degree turn. A head turn was defined as a sow moving her head laterally before lying down. These behaviors may signal that the sow is looking for her pigs before lying down. A position change was defined as a change from one position to another, such as lying to sitting. Position changes were also counted when the sow changed from lying lateral to sternal. This was used as a general measure of activity of the sow.

Production data, such as farrowing duration, average birth interval, number stillborn, number liveborn, number crushed, birth weight, seven day weight, and total weight gain, were also collected.

The Wilcoxon-Mann-Whitney statistical analysis was performed on the data to determine breed differences.

## Results and Discussion

Meishans had a shorter farrowing duration and less time between piglet births ( $P < .01$ ; Table 1). The Yorkshires were heavier at birth, gained more weight in the first week, and were heavier at seven days ( $P < .06$ ). The differences in body weight and gains were expected and confirmed the results of Bidanel et al. (1990). The differences in birth intervals was an interesting finding and may affect piglet survivability. Because Meishan piglets spend less time being born, they may be stronger and more active at birth, increasing their ability to get out of the sow's way.

During the first 12 hours post partum, Yorkshire sows tended to grind their teeth more and urinated more ( $P < .09$ ). In the 16 hour post-partum check, Yorkshires had more head turns and grunts, and Meishans spent more time lying ( $P < .09$ ). Yorkshires tended to have more position changes in the 20 hour post partum check ( $P = .09$ ). There were no differences in the 24 hour post-partum check. During the duration from 12 to 48 hours post-partum, the Yorkshires spent more time sitting ( $P < .03$ ; Table 2).

In general, the Yorkshires spent more time sitting and kneeling. This may indicate greater discomfort on the part of the Yorkshires. The Yorkshires also tended to grind their teeth and to urinate more often. These findings may be indicative of a more excited state which could be a factor in crushing. The Meishans clearly had more body turns in the first 12 hours post-partum. This may help prevent crushing, because as the sow circles, she appeared to look for her pigs and check her lying area before lying down. The Meishans had more time lying at 16 hours. This may prevent crushing, because the more time spent lying, the less opportunity for the sow to crush her piglets. Increased time spent lying and lower birth intervals may be important in the survival of Meishan piglets.

**Table 1. Production data.**

Production data	Meishan	Yorkshire	P value
Farrowing duration (h)	0.96	3.12	.01
Birth interval (h)	0.10	0.45	.01
Live born (#)	10.67	8.25	.23
Still born (#)	0.33	0.75	.54
Crushed (#)	0.17	1.00	.29

**Table 2. Behavior data 12-48 hours post-partum.**

12 to 48 h post-partum	Meishan	Yorkshire	P value
time lying (h)	34.18	33.48	.37
time standing (h)	1.72	2.06	.70
time sitting (h)	0.09	0.43	.03
time kneeling (h)	0.02	0.03	.44
head turns (#)	11.17	15.00	.70
body turns (#)	78.17	45.33	.90
position changes (#)	51.83	75.33	.52
roots (#)	1.67	0.00	.22
kneeling < 5 seconds (#)	7.67	1.67	.20

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