

Danger to Piglets Due to Crushing Can Be Reduced by the Use of a Simulated Udder

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Summary and Implications

Data collected during this study show that an object that has the smell of the sows udder, a relatively soft texture, and warmth is more effective than a heat lamp alone at drawing piglets away from the sow and into a safe area. Much more research is necessary to perfect the design and increase the probability that pigs will use this attractant soon after birth.

Introduction

The farrowing stall was introduced to reduce piglet crushing, a major cause of piglet mortality occurring when a sow lies on her piglets. Stalling the sow, however, does not completely solve the problem. Mortality rates of piglets in farrowing stalls are estimated to be between 4.8 and 18%. Even at the modest rate of 5% crushing costs swine producers in the United States more than \$499 million each year. Many studies have examined the rate of piglet crushing, trying with variable success to use different farrowing pen designs or dimensions. The overall consensus is that the typical farrowing stall saves some piglet lives, but it does not prevent crushing.

The major reason changes in pen sizes and shapes have not been successful in decreasing crushing is because piglets are attracted to their dam's udder immediately upon birth and prefer to lie there the majority of time during the first 3 days after birth. After this initial 3 days, pigs are often seen using the heat lamp instead of the sow's udder. This change of preference for lying area may help the pigs avoid death due to crushing because most of the crushing occurs in the first few days of piglet life.

The pigs' attraction to the udder is most likely dependent on odor. When a sow farrows, the majority of the piglets moves directly toward the udder, and very few venture the long way around the back. This indicates that the piglets have a drive to move toward the udder, despite their known lack of significant vision at this time. It's well established that pigs have a highly developed sense of smell within 12 hours of birth (1,2). Thus, odor is probably used for orientation by the pigs.

To investigate a novel method of decreasing piglet

crushing, the following study was conducted to determine if piglets could be drawn away from the sow's udder with an object that felt and smelled similar to the sow's udder. Therefore, the objective of this research was to determine if placement of a simulated udder in the farrowing crate for 3 days post-farrowing would draw a significant number of pigs away from the sow's udder.

Materials and Methods

Fifteen Yorkshire (Landrace sows and their litters (11.4±.78 pigs) were randomly assigned to either the control group (C, n=9) or the experimental group (SU, n=6). Sows farrowed in a conventional farrowing crate (1.5 x 2.3 m) that contained a 61-cm-wide area for the sow and two 46-cm-wide areas on either side of the sow for the pigs. A heat lamp in the piglet area was provided for C pigs, whereas a simulated udder and a heat lamp were supplied in the piglet area for the SU pigs. The simulated udder was made by placing a pillow inside a pillow case. An adjustable heating pad and two water bottles were then placed inside the pillow case and on top of the pillow. This design helped to simulate the movement, flexibility, and temperature of the sow's udder. To simulate the odor, sows assigned to the SU treatment had a piece of cotton cloth wrapped around their midsections for at least 3 days prior to their expected farrowing dates. At the initiation of farrowing, this cloth was taken off the sow and wrapped around the simulated udder to allow for transfer of the dam's odor. The udder was then placed under the heat lamp in the piglet area beside the sow. The temperature of the simulated udder was monitored using infrared video photography and was maintained at approximately 39°C by using both the heating pad and a heat lamp. The behavior of sows and piglets from both treatments was recorded for a 3-day duration starting at the initiation of farrowing.

Results

From 12 to 72 hours postpartum, excluding 24- to 36-hours postpartum, the estimated probability that piglets were in a safe area (simulated udder or heat lamp) was .89 for SU piglets compared with only .72 for C piglets (P=.005). During the 24- to 36-hour period, it was more probable to find piglets on a simulated udder (.45) than under only a heat lamp (.19, P=.005). During the 3-days postpartum, more pigs used the simulated udder than the heat lamp alone, with a ratio of .85±.005 vs. .73±.009, respectively. Examining each time period, it is clear that pigs preferred to use the simulated udder compared with

the heat lamp. Interestingly, it appears that the simulated udder is able to more effectively draw pigs away from the sow's udder soon after birth (24 to 60 hours) compared with simply using a heat lamp. This is critical because it is this period soon after birth during which many piglets are killed due to crushing.

As expected, the number of stillborn piglets, piglet crushing, and death by other means were not different between treatments (mean=.87, .60, 1.2; $P>.20$). Because piglet mortality is extremely variable between sows, a much larger sample size will need to be used to determine if the simulated udder will be effective in decreasing the rate of crushing.

Discussion

The results from this experiment are promising. The consistent finding that pigs are more likely to be found on the simulated udder compared with near a heat lamp creates an opportunity for future research to perfect a management system using this technology. Critical design characteristics need to be examined further to determine which components of the simulated udder are most attractive to pigs and how we can make them even more attractive (for instance, warmth, tactile character, odor). Application of this technology on a large scale may prove to have profound effects on the swine industry by decreasing piglet crushing.

Upon birth piglets have a highly developed sense of smell and are attracted toward the dam's udder. Morrow-Tesch and McGlone (2) found that piglets were highly attracted to the odor of their dam's feces and nipple washings, and they learned this attraction within the first 12 hours of life. Similarly, Horrell and Hodgson (1) noted that piglets were able to distinguish odors associated with their dam (urine, feces, udder) compared with a nonfamiliar dam and that they were particularly attracted to the wood shavings that had been previously associated with their dam's udder. It is intuitive that piglets should have a high attraction to their dam's udder and its associated warmth, nutrition, and comfort. And Weary et al. (3) has shown that it is more probable to find the smaller, weaker pigs near the udder, thus increasing their chance of becoming crushed. These authors hypothesized that these smaller pigs were hungry and thus maintained contact with the sow's udder to gain access to her warmth and milk.

The simulated udder used in this study was designed to address the needs of the piglets: warmth, a comfortable surface to lie on, and a familiar odor. Although future use of a simulated udder may prove to help in reducing deaths due to crushing, it is not a solution to the problem. The real problem is that sows do not respond to the distress vocalizations of their piglets. The sow is the only mammal that apparently produces large litters only to lie on a significant portion of them within days of parturition. Because of the risk associated with parturition and the repartitioning of nutrients associated with producing young-piglet crushing by the dam is not consistent with current evolutionary theory. Probably, the modern sow has been

altered through genetic selection resulting in the sows being "poor" mothers.

Future studies need to increase the attractiveness and perfect the design of the simulated udder. The use of heat lamps and pads to draw the pigs away from the sow was an effective method in increasing pig health and welfare. The added attraction of the odor and comfort should make this management technique even more effective. Widespread application of a perfected model should help to decrease piglet crushing. If a simulated udder can be developed that is highly attractive to pigs and is able to keep pigs in a safe area, then sow welfare could be enhanced by allowing sows to farrow in pens that provide them the opportunity to turn around.

References

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