# RESEARCH REPORT
## ANIMAL WELFARE

**pork checkoff**

**Title:** A prospective observational study of periparturient sow mortality - **NPB #02-087**

**Investigator:** John Deen

**Institution:** University of Minnesota

**Date Received:** February 11, 2005

**Abstract:** Sow mortality continues to be a major concern in the industry, with rates continuing to rise in the major benchmarking databases. In this project we focused on the major time of risk, namely the periparturient period. The periparturient period is defined as the time around farrowing, including five days before the due date and 21 days after that due date. In this study of approximately 20,000 farrowings, we found that 61% of mortality occurred during this time period. This resulted in a rate of mortality per day that was approximately seven times higher, when compared with the rest of the sow's farrowing interval.

For those sows that died to the major risk factors identified included:
- Low feed intake post farrowing, with 2 or more days of insignificant feed intake in the first week resulting in more dead sows
- gestation length, with shorter gestation length having higher risk of mortality
- summer and heat, with summer having a higher rate of mortality than other seasons
- sows induced with prostaglandins had a higher rate of mortality
- age was also protective, with sows less than 4 parities of age having higher rates of mortality than those four parities or older

In addition, problem sows, those that enter the farrowing crate lame, or produce more than one stillbirth, or are reluctant to rise and drink after farrowing have a very high risk of mortality during this period and need more thorough treatment protocols.

**Introduction:** Mortality and morbidity of sows is an important concern for pork production as it affects farm productivity and the well-being of sows and their progeny. Moreover, it is disconcerting to employees whose responsibility it is to take care of these pigs. The economic loss due to the death of a sow includes not only the value of the sow but also the value and opportunity costs of the piglets that could have been produced. It is an area that has been studied epidemiologically, in the past, but has not focused on the time when the majority of mortality is occurring, namely the periparturient period.

**Project Objectives:**
- Describe periparturient sow condition, behavior and farrowing activity of sows in a high risk sow herd
- Identify risk factors for mortality of sows during the period immediately prior to the farrowing due date and for the three weeks after farrowing

**Materials and Methods:**
Three large sow herds in the Midwest were studied to assess the effects of farrowing on mortality. The inventory it on these sites was approximately 10,500 sows. All farms used PigChamp as their record-keeping system. The farm shared a common gilt, feed supply and management system. This study involved two populations. The first population involved all sows in the herd and measured the following:

1. Sow parity as a measure of sow age
2. Sow injuries and lameness
3. Sow condition score
4. Sow feed intake before and during lactation
5. Number of stillbirths and mummies
6. The use of prostaglandins for induction
7. The use of injectable therapies
8. The dosage and frequency of oxytocin use
9. Litter size

This portion involved 17,117 farrowings and had 514 periparturient deaths associated with it.

In addition, a subset of 1,843 sows due to farrow were selected and were monitored intensively to assess activity of sows and identify clinical signs of sows at risk. Of these sows, 41 died during the periparturient time. The following measures were also included, in addition to those listed above:

1. Backfat at entry into the farrowing stall.
2. Time of introduction to the farrowing stall and time of farrowing.
3. Estimated duration and time of day of farrowing
4. Number of observations by personnel and number of obstetrical interventions
5. Ambient temperature in the farrowing room at time of farrowing
6. Sows were observed during the periparturient period. The measure of concern that was identified was the time that it took for as sow to stand and drink after farrowing.

Analysis was performed using a multivariate logistic regression model, with mortality as the dependent variable.

**Results:** In this study, approximately 3% of sows died between day 111 of gestation and 21 days post-farrowing. This mortality accounted for approximately 61% of the total

mortality in the herd during this two-year study period.  The rate of mortality was approximately seven times higher during the periparturient period as compared to other periods during gestation.

Using a logistic regression model, we attempted to identify the effects of independent variables, while controlling for others in the same model.  When we looked for risk factors of mortality in the larger population there were a number of obvious factors:

- Lameness.  Sows that enter the farrowing crate lame had a 40% higher relative risk of dying.

- Season.  Sows tended to die at a higher rate during the summer with the relative risk of mortality being approximately 38% higher from June to September than other months.

- Parity.  Sows of three or less parities had a higher mortality risk than older sows of approximately 26%.

- Induction. Induction increased the relative risk of mortality risk by approximately 39%.  Oxytocin was not used as part of the induction process

- Stillbirths.  When compared with litters with no stillbirths sows with stillbirths had a 27% higher relative risk of dying during this period.

- Feed intake.  Two or more days of feed intake of 1 pound or less during the first week post farrowing signified a problem sow and the sows had a higher level of mortality.  The relative risk of mortality was increased by 31%.

- Litter size.  Large litters (>12) was protective, resulting in a 7% decrease in the relative risk of dying.

- Oxytocin and injectable antibiotics after farrowing were not found to affect the relative risk of mortality, in either direction, in this study.

- Farm.  There were differences between the farms, even accounting for the above factors.  One farm had a lower risk of mortality of approximately 31% in comparison to the other farms, even after accounting for the above factors.

- In the intensive examination of prospectively monitored at-risk sows, two aspects must be emphasized. The first is that there was a 26% decrease in mortality rates when compared to the larger study. This suggests that the level of examination may have induced further interventions and care for the animals.

In this examination, the factors previously identified were included in the model and the effect of these added measures were analyzed.  The effects seen were:

- Temperature. On days when the ambient temperature exceeded 90°F, the relative risk of sow mortality approximately doubled.

- Rising to a standing position post farrowing.  The ability or interest of the sow in standing up post farrowing provided a significant protective effect from mortality,though it was correlated with some other factors.  Controlling for those factors, not rising to her feet and not drinking within two hours post farrowing resulted in an a 18% higher relative risk of mortality

Some other factors did not have an statistically significant effect.  Based on our power calculations, we would be unlikely to detect effects that resulted in less than a 15% change in relative risk.

- Acclimatizing to the farrowing crate. When controlling for gestation length, no effect was seen.

- Backfat. Sow condition scores were a better predictor of mortality than back fat.

- Obstetrical interventions and duration of farrowing. When controlling for stillbirths, this did not appear to have an effect.

**Discussion:** These factors together signify a problem sow. They are interrelated and further analysis must be done with a larger number of herds to identify in more detail the problems seen in these animals. However, the description should not be unfamiliar to many farrowing room managers. Some recommendations can be made, however.

The first is that problems such as the effect of lameness suggest that further attention should be paid to sows. The use of analgesia should be re-examined as well. Conversely, however, this should not immediately result in a higher level of the obstetrical assistance. Efforts in cooling sows can be very important and exhaustion should be avoided in all cases.

Induction of sows with prostaglandins appears to be a risk factor at this point. This, along with factors such as parity, length of gestation, and farm factors need more research.

Current work is design to identify these at risk sows using a combination of factors. It appears that certain sows exposed to a combination of factors can have mortality rates as high as 35% in a single farrowing. Treatment can be difficult and prevention is probably a better strategy.

The simple answer is that periparturient mortality involves a number of factors in a relatively short period of time. There are a number of opportunities to focus on sow longevity where much of the emphasis has been placed on preweaning mortality in the past.

**Lay interpretation:** Mortality in the farrowing crate
**John Deen**
**University of Minnesota**
**Email: Deenx003@umn.edu**
**Telephone: (612) 625-7784**

In this study, as well as others, it has been shown that the probability of dying is seven times as high during the period from day 111 of gestation to weaning (approximately 21 days) as compared to the rest of a sows reproductive lifecycle In order to significantly affect the overall rate of sow mortality, interventions will have to be directed at this timeframe. Thus the objective of this study was to analyze factors that could be used to identify sows at risk. This was done by following sows and creating a statistical model that estimated the effect of different factors on the likelihood that a sow dies.

In this study of sow mortality, approximately 3% of sows that entered the farrowing stall died before exiting. This accounted for approximately 60% of the mortality in the herds studied. When we looked at the factors that could identify problem sows, the factors included lameness at entry, hot seasons, younger parities, induction with prostaglandins, high rate of stillbirths, low feed intake, low litter size and a reluctance to get up after farrowing. These together describe problem sows or times that should have further emphasis in management in sow herds.