Clinical signs of stress in finisher pigs transported to market in the summer
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Introduction
A study conducted in 2001 in Ontario found that of 4,760,213 market weight pigs shipped to packing plants, 7969 died prior to being processed at the plant. Of those that died, 15% were classified as “subject” pigs when they were loaded into the truck.1 A subject pig is one that appears abnormal for any of a variety of reasons. Pigs shipped in the summer months were twice as likely to die in-transit compared to pigs shipped during other months of the year. The objectives of this study were to describe the numbers of subject pigs and pigs dying in-transit and the factors associated with these during the summer. Specifically, we recorded reasons for subject pig classification, clinical signs of stress as pigs were being unloaded, temperatures at the time of unloading, time spent waiting at the packing plant prior to unloading and the relationship between these variables and in-transit loss.

Materials and methods
This observational study included a weekly visit to the three largest packing plants in Ontario during July to September of 2003. Data were collected on 46,331 pigs from 250 trucks and detailed observations were made on 7351 individual pigs as they were unloaded at the plant. Specifically, every fifth pig unloaded for a maximum of 30 pigs per truck was scored for stumbling, panting, squealing, tail injury, and scratched skin. Time of arrival of trucks, wait time prior to unloading, number of pigs per truck and the number of subject and dead pigs on each truck was recorded. The reasons for subject classification, clinical signs of stress as pigs were being unloaded, temperatures at the time of unloading, time spent waiting at the packing plant prior to unloading and the relationship between these variables and in-transit loss.

Results and discussion
On average 0.27% of pigs were classified as subject. Of the 0.07% pigs that died in-transit, 34% were identified as subject prior to death. Subject classification occurred 6.1%, 30.4%, and 63.4% of the time at the producers, assembly/dispatch yard, and packing plant respectively.

The reasons for subject classification were as follows: pigs showing severe signs of heat stress (fatigued) (48.0%), lame (44.9%), prolapse (6.3%), intact males (3.1%), severe bruises (2.4%), head tilt (1.6%) and tail bitten (1.6%). In total, 7.8% of these pigs had more than one reason for the subject classification. Of the 7351 pigs observed 11.6% stumbled or fell, 5.4% panted, 4.5% squealed, 1.2% had injured (bitten) tails and 59.8% had scratches.

There were 38 pigs that died on the 250 observed trucks. The locations on the trucks where pigs were found dead were as follows: 46% bottom deck, 3% front middle deck, 15% back middle deck, 9% front top deck, 21% center top deck and 6% back top deck. Knowledge of the location on trucks where pigs are more likely to experience heat stress or die from heat stress may be used to alter stocking densities or implement cooling mechanisms in these areas.

During heat stress, pigs thermoregulate by panting and if their body temperature continues to rise they collapse and may die due to cardiovascular failure.1 Trucks with at least one dead pig were 2.0 times more likely to have panting pigs than trucks without dead pigs (P < 0.0001). Similarly, panting pigs were 2.2 times more likely on
trucks with fatigued pigs than on trucks without fatigued pigs (P < 0.0001).

Trucks waited to unload for an average of 49 minutes with a range of 2 to 198 minutes. There was no association between the time waiting to unload at the packers and the risk of pigs panting. However, as the waiting time increased by 30 minutes, the risk of dying and the risk of being a fatigued subject pig increased by 2.2 and 2.3 times respectively (P < 0.0001). The outside temperature when the pigs arrived at the packers averaged 25°C and ranged from 19 to 31°C. As the temperature on arrival at the packers increased by 10°C increments, the risk of panting, dying or being a fatigued subject pig increased 2.3, 26.7 and 26.2 times respectively (P < 0.0001).

Previous research on pig transport trailers in Ontario during the summer showed that when stopped, trailer temperature increased on average by 5.6°C. It took 56 minutes for the truck to reach its maximum temperature after the stop. The increase in temperature of the trailer while it was stopped ranged from 0°C to 25°C. Thus, as time waiting to unload at the packers increased, the temperature within the truck would have increased. This rise in temperature may be responsible for the correlation between time waiting in the yard and the risk of death or being a fatigued subject pig.

Heat stress, as indicated by counting panting pigs, was a predictor of subject classification and death during transport. Shipping pigs during the cooler hours of the day, implementing cooling mechanisms such as sprinkler systems (as observed at 2 of the 3 plants) and efforts to decrease wait times prior to unloading may help reduce loss due to heat stress and improve swine welfare.

Acknowledgements
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References

Periparturient risk factors for sow mortality
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Introduction
Sow mortality is an important economic and animal welfare concern for pork producers. Mortality is an economic drain on sow farms (Duran, 2001). In addition high sow mortality affects employee morale (Deen & Xue, 1999) and is an important welfare indicator (Broom, 1996). Currently, the suggested target for herds of more than 200 sows is to keep annual rates below 5%, and some researchers advocate increasing this target to 8 to 10% for herds of more than 1,200 sows (Duran, 2001).

Sow mortality is affected by factors related to health, management, and environment. The periparturient period, defined as the last 10% of the gestation period and the first few weeks post-partum, is a time of high risk for sows with over 50% of mortality occurring during this time (Duran, 2001; Anil et al., 2005). Parity, farrowing induction, stillbirths, and season have all been identified as periparturient factors influencing sow mortality in previous studies (Deen & Xue, 1999; Koketsu, 2000; Deen, 2003; Chagnon et al., 1991; D’Allaire et al., 1996). While not all the factors associated with sow mortality can be controlled, understanding them will assist producers in minimizing death loss. The present retrospective study analyzes the association of induction and other periparturient risk factors with sow mortality.

Materials and methods
This study involved 312,000 parity records from 16 U.S. commercial farms retrieved from the PigCHAMP database (PigCHAMP Inc. Ames, Iowa) for sows serviced between January 2001 and December 2004.

The production outcome evaluated was sow death (including euthanasia). Data on parity (1-2, 3-5, > 5), day of farrowing (weekday or weekend), pigs born alive per litter (continuous), stillbirths (0, > 0), mummies (0, > 0), season of farrowing (summer, other), induced (yes, no), and number of services (1, > 1) were retrieved from the PigCHAMP databases of the respective farms.

A multivariate logistic (Proc Logistic) regression models, with farm as a random effect variable (Glimmix macro), were fitted to evaluate the association of the selected variables with sow mortality. All statistical analyses were performed using the statistical software package, SAS v. 8.2 2001 (SAS Institute, Cary, N.C.). The reported reasons for sow removals were also collected from the PigCHAMP database, and the proportion of removals was calculated. Death and culling rates were obtained from the PigCHAMP performance monitor reports.

Results and discussion
Over the four-year period, the sow death rate on the farms in this study ranged from 4.8% to 19.1% with a mean of 8.9%. Farm records indicated that 24.9% of sow deaths were due to problems related to farrowing. Other studies have also found this period to be critical
to sows as more than 50% of mortality occurs in this time period (Duran, 2001; Deen & Xue, 1999; Anil et al., 2005; Chagnon et al., 1991).

When we applied the multivariate model, we found that parity is positively associated with sow death. This is consistent with previous studies. However, individual farm culling practices have great influence on the type of older sow removals (Deen & Xue, 1999).

Sows having litters with stillborn pigs were more likely to die than those with no stillborn pigs (P < 0.0001). Litter stillborns are related to both the viability of the pigs born and the attention given to sows during parturition (Holyoake et al., 1995). Thus the relationship of stillborns and mortality is reflective of both sow condition and management of the farrowing barn.

Only a few studies have addressed sow injury or mortality associated with farrowing induction. Studies examining different induction protocols have shown an increased need for assistance and interrupted piglet delivery with certain common induction drugs (Yang et al., 1996; Kirkwood & Aherne, 1998; Cassar et al., 2005; Kirkwood, 1999). These effects are related to more painful, stressful delivery, and greater chance for sow injury (Kirkwood & Aherne, 1998; Cassar et al., 2005), leading to further complications and sow death. In our study, sows that were induced were 11% more likely to die than those that farrowed naturally (P = 0.002).

The presence of mummies in a litter, farrowing on a weekend or weekday, number of services required for conception, and total-born-alive litter size were not associated with sow mortality, when controlling for other factors.

In conclusion, this study found measurable sow attributes, such as parity, stillbirths and induction, are significantly associated with sow mortality. Attention should be given to the periparturient sow. Inducing farrowing can increase sow mortality risk and should not be used without justification and care. This study is a retrospective observational study using computerized records from commercial farms. The results could be affected by housing, nutrition, environment, and genotype which were not measured. Results could be further biased because the data was both producer recorded and volunteered. Discrepancies between the type of removal (death, euthanasia, or culling) and reported reasons for removal were noted and are a potential source of errors.

Submitted by Morgan Morrow

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