RESEARCH ABSTRACT

ANIMAL WELFARE

Title: Evaluation of Transportation Conditions on Performance of Weaned and Feeder Pigs – **NPB #13-010.**

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Scientific Abstract:

Transportation of pigs at early ages may result in profit-stripping incidence of mortality and compromised animal welfare due to stress stemming from unfavorable transporting conditions. This project took a four pronged approach to address possible causative relationships of mortality rate, the longer term impact of transportation stress on piglets, and characteristics of the environment within a livestock trailer.

A total 7,056 records of weaned (3,174 records) and feeder (3,882 records) pig transportation for the period of April 2012 – January 2014 were provided by a U.S. swine company. Effects of pig type (weaned vs. feeder pigs), weather condition (ambient temperature <15°C or 'cool/cold', ambient temperature=15-25°C or 'mild', and ambient temperature >25°C or 'warm/hot'), travel distance (<600, 600-900, 900-1,200, 1,200-1,500, >1,500 km) and the interactive effects on pig mortality rate during transportation (death-on-arrival 'DOA'/head loaded, %) were tested; and effects of weather condition, travel distance and the interactive effects on post-transportation mortality of weaned pig were tested using generalized linear mixed models. Results show that DOA rate was affected by pig type, weather condition and travel distance interactively. Weaned pigs tended to have higher DOA rate than feeder pigs, and were more vulnerable to transport stress in warm/hot weather. For weaned pigs, DOA rate was higher with travel distance >900 km than that <900 km under cool/cold weather condition; and DOA rate significantly increased as the travel distance increased under warm/hot weather condition. For feeder pigs, DOA rate was not affected by the travel distance under cool/cold or mild weather condition; however higher mortality rate was found when pigs were transported with distance >1,200 km than that <1,200 km. Statistical analysis shows that post-transportation mortality rate of wean pigs was affected by weather and travel distance interactively for the first 1 and 2 weeks after transportation. However, it should be prudent to interpret the relationship between post-transportation mortality and transportation conditions because of other confounders, e.g. management at the finishing farm. Outcomes of this study are expected to offer insight into improving ground transportation of the pigs.

Loads of weaned pigs traveling from southern Illinois to Iowa and Northern Illinois were monitored for temperature, humidity and mortality by compartment. After QA/QC, 78 loads were used for analysis. The overall mortality of the loads was found to average 0.031% over the entire monitoring period. When examining

the estimated probability of mortality by compartment no significant differences were found (p=0.05) but the upper deck (Upper 1,2,3,4) tended to have numerically lower estimated probability in winter than the lower deck (Lower 1,2,3,4). In summer the lower deck tended to have numerically lower estimated probability of mortality than did the upper deck. There were significant interactions of ambient temperature, compartment and compartment density when examining effects on compartment temperature. Estimated compartment temperatures were compared using 95% confidence intervals for three different ambient temperatures and three different stocking densities for each compartment. At 2 C (35 F), estimated compartment temperature of Upper 1 was significantly higher than Lower 3 and Lower 4 for densities 0.75 and 0.90 ft^2/pig but all other compartments were not significantly different (p=0.50). At 16 C (60 F), estimated compartment temperature of Upper 1 was significantly higher than Lower 4 (p=0.05) at a density of 0.9 ft^2/pig but all other comparisons were not significant. No significance was found at 29 C (85 F).

In this study a $1/7^{th}$ scale model of a livestock trailer and tractor were placed in a wind tunnel to examine the flow characteristics within the eight animal compartments. Trials were run with front vents on the trailer open and closed and with and without partitions in place within the trailer. Sidewall openings were always open. When front air vents on the trailer were open, air flow tended to occur from the back of the trailer toward the front. Upper compartments tended to have higher air speeds than did lower compartments. When front air vents on the trailer were closed, air flow was more of a mixture with most of the upper compartments having front to rear flow and most of the lower compartments having back to front flow. Using partitions between compartments (gating) within the trailer tended to result in higher air flow speeds within the trailer when the front vents were open. The lower rear compartment (Lower 4) tended to have the lowest or next to lowest air flow rates while the one of the upper front two compartments (Upper 1 & 2) tended to have highest air flow rates, depending on if the front was open (Upper 2 highest) or front vents were closed (Upper 1 highest).