

Title: The Effect of Space Allowance and Season on the Welfare of Early Weaned Piglets Under Commercial and Experimental Transport Conditions - **NPB #03-147**

Investigators: N. J. Lewis and S. Wamnes

Institution: Department of Animal Science, University of Manitoba

Date Received: December 13, 2004

Abstract: Six groups of forty eight Cotswold piglets were weaned at 17 ± 1 day of age and placed on trial in one of three seasons: summer, spring or winter. Piglets in each group were transported for 24 h at one of 3 densities: recommended ($0.06 \text{ m}^2/\text{pig}$), 80 % of recommended ($0.048 \text{ m}^2/\text{pig}$) or twice recommended ($0.12 \text{ m}^2/\text{pig}$). During transport, air and bedding temperatures were collected in each density defined area. Behavioral data were collected using a VCR and 3 infra-red cameras. Piglet skin temperatures were recorded at the end of each 6 h period of transport. Following transport, piglets were placed in groups of 4, in weanling pens with free choice feed and water. Behavior was recorded for 4 days post transport using a VCR and low light level cameras. Body weights were recorded daily until 7 days post-weaning and again at 10 days post-weaning.

On average piglets dropped to 5.4 kg from a weaning weight of 5.9 kg, a weight loss of 7.8 %. Piglets reached their lowest average weight at 2.7 days post-weaning and recovered their weaning weight at 4.3 days post weaning. Piglets transported during the summer showed consistently poor production compared to winter and spring transport, with higher weight losses (9.6 % vs 6.9 % $P < 0.01$) and a longer growth check (4.9 d vs 4.0 d, $P < 0.01$). Behaviour also varied by season. Activity during transport was more prevalent in summer (25.6 %) and spring (25.2 %) than in winter (13.6 %; $P < 0.01$). Resting showed the opposite pattern with more resting during winter transport (85.7 %) than during summer (71.1 %) or spring (68.7 %; $P < 0.03$). Following winter transport resting was more frequent for 3 days, indicating a higher level of fatigue.

Serum cortisol levels were significantly higher following weaning irrespective of temperature or density during transport. Baseline serum cortisol levels averaged 42,601 picograms/ml the day before weaning and transport. After weaning/transport (24 h) cortisol levels had almost doubled to 82,915 picograms/ml. Twenty four hours later serum cortisol level had returned to baseline levels. Although temperature and density are likely to contribute to stress this was not measurable against the background of stress due to weaning.

These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed

For more information contact:

National Pork Board, P.O. Box 9114, Des Moines, Iowa USA

800-456-7675, Fax: 515-223-2646, E-Mail: porkboard@porkboard.org, Web: <http://www.porkboard.org/>

The thermal microclimate of the piglets can be judged from 3 factors, truck temperature, piglet temperature, and thermoregulatory behaviour. Both bedding temperature and air temperature above the piglets varied with season. Average hourly air temperatures above the pigs ranged from 20.4 °C to 32.2 °C in summer, while winter air temperatures rarely exceeded 8.0 °C, with temperatures dropping to hourly averages of -9.8 °C. Spring temperatures tended to be intermediate ranging from 7 to 26 °C. Air temperatures in the truck followed environmental temperatures but were 10 to 15 °C higher in winter and spring and 5 to 10 °C higher in summer. Ear temperatures followed seasonal temperature with higher temperatures recorded in summer (35 °C) than winter (16.5 °C), with spring intermediate (29.6 °C). In the summer more piglets (81.3 %) spent 75-100% of the time in transport on top of bedding or other piglets ($P < 0.01$). In the winter piglets showed a preference for being underneath other piglets or bedding ($P < 0.01$) with only 8.6% exposed for greater than 75 % of the time in transport. Theoretically, the most desirable situation in winter was to be exposed to the environment a minimum amount of time (< 25 %). This was achieved by 35.9 % of piglets. Piglets exposed for 50-75 % and 25-50 % represented 29.7 % and 25.8 % of the piglets and indicated room for improvement with changes in density or bedding type and depth.

Density affected air temperature, ear temperature and thermoregulatory behaviour of piglets. At high density air temperatures were higher (15.1 °C) than at low density (14.0 °C) with standard density intermediate (14.7 °C; $P < 0.04$). Higher ear temperatures were also recorded at the high density (27.6 °C) when compared to standard (26.6 °C) or low density (26.9 °C; $P < 0.04$). The higher temperatures associated with high density were more likely to be detrimental during the summer heat. In addition the higher densities may have interfered with thermoregulatory behaviour. At the high density fewer piglets were able to stay exposed for 75-100 % of the time (high: 39, standard: 58, low: 61) although this did not meet the criteria for significance.

At the high density in summer piglets have a higher air temperature to contend with, which is reflected in higher ear temperatures. They also have more difficulty staying exposed to the air and run the risk of hyperthermia. Higher densities in winter were not as clearly detrimental possibly because the piglets tend to huddle irrespective of space available.