

ANIMAL WELFARE

Title: Mitigating the negative effects of *in utero* heat stress on piglet welfare following weaning and transport – **NPB #18-094**

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Scientific Abstract:

In utero heat stress (**IUHS**) increases pig energy requirements during postnatal life, and this may compound weaning and transport stress. Therefore, the study objective was to mitigate the negative effects of IUHS on piglet growth performance and welfare following weaning and transport through the provision of a nutrient dense (**ND**) nursery diet formulated to meet the greater energy requirements of IUHS pigs. Twenty-four gilts were bred and exposed to thermoneutral (**TN**; n = 12; 17.5 ± 2.1°C) or heat stress (**HS**; n = 12; cycling 26°C to 36°C) conditions for the first half of gestation (d 6 to 59) and then TN conditions (20.9 ± 2.3°C) for the remainder of gestation. At weaning (16.2 ± 0.4 d), mixed-sex piglets (N = 160; 4.78 ± 0.15 kg BW) were transported (loading + transport + unloading) for 11 h 40 min from Columbia, MO to West Lafayette, IN. Piglets were blocked into pens (n = 4 pigs/pen) by *in utero* and dietary treatments: IUTN + C (n = 10 pens), IUTN + ND (n = 10 pens), IUHS + C (n = 10 pens), IUHS + ND (n = 10 pens). Treatment diets were fed from d 1 to 14 post-weaning and transport (**Period 1**), and from d 15 to 35 post-weaning and transport the C diet was fed to all pigs (**Period 2**). Production measures were taken in 7 d intervals to calculate average daily gain (**ADG**), average daily feed intake (**ADFI**), average daily energy intake (**ADEI**), gain:feed, and gain:energy intake. Blood samples were collected prior to transport (**Pre-T**), immediately following transport (**Post-T**), and on d 2, 7, 14, 28, and 35 post-weaning and transport to analyze glucose, insulin, cortisol, and non-esterified fatty acids (**NEFA**). Behavior was assessed through video-recording on d 3, 5, 8, 11, and 13 post-weaning and transport. Data were analyzed using PROC GLIMMIX in SAS 9.4. In Period 1, ADG was reduced ($P = 0.03$; 10.9 g/d) in IUHS vs. IUTN pigs. Pigs fed

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ND diets had reduced ADFI ($P = 0.02$; 8.9%) compared to C diet fed pigs during Period 1, which resulted in similar ADEI ($P = 0.24$; $1,115 \pm 46$ kcal/d). During transport, cortisol was decreased ($P = 0.03$; 25.8%) in IUHS vs. IUTN pigs. On d 2, glucose was decreased ($P = 0.01$; 13.5 ng/mL) in IUHS vs. IUTN pigs. No *in utero* treatment-related behavioral differences were observed, but lying behavior was reduced ($P = 0.03$; 4.4%) and standing behavior was increased ($P = 0.04$; 4.0%) in ND vs. C pigs. In summary, IUHS reduced growth performance in pigs following weaning and transport and providing a ND diet did not rescue lost performance.