Scientific Abstract:

Study objectives were to evaluate the effects of post-weaning transport during heat stress (HS) and thermoneutral (TN) conditions when dietary antibiotics are removed or replaced with a nutraceutical. Sixty mixed sex piglets from 10 sows (n = 6 piglets/sow) were weaned (18.8 ± 0.8 d of age) and then herded up ramps into one of two simulated transport trailers in either TN (28.8 ± 0.2°C) or HS (cyclical 32 to 37°C) conditions where they remained for 12 h. During the 12 h of simulated transport, fans were used to simulate air movement through the trailer, feed and water were withheld, and rectal temperature (Tr) was measured hourly. Following the 12 h simulated transport, piglets were unloaded from the trailer, weighed, and then housed individually in TN conditions (28.5 ± 0.1°C; 29.1 ± 0.1% RH) and assigned to one of three dietary treatments balanced by weaning weight, sex, sow, and transport environment. Treatments were dietary antibiotics [A; n = 20 piglets; 5.5 ± 0.2 kg BW; chlortetracycline (400 g/ton) + tiamulin (35 g/ton)], no dietary antibiotics (NA; n = 20 piglets; 5.6 ± 0.2 kg BW), or 0.20% L-glutamine (GLU; n = 20 piglets; 5.6 ± 0.2 kg BW) fed for 14 d. During the diet treatment period, feed intake (FI), BW, and behaviors were monitored daily. At the conclusion of the diet treatment period, all piglets were euthanized and intestinal samples were collected for histology. The Tr and post-transport BW loss were increased in HS (40.7°C and 0.43 kg, respectively) compared to TN-exposed (39.2°C and 0.27 kg, respectively) piglets during simulated transport. Throughout the 14 d dietary treatment phase, FI was greater overall (P < 0.01; 60.3%) in GLU compared to A and NA pigs, and tended to be greater (37.7%) in A compared to NA pigs. BW was greater overall (P < 0.01; 8.7%) in GLU and A compared to NA pigs, but no differences were detected between A and GLU pigs. Lying behavior was greater (P = 0.05; 11.7%) in NA compared to A and GLU piglets in the first 2 d following simulated transport. The villus height to crypt depth ratio was greater (P < 0.05) in the duodenum (12.1%) and jejunum (12.8%) for A and GLU compared to NA pigs, and greater in the ileum (15.6%) for GLU compared to A and NA pigs. In summary, withholding dietary antibiotics after weaning and transport can negatively affect piglet productivity and measures of intestinal morphology compared to dietary antibiotic administration and L-glutamine provision.