

## ANIMAL SCIENCE

**Title:** Improving production efficiency and carcass weight of finishing pigs housed under heat stress conditions by heat abatement with dietary betaine – **NPB #12-154**

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### Scientific Abstract:

Betaine is an osmolyte and has an important role in maintaining water homeostasis and cell integrity. The objective of this study was to determine the impact of dietary betaine as a heat abatement strategy in swine. Three experiments were conducted. In Experiment 1, effects of dietary supplementation of natural betaine (0, 0.10, 0.15, or 0.20%) on pig performance and metabolic status during thermo-neutral and heat stressed conditions was evaluated using 64 pigs. Heat stress reduced daily gain and feed intake and increased respiration rate and rectal temperature ( $P < 0.01$ ), as expected. Betaine appeared to reduce respiration rate and rectal temperature in heat stressed pigs ( $P < 0.05$ ), but did not have major impacts on serum chemistry or growth performance. In Experiment 2, the impact of betaine during heat stressed conditions on pig performance, production efficiency, carcass characteristics, morbidity and mortality in pigs fed with or without Paylean in a commercial production facility was evaluated. A total of 1,477 male and female pigs (initial body weight was  $91.5 \pm 0.7$  kg) were used and fed diets with betaine at either 0 or 0.2% and Paylean (no Paylean or a Paylean step-up program using 4.5 g per ton, followed after 20 to 21 days by 8 g/ton) in a 2 x 2 factorial arrangement. Betaine reduced feed intake ( $P < 0.03$ ), but did not impact any other measures of pig growth performance or carcass characteristics. Paylean improved ( $P < 0.01$ ) final body weight (by 3.4 kg), carcass weight (by 4.0 kg), carcass yield (by 1.05%), and loin depth (by 3.5 mm) and reduced backfat depth (by 2.1 mm), subsequently increasing lean percent (by 1.4%). Supplementation with Paylean improved feed efficiency ( $P < 0.001$ ) when considering whole body weight gain (0.328 vs. 0.292; a 12.3% improvement in gain per unit of feed), with a greater impact when considering feed efficiency based on carcass gain (0.256 vs. 0.212; a 20.7% improvement in carcass gain per unit of feed). In Experiment 3, a dose titration study was conducted to evaluate the impact of betaine in late finishing pigs housed under heat stressed conditions using a total of 2,193 crossbred pigs (initial body weight was  $96 \pm 1$  kg). Betaine supplementation at 0.0625, 0.125, 0.1875% had no effects on growth performance or carcass characteristics. Paylean increased ( $P < 0.05$ ) final body weight (by 2.45 kg), carcass weight (by 2.40 kg), carcass yield (+0.6%), loin depth (by 2.2 mm) and reduced backfat depth (by 1.3 mm) and, therefore, lean percent (by 0.8 %). Supplementation with Paylean improved feed efficiency ( $P < 0.001$ ) when considering whole body weight gain (0.343 vs. 0.308; an 11.4% improvement in feed efficiency), with a slightly greater impact when considering feed efficiency based on carcass gain (0.257 vs. 0.226; a 13.4% improvement in carcass gain per unit of feed intake). Collectively, these data indicate that under practical, commercial conditions, betaine did not improve pig performance or carcass characteristics when supplemented at 0.0625, 0.125, 0.1875, and 0.20% during heat stress. Supplementation with Paylean clearly improved pig performance and carcass characteristics, resulting in an immediate net economic benefit to pork producers.

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