

SWINE HEALTH

Title: Effects of enteric disease on the prevalence of fallback pigs and profitability in a commercial setting – NPB #11-084

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Scientific abstract: The objectives of this experiment were to: 1) identify the effects of piglet birth weight and transition average daily gain (tADG) on subsequent growth, mortality, and carcass composition; and 2) determine if light birth weight pigs or those from the bottom 10th percentile of tADG in a commercial setting have a greater incidence of disease or gastrointestinal lesions. A total of 1,054 pigs (Danbred 600 × Newsham NC32) were farrowed at a commercial sow farm, weighed at birth (BRW), and tagged individually. At 16 or 17 days of age, 1,054 pigs were weaned and moved to a commercial wean-to-finish barn. Mortalities were recorded on a daily basis. Pigs originated from a PRRSV negative herd, but broke with the disease in week 2 post-weaning. Pigs were weighed individually at weeks 0, 3, 6, and 22 post-weaning. Average daily gain from weeks 0 to 3 post weaning was termed transition ADG (tADG). One pig from each of the 10th, 30th, and 70th percentiles was used to create a ‘set’ of three pigs with the same gender, litter size and parity. Forty such sets were created, for a total of 120 pigs. On each of weeks 3 and 22 post-weaning, 20 sets of pigs were harvested to determine nutrient digestibility, carcass composition, and organ system tissue evaluation. Lung, lymph node, and digesta were analyzed for presence of various pathogens by PCR and culture methods. Data were analyzed using the GENMOD, GLIMMIX, and REG procedures of SAS. Birth weight was a good predictor ($P < 0.02$; $R^2 > 0.97$) of overall post-weaning growth performance and final weight, except for the period immediately after weaning ($P = 0.99$). Transition ADG was an excellent predictor of subsequent post-weaning growth ($P < 0.0001$; $R^2 > 0.98$) and a good predictor of post-weaning mortality ($P < 0.0001$; $R^2 = 0.82$). There was a significant BRW × tADG interaction for mortality, where pigs from the 10th percentile of transition ADG and BRW heavier than 1.51 kg had greater mortality than those with birth weights from 1.26 to 1.50 kg ($P < 0.05$). Neither birth weight nor transition ADG affected apparent total tract digestibility of nutrients or energy ($P > 0.15$), but these values were substantially lower than other values in the literature. Transition ADG did not affect carcass composition ($P > 0.11$), but pigs with BRW heavier than 1.76 had more backfat than all other pigs and larger longissimus muscle area at 22 weeks post-weaning than pigs with BRW lighter than 1.25 kg ($P < 0.05$). There was no correlation ($P > 0.12$) between tADG and pathogen presence at either 3- or 22-weeks post-weaning. Incidence and severity of microscopic lesions in the large intestine decreased linearly with increasing tADG (incidence: $P = 0.01$; 65, 55, 25% for 10th, 30th, and 70th percentiles, respectively; severity: $P = 0.01$; 1.15, 0.75, 0.16 for 10th, 30th, and 70th percentiles, respectively) at 3-weeks post-weaning. Lesion incidence and severity were also affected ($P < 0.04$) by tADG at 22-weeks post-weaning. Birth weight affected ($P = 0.02$)

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Haemolytic E. coli and *Salmonella spp. B* isolation at 3-weeks post-weaning, as well as *Brachyspira spp.* isolation at 22-weeks post-weaning ($P = 0.05$). There were no effects ($P > 0.21$) of BRW or tADG on serum or ileum mucosa scraping immune markers. Thus, our data suggest that tADG, but not BRW is related to post-weaning mortality. Both BRW and tADG are indicative of subsequent growth performance, but not due to differences in nutrient digestibility. Finally, poor tADG is not correlated with pathological or immunological markers of enteric disease.