The Molecular Mechanisms of a Commercial Product on Fetal Piglet Growth and Development

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Abstract

Background: The swine industry has made great progress in increasing the number of piglets born per sow. With increased prolificacy comes increased variation in birth weight, which can negatively impact survivability particularly in low birth weight piglets. The objective of this study was to determine the effect of a commercial product fed during gestation on piglet birth weight, morphometrics, and relative organ weights.

Methods: 26 sows assigned to 1 of 2 treatments. Half of the sows were fed a common gestation diet daily while the other half were given the gestation diet supplemented with 6 grams of a commercial product to determine if it could positively affect fetal growth and development and reduce the number of runt piglets in the litter. The sows were allowed to gestate until farrowing at which point neonatal birth weight and piglet morphometrics (crown to rump length, thoracic circumference, head circumference, head length and head width) were determined for each piglet. One small and one medium male piglet were sacrificed from each litter for organ (brain, heart, lung and liver), muscle, and adipose tissue collection for lab analysis. The relationship between birth weight, piglet morphometrics, and organ weights was also determined.

Results: There was no size by treatment interaction ($P > 0.05$). The treatment had no effect ($P > 0.05$) on the organ weight nor did it contribute to the growth of the piglets. The brain, heart and lung were relatively heavier ($P < 0.05$) in the smaller piglets than in the medium piglets. This is due nutrients being partitioned toward the runt’s vital organs at the expense of their muscle and bone growth. There is a moderate relationship ($R^2 = 0.69$) between head length and the birth weight of all the piglets in the litters. With this relatively weak correlation, head length will not be relied on to predict the birth weight of the piglets. Crown-rump length had a stronger relationship ($R^2 = 0.79$) with the birth weight of the piglets. Head circumference had an even stronger relationship ($R^2 = 0.84$) with the birth weight of the piglets. The thoracic circumference was shown to be the best predictor of piglet birth weight with an $R^2 = 0.90$.

Conclusions: Ideally litter size and piglet survival should be optimized to produce maximum pounds of high quality meat in most efficient manner. Selection for weaning survival and not just prolificacy should be examined.