RESEARCH ABSTRACT
PORK QUALITY

Title: Determining the temporal and spatial regulation of marbling development in the longissimus muscle of porcine offspring from weaning through finishing – NPB #18-068

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Scientific Abstract

A total of 80 pigs were subjected to one of 4 dietary treatments from wean to finish to determine the temporal and spatial regulation of marbling deposition in the loin muscle of the developing market hog. : lysine deficient (LysDef), vitamin A deficient (VitADef), lysine and vitamin A deficient (LysVitADef), and a control group who received the NRC recommended requirements (CON) from weaning though the finishing phase. At day 0, 84, and 150 of the trial, biopsies were taken from the proximal, medial, and distal locations of the LM. The biopsies were subjected to quantitative PCR to determine location-specific adipogenic gene expression. The animals were then harvested to assess carcass characteristics. The current data indicate that restriction of dietary lysine increased the expression of genes involved in the de novo synthesis of fatty acids from glucose and other carbon sources via Acetyl-CoA Carboxylase and Fatty Acid Synthase upregulation. The location along the loin muscle and the phase of feeding had the greatest impact on expression of the genes of interest. Numerically, the final body weight was greatest in the control group and the LysDef and LysVitADef groups had the lightest final body weights however these differences were not statistically significant ($P \geq 0.15$). There were no treatment x phase interactions for the expression of the adipogenic and lipogenic genes of interest ($P \geq 0.07$). ACC expression was greatest ($P < 0.05$) in the CON and LysDef diets compared to that of the VitADef and LysVitADef diet which had similar ($P > 0.05$) expression. Fatty acid synthase expression was also greater ($P \leq 0.01$) in the LysDef diet compared to the CON and LysVitADef diet group. The LysDEF group was similar ($P = 0.24$) to that of the VitADef treatment group. The expression of SCD was similar in the LysDef and VitADef groups ($P = 0.82$) which were both increased ($P \leq 0.03$) compared to the LysVitADef group and were similar ($P \geq 0.09$) to that of the CON group. Treatment had no effect ($P = 0.14$) on the percentage of SFA, however the percentage of saturated fatty acids decreased ($P <0.001$) as location went from the proximal to distal portions of the loin muscle. In contrast, the percentage of polyunsaturated fatty acids increased ($P <0.001$) from the proximal to distal portions of the loin muscle. The biological data generated from the current study are informative in terms of the spatial and temporal regulation of marbling development in the LM of the growing pig.