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Effects of Various Levels of Protein, Lysine, Fat, and Fiber on Swine Growth and Pork Quality

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Objectives

Efficient and profitable swine production depends on an understanding of the concepts of genetics, environment, herd health, management, and nutrition (DeRouchey et al., 2007). Feed represents about 60 to 75% of the total cost of pork production; therefore, a thorough knowledge of the principles of swine nutrition is essential to maintain a profitable swine enterprise. Davey (1976) found that improvements in carcass composition are associated with the feeding of higher protein levels. Diets with higher protein content were associated with lower intramuscular fat content and less-tender (higher shear force value) meat. Therefore, the objective of this study was to determine how varying levels of protein, lysine, fat, and fiber in swine diets affected swine growth and pork quality.

Materials and Methods

The study was performed at the Fresno State Swine Unit where data was collected on a total of 12 crossbred barrows, 2 barrows per treatment per replication (3 replications), with littermates in each treatment in a replication. The barrows started at approximately 4 mo of age (approximately 63.5 kg) and were fed specific diets for 56 d. Two different diets were used: a commercial hog feed (protein- min 14%, lysine- min 0.69%, fat- min 6.8%, fiber- max 8.7%) and a show hog feed (protein- min 22%, lysine- min 1.55%, fat- min 1.80%, fiber- max 2.6%). Weights were collected each week and average daily gain was calculated each week as well as overall. Carcass data was collected including hot carcass weight, NPPC color, NPPC firmness, NPPC marbling, loin eye area, tenth and

last rib fat thickness. Dressing percentage and percent fat free lean were calculated and instrumental color (L^* , a^* , b^*) on the loin eye was measured. Data were analyzed using the Proc ANOVA procedure of SAS (SAS Inst. Inc., Cary, NC) with statistical differences being set at $p < 0.05$.

Results

The results of this study determined there were minimal differences between the 2 diets when it came to weekly weights and pork quality. However, the show diet had a higher ADG for wk 1 (1.21 kg vs. 0.76 kg; $p = 0.01$). This is most likely due to compensatory gain from switching types of hog feed. Barrows fed the show feed had a higher dressing percentage (74.7 vs. 71%; $p = 0.0027$) and more fat at the last rib (2.79 cm vs. 2.03 cm; $p = 0.03$). Additionally, the show feed resulted in higher L^* values (56.89 vs. 53.89; $p = 0.004$) in the loin eye, yet no visual color differences were observed with NPPC Color. There was a trend for the barrows fed the show feed to have larger muscle scores (2.5 vs. 2; $p = 0.09$ and larger loin eye areas (20.07 cm² vs. 17.78 cm²; $p = 0.07$). All other measurements and calculations were not statistically different ($p > 0.1$). Show fed barrows resulted in observationally firmer fat than commercial fed barrows.

Conclusion

Results of this study indicate that diets higher in protein and lysine and in lower fat and fiber leads to a higher dressing percentage and that were lighter in color objectively. Therefore, carcasses should have more total pounds of product on them.