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Fibroblast growth factor 21 (FGF21) is a liver-derived hormone which regulates glucose metabolism, energy expenditure, and body weight. FGF21 was originally described as a fasting hormone, but recent work in rodent models and humans suggests that FGF21 is specifically induced by the restriction of dietary protein rather than energy restriction. To determine whether this protein-specific effect also translated to young, growing pigs, the effect of a low-protein diet on the expression of liver *Fgf21* mRNA expression was examined. All pigs were housed in the University of Wisconsin-Platteville Swine Center (Platteville, WI) and all procedures were approved by the University of Wisconsin-Platteville Animal Care and Use Committee. Sixteen four-week old crossbred barrows (mean BW 7.0 ± 0.1 kg) were randomly sorted into two pens (n = 8/pen) and assigned to one of two experimental diets, corn-soybean meal based (CON) and corn based (LP). Diets were formulated to be similar in NE, digestible Ca, and digestible P, but different in crude protein concentration (6.6 % LP versus 23.5 % CON as fed basis). Diets were fed ad libitum for 7 d using self-feeders. On day seven, all pigs were euthanized; serum and liver samples were collected and frozen for subsequent analysis. Consistent with a state of protein restriction, blood urea nitrogen concentrations were reduced in pigs fed LP versus CON diets (6.31 ± 1.22 mg/dL versus 13.66 ± 1.22 mg/dL; $P < 0.001$). Total liver RNA was extracted and *Fgf21* mRNA expression was evaluated using real-time PCR. *Fgf21* mRNA levels were increased seven-fold in pigs fed LP versus CON diets (7.4 ± 1.0 AU versus 1.0 ± 0.2 AU; $P < 0.001$). This increase is consistent with previous experiments in rodents and humans, suggesting that FGF21 is a novel signal of dietary protein restriction across multiple species. The current experiment provides a foundation for future studies examining the role of FGF21 as an endocrine regulator during periods of nutrient restriction in swine.

Key Words: Protein restriction, Fibroblast Growth Factor 21, Swine

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516 Effects of Mill Type and Particle Size Variation on Growth Performance and Carcass Characteristics of Finishing Pigs. M. B. Braun*, H. K. Wecker, A. D. Yoder, J. C. Woodworth, C. R. Stark, C. B. Paulk, *Kansas State University, Manhattan, KS*

The objective of this experiment was to determine the effects of mill type used to grind corn and corn particle size variation on diet flowability, growth performance and carcass characteristics of finishing pigs. A total of 200 pigs (DNA Line 241 × 600; Initial BW 55.3 kg) were used in a 75-d growth trial. Pigs were randomly assigned to pens with either 5 barrows or 5 gilts per pen. Pens were then randomly allotted to 1 of 4 treatments balanced by BW and gender with 10 pens per treatment. Treatments were arranged as a 2 × 2 factorial design with 2 mill types (3-high roller mill; RMS, Model 924 or a hammermill; Bliss, model 22115) and 2 particle size variations (standard vs high). Increasing corn particle size variation was accomplished by blending 30% 400 μm corn, 40% 600 μm corn and 30% 800 μm corn. Diets were fed in 3 dietary phases from 56 to 76, 76 to 100, 100 to 129 kg. On d 75, pigs were transported to a commercial packing plant for processing and determination of carcass characteristics. The average analyzed complete diet mean particles sizes were 497, 540, 503, and 520 μm for the roller mill standard, roller mill high, hammermill standard, and hammermill high treatments, respectively. Diet flowability was calculated using angle of repose (AOR), percent compressibility, and critical orifice diameter (COD) measurements to determine the composite flow index (CFI). The AOR were 34.2, 33.0, 35.4, and 36.2º, COD were 32.0, 31.3, 30.0, and 33.0 mm, compressibility's were 18.7, 18.4, 17.0, and 15.7%, and CFI were 52.9, 55.4, 53.9, and 53.2, for the roller mill standard, roller mill high, hammermill standard, and hammermill high treatments, respectively. There were no interactions or main effects of mill type on growth performance or carcass characteristics. However, increased particle size variability resulted in a marginally significant decrease ($P < 0.083$) in ADG. The ADG were 1.00, 0.96, 1.00, and 0.98 kg and G:F were 0.374, 0.371, 0.369, and 0.365 for pigs fed the roller mill standard, roller mill high, hammermill standard, and hammermill high treatments, respectively. In conclusion, mill type used to grind corn and increasing particle size variation did not impact flowability metrics. In addition, mill type used to grind corn did not influence performance of finishing pigs, while increasing particle size variation led to a marginal reduction in ADG

Key Words: Particle Size, Finishing Pigs, Feed Processing

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517 Amino Acid Profile of Guarpro F-71, a Potential Protein Source for Swine and Other Agricultural Animals in the United States. R. M. Humphrey*[,1], Z. Yang[1], M. S. Hasan[1], M. A. Crenshaw[1], J. Brett[1], B. J. Rude[1], H. B. Bubba Burch[2], S. F. Liao[1], [1]*Mississippi State University, Mississippi State, MS,* [2]*Nutrix Organics, USA, Lafayette, LA*