Research in Progress

Effects of high-oil corn and duration of conjugated linoleic acid supplementation on pork quality and carcass composition. J.M. Eggert, M.A. Belury, J.C. Forrest, D.E. Gerrard, S.E. Mills, B.T. Richert, and A.P. Schinckel. Departments of Animal Sciences, and Foods and Nutrition.

High-oil corn (HOC) enables producers to feed higher energy diets without supplementing with fat or oil. Hogs fed diets formulated with HOC have carcass characteristics similar to those fed diets formulated with typical corn plus added animal fat. However, the effects of HOC on the growth and carcass composition of high-lean genotypes of pigs have not been determined. Conjugated linoleic acid (CLA) has the potential to directly increase profitability to both producers and processors. Preliminary reports indicate that feeding CLA-supplemented diets may decrease feed intake and increase percent lean without affecting growth rate. Furthermore, researchers report a dramatic increase in the belly firmness of CLA-fed pigs. This trial will allow us to better determine the optimal duration for supplementing with CLA and the effects of CLA and HOC on the growth, feed efficiency, pork quality and carcass composition of lean pigs.

Effects of conjugated linoleic acid on blood cholesterol levels of pigs and rats, pig growth and carcass composition, and the regulation of gene expression. J.M. Eggert, M.A. Belury, K.L. Houseknecht, M.A. Latour, S.E. Mills, and A.P. Schinckel. Departments of Animal Sciences, and Foods and Nutrition.

Diets supplemented with conjugated linoleic acid (CLA) have been reported to reduce blood cholesterol levels of laboratory animals. This trial will determine if CLA has similar effects on the cholesterol levels of pigs, which provide a better model for the effects of CLA on human nutrition. Furthermore, the amount of CLA that is deposited in the muscles of the pigs will be measured, and this CLA-enriched or "heart-healthy" pork will then be fed to rats in an effort to lower their blood cholesterol levels. Thus, we will determine whether feeding CLA-supplemented diets can enhance the nutritional value of pork. CLA will be fed to two divergent genotypes of gilts – high-lean (low feed intake) and average-lean (average feed intake). This study will determine the effects of CLA on pig growth, composition and pork quality, and seeks to further understand the underlying biology that controls such traits. Knowledge of how CLA effects the biology of the pig will allow us to select for components of fat growth and to identify genes which have major effects on pig growth and development.

Relationship between muscle development and pork quality. A.L. Grant. Department of Animal Sciences.

Experiments are in progress to develop animal models that can be used to study the relationship between muscle development and pork quality. These models are including the use of cell-mediated gene transfer and direct DNA injection. These methodologies will allow elucidation of developmental processes and examination of the changes in pork quality that result from altered muscle development. This research is supported by NPPC.

Development of fiber optic and electronic methods for predicting quality in fresh pork. J.C. Forrest. Department of Animal Sciences.

The objective of this research is to develop sensors for on-line use to detect changes in pork muscle that are related to important consumer quality attributes such as color and water holding capacity. Experiments are designed to determine the optimum timing and conditions for near infrared spectra, electrical conductivity and/or pH measurement in predicting fresh pork quality. This research is supported by NPPC.

Effects of genotype and preslaughter handling on pork quality. D.E. Gerrard. Department of Animal Sciences.

Studies are underway to examine the effects of preslaughter handling on pork quality in different pig genotypes. Investigation of these genotype interactions is crucial for understanding factors important in determining pork quality and in developing strategies for improving pork quality.

The use of high oil corn in grow-finish and lactation diets. D. Kendall, K. Bowers, S. DeCamp, B. Richert, T. Cline, and A. Schinckel. Department of Animal Sciences.

A high oil top-cross corn variety averaging 8% oil is currently being evaluated as a replacement for normal corn or normal corn plus oil in both lactation and grow-finish diets. Growth rate, carcass composition, feed intake and efficiency, litter growth rates and milk composition are being used as response criteria in these experiments.

The effects of rearing environment and vaccination/antibiotic treatment on two genotypes: lean and fat growth rates, efficiencies, death loss, immune response proteins and meat quality. D. Kendall, J. Frank, B. Belstra, S. DeCamp, B. Richert, A. Schinckel, J. Turek, and M. Ellis. Departments of Animal Sciences, Veterinary Clinical Sciences, and Basic Medical Sciences, Purdue University; and Department of Animal Sciences, University of Illinois.

Two genotypes compared in this project were lean European Hampshire-Duroc sires mated to European females, and U.S. Durocs bred to U.S. Yorkshire-Landrace females. Littermate barrows and gilts of each genotype were either early-weaned and managed in an all-in, all-out production system, or conventionally weaned and managed in a continuous flow system. Pig lean and accretion rates, feed efficiency, carcass composition, and pork quality will be measured. Measures of immune system activation will also be measured to evaluate the differences between rearing environments and vaccination/antibiotic treatments.

The use of reduced crude protein diets with or without additional fiber on swine facility odor. D. Kendall, S. DeCamp, B. Richert, A. Sutton, and D. Kelly. Department of Animal Sciences.

Pigs are being fed a standard corn-soy diet with .15% synthetic lysine or a reduced crude protein diet with synthetic amino acids and 10% soy hulls in totally controlled environmental rooms. Pig growth rate, carcass composition, pit composition, aerial ammonia, and aerial sample odor panel evaluation are being used to quantify the impact of diet manipulation on reducing odor production from swine facilities.

Determining the gestating lysine requirement by trimester of pregnancy in parity 1 and 2 sows. D. Kendall, K. Bowers, C. Thomas, B. Richert, and O. Adeola. Department of Animal Sciences.

Forty-eight gestating sows are being fed 6 different lysine levels through parities 1 and 2. Response criteria are nitrogen balance at days 40, 70, and 100 of gestation during parity 1, sow weight changes during gestation and lactation, litter size, growth rate and return to estrus.

Effect of dietary fermentable carbohydrates on pig growth and health, manure composition and odors. A.L. Sutton, J.A. Patterson, M.W.A. Verstegen, and B.A. Williams. Department of Animal Sciences, Purdue University; and Wageningen Institute of Animal Sciences, Netherlands.

This is a cooperative project to determine the value of using fructooligosaccharide and dried sugar beet pulp in pig diets without antibiotics on pig health, performance, nutrient digestibility and utilization, manure composition and odors. Partial support for this study is by a grant from the USDA Foreign Agricultural Service Research and Scientific Exchange Division Cooperative Program.

Reduction of odorous compounds in pig manure through specific dietary fiber manipulation. A.L. Sutton, J.A. Patterson, B.T. Richert, A.J. Heber, K.B. Kephart, and S.D. Carter. Departments of Animal Sciences, and Agricultural and Biological Engineering, Purdue University; Department of Animal and Dairy Science, Pennsylvania State University; and Department of Animal Science, Oklahoma State University.

This is a cooperative project to determine the effect of using soybean hulls or dried sugar beet pulp in pig diets on pig performance, energy:protein balance, nutrient digestibility, manure composition, and odor emissions. Partial support for this study is by a grant from the National Pork Producers Council.

Thin layer drying rates, stress cracking, and digestibility of high oil corn hybrids. A.E. Watkins and D.E. Maier. Department of Agricultural and Biological Engineering.

Thin layer drying tests were conducted on high oil corn samples at temperatures between 37.8°C and 104.4°C. Half of the samples were cooled rapidly with 4°C forced air, and the other half tempered for one hour before cooling non-evaporatively to room temperature. Stress crack tests were performed on 100 kernel samples from each drying treatment, and the differences between drying treatments compared. Final moisture ratios were used to determine drying rate. Digestibility tests were performed on a single hybrid from each drying temperature in ducks to determine whether drying temperature affects nutritive value.
