The Nonruminant Nutrition Symposium titled “Breaking the mold: Formulating monogastric diets without traditional ingredients” was held at the Joint Annual Meeting of the American Dairy Science Association and American Society of Animal Science in Indianapolis, IN, July 8 to 12, 2013. Ingredients typically used in monogastric diets, such as corn, wheat, and soybean meal, are now facing greater competition from both the human food and biofuels industries. To limit feed costs and remain profitable in the future, producers must be flexible to provide diets with alternative ingredients when supply of one ingredient become limited. The purpose of the symposium was to explore alternative feed ingredients and determine the feeding value of these potential ingredients. Knowledge on available feed ingredients from around the globe, factors to consider when evaluating potential alternative ingredients, formulating high quality cost effective swine diets with alternative ingredients, and evaluating new byproducts from the biofuel industry were discussed during this symposium.

The first speaker of the symposium was R. Campbell (Pork CRC, Willaston SA, Australia) whose presentation was titled “Alternative ingredients for diets – A global perspective” (Campbell, 2013). Global animal feed production approached 865 million t in 2012. While corn and soybean meal have been the main cereal and protein source in the United States, other countries regularly use wheat millings, barley, sorghum, and triticale as cereal sources and canola seed meal for protein sources. Dried distillers grains with solubles also remains an alternative source for cereal and protein sources in livestock diets. Developing means to accurately assess the nutrient value of an ingredient and define inclusion levels are necessary to allow accurate assessments comparing cost effectiveness vs. animal performance.

The next speaker was K. Adams (Akey/Cargill, Brookville, OH), discussing “Factors to consider when formulating diets with alternative ingredients” (Adams, 2013). Many byproducts are variable by nature and require frequent analysis to accurately estimate the nutritional value of the ingredient. Accurate analysis of percentage moisture, protein, fat, ADF, NDF, Ca, P, Na, ash, and AA is necessary to allow for the appropriate use of alternative ingredients to support acceptable growth performance in animals.

The symposium continued with R. T. Zijlstra (University of Alberta, Edmonton, Canada), discussing “Controlling feed cost by including alternative ingredients in swine diets: A review” (Woyengo et al., 2014). Reducing total diet cost per metric ton of metric feed does not always result in the lowest cost per kilogram of gain. The successful use of alternative ingredients is dependent on appropriate characterization of available nutrients. Several available alternative feedstuffs contain high levels of antinutritional factors (ANF) such as fiber, tannins, glucosinolates, and heat-labile trypsin inhibitors. Methods such as reducing the particle size, dehulling or scarification of fiberous ingredients, air classification to create fractions with lower levels of ANF, heat treatments to reduce heat labile ANF factors, and use of fiber-degrading enzymes can be implemented to improve nutrient availability in some alternative ingredients. The ability of alternative ingredients to reduce the cost of feed per kilogram of pork produced is dependent on both the accurate assessment of nutrient availability and controlling the negative effects of ANF.

The fourth presentation, by J. D. Hancock (Kansas State University, Manhattan), discussed the necessities to maintain high quality swine and poultry diets with...
nontraditional ingredients (Hancock et al., 2013). Feed energy costs have dramatically increased during the past 7 yr, increasing an emphasis on nontraditional feedstuffs to control feed costs yet maintain growth performance. Coproducts from the milling, baking, and ethanol industries are now being considered as possibilities in diets. Including new coproducts in diets comes with potential challenges in feed manufacturing, diet flowability, feed intake, and carcass composition. The need for cost effective energy sources in diets will continue to challenge nutritionists to be innovative in using ingredients outside of corn and soybean meal.

The symposium concluded with a presentation by X. G. Lei (Cornell University, Ithaca, NY) titled “Potential of defatted microalgae from the biofuel industry as an ingredient to replace corn and soybean meal in swine and poultry diets” (Gatrell et al., 2014). Interest in renewable fuels as alternative energy sources has led to development of microalgae as a potential third generation feedstock for biofuel production. The defatted biomass is high in protein, carbohydrates, and other nutrients, making it a potential ingredient to replace portions of corn and soybean meal in animal diets. Full-fat and defatted microalgae biomass from biofuel production research (Cellana, Kailua-Kona, HI) ranges in protein content from 13.9 to 38.2%, lysine levels ranging from 0.57 to 2.27%, and crude fat levels of 1.5 to 9.3%. Microalgae levels of 7.5 to 15% have been safely and effectively included in diets of weanling pigs, broiler chicks, and laying hens at 7.5 to 15% of the diet, based on performance, egg production, and egg quality, with no overt signs of toxicity in plasma biochemistry markers. Microalgae biomass appears to serve as a viable alternative feedstuff for swine and poultry as a replacement for conventional corn and soybean meal.

The 5 speakers at the Nonruminant Nutrition Symposium on evaluating alternative ingredients in monogastric diets stressed the need for cost effective energy and protein sources in monogastric diets as the world population continues to increase. Accurately estimating nutrient composition and regularly analyzing alternative feedstuffs is necessary to formulate lower cost diets that do not negatively impact animal performance. Coproducts from the growing milling, baking, and biofuels industries are potential feedstuffs for monogastric diets as replacements for corn and soybean meal.

LITERATURE CITED
Gatrell, S., K. Lum, J. Kim, and X. G. Lei. 2014. Potential of defatted microalgae from the biofuel industry as an ingredient to replace corn and soybean meal in swine and poultry diets. J. Anim Sci. 92: [EMILY: add page range when booking issue].