The Alpharma Beef Cattle Nutrition symposium was held at the joint annual meeting of the American Society of Animal Science, the American Dairy Science Association, and the Canadian Society of Animal Science in Montreal, Quebec, Canada, July 12 to 16, 2009. The symposium was organized to discuss the increased incorporation, challenges, and management options when alternative energy sources are incorporated into high-energy diets for finishing beef cattle. Much of the dietary energy in feedlot diets for beef cattle has and continues to originate from the inclusion of corn grain. However, as the more traditional sources of energy for cattle are being diverted to supply substrates for other purposes (e.g., ethanol production), feedlot diet formulation must adapt. Concurrently, price volatility of grain sources, increases in cost per unit of energy, and locally availability of coproducts affect the formulation of high-energy feedlot diets for finishing cattle. However, as the more traditional sources of energy for cattle are being diverted to supply substrates for other purposes (e.g., ethanol production), feedlot diet formulation must adapt. Concurrently, price volatility of grain sources, increases in cost per unit of energy, and locally availability of coproducts affect the formulation of high-energy feedlot diets for finishing cattle. These challenges to the continued use of traditional high-energy feedlot diets for finishing cattle have compelled the beef cattle feeding industry to identify and utilize a greater array of coproducts from other production systems as alternative energy sources in feedlot diets. Incorporation of alternative energy sources presents opportunities and challenges to diet formulation, determination of feed energy content, practical feed delivery and utilization, beef cattle performance, digestive physiology, and carcass characteristics.

Owens et al. (2010) reviewed the impact of feedstuff nutrient composition on digestibility and energy supply for cattle. The variability of the chemical composition in feed ingredients is a major issue in feedlot diet formulation and predication of cattle performance. The ability to identify and adapt to the variation in chemical composition can have great economic importance. Crude fiber appears to most closely estimate TDN and metabolic fecal loss of OM associated with a variety of feedstuffs. Crude fiber content of feedstuffs may exert an adverse effect on apparent digestibility of other nutrients that could have a greater nutritional impact than the energy derived from fiber digestion itself. The influence of fiber, as well as other feed components, on the metabolic fecal loss of OM, total energy expenditure, influence on digestibility, and utilization in cattle warrants further investigation. The review by Owens et al. (2010) portended the importance of the discussion about the incorporation of coproducts into diets of feedlot cattle.

Berger and Singh (2010) described evolutions in the processing methods of corn and the resulting coproducts. Innovative technologies are being utilized in ethanol production facilities that fractionate the corn or distillers dried grains with solubles (DDGS) or both for recovering additional coproducts, alter the nutritional composition of DDGS, and reduce the volume of DDGS. Corn components including the germ, pericarp fiber, endosperm fiber, and oil are used as sources for other coproducts or directly as ingredients in animal feeds. The modification of the DDGS chemical composition has important implications for the formulation of high-energy feedlot diets and the resulting cattle performance. Feedlot research reviewed in Berger and Singh (2010) indicated that new DDGS can replace corn in feedlot diets and still maintain or improve beef cattle performance and carcass characteristics.

Wet coproducts other than corn-based products are an important component of many high-energy feedlot diets. Wet coproducts fed to beef cattle include those from the fruit, vegetable, juice, and brewing industries. Quantitatively, potato (Solanum tuberosum) may be the most important because of the estimated 4.3 million t of coproduct produced (Nelson, 2010). The incorporation of potato coproducts into beef cattle diets is contingent.
upon identifying the coproduct and understanding the nutrient composition and feeding value, anti-quality components and hygiene, storage and preservation, and potential effects on meat quality. Potato coproducts readily ensile, and feeding them to ruminants solves a significant disposal issue for the food processing industry. Nelson (2010) indicated an optimal of 10% potato coproduct inclusion when replacing barley in feedlot diets. Knowledge gaps continue to exist regarding the utilization of potato coproducts, and additional research is required for fried-cooked potato coproducts and models for pricing of the potato coproducts.

High-energy feedlot diets include many important feed technologies that increase the efficiency of feed utilization. Much of the current experience in utilizing these feed additives and management technologies is based upon high-corn diets, but research to evaluate the efficacy of traditional feeding practices and feed additives when coproducts are utilized has not kept pace (DiLorenzo and Galyean, 2010). Incorporation of grain-based coproducts into feedlot diets has resulted in diets that differ in compositional and physical characteristics relative to traditional diets. Evaluation of diet formulation approaches that include roughage level and source may be an increasingly important consideration because of the high fiber concentrations of corn coproducts and differential digestibility of the coproduct fiber fraction (DiLorenzo and Galyean, 2010). Likewise, grain processing and source contribute to the variation in response to the incorporation of grain coproducts in feedlot diets. A limited amount of research has addressed the efficacy of ionophores in diets utilizing high levels of coproducts. Likewise, inclusion of exogenous enzymes may hold potential for increased efficiency of coproduct use, but remains an area of limited research.

The incorporation of coproducts into traditional beef cattle feedlot diets provides many opportunities. However, full understanding of the potential positive and negative interactions of coproducts in high-energy feedlot diets needs to be more fully elucidated. Issues regarding appropriate estimates of the energy value, nutrient and specifically fiber digestibility, and detailed analytical descriptions of coproduct are crucial to fully understand the extent of the incorporation of coproducts into diets of feedlot cattle.

**LITERATURE CITED**


