

DAIRY SPECIES

346 Genetics of nutritionally improved corn and sorghum grain hybrids. T. T. Lohrmann*, *Optimum Quality Grains L.L.C., Des Moines, IA.*

The ability to select and modify traits in corn or sorghum grain (CS) through transgenic modification and molecular breeding is now a fast growing enterprise. These technologies enhance the speed and magnitude at which targeted changes can occur in a plant over time. Genetic modification of CS are generally directed as either an input or output trait. An input trait directly or indirectly improves the efficiency or quantitative aspects of grain production. An output trait improves the quality or added value (AV) of the grain. Corn AV traits that are in development or commercially available include high oil, high lysine, high methionine, high oleic acid and combinations of the fore mentioned. The AV of these traits for dairy and beef has not been extensively studied to date, although value is a relative term. The savings from ingredient (isonutrient) substitution, such as Kcal for Kcal, is only one assessment of value. For instance, the AV of a trait may go beyond nutrient substitution to include savings from reduced feed processing costs. Beef and dairy (BD) producers may also obtain AV from enhanced CS by developing and marketing designer milk or beef. By feeding a type of AV grain, the nutritional profile of milk or beef may be changed to meet the preferences of customers. An example of this may be conjugated linoleic acid (CLA). Research with CLA suggests potential for human health benefits. The CS may not contain CLA, but rather the grain would contain a higher percentage of the oil as linoleic acid. Since rumen microflora naturally conjugate a portion of linoleic to CLA, higher levels of CLA would be expected in the milk or meat. In areas of carbohydrate modification, specific oligosaccharides could be incorporated into CS. One benefit may be the enhancement of beneficial microbe populations in the rumen of adult BD or in the gastrointestinal tract of calves, thereby improving animal health, livability, growth and production. In the future, nutritionally enhanced CS could offer BD producers, partners and consumers greater opportunities, value and benefits.

Key Words: Improved Corn and Sorghum, Beef, Dairy

347 Marketing and execution of value added corn. P. A. Welge* and G. A. Morantes, *Continental Grain Company, Chicago, IL.*

A shift in market drivers is creating demand for value added products and services in the traditional corn channels. The end users are segmenting themselves as they learn to extract efficiencies from corn and soy that are particular to their industry. The advancements in biotechnology are allowing for the development of specific attributes that aid these particular efficiencies. Exchange of information is now critical to assure distribution of created value. The marketplace is requiring structural changes to accommodate the inclusion of the value added corn and soybeans. Contract production, additional quality assurance and identity preservation are key processes in the distribution of these new products. Strategic alliances, understanding of a specific customer's business coupled with the use of nutritional, veterinarian and operational expertise are necessary to position and market the new products.

Key Words: Specific Attributes, Exchange of Information, Structural Changes

348 Nutritional benefits of specialty corn grain hybrids in dairy diets. R.G. Dado, *Southern Illinois University, Carbondale.*

Corn grain continues to be the primary energy supplement in most dairy diets, and can contribute up to 30%, 60%, and 98% of the diet's protein, net energy, and starch, respectively. Yet corn is not nutritionally perfect, and efforts have been made to exploit the natural variation in composition to more closely match the needs of livestock. Specialty corn hybrids are one result of these efforts and have become consistent, predictable providers of certain nutrients. Many of these hybrids, which include high lysine, high oil, waxy, white, sugary, and many others, have been available for over 20 years. Specialty corn has gained renewed interest because of improvements in agronomic and yield performance, commitments by grain marketers to preserve the identity of specialty corn grain, and improvements in our understanding of digestion and nutrient utilization. Nutrients that have been, and will continue to be, targeted for improvement in corn for dairy cattle include protein content, amino acid quality (especially lysine and methionine that by-passes rumen fermentation), starch (including form, texture, and digestibility), lipid content, fatty acid composition, mineral composition and availability, and to a limited extent, fiber digestibility. Protein and oil content is highest in the germ, and both are negatively correlated with starch content. Efforts to improve lysine content are hampered by its negative correlation with total protein content and its extensive degradability in the rumen. To date, lactation studies have shown variable responses to all the specialty corns, and suggest that final ration composition often overshadows the relative nutrient benefit of the corn. Nutrient manipulation through transgenic technology may be the most important tool in the future to enhance quality. Seed cost, agronomic performance, grain yield, and price of substitute ingredients will determine the extent to which specialty corn grain can be economically positioned in dairy diets.

Key Words: Corn, Dairy, Nutrition

349 Nutritional benefits of specialty grain hybrids in beef feedlot diets. R. A. Stock, *Cargill Corn Milling, Blair, NE.*

Specialty grain hybrids have received less attention in beef feedlot diets than nonruminant diets because of the perception that the specialty grain hybrids may have less value in beef feedlot diets. Research that has been published includes evaluation of grains based on differences in digestibility due to endosperm type, rate of ruminal starch fermentation, and lysine content. Starch is the major component of cereal grains and is the primary dietary energy source for cattle in feedlots. Grains can be categorized as having different rates and extents of starch fermentation. Wheat has the fastest rate of ruminal starch digestion followed by barley and corn with grain sorghum having the slowest rate of ruminal starch fermentation. In general, increasing rate and extent of ruminal starch fermentation has resulted in improvements in efficiency of animal gain provided that the incidence of subacute acidosis was minimized. Therefore, identifying hybrids possessing faster or more extensive rates of starch fermentation has been a key research area. Because grain sorghum starch is generally regarded as being less accessible to enzymatic degradation than starch in other grains, it has received the greatest research emphasis. However, all grains have been evaluated to some extent. Grain sorghum hybrids appear to be more variable in *in vitro* and *in vivo* digestibility, and rate of starch fermentation than corn hybrids. The greater variation is partially due to grain sorghum hybrids being developed and evaluated under more stressful environmental conditions (high temperature and limited water conditions) than corn hybrids. *In vitro* and *in vivo* studies indicate that differences in grain hybrids exist, but these differences may not totally explain differences in cattle performance. The response to feeding high-lysine corn to cattle has been variable. Corn is an excellent source of escape protein and, in combination with microbial protein, may meet the animal's metabolizable protein needs. Hybrids selected for increased lysine content have been shown to have faster *in vitro* rates of starch digestion suggesting that improvements in animal performance may be related to the indirect selection for improved energy utilization. At the present time, studies evaluating other genetic modifications of grain hybrids are in progress, but the results have not been published.

Key Words: Grain, Starch, Digestibility