Symposium: ALPHARMA Beef Cattle Nutrition and Beef Species Joint Symposium: Producing Quality Beef in a Bio-Based Economy

146 ASAS Centennial Presentation: Development and current issues of a corn-based beef industry. L. R. Corah*, *Certified Angus Beef LLC*, *Wooster, OH*.

The development of a beef industry, heavily dependent on corn utilization, began to occur in the 1940s. Started as a means to add value to the grain while improving consumer acceptance of beef, corn has become an integral part of beef production. Developments in the 21st Century—including unprecedented cattle prices, changes in beef demand, BSE, surge in energy costs, pricing differentiation of cattle prices based on quality, and industry consolidation—have dramatically changed the price of corn and cost of beef production. The future of the beef industry will be dependent on our ability to continue producing high-quality beef for a global market through effective use of genetics, new technologies, and economic management strategies.

Key Words: Corn, Feedlot, Beef Quality

147 Feeding strategies to reduce corn use. R. H. Pritchard*[1], D. D. Loy[2], and D. L. Boggs[3], [1]*South Dakota State University*, *Brookings*, [2]*Iowa State University*, *Ames*, [3]*Kansas State University*, *Manhattan*.

The equilibrium among industries competing for corn grain has been disturbed by the dramatic increase in demand for corn use in ethanol production. The current situation differs from previous episodes of high corn prices in that there will be a long term increase in corn usage rather than a short term decrease in corn supply. This will alter cropping plans and reduce access to alternative grains. Biofuels development will increase competition for fats and oils, high fiber feeds, and the amount, form, and cost of ethanol by-products available. Having alternative feedstocks more available to substitute for corn in finishing diets will likely be the exception rather than the norm in many situations. These alternatives will often contain less energy than corn and limitations may exist on dietary substitution levels. Corn is substituted for roughage in finishing diets to increase ADG and to reduce feed/gain. In doing so, the corn per unit of live weight gain (LWG) increases. We can increase final diet roughage from $<10\%$ to levels of 20% or 30%, and achieve high growth rates and produce high Quality Grade beef. This requires access to a roughage source and imposes logistical challenges to larger capacity feedlots where most cattle are fed. We can reduce the corn/LWG by 8 to 10% by switching from rolled corn to steam flaked corn. Other potential savings in corn/LWG can be found in managing grain processing x roughage source × roughage level interactions. In older cattle (> 18 mo) reducing the targeted ribfat endpoint at harvest from the current 1.5 cm to 1.0 cm will greatly reduce corn use per unit of retail product; but would be less effective in younger cattle. While implants cause increased intake and final BW, they along with other technologies, effectively reduce corn/LWG. The most dramatic effects in reducing corn usage will come from extensive cattle production systems that increase the amount of growth occurring outside the feedlot. This will likely coincide with a change in the genetics and phenotype of cattle as well as a reduction in total beef cow numbers.

Key Words: Beef, Feeding, Corn

148 Environmental considerations of feeding bio-fuel co-products. N. A. Cole*[1], M. S. Brown[2], and J. C. MacDonald[3], [1]*USDA-ARS-CPRL*, *Bushland, TX*, [2]*West Texas A&M University*, *Canyon*, [3]*Texas AgriLife Research*, *Amarillo, TX*.

The high concentrations of some nutrients in distiller's grains (DG) make formulation of diets difficult and can lead to environmental concerns. These concerns will differ with feedlot location, feedlot size, diet formulation, and grain processing method used. Feeding DG in dry-rolled corn-based diets (DRC) does not apparently affect DM digestion or total DM excretion; whereas, with steam-flaked corn-based diets (SFC) the feeding of DG decreases DM digestibility. With SFC-based diets the quantity of pen manure collected increased about 10% for each 10% increase in dietary DG concentration (DM basis); whereas it increased 0 to 7% with DRC-based diets. With SFC-based diets, the N and P concentrations of collected manure were not affected by feeding of DG. Phosphorus excretion (and acres of cropland required for manure removal) increases approximately 10 to 25% for each 10% increase in dietary DG concentration. The effects of feeding DG on subsequent ammonia emissions may vary with season and dietary N concentrations. In our studies, N volatilization as a percentage of N intake, decreased about 20% when DG was fed (15 or 20% of DM); however, because of greater N intake, total N volatilization losses (kg/steer) were not affected. During production and storage, DG emit volatile organic compounds (VOC) that could potentially contribute to odors or ozone formation. High sulfur concentrations in DG could affect animal health as well as emissions of hydrogen sulfide and other odorants. British and Nebraska studies suggest that feeding of DG can decrease enteric methane production in high-roughage diets; however, the effects in high-concentrate diets are not known. To our knowledge, the effects of feeding DG on excretion of physiologically active compounds (antibiotics, hormones, etc.) have not been studied. In conclusion, it appears that the feeding of DG may have environmental effects that need to be considered when determining ingredient value and optimal diet formulations.

Key Words: Distiller's Grains, Beef Cattle, Environment

149 Precursors to enhance marbling. S. B. Smith*, J. E. Sawyer, R. D. Rhoades, and M. A. Brooks, *Texas A&M University*, *College Station*.

The overall process of lipid synthesis in marbling (intramuscular; i.m.) and s.c. adipose tissues is similar in that both incorporate the same long-chain fatty acids into neutral lipids, and both adipose tissues synthesize fatty acids *de novo* from acetate and glucose. However, the relative rates of incorporation of specific fatty acids, acetate, and glucose differ markedly between adipose tissue depots. Oleic acid (18:1n-9) and linoleic acid (18:2n-6) are incorporated into lipids in s.c. adipose tissue at nearly twice the rate observed in i.m. adipose tissue. Thus, any dietary treatment that increases absorption oleic or linoleic acid may promote adiposity of s.c. adipose tissue disproportionately. The rate of synthesis of lipids from acetate *in vitro* is as much as 10-fold greater in s.c. than in i.m. adipose tissue. However, the overall metabolism of glucose (to CO_2, lactate, and fatty acids) typically is greater in i.m. than in s.c. adipose tissue and, in i.m. adipose tissue, glucose can be the predominant *de novo* precursor

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