ADSA Southern Section Symposium: Maximizing forage quality in the Southeast

215 Improving corn silage quality in the Southeast and throughout the United States. Donna M. Amaral-Phillips*, *University of Kentucky, Lexington, KY.*

Corn silage has been called the king of stored forages for good reason. Dry matter yields and milk production potential per acre consistently surpass other forage crops while allowing farmers to harvest large amounts of quality feed over a relatively short harvest period. Corn raised for silage can be used in combination with other forage crops to allow for the implementation of double or even triple cropping systems. Thus, increasing the number of dairy cattle supported by each acre of farmland and increasing utilization of nutrients applied to soils through manure applications (i.e., phosphorus). Seed companies have improved the genetics of corn hybrids used for silage, especially as they relate to NDF digestibility. These genetic improvements have increased the nutritional value of these crops, which is even more important under the extended heat stress conditions and resulting decreased dry matter intakes of the Southeast. Environmental temperatures in excess of 32°C and limited rainfall during tasselling and pollination decrease grain development in the corn plant, resulting in a lower energy crop and presenting challenges for meeting the energy needs of high producing dairy cows. Harvesting corn for silage at the proper dry matter content and particle size can affect packing density and quality of silage available at feedout. Starch digestibility can be improved with the proper use of kernel processors on silage choppers. Silage management at harvest and feedout also affects feed quality and dry matter losses.

Key Words: corn silage, forage, corn

216 The effect of forage quality on health and performance of dairy cattle. Adegbola T. Adesogan*, *University of Florida, Gainesville, FL.*

Forages constitute a major portion of the diet of dairy cattle; therefore, factors that affect forage quality can determine the performance and health of the cows. The quality of southeastern forages is relatively low because the prevailing high temperatures favor fiber deposition. This factor coupled with heat stress reduces the productivity of dairy cows in the southeast. Consequently, strategies that increase the quality and utilization of southeastern forages are needed critically. Though effective at increasing forage utilization, strategies like kernel processing and chemical treatment have not been widely adopted. Other approaches such as application of fibrolytic enzymes have given variable results but strategic supplementation with yeast or yeast culture is often effective. Recent studies have shown that milk production was increased by replacing conventional corn silage with shredlage, BMR hybrids or mutant hybrids with lower ferulic acid concentrations. Similar research is needed for other high yielding warm-season grasses adapted to the southeast. Forage-related factors that can reduce the performance and health of dairy cows can be classified as those occurring during the growth or storage of the forage. Compounds such as nitrates, glycosides and alkaloids can accumulate in growing forages during inclement weather or under inadequate management. In addition, forage stressors such as disease, hail, pests and lodging can result in mycotoxin contamination by invasive fungi, which can reduce milk production and safety. In addition, poorly managed silage can reduce milk safety and predispose cows to low milk production and diseases due to accumulation of harmful compounds like mycotoxins, nitrates and biogenic amines or pathogens like *Listeria*, *Bacillus*, *Clostridia* and molds. Microbial inoculants and chemical additives can increase forage preservation, prevent accumulation of harmful compounds and inhibit growth of pathogens but their effects on milk production by dairy cows have been variable.

Key Words: forage quality, milk, health

217 Warm season annual grasses for dairy cattle. J. K. Bernard*, *University of Georgia, Department of Animal and Dairy Science, Tifton, GA.*

Warm season annual grasses are commonly used by dairy producers in their forage programs for grazing, green chop, hay, or silage production. Most warm season annual grasses require less water to grow and are more drought and heat tolerant than corn. These characteristics along with improved varieties that have improved DM yield and higher fiber digestibility have increased the interest in their use for dairy cattle. The incorporation of the brown-midrib 6 gene (*bmr*) in varieties increases in fiber digestibility and energy to support production compared with non-*bmr* varieties. Warm season annuals grasses are susceptible to nitrate toxicity during drought conditions. Prussic acid toxicity is an issue for members of the sorghum family during early growth and after stress from frost. Of the warm season annuals, forage sorghum is used more frequently for silage production. It is susceptible to lodging, but new brachytic dwarf varieties have shorter internodes, reducing lodging potential while providing forage with greater leaf to stem ratio. Diets based on *bmr*-6 forage sorghum silage have supported milk yield comparable to that of corn silage based rations when balanced for fiber content. Pearl millet silage support similar DMI and milk yield, and higher milk fat percent compared with corn silage; however, other trials reported reduced ADG or milk yield when fed to growing heifers or lactating cows. Differing responses may be partially attributed to differences in fermentation of the silages produced from pearl millet, which is more challenging to ensile if water-soluble carbohydrate concentrations are low. Data on *bmr* sorghum-sudangrass are limited and suggest that these forages can support solids-corrected milk yield similar to that of corn silage-based diets. Warm season annual grasses can be effectively incorporated into forage systems for dairy cattle. Improved varieties, especially *bmr* varieties, can support acceptable milk yield.

Key Words: dairy cattle, warm season annual, milk yield

218 Forage systems for Southern dairy production. John G. Andrae*, *Clemson University, Clemson, SC.*

Forages are the major component of lactating dairy rations and make up an even greater proportion of replacement heifer and dry cow diets. Due to the wide range in climate, soils, irrigation availability, and cow management (i.e., confinement vs. grazing vs. hybrid systems), a "cookie-cutter" approach to designing forage systems for southern US dairy production is impossible. Consequently, forage systems are driven by local conditions and management preferences and often vary markedly even within a community. Traditional forage systems comprised of corn, alfalfa and/or small grains silage are common regionwide; however, rising fertilizer input costs and risks associated with drought and irrigation water have increased plantings of forage sorghum and pearl millet. Tropical corn hybrids, Tifton 85 bermudagrass, and adapted

non-dormant alfalfa varieties have also improved silage and green chop options for confinement forage systems. Baleage as a production practice has increased the feasibility of harvesting high quality forage when traditional silage equipment is prohibitively expensive or where custom harvesters are unavailable. Grazing dairies have also recently increased some areas. Forage systems for these dairies vary depending on region and range from non-toxic tall fescue, alfalfa, bermudagrass and orchardgrass based perennial systems to annual systems including ryegrass, crabgrass, pearl millet and sorghum × sudangrass. Systems regionwide will be reviewed to provide an overview of their diversity and uses.

Key Words: forage, silage, grazing

219 Environment and crop management as determinants of forage yield and quality in the Southeast. Gonzalo Ferreira*, *Virginia Polytechnic Institute and State University, Blacksburg, VA.*

After the summer and spring drought of 2012, increasing interest has emerged to use alternative species to maize (*Zea mays*) to produce forages in dairy production systems. Sorghum species (*Sorghum* sp.) are characterized for having greater water use efficiency, water potential, and transpiration and photosynthetic rates under drought conditions. In addition to this, sorghum shows higher turgor potential than corn at the same water status. Despite all these attributes, the land surface planted with corn for silage is substantially greater than that of sorghum for silage in the Southern region. Potential evapotranspiration is substantially greater in the Southern than in the Midwest region. Therefore, to minimize the adverse effects of drought and heat stress, in the Sothern region adequate crop management should be prioritized. Drought stress around silking diminishes kernel development by negatively affecting pollination, mainly through an increased anthesis-to-silking interval. Kernel development is also negatively affected when high temperatures (≥35°C) occur during the lag phase of kernel development. High temperatures immediately after silking limit starch accumulation within the kernels, and increases the rate of kernel abortion as well. Therefore, in regions with extended periods of temperatures greater than 35°C, choosing early maturity corn hybrids, or delaying planting date, should be considered to avoid drought and heat stress during silking and kernel development. Planting density can also affect yield of corn for silage, although this effect depends on the crop rotation system and time of harvesting. Corn silage yield increased at high corn planting densities when an extended fallow and abundant precipitations occurred during the crop cycle. However, no differences in corn silage yields were observed when different corn planting densities were used in more intensive (i.e., double-crop) rotation systems. The effects of corn planting density on nutritional quality are also dependent on environment, although these effects are likely dependent on harvesting time. In summary, adequate crop management strategies should be carefully considered to ensure and maximize yield and quality of corn silage in the Southern region.

Key Words: corn silage, drought stress, heat stress