Feeding Drought-Stressed Corn & Limited Forage Inventories

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The 2021 forage production season was difficult for some farms across the Midwest which were affected by drought with lower forage inventories and possibly variable corn silage quality. Drought stress can have variable effects on corn silage depending on when the drought stress occurred during the growing season. Farmers affected can help manage the use of harvested corn silage and other forages to effectively feed and stretch inventories through winter.

Corn silage affected by drought stress can have variable quality depending on when the stress occurred. If the stress occurred prior to pollination but adequate rainfall occurred during pollination and grain fill, this typically causes shorter plants with good ears and normal to higher starch corn silage. If a lack of moisture occurred during pollination and grain fill, this decreases kernel development and starch with higher fiber content. However, with a lower starch content the forage can have higher sugar content with less transfer to the kernels. Higher sugar levels partially offset the lower starch but maintain energy content. Protein content is usually increased in water-stressed forage and should be considered when feeding.

Changes in nutrients are fairly predictable depending on timing of drought stress and resulting plant changes (i.e., height, ear development). However, commonly thought fiber digestibility increases in drought-stressed corn silage due to reduced stalk development and lignification. To evaluate this idea, Gonzalo Ferreira (Virginia Tech University) and others looked at the effect of water stress on corn grown in Idaho with or without irrigation. Results were a bit surprising, as corn silage fiber digestibility was not improved by drought stress. When they measured various fiber components, they found minimal differences in stem fiber composition and actually lower neutral detergent fiber (NDF) digestibility. With potential for high variability in forage quality, corn silage must be tested to determine protein, starch, sugars, fiber, and fiber digestibility. In addition, nitrates, which can be elevated in drought-stressed corn, should be examined. Nitrate tests are well-worth the cost (~$10/test) compared to possible loss of animals. Depending on nitrate analysis, feeding levels may need to be adjusted to ensure diets are less than 1,000 ppm NO_3-N. Molds, including aspergillus species, are also a potential concern during dry conditions and may lead to mycotoxin contamination such as aflatoxins. Aflatoxin is an especially problematic mycotoxin as its metabolites are secreted in milk and, thus, regulated by the FDA. Be watchful of mold and test for mycotoxins if contamination is suspected.

Farms with low forage inventories going into winter need to think about strategies to extend forages until spring or the following fall. Working with a nutritionist to evaluate current feed inventories and feeding rates is the first step to determine if feeding rates should be adjusted for specific forages. Testing of forages will help determine which forages should be fed to each group. If a lower-quality forage is in excess, it may be used to partially replace a portion of higher-quality forages in the diets if running short. Adjustment of the ration can be accomplished by using other ingredients to obtain the desired protein, fiber, energy, and mineral content. Purchasing hay or forage can be an option to help extend inventories, especially to maintain minimum forage fiber levels. Additionally, you can consider various byproduct options to help extend forages. Dairy cows don't necessarily have a requirement for a certain level of forage as long as diets are balanced with sufficient forage NDF and don't include excessive starch. When forages are limited, forage NDF content can be reduced to 16-18% of dry matter (DM) compared to 21-23% for higher forage diets. This equates to ~40% of forage in the diet with 40-42% NDF. To ensure rumen health, a higher fiber diet is usually fed with lower starch content (20-22%). To accomplish this, inclusion of byproducts at 5-10% of diet DM is typically used. Especially useful byproducts include soybean hulls, wheat middlings, distillers grain, corn gluten feed, and malt sprouts. These byproducts have moderate protein and are high in digestible fiber which helps maintain rumen fermentation and energy intake. Feeding diets with lower forage content requires careful feeding management such as optimal diet DM content to limit sorting (45-50% DM) and good mixing management to ensure adequate particle size. To help determine which byproducts are economical, the FeedVal tool (dairymgt.info/tools.php) developed by Victor Cabrera at UW-Madison can be very useful. The tool uses current feed prices and nutrient content to determine the feed's value compared to other feeds. Working with a nutritionist will help to determine which purchased forages or byproduct feeds may be most optimal in the ration and how they may extend on-farm forage inventories.