What Corn Silage Contests Reveal

Forage contests are beauty contests. They make you appreciate high-test forages but don’t tell the whole story; for example, whether the crop yielded well, the farmer had lodging problems, or whether it produced a lot of milk.

But forage contests do focus on something important: forage quality analysis. We need to know how to harvest forages for profitability and quality before we see what happens in the milk tank. Fortunately, forage contests use a good dose of science.

Most agronomists and animal nutritionists recommend a combination of lab testing and visual analysis to predict quality. Although forage testing is imperfect, it has enabled dramatic improvements in production of high-quality forages. The average cow in the U.S. now produces nearly four times more milk than a cow in 1950, and higher-quality forages have been a major contributing factor.

So what can we learn from the World Ag Expo Forage Challenge recently held in Tulare, CA? Its corn silage data from Western states provide interesting insights into what is, and perhaps what isn’t, important in predicting forage quality for this crop.

Samples were analyzed and data independently judged by nutritionists, and ranked 70% by lab results and 30% by visual criteria. (For contest results, see page 21).

Here are some interesting trends:

- **High-starch** silages were rated highly by nutritionists. Samples ranged from below 20% to the upper 30s. Starch often predicts grain percentage, and conventional corn silages were somewhat higher in starch than BMR silages (see starch graph).
- **Neutral Detergent Fiber Digestibility** (NDFD 30-hour) is considered a critical measurement to predict animal performance with corn silage as well as with hay. NDFD was predictive of the winning samples, and BMR hybrids were significantly different from conventional hybrids, as a group. NDFD ranged from a low of 45% to a high of 78%. Some researchers have estimated that for every one-unit increase in NDFD, a 0.5-lb increase in fat-corrected milk can be observed.
- **Lower fiber, or aNDF** (amylase-treated) silages were also important. aNDFs ranged from about 36% to nearly 50%. As a group, conventional silages were somewhat lower in aNDF than were BMR silages, perhaps reflecting a somewhat higher grain percentage.
- **Indigestible NDF** (iNDF) is the percentage of the NDF that isn’t digested after 10 days in the rumen. iNDF ranged from less than 14% to 40%. The average iNDF of conventional silages was 32.2% compared to 18.5% for BMR hybrids. This interesting measurement, while not common, is quite revealing.
- **Net Energy of Lactation,** **Total Digestible Nutrients, Milk per Ton,** and other calculated energy values take into account starch, NDFD, NDF, protein, ash, and fat to predict animal performance. Winning samples clearly had higher total calculated energy values than the others.
- **Dry matter (DM), crude protein, fat, ash, lactic acid, corn processing score, volatile fatty acids (VFAs) and lactic acid differences** – generally these weren’t as important to sample ranking or to differences between BMR and conventional groups. But individual samples sometimes showed unusually high or low DM, or low lactic acid, VFAs, or processing scores, indicating poorer fermentation. Fat, ash and protein didn’t differ a lot between samples or by ranking.

What can we learn? High starch, high NDFD and lower aNDF forages were clearly the most powerful determinants of biological energy for milk production and intake as judged by nutritionists. Protein, fat, ash and fermentation characteristics tended to be more standard between samples and less predictive.

These values showed important differences between conventional and BMR samples. Keep in mind the evidence that BMR hybrids have greater lodging problems than conventional, depending on specific hybrids and management factors. Yields are also obviously important. Conventional and BMR hybrids have been used successfully in corn silage programs. Forage quality isn’t the only corn silage criterion to consider; it should always be considered in context of agronomic performance.

Despite their limitations, forage contests give insight into what nutritionists value in corn silage and what measurements are most important (see complete dataset at alfalfa.ucdavis.edu).

Stay tuned for 2013’s World Ag Expo Forage Challenge, to be held in Tulare, and the World Forage Analysis Superbowl at World Dairy Expo in Madison, WI, in 2012.