VALUE OF BMR CORN SILAGE IN A DAIRY RATION

Richard J. Norell

INTRODUCTION

Corn silage is commonly used in most Idaho dairy rations where producers feed about a third to two-thirds of the diet dry matter as corn silage. Many factors influence silage feeding rate, including: relative forage prices, available alternative forages, available alternative by-products, prevailing feed prices, milk prices, herd milk yield, and producer goals. Hybrid, agronomic practices, growing conditions, harvest time and method, fermentation and diet formulation all affect the feeding value of corn silage. This paper will focus on feeding value of brown mid-rib (BMR) corn silage, its positioning in dairy rations, and feeding management practices for successful results.

FEEDING VALUE OF BROWN MIDRIB CORN SILAGE

Nutrient composition of BMR silage is generally very similar to conventional hybrids with two very important differences: BMR is lower in lignin and has a significantly higher in-vitro NDF digestibility (Kung 2011; Grant and Contanch, 2011). Feeding value varies with advancing plant maturity, moisture content, harvest chop length, roller processing, and days in storage.

Maturity. NDF digestibility decreases as the BMR plant matures. High dry matter BMR silages are more mature and have significantly lower NDF digestibility than BMR silages harvested in the targeted moisture range (32 to 34%). Monitor moisture levels to optimize the harvest window for high fiber digestibility.

Chop length. The correct chop length will vary based on specific conditions on the farm. But, for starters, a general guideline is to chop BMR corn at a TLC of ¾ inch, longer if the corn will be processed.

Processing. There are two published studies that compare processed versus unprocessed BMR corn. In a Wisconsin study, unprocessed BMR corn was chopped at either ½” or ¾” TLC and processed was chopped at ¾” or 1-1/4” TLC with a roll spacing of 2mm (Schwab et al, 2002). All four silages fermented well and produced quality silage. Milk yield did not differ between silages but dry matter intake was less when feeding longer chopped silage (2.4 lbs. less with unprocessed and 1.8 lbs. with processed silage). Fat test was reduced by processing and there was no improvement with a longer chop length. NDF digestibility decreased and starch digestibility increased in these processed, moderately high dry matter BMR silages (37.6% to 43.9%).

In University of Delaware research (Ebling and Kung, 2008), three silages were compared: processed and unprocessed BMR corn plus processed non-BMR corn. Chop length was set at ¾” TLC and roll spacing was 2mm. Compared to unprocessed BMR corn silage, cows fed processed BMR silage had better starch digestibility, less than one-sixth the number of kernels in the manure, higher dry matter intake (+3 lbs), greater milk production(+4 lbs.) but lower butterfat test (-0.23%). Compared to processed non-BMR

silage, cows fed processed BMR silage had greater milk production, but few other differences. Perhaps the most meaningful result in the study was a 6.4 lb. difference in milk production between cows fed processed BMR and processed control corn silage: 97.5 vs. 91.1 lbs./cow.

Days in storage. Recent research from the University of Delaware followed NDF and starch digestibility over time in storage with conventional and BMR silage. NDF digestibility decreased 3 to 5% during the first 60 days of storage and remained fairly stable through day 360 (der Bedrosian and Kung 2010). Starch digestibility was lower at harvest for the BMR silage than a conventional hybrid. Starch digestibility increased over time in storage for both hybrids but BMR silage remained lower than conventional hybrid throughout the study (der Bedrosian and Kung 2010).

Positioning BMR Corn Silage in Dairy Diets
High energy forages with highly digestible fiber are preferred by dairy nutritionists and can easily fit into rations for high producing lactating cows and for transition cows. Since 1999, there have been 17 published research trials in the Journal of Dairy Science where BMR silage was fed to lactating cows. In most cases, trials were conducted on cows that averaged around 50 to 100 days in milk at trial initiation and were fed high forage rations (55 to 60% forage % of DM). In the majority of the trials, the concentrate portion of the diet was similar with silage hybrid as the main difference between diets. Others, fed slightly more forage and less grain concentrate on the BMR diet (Bal et al 2000; Oba and Allen 2000) BMR silage typically accounted for 30 to 60 percent of the ration dry matter. Significant increases in dry matter intake (+2.9 lbs.) and milk yield (3.8 lbs.) were observed on average across the 17 studies (Gencoglu et al, 2008). Milk fat test decreased slightly (-0.08%) while protein test did not change (-0.1%).

Michigan State researchers evaluated animal response to BMR silage relative to the individual cow’s pre-trial milk yield (Oba and Allen, 1999). Cows with high initial milk yield were more likely to have large milk responses than cows with more average milk yield at the start of the trial. Significant responses to BMR silage were observed when cows were fed diets with 29 and 38% NDF in the diet. However, yield responses were greater on the high NDF diet which suggests improvements when intake is limiting production (Oba and Allen, 2000). Intake can be limiting for diets fed to early lactation and high producing. Best bang for the buck will made by offering BMR silage to early lactation, high producing cows with an appropriately formulated ration.

Transition cows (cows within 3 weeks before and after calving) have benefited from research diets with BMR corn silage. Performance and health of fresh cows is improved by elevating feed intakes during this critical transition period. Santos et al. (2001a, 2001b) fed first lactation and older dairy cows three different diets: two based on conventional corn silage and one based on BMR corn silage. Forage to concentrate ratio was fixed at 55:45 or 65:45 on the conventional silage diets and was set at a 65:45 ratio for the BMR-based diet. The dietary treatments began about 23 days prior to calving and were continued for 33 days after calving. Dry matter intake and health events post calving were similar between treatments, but there was a tendency ($P = 0.09$) for increased milk yield (+4.8 lbs.) by the aged cows receiving the BMR diet.

Stone et al. (2008) fed BMR corn silage to close-up dry cows for three weeks pre-partum and three weeks post-partum and documented differences in dry matter intake (DMI) and energy corrected milk production. Dry matter intake was increased significantly on the BMR rations by 2.5 lb. pre-calving and 4.4 lb. post-calving. Energy corrected milk for the first 15 weeks of lactation averaged 95.3lbs for cows on the BMR ration and 89.5 lbs. for the control cows. Note, BMR was only fed for the first three weeks postpartum yet provided benefits through the first 15 weeks of lactation, illustrating the benefit of boosting peak milk.
For producers that are interested in trying BMR silage, it may easier to try it first with the transition cows since the required total amount of BMR silage is less than a ton per cow. However, feeding management during the transition is very critical so careful consideration is required as not all dairies are good candidates for more intensive transition cow programs.

**Harvest and Feeding Management for Success**

1) Grow the BMR silage separately from your main corn silage and store separately.
2) Plan your storage facility based on number of cows to be fed, silage feeding rate, and targeted silage removal rate from storage.
3) Base harvest decision on plant moisture content rather than on milk line location.
4) Use a chop length of ¾ to 1 inches and set processor roller spacing at 2 mm (if processed).
5) Collect feed samples for analysis, and run NDF digestibility and starch digestibility analysis on your silages. Run NDF digestibility on all forages for lactating cows.
6) Test all of your forages for NDF digestibility, using a common laboratory.
7) Target feeding BMR silage to cow groups most likely to respond (high producing cows, transition cows).
8) Have herd nutritionist use dynamic ration formulation software such as CPM or CNCPS to make best use of your highly digestible NDF forage.
9) Use care to avoid over processing forages in TMR mixer wagons.
10) BMR silage stimulates less cud chewing per unit of forage NDF than conventional silage or hays. Plan on feeding more forage fiber and more total ration fiber in the diet.

**REFERENCES**


