Dairy

Is Shredlage a Good Idea?

Posted: April 25, 2016

Shredlage has been a hot topic in recent years, but studies have demonstrated it has the same overall dry matter and fiber digestibility as conventional silage.

In the past few years, there has been renewed interest in a corn silage chopping system using differentially sized and rotating rollers in a corn harvester to create a longer particle size corn silage known as shredlage. Quite a bit of research into a similar chopping method was done about 20 years ago, but it was never pursued due to a few problems and the increased cost of production. The system has been altered some, and shredlage has gained new attention.

The harvesters that produce shredlage have processing-type rollers where one is larger than the other and each moves at a different speed. The result is a kernel-processed corn silage that is both ripped apart and cut. Most often the cutting is done at a longer theoretical length, making a softer, less coarse silage material. The thought 20 years ago was that it might make the forage more digestible by rumen bacteria and therefore improve the value of the crop to the cow, but that has not ever been shown to be true. To date, studies have demonstrated that shredlage has the same overall dry matter and fiber digestibility as conventional silage.

Shredlage Changes Particle Size Distribution

This harvesting system does change the particle size distribution of corn silage, which is easily viewed using the Penn State Particle Separator (PSPS). In shredlage forage particles generally shift from the second sieve of the PSPS (7 to 19 mm) and instead land in the top sieve with a length of more than 19 mm. This change in the particle size distribution can create three problems. First, by making longer corn silage you increase the risk of not getting it well packed in the bunker silo; especially if it gets a bit too dry. Sooner or later this is going to happen in most harvest seasons, likely near the end of the silo filling time. We know well that the drier the silage at ensiling, the more important it is to chop finely for packing. Coarse, dry silage will be prone to increased dry matter losses, poor fermentation, and mold growth. It is important to understand that coarse, wet silage (shredlage) will pack with little problem. In the event that the silage gets too dry, we are increasing the risk of packing problems by making shredlage.

Second, it is well proven by research that increasing particle size of corn silage prolongs eating time by high producing cows and lowers dry matter intakes. Sometimes these are small decreases, but often in research the drop in dry matter intake is statistically significant and in the range of 1 to 2 pounds of dry matter per day on high corn silage diets. Obviously, this is not desirable for high producing dairy cows.
Finally, research has shown that the physically effective fiber in a forage is related to the top 2 or even 3 sieves of the PSPS—everything > 4 mm has been shown to be physically effective in the cow. Shredlage does not increase physically effective fiber levels, it just changes the proportion found on the top two sieves. Furthermore, these top two sieves often add up to the same number for conventional silage or shredlage. In the end, shredlage does not give the cow any more physically effective fiber (peNDF) or provide any advantage over conventionally chopped silage in this aspect of the diet.

Another factor to consider is that shredlage costs more to produce, due to the equipment needed and its power requirement. This can be quite substantial and increases the cost of the final product by $1 to $3 per ton of silage.

**Shredlage Research**

The research 20 years ago primarily considered the engineering aspects of the system and energy requirements to produce the material. Recently there have been two studies conducted comparing shredlage to conventionally processed corn silage. To my knowledge, these are the only two milking cow studies conducted; the first used a conventional silage variety and the second used a BMR corn variety. Both studies showed longer silage was produced as shredlage as compared to a kernel-processed silage, as is usually observed; however, the calculated physically effective fiber levels in the resulting silages were equal. The second study measured rumination of the cows and found it to be the same for both groups as would be expected. There were no differences in nutrient analysis of the two silages from each study, and no differences in fermentation patterns of the silage or digestibility of the feed. In all cases it appeared that the silages were well fermented. In the first trial, 2 groups of Holstein and Holstein-Jersey cross cows were fed for a 12-week period. Cows were not given the opportunity to be on each treatment and were housed and fed in pens of 8. In the second trial, only Holsteins were used for 16 weeks in a similar design also with pens of 8 cows. They found no significant differences in intake in either study, however all cows did some sorting in the second study. They also found no difference in milk and milk component production when comparing kernel-processed and shredlage silages in either study (in the second study, they had a treatment with coarse hay added), yet in the second study both groups had low milk fat (3.3%).

The difference that they did have however, was a large difference in kernel processing score between the two crops in both studies. In the first study, the shredlage had a kernel processing score of 75 on average, which is in the range that we typically consider excellent, while the kernel-processed silage was on average 60%; below the recommended range. From methods described in the paper, the shredlage was processed with rollers spaced 2.5 mm apart and the kernel-processed silage at 3 mm. Clearly, the kernel-processed silage was not processed well enough. In the second study both rollers were set using a similar gap (2 mm), but the shredlage resulted in a processing score of 72 and the kernel processing a score of 68. Data in the paper show that the kernel-processed silage had some samples with processing scores of 55 to 60 up to 80, while the shredlage had kernel processing scores of 66 to 70 up to 80. Obviously, the processing was more variable for the kernel-processed silage and some loads of silage did not meet the goal of 70 or higher. Lower processing scores are likely to yield undigested corn in the manure of high producing cows that consume it.

I draw two conclusions from this re-visit of shredlage. First, there are no advantages to going to shredlage; increased risk of a poor fermentation, no change in rumination time or peNDF, possible reduction in dry matter intake by high producing cows, and an increased cost. The research so far does have a very important take-home message—when you or your custom harvestor are making silage this fall pay close attention to the dry matter and particle size of the whole plant material in addition to the processing of the grain kernels. We know kernel processors can do a great job, and we see from the above studies that shredlage also does a good job of kernel processing. Check the first load and every few loads as the harvest
progresses. Dry matter, particle size, and kernel processing score are items that will have huge impacts on the fermentation, digestion, and utilization of your silage and can easily and accurately be checked on the farm in minutes.

References


Contact Information

Jud Heinrichs
Professor of Dairy Science
Email: ajh@psu.edu
Phone: 814-863-3916

© 2016 Penn State College of Agricultural Sciences [http://agsci.psu.edu]