Study Examines Effects Of Processing Corn Silage

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Studies have shown the need for a limited amount of effective fiber in the rations of lactating dairy cows being fed total mixed rations.

Mechanical silage processing using roller mills has been hailed as a means to achieve more physically effective fiber with all silage diets, and many farmers have begun to incorporate corn silage processing into their forage feeding systems.

Corn silage processing has been marketed for its ability to reduce or eliminate undamaged corn kernels and achieve more physically effective fiber in corn silage. While this is true, little is known about the effects of mechanical processing on silage particle size distribution for different theoretical lengths of cut (TLC).

How long should silage be chopped if it will be processed before entering the silo? Does it matter? How does processing and TLC affect silage compaction?

In an effort to answer these questions, a recent study at Penn State was conducted to determine the interactions between mechanical processing and length of cut on particle size distribution and compaction of corn silage. Corn silage at 70 percent and 57 percent whole plant moisture and cut at 0.75-, 1.5-, and 2.25-inch theoretical lengths of cut (TLC) was used in the study. The corn silage was processed in a roller mill with the rolls set at minimum clearance — 0.015 inch.

One significant finding of the research showed that processing silage with the rolls set at minimum clearance totally eliminated undamaged kernels and large pieces of cob in the silage regardless of TLC and moisture content. We also found that as TLC increased, the effective fiber of the processed silage increased, regardless of moisture content.

When we evaluated the particle sizes of the silages, we found the amount of fine material in the processed silage was similar, regardless of TLC and moisture content. In other words, there was not more fine material (<0.22 inch) in the processed 0.75-inch TLC when compared to the processed 2.25-inch TLC.

Our study also showed that the compacted densities of the processed silage were similar regardless of chop length.

The decision concerning how long to chop corn silage must first be based on the type of storage system being used on the farm. There are practical limits to the lengths of cut used in upright silos because of silage compaction and consolidation within the silo as well as compatibility with blowers and silo unloaders.

Bunker silos can more easily accommodate longer lengths of cut since blower and unloader compatibilities no longer apply and compaction is accomplished by physically driving over the silage with a tractor. Chopping fine requires more power than chopping at a longer TLC, and processing also takes a significant amount of power. Therefore, chopping at a short TLC as well as processing will require more power than processing and chopping at longer TLC.

In light of the findings in this study, farmers who are processing corn silage chopped at less than 0.75 inch are using more power than necessary and not capitalizing on the full potential silage processing provides in regards to increased effective fiber. According to this study, the longest TLC that is compatible with the farmer s feeding system is best.

Silage compaction is important due to its impact on silage quality. To produce quality silage, the silage must ferment in an oxygen-free environment, and compaction is an important means of excluding oxygen from silage and prohibiting oxygen infiltration during storage. The results of this study suggest that the densities of processed silage, regardless of TLC, were similar, suggesting that, if compacted properly, 2.25-inch TLC processed silage should compact as well as 0.75 TLC silage, producing similar quality silage in the end.

On the other hand, the densities of the unprocessed silage did vary significantly with TLC. Silage chopped at 2.25-inch TLC did not pack as well as silage chopped at 0.75-inch TLC, meaning that less oxygen was excluded from the 2.25-inch TLC, resulting in lower quality silage.

In conclusion, kernel processing becomes increasingly beneficial as the silage TLC is increased. In order to maximize the potential of silage processing, silage should be chopped at the largest TLC that is compatible with the feeding system. In so doing, producers will obtain the benefits of longer fiber particles in his silage without sacrificing forage quality due to poor packing in the silo.