Toplage – A Corn Silage Between High-Cut & Snaplage

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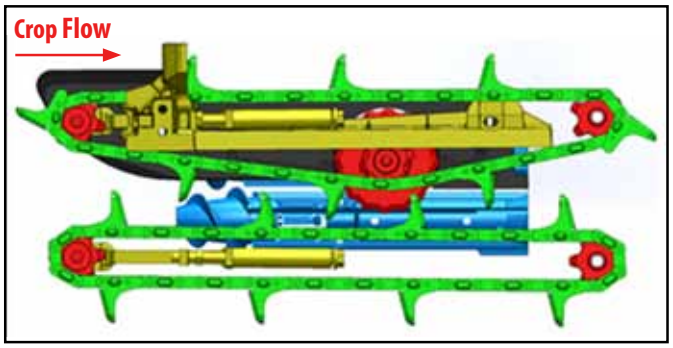
Harvesting traditional whole-plant corn silage is an efficient single-pass system with high yields, but resulting feed is a mix of starch-rich grain with highly variable fiber digestion from the rest of the plant. Producers have adopted "high-cut" silage and "snaplage" as alternatives with more digestible fiber and greater starch concentration than whole-plant silage. To give producers additional options, we have investigated a new silage with a yield and nutrient composition between high-cut silage and snaplage.

High-cut silage is created by cutting at 15-18˝, leaving behind the lignified bottom portion of the stalk to create corn silage with improved NDFD. Snaplage is created by using an ear-snapper header to harvest only the ear. To insure proper ensiling and feeding, snaplage should be chopped short and be well processed by the kernel processor. Snaplage is an attractive alternative to harvesting dry grain since it can be harvested earlier with greater grain yields. Also, fermentation increases ruminal starch availability compared to dry ground corn, and the cob and husk are good sources of NDFD. However, the ear dries quickly; it can be challenging to manage harvest timing so over-drying and low moisture content do not adversely affect fermentation, digestibility, palatability, and aerobic stability. To reduce yield loss impact when harvesting only the ear, some producers harvest stalks and leaves remaining after snaplage for a high-fiber roughage feed.

We wanted to offer an alternative to snaplage or high-cut silage allowing the producer to "dial-in" the fiber and starch content they desire. By modifying the ear-snapper header to cut stalks right below the ear, we created a new feed we call "toplage." The modified ear-snapper header takes only the ears on some rows and uses stalk cut-off knives powered by the header gathering chains to harvest the top part of the stalk and leaves on the remaining rows. These commercially available knife kits are normally used to harvest sunflowers and replace the header deck plates on as many rows as desired (Figure 1). Using simple hand tools, it only takes about 15 minutes per row to install the kits. Toplage yield and composition can be altered by the number of stalk cut-off knives used and the header height. Adding more knives or lowering the header increases the fiber content and yield, creating a feed closer to high-cut silage. Installing fewer knives or raising the header reduces yield and increases starch concentration, creating a feed closer to snaplage. Producers utilizing this new approach can quickly and simply alter the nutrient composition of the feed on a row-by-row basis.

Figure 1. Stalk cut-off knife (center-red) added to ear-snapper header to cut the top portion of the stalk. The left-hand deck-plate is not shown to highlight the position of cutting disk with respect to snapper roll. The disk is driven by right-hand gathering chain.



In one of several studies, we harvested toplage using four stalk cut-off knives on a six-row header and the header height was set just below the ear. Toplage yield was 22% greater than snaplage but 13% and 24% less than yields of high-cut or whole-plant silage, respectively. Toplage had greater starch concentration (52.0%) than high-cut or whole-plant silages (47.0% and 41.4%), but less than snaplage (63.4%). Fiber concentration of toplage was significantly greater than snaplage (19.9% vs. 8.6%) and the digestible fraction of the NDF was also greater for toplage than for high-cut or whole-plant silages.

Snaplage can be difficult to ensile because it is harvested at a high dry matter (DM) content and because starch is a minor source of fermentation substrate compared to fiber. In our study, toplage had lower DM and greater fiber content, so it fermented to lower pH and produced more fermentation acids than snaplage, so it should have improved aerobic stability.

An intriguing benefit of harvesting toplage is potential improvements to kernel processing. We hypothesized that kernels will be more highly processed with toplage because processing energy now absorbed by the stalks can be utilized to better process the kernels. In preliminary results, we found kernel particle size did decrease as fewer stalks were processed with high-cut, toplage and snaplage. Greater research is needed to confirm this result.

The stalks and leaves left after toplage harvest would have value as roughage feed. To facilitate harvest of this material, the harvester wheel spacing was adjusted to leave the stalks standing during toplage harvest. Stalks were then windrowed, wilted, chopped, and ensiled to create "stalklage," a roughage feed similar in nutrient composition to corn stover but now harvested in the early fall when weather conditions are more favorable. Applying lime to the stalklage fraction to increase fiber digestion could increase the value of this material. The combined yield of toplage plus stalklage was only 7% less than whole-plant silage yield, but 6% greater than high-cut yield. Although the harvest of toplage followed by stalklage required three harvest operations, we produced two silages with vastly different nutrient compositions separating the high-fiber, low-digestibility stalk from the more digestible plant fractions. This fractional harvest of corn silage should allow targeted feeding of different silages to different animal groups.

Additional research is needed to more completely quantify the effect of the number of stalk cut-off knives and header height on DM content and nutrient composition. Investment to modify the ear-snapper header with stalk cut-off knives is modest and easily adopted, so dairy producers will now have new options for harvesting and feeding corn silage.