Extreme Mechanical Processing Project Update

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Alfalfa has well-documented environmental and sustainability advantages compared to corn silage. However, over the last 30 years, corn silage has overtaken alfalfa as the most significant component of the dairy cattle diet. The production of corn silage has increased by 33%, whereas alfalfa and grass silage decreased by 32%.

Corn silage harvest is relatively short, requiring a single fall field pass. It is perceived to produce a more consistent feed at a lower cost. Conversely, haylage is harvested at ~30-day intervals, sacrificing yield for quality. As many as 4-5 cuttings/season are needed to meet total annual yield requirements. Since each cutting requires three passes (mowing, merging, chopping), haylage economics are challenging.

Our research is intended to reduce cuttings required to achieve desired fiber digestion and improve haylage economics. Increasing alfalfa fiber digestibility in dairy cattle diets by five percentage points provides enough energy to support an additional 3 lbs milk/day/cow. Our team has been altering alfalfa fiber digestion through a novel approach we are calling extreme mechanical processing (ExMP). This combines two techniques of fiberizing the crop using impact and shredding. Through the support of NAFA's alfalfa checkoff, we made a device and generated material for a lactating-cow feeding trial, which included two diets, one where alfalfa was processed, and the other was conventionally harvested. Alfalfa comprised a third of the diet, with the remaining equally divided between corn silage and concentrates. These diets were fed to 36 lactating Holstein cows for six weeks after a two-week common feeding period. We demonstrated a statistically significant increase in both fat-corrected and energy-corrected milk yields of 3 and 1.4 lbs/cow/day. Moreover, feed efficiency of processed alfalfa was higher, as cows fed that diet regulated intake, accounting for the more accessible fiber.

While initial results are promising, more research is needed before ExMP is available. We plan on following the initial study with a longer feeding period and investigating how crop moisture, maturity, and processing rate impact efficacy. We also want to know how ExMP affects ensiling, inoculant efficacy, and fermentation. Our team is also looking at the whole-farm economic impact of energy use and land area needed to support a herd of cattle fed with the ExMP and unprocessed alfalfa.