



Trees & Shrubs Offer Useful Winter Forage for Ruminants

BY SHANA HANSON

A Jersey heifer requested to join our goat herd.

After tasting woodland forages from my first SARE research project, “Tree Leaf Fodder for Livestock: Transitioning Farm Woodlots to ‘Air Meadow’ for Climate Resilience,” a Jersey heifer requested to join our goat herd. Currently, I have her 2nd son, the steer. The goats (now with the steer) have spent 20 years training me to surrender my waking (and some sleeping) hours, wandering to choice woodland plants and trees. My research explores practical methods for saner farmers to utilize such forages, and transforms my browse wanderings into scholarly sessions of data analysis (or article writing).

While comparing the palatability of tree leaves stored in various ways within that SARE FNE project, the animals and I became enamored by the wonderful aromas in leaf-silage. Airborne plant/animal communication can be inviting or dissuasive. When one plant in a stand is over-browsed, the whole stand sends defensive chemical communication to animals, indicating “antifeedant” plant

changes that limit animals’ digestive uptake of nutrients. When I drop leafy branches or a whole tree, the steer and goats make a beeline to the feast; tall trees are less defended than those in browse reach. Not all farmers climb, so before my second SARE FNE project, “Efficient Leaf-Dense Tree/Shrub Silage Production from Field Edges,” I bought a 9-foot pole chainsaw.

Animals wandering with a skilled herder (me) through a circuit of lush places can balance antifeedants of different forages against each other, and eat one-third more than animals given the perfect diet in a stall. Antifeedants at correct levels have positive effects. Aromatic compounds prevent spoilage in leaf-silage or in milk. Condensed Tannins (CT) improve ruminant protein utilization, decrease methane in cattle burps, and decrease intestinal parasites. Wayne Zeller, US Dairy Forage

Image: Red oak silage harvested 10/4/22 just after the leaf-separator machine arrived. Both steer and goats ate it well despite being kept over a year. Credit: S. Hanson.

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Research Center, is isolating and identifying CT in our fresh leaves and leaf silages.

In Europe, leaves for cattle and hogs were ensiled (fermented anaerobically) to improve digestibility. Sheep and goats might get listeria from dirt in a ground-based silage pit; they were traditionally wintered on dried leaves. In 2003, Norwegian researchers safely ensiled chipped leafy branches in plastic barrels for sheep.

My animals wanted leaf-silage without woodchips. I collaborated with Karl Hallen, Hallen Farm, and the SUNY ESF Willow Biomass Project to develop a Chain-Flail Leaf-Separator prototype, which effectively removes leaves from brush. The Final Report (posted on the websites listed below) includes a photo diagram, parts list, and videos (no copyright; you can build one!)

From late June into October, we coppiced (cut low) or pollarded (cut high) all 23 woody species along field edges of 3 sites, producing 100 lbs (44 lbs Dry Matter (DM)) of leaf-silage per 27 lineal feet. That winter, in one 2-hour free-choice session per day, my steer ate leaf-silage as 33% of his total dietary DM (with hay offered 24 hours), and 10 goats ate it as 55% of theirs. 14 Holstein heifers ate single 30-gallon barrels of elm, green ash, and black locust leaf-silage in 30 minutes per barrel; red oak took longer to chew. Sheep ate leaves plus twigs of 19 species, leaving nothing.

Goats’ milk yield was slightly less with leaf-silage than with high-quality 2nd-cut hay offered similarly, but butterfat yield was equal. A grain and hay-fed cow yielded 8% more milk when given 7 lbs/day of leaf-silage.

My third and current SARE FNE project extended nutritional and toxin analyses. Tree and shrub leaves have lower protein and fiber levels than grass but higher energy and minerals. Our leaf silage had twice the Non-Fiber Carbohydrates (NFC) and calcium levels of average grass silage. Cherry became safe when ensiled; box elder probably does not. Low-toxin Norway maple excelled among maple forages. Gray birch had harvest timing issues; I am tracking the dates of animal refusals this growing season.

Find SARE FNE Project Updates, Final Reports and tree fodder resources at 3streamsfarmbelfastme.blogspot.com or at NortheastSARE.org.

Shana Hanson is a farmer-researcher at 3 Streams Farm in Belfast, Maine. Thanks to Northeast SARE (Sustainable Agriculture Research and Education), which is funded by the National Institute of Food and Agriculture (NIFA), for funding these projects.



Angelo finishing cherry and refusing gray birch. Credit: Hanson

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