2019 Northeast Pasture Consortium Conference Poster Paper Abstracts

Forage Management

Accurately Measuring Available Pasture Forage Mass using Ruler or Plate Meter Pasture Height

Ed Rayburn, Forage & Pasture Specialist, West Virginia University, Morgantown, WV

Measuring available pasture forage mass is tedious and time consuming when taking clipped forage samples. However, measuring pasture height with a ruler or falling plate meter is relatively simple. The key when using pasture height is having the proper calibration between height and forage mass for both pre- and post-grazing events. Having conducted plate meter calibrations across numerous pastures across the Northeast we have found a continuum of plate meter calibrations that provide estimates of available pasture mass within 10-percent. First pre-grazing pasture height is measured. Then a goal post-grazing pasture height is identified. The pre-grazing and post-grazing pasture forage mass are found in the calibration chart. Forage Mass available for grazing is found by subtracting the post-grazing forage mass from the pre-grazing forage mass. When used within the normally recommended pre- and post-grazing forage heights this estimate is usually within 10 percent of the mean across pastures differing in basal tiller density.

Forage Brassicas: Extending the Grazing Season with an Alternative Forage

E. Billman, S.L. Dillard, and K. Soder, Pasture Management & Watershed Management Research Unit, University Park, PA

Fluctuations in perennial cool-season forage growth patterns can results in the inability to meet nutrient needs of grazing livestock during certain seasons of the year. This necessitates either a.) large stores of hay or balage to last upwards of four to five months, or b.) stockpiling of forage into winter months, in which case quality and nutritive value can be low. Forage brassicas offer a potential alternative to these issues. They accumulate biomass rapidly, have high leaf to stem ratios, will continue to grow until temperatures remain below freezing for several days, and also maintain their quality for far longer than perennial grasses and legumes. The objective of this project was to evaluate performance of different annual forage brassica species, compared to traditional winter annual options, in northeastern forage production systems. Three brassica species, 'Barisca' rapeseed (RAP; *Brassica napus* L.), 'Inspiration' canola (CAN; *B. napus* L.), and 'Appin' turnip (TUR; *B. rapa* L.) were compared against 'KB Supreme' annual ryegrass (*Lolium multiflorum* Lam.) for dry matter yield and forage quality over two autumn production seasons. Plots were 18 x 30 ft. and were seeded with a no-till drill (Wintersteiger AG, Austria) in August of 2015 and 2016 with all brassicas seeded at 5 lbs. ac^{-1}, and annual ryegrass at 20 lbs. ac^{-1}. Results indicated that harvest date had no significant impact on yield, and that mean yield of all brassicas (653-767 lbs. ac^{-1}) were significantly greater ($P < 0.001$) than annual ryegrass (307 lbs. ac^{-1}) over the two-year test period. This indicates that brassicas potentially haver greater forage yield under environmental stress conditions that hinder annual ryegrass growth, such as warm temperatures in late summer, or colder temperatures in late fall. This also indicates that regrowth potential of brassicas is far

greater than annual ryegrass. Fiber fractions affecting intake (neutral detergent fiber, NDF) were also significantly less ($P < 0.001$) in brassica species (15-20%) than in annual ryegrass (35%), potentially allowing for increased dry matter intake when consuming diets containing brassicas. These results indicate that forage brassicas can serve as viable alternative forages for producers who desire high yielding, rapidly growing crops that meet high animal productivity standards.

Let it snow! Snow Cover Reduces Freezing Mortality in Perennial Ryegrass

Jeff Gonet, Agricultural Science Research Technician and Sarah Goslee, Ecologist, USDA-ARS Pasture Systems & Watershed Management Research Unit, University Park, PA

Perennial ryegrass is a productive and palatable forage species, but its use in the northeastern United States is limited by its winter hardiness. New cultivars are more freeze-tolerant, but temperatures in much of the Northeast still regularly fall below the level that even the hardiest cultivars can survive. We used both growth chamber tests of freeze tolerance and small plot field studies of perennial ryegrass winter survival to understand current limitations on this important forage species. In the field, perennial ryegrass can survive low temperatures that were shown to kill it in the growth chamber, but only if there is enough snow cover to provide insulation. Climate change predictions show warmer winter temperatures, but still regularly cold enough to kill exposed perennial ryegrass. Reduced snowfall and fluctuating temperatures can further reduce survival in cold years, even as the average temperature becomes more favorable for perennial ryegrass.

Yield and Forage Nutritive Value of Reduced Lignin and Reference Alfalfa Varieties Subject to Diverse Cutting Treatments

A.M. Grev[1], M.S. Wells[2], D.A. Samac[3], K.L. Martinson[1], and C.C. Sheaffer[2]

[1]Department of Animal Science, University of Minnesota; [2]Department of Agronomy and Plant Genetics, University of Minnesota; [3]USDA-ARS Plant Science Research Unit

Reduced lignin alfalfa varieties have potential to improve the digestibility and utilization of alfalfa by livestock animals and to provide increased management flexibility for producers. The objectives were to compare the yield and forage nutritive value of reduced lignin and reference alfalfa varieties when subject to diverse cutting treatments. In 2015, alfalfa was seeded in a randomized complete block with a split-plot arrangement of treatments at four locations in Minnesota. Whole plots were four cutting treatments with harvest intervals ranging from every 30- to every 45-days. Sub-plots were four alfalfa varieties, which included '54R02', 'DKA43-22RR', 'WL 355.RR', and the reduced lignin variety '54HVX41'. Alfalfa was harvested throughout the seeding (2015; data not shown) and first production (2016) years. At harvest, alfalfa plots were hand-sampled for maturity and forage nutritive value determination and then mechanically harvested to determine yield. Cutting treatment by variety interactions were not significant; therefore, the main effects of cutting

treatment and variety are reported. First production year yields ranged from 14.7 to 21.9 Mg ha^{-1} and were generally highest under a 40-day cutting schedule. The 30- and 35-day cutting treatments increased forage crude protein (CP; ≥ 19% DM), decreased neutral detergent fiber (NDF; ≤ 41% DM) and acid detergent lignin (ADL; ≤ 7.7% DM), and increased neutral detergent fiber digestibility (NDFD; ≥ 35% DM) compared to the 40- and 45-day cutting treatments, which contained ≤ 16% DM CP, ≥ 45% DM NDF, ≥ 8.3% DM ADL, and ≤ 28% DM NDFD. Yields were similar for all alfalfa varieties at Rosemount and St. Paul but '54HVX41' was lower yielding at Becker. Concentrations of CP and NDF did not differ among alfalfa varieties and averaged 18 and 42% DM, respectively. Acid detergent lignin concentrations were reduced (7.7% DM) and NDFD was increased (34% DM) for '54HVX41' compared to all reference varieties (≥ 8.1% DM ADL; 31% DM NDFD). Compared to reference varieties harvested under a 30-day cutting sched-ule, '54HVX41' harvested under a 35-day cutting schedule showed a 21% gain in yield and a 3% reduction in relative forage quality. These results demonstrate that the reduced lignin variety '54HVX41' can be harvested for improved forage quality or for higher yields while maintaining forage quality.

Livestock Management

Are our cattle causing an increase in global warming?

C. Alan Rotz, Agricultural Engineer, USDA-ARS Pasture Systems & Watershed Management Research Unit and Alex N. Hristov, Professor of Dairy Nutrition, Penn State University, University Park, PA

The short answer to this question is **no**, but this requires some explanation. Cattle do produce a lot of methane gas, primarily through enteric fermentation in their rumen and fermentation in their manure. Methane is a powerful greenhouse gas that, along with nitrous oxide, carbon dioxide and some other compounds in the atmosphere, create a blanket around our planet to keep us warm. Our current problem is that our blanket is thickening. Over the past decade, we have seen the media place a lot of blame on cattle for greenhouse emissions and their impact on climate. For cattle here in the U.S., this has been misleading at best. The methane that cattle produce is part of a natural carbon cycle that has been happening since the beginning of life on our planet. This methane is oxidized in the atmosphere through a chain of reactions. Within about 10 years of its release, over 90% of the methane is removed from the atmosphere with the carbon in the methane ultimately transformed back to carbon dioxide. This replaces the carbon dioxide that was originally drawn from the atmosphere and fixed in crops to produce feed. In contrast, when we burn fossil fuels, we are taking carbon that has been stored in the earth since pre-historic times and converting it to "new" carbon dioxide released to the atmosphere where it will be with us for 1000s of years. So, whereas cattle are part of a natural cycle with short term impact, burning of fossil fuels has a much more permanent impact. The other consideration is that cattle numbers are not increasing, so the amount of methane they produce is not increasing. Looking further back, cattle today are not contributing a substantial increase in the methane emissions from U.S. lands compared to the ruminants (primarily buffalo) on the land in pre-settlement times. The fact remains that cattle produce

a lot of methane. This methane is essentially wasted energy escaping the rumen. Reducing this waste by increasing the efficiency of the rumen may provide a substantial benefit by producing more meat or milk with less feed consumed. Dietary changes and feed supplements can reduce enteric methane emissions and improve feed efficiency. So, although cattle in the U.S. are not really contributing to the increase in global warming and related climate change, they may become part of the solution by reducing the greenhouse gas they produce.

Milk Production of Organic Dairy Cattle is Influenced by Altering Supplemental Feed Protein Content.

A. Ayers, H. Darby, J. Colby, S. Ziegler, J. Alvez, S. Bosworth, J. Kraft, and S. L. Greenwood, University of Vermont, Burlington, VT

As demand for organic dairy products grows, it is important that the industry focuses on feeding and management strategies that can optimize milk production. Dietary crude protein (CP) profile is variable across farms, and is a factor that impacts animal health and production during the grazing season. Over- and under-feeding of protein can be identified through milk urea nitrogen (MUN) content. This study evaluated the impact of altering the CP content of dietary supplements included in dairy rations on milk production and MUN profile from grazing cattle. Six Vermont organic dairy farms participated in a six-week trial during the 2018 summer grazing season (June to August). Farms were paired by their 2017 summer MUN profile, and farms within each pair were assigned to either 1) continuation of their regular supplements (n=3, control group, CON), or 2) a 16% CP (% of DM) supplement formulated using an organic barley and roasted soybean mix (n=3, treatment group, TRT). All farms were maintained on their regular supplements during the first two weeks of the trial (baseline), and then continued on either the CON or TRT supplements, respectively, for the last four weeks of the trial (experimental period). During the 6-week trial, milk samples were collected at two consecutive milkings every week. Individual milk yields were recorded at each sampling, and samples were collected in bronopol preservative and commercially analyzed for protein, fat, and MUN content. Data were statistically analyzed using the mixed procedure of SAS for all parameters, and effects of treatment, week, and their inter-action (treatment x week) were determined. Milk weight, fat percent, protein percent, and MUN content were all affected by treatment x week ($P<0.0001$). Across the 4-week experimental period, milk yield was higher in the TRT group versus the CON group (11.89 kg vs 9.92 kg, respectively). Fat percent was higher in the CON group versus TRT group (4.20% vs 3.71%), as well as protein percent (3.15% vs 3.07%). MUN profile was higher in the TRT group versus the CON group (13.24 mg/dL vs 11.62 mg/dL). These results suggest that modifying the CP content of the supplement was an appropriate and effective method in increasing milk yield while moderating MUN levels.

2019 Northeast Pasture Consortium Conference Poster Paper Abstracts

Yield, Preference, and Forage Nutritive Value of Small Grains and Annual Grasses under Horse Grazing

A.M. Grev[1], C.C. Sheaffer[2], D.N. Catalano[1], M.L. DeBoer[1], and K.L. Martinson[1]
[1]Department of Animal Science, University of Minnesota; [2]Department of Agronomy and Plant Genetics, University of Minnesota

In the upper-Midwest, cool-season perennial grasses are the foundation of productive horse pastures. However, there may be opportunities to utilize alternative forages such as small grains or annual grasses to extend the grazing season earlier in the spring when perennial species are not yet growing or later in the fall when perennial species are no longer productive. In addition to extending the grazing season, annual grasses can be used to provide forage in emergency grazing situations following events such as winterkill, flooding, or drought. These grasses have not yet been evaluated under horse grazing. Therefore, the objectives of this study were to evaluate a variety of small grains and annual grasses for yield, preference, and forage nutritive value under horse grazing during the spring and fall seasons. Spring grasses were planted May 8, 2013 and April 22, 2014 and included spring oat, spring wheat, winter wheat, spring barley, and annual ryegrass. Fall grasses were planted August 1, 2013 and August 5, 2014 and included the same five species plus winter rye, winter barley, and a forage variety spring oat. Before grazing was initiated, forage samples were hand-harvested to determine yield and forage nutritive value. On June 18, 2013, June 5, 2014, September 17, 2013, and September 9, 2014, horses grazed all plots for four hours at a vegetative stage. After grazing, horse preference was determined by visually assessing the percentage of available forage removal on a scale of 0 (no grazing) to 100 (100% grazed). Plots were mowed and grazing was repeated when spring forages regrew to the target maturity on July 9, 2013; June 24 and July 18, 2014; and when fall forages regrew on October 15, 2013; October 7 and November 4, 2014. Within each season, preference and quality measurements were averaged across grazing events and yield was totaled for all grazing events. In the spring, annual ryegrass and spring oat were among the highest yielding species (≥ 3.7 Mg kg^{-1}), while spring wheat, spring barley, and winter wheat were among the lowest yielding species (≤ 4.0 Mg kg^{-1}). Winter wheat, spring wheat, and annual ryegrass were among the most preferred species with ≥ 67% removal, while spring oat was the least preferred species with ≤ 16% removal. In the fall, winter barley and spring forage oat were among the highest yielding species (≥ 3.4 Mg kg^{-1}), while spring barley and spring wheat were among the lowest yielding species (≤ 4.2 Mg kg^{-1}). Annual ryegrass and spring wheat were among the most preferred grasses with ≥ 50% removal, while spring oat, spring forage oat, winter barley, and winter rye were among the least preferred (≤ 32%). Although differences in forage nutritive value were observed, all annual grasses had ≤ 58% neutral detergent fiber (NDF), ≥ 18% crude protein (CP), ≤ 17% nonstructural carbohydrates (NSC), and ≥ 2.08 Mg kg^{-1} of equine digestible energy (DE). Based on these results, annual ryegrass is high yielding and highly preferred and appears to be a viable option for alternative or emergency pasture in the spring and fall.

2019 Northeast Pasture Consortium Conference Poster Paper Abstracts

Educational & Technical Assistance Programs

Professional Development Project in Weed and Forage Identification and Management

Sid Bosworth[1], Deb Heleba[1], Rick Kersbergen[2] and Richard Brzozowski[2]
[1]University of Vermont Extension and [2]University of Maine Extension

Because high quality perennial forages are critical to sustaining dairy and livestock agriculture in New England, proper identification and management of both weed and forage species are needed. Weeds in these systems pose important management challenges for livestock farmers as they often compete for both above- and below-ground resources that may reduce forage yields, seasonal pasture distribution, and stand life. Being able to identify weeds and understanding their biology, as well as understanding forage quality, are key in helping farmers develop effective forage management strategies.

Survey results indicate that many New England agriculture service providers lack the proper knowledge, skills, and confidence to identify both weed and forage species, as well as developing appropriate strategies to manage them on our dairy and livestock farms.

This project provided a two-year training for beginning and mid-level professionals to enhance their knowledge and skills in weed and forage plant identification and management. They also attended the 2016 NE Pasture Consortium meeting.