WINTER GRAZING IN THE NORTHEAST

SARE FINAL REPORT—JULY2013

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Hardwick, MA

SUMMARY

This project was designed to build on previous trials to extend the grazing season for cattle in the Northeast and thereby reduce feeding costs during the months when grass is not growing. Our methodology was to stockpile feed by refraining from mowing or grazing designated paddocks of pasture after mid-summer in order to provide adequate time for growth before the end of the traditional grazing season. We then applied designated cattle systematically from November 1 to February 21 to the paddocks with stockpiled feed. We monitored the quantity and quality of the stockpiled feed throughout the trial.

At the end of the trial period our veterinarian, Dr. Mark Ledoux, DVM evaluated both the cows and calves (27 animals—15 cows and 12 calves) that ate only the stockpiled forages and also the cows and calves (8 animals—5 cows and 3 calves) that were given only high-cost, stored feed (balage). Both groups were in excellent condition based on their Body Condition Scores (BCS): the cattle that had grazed on the stockpiled feed averaged a BCS of 6.63; the animals that received baleage averaged a BCS of 7.

We also compared the feed values of the stockpiled feed and the balage. The stockpiled feed was analyzed monthly throughout the trial; the balage was analyzed twice during the trial, though the balage we fed throughout was all from the same cutting. We also analyzed a hay sample supplied by our advisor Stephan Herbert from UMass. The forage analyses of the stockpiled feed showed that although feed values declined over the course of the trial, the tested value of the stockpiled forage, even in February at the end of the grazing trial, was equivalent or better than the samples of baleage and hay. For instance, values measured by forage test (February testing period) showed the stockpiled feed compared to baleage: RFV of 80 versus 65; NDF 66.3 versus 71.5; TDN 56 versus 54; and ACP 13.3 versus 9.3. The complete forage results are assembled in an excel spreadsheet attached to this report.

The group that was fed hay were fed 53 bales (approximately 1000 pounds, measuring about 50% dry matter) over the 113 days (53 bales at $50 per bale or $2,650). At a cost of $50 per bale this means the costs were $23.45 per day and therefore $2.93 dollars per head per day. The stockpile group (approximately 27 animal units (27194 pounds)) ate about 30 pounds of dry matter per day as well, and therefore saved about $2.93 per head per day (times 27 head over the 113 day trial period) or

$8,939.43. The area of stockpile grazed during the trial was 21.7 acres and by calculation that area supported 27 animals for 113 days and generated 91,530 pounds of dry matter (30 pounds per day per animal unit) or the equivalent of 183 baleage bales. Both groups required labor: the bale group needed bales moved into hay rings periodically over the period and the stockpile group required moving the fence daily.

The temperature for the winter 2011/2012 was "much above normal" and snow was less than normal, which was an advantage to the cattle grazing stockpile. It did snow significantly twice during the trial, however (see the uploaded photos), with a freak, deep (10-12 inches) snow in October 2011 that the cattle grazed right through, and more snow in late January (2.7 inches and 3.5 inches) which is the snow pictured in the February grazing photos.

This trial indicates that cattle in the Northeast can thrive on stockpiled feed with considerable cost saving for beef producers.

The cattle in the group fed stockpiled feeds were Devon, although the control group was Devon and Angus, both British breeds. A larger trial might seek to determine which of several breeds do best on a diet of stockpiled grass with no grain.

INTRODUCTION

At Out of the Woods Farm, we currently graze 21 animals on 59 acres in paddocks on a number of farms in Hardwick. We intend to stockpile approximately 30 acres this year to try to extend the grazing season and save on purchased feeds.

Our advisor Stephen Herbert is the Associate Dean of the Stockbridge School of Agriculture and the Director of the Center for Agriculture at UMass Amherst. Stephen was critically important to this trial and was centrally involved in the analysis of the data obtained from forage samples. The graphs he developed help make the results clear.

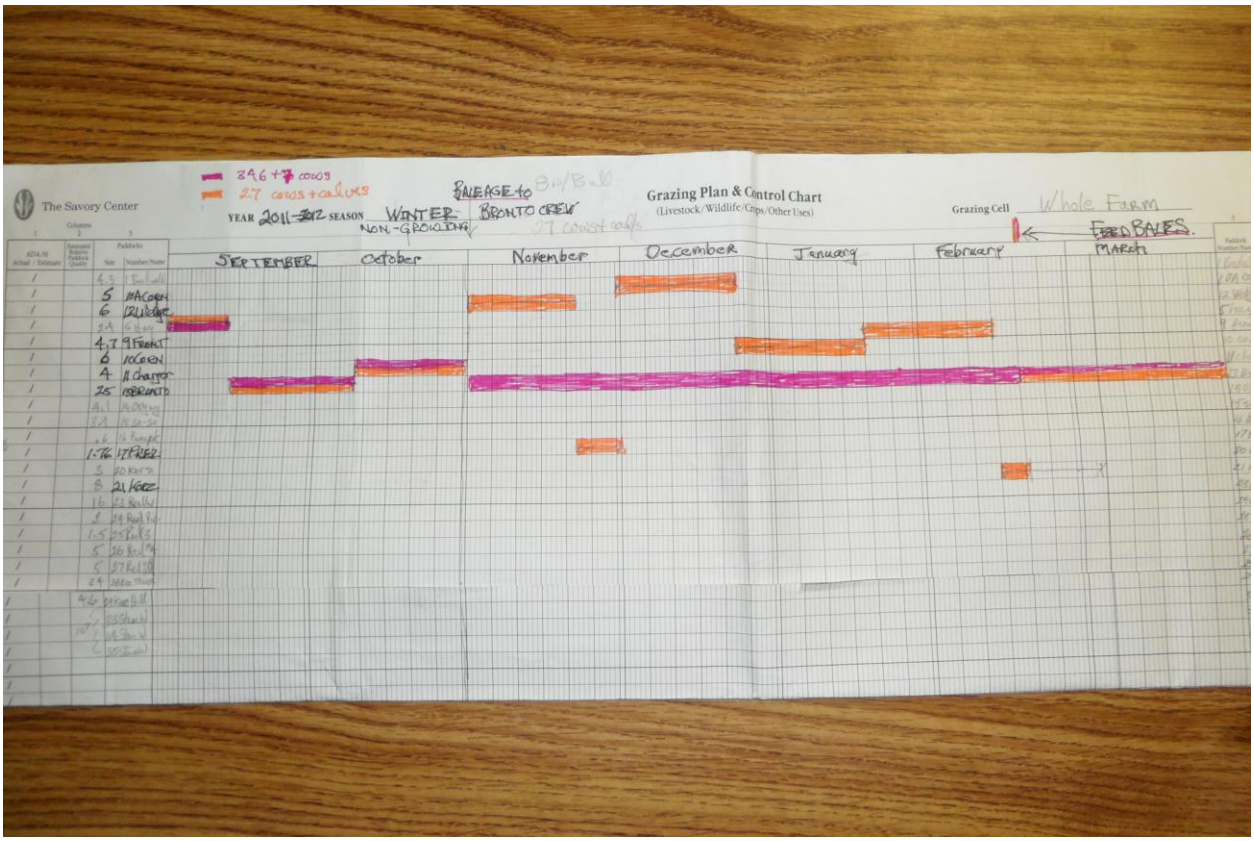
OBJECTIVES/PERFORMANCE TARGETS

The goal was to show that the number of days when stored feed must be fed can be reduced in order to save costs and increase net profitability. We wanted to document that cattle could not only survive but also thrive on stockpiled feed.

We did not expect much change in the cows in terms of weight gain, since they were at their mature weights, but we planned to weigh them as well as the calves. We planned to use their BCS (Body Condition Score) as well as photographs to evaluate their condition at the end of the trial. In addition to evaluating the cattle we also planned to analyze forage samples throughout the trial period so we could compare them to samples of stored feed—baleage and hay.

METHODS

We used the Holistic Planned Grazing methodology. Holistic Management International has published the Aide Memoire, which helped shape the grazing plan. Each day of the year is represented on our grazing chart, and all the available paddocks on the farm are listed. The various cattle "mobs" are described and numbered as well.

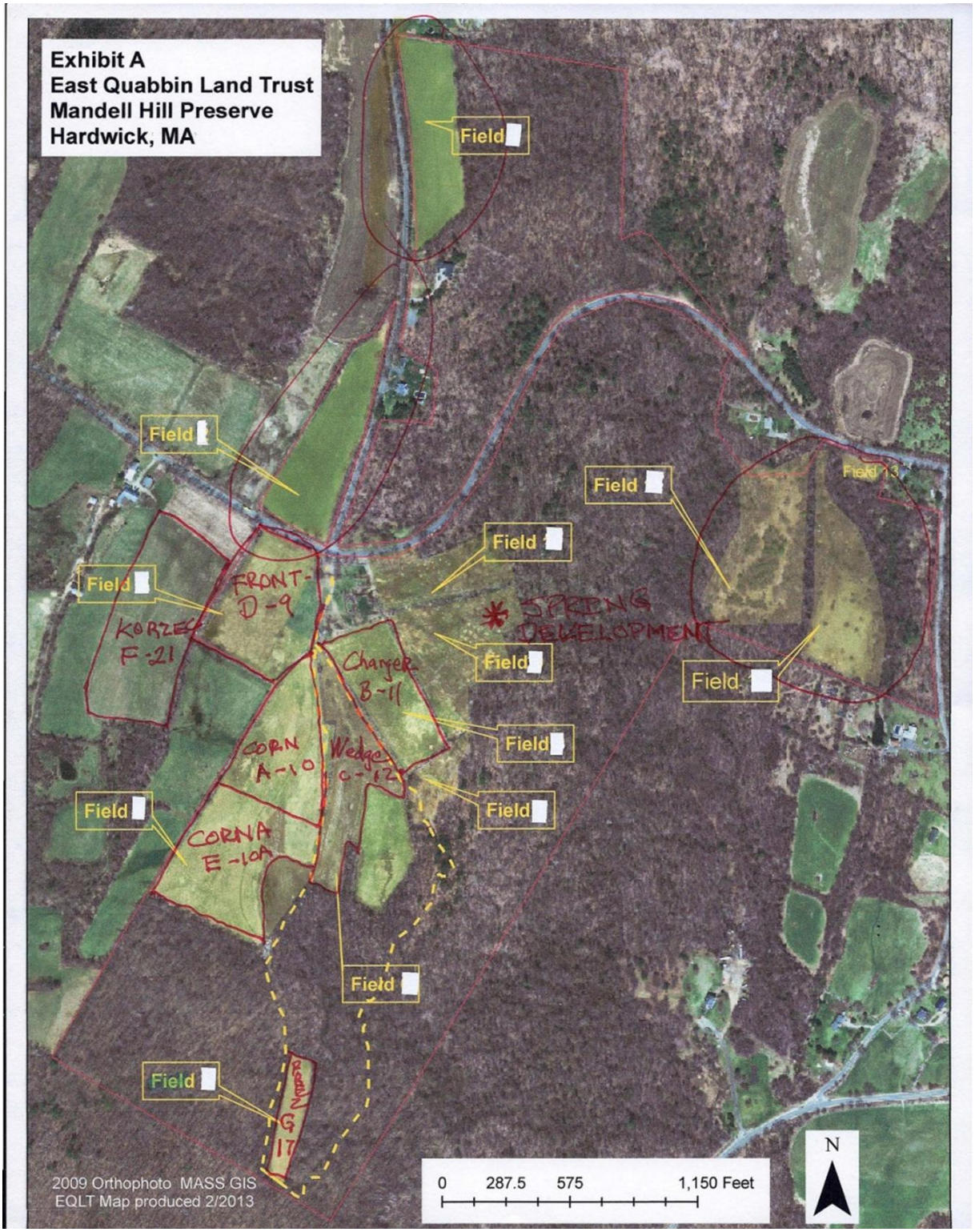


A critical part of the planning process for winter grazing was deciding which paddocks we would stockpile based on topography, water access and protection from wind. The paddocks for the winter grazing trial, a total of 21.7 acres were stockpiled beginning in July 2011. This means the acreage for stockpiling was not mowed or grazed after July 2011.

In the attached power point, see both the map of the paddocks used and also photos of the various stockpiled paddocks at the time of sampling in July, January and February. The specific paddocks used for stockpiled feed were recorded on the grazing plan. Each paddock used in the stockpile was identified with a name, a letter, and a number. The letter designation was also used to label the forage samples. The actual grazing days were recorded with a colored-in box. See a photo of the grazing plan in the

attached documents. An Excel spreadsheet with the raw data results on each paddock is attached, as well as a set of graphs illustrating the feed quality over the winter, compared to stored feeds.

MAP of PADDOCKS



"Corn" Paddock –A -10

JULY sample **JANUARY sample**


"Corn" Paddock-A-10
February sample

"Charger" Paddock-B-11

JULY sample **JANUARY sample**


"Charger" paddock-B-11
February sample

"Wedge" paddock-C-12

JULY sample **JANUARY sample**


"Wedge" paddock-C-12
February sample

"Front" Paddock-D-9

JULY sample **JANUARY sample**


"Front" Paddock-D-9
February sample

"Corn A" Paddock-E-10A

JULY sample **JANUARY sample**

"Corn A" Paddock-E-10A
FEBRUARY sample

"Korzec" Paddock-F-21

JULY sample **JANUARY sample**

The growing season in Central Massachusetts is considered to extend through October. On October 11, a group of 35 cattle (cows and calves and one bull) were moved into an area adjacent to the stockpiled paddocks. When the grass stopped growing and the cattle needed supplemental feed, the original plan was to move only ten animals into the stockpiled area, leaving the rest—the control group—to receive stored feed in the non-growing months. Instead 27 cows and calves were moved into the stockpiled area, where they remained on stockpiled feed until February 21; the remaining eight (including the one bull) were left to receive stored feed beginning on November 1. This decision was made because the condition of the whole group was excellent, and since our hypothesis was that the animals on the stockpiled feed would thrive at much less cost, we adjusted the ratio of animals to benefit from that anticipated outcome.

The stockpiled forage was fed in an area defined by electric fence, in the same way it is fed in the growing season to ration out the feed.

Forage samples of the stockpiled feed were submitted to the Cornell University testing service. Forage analysis was tested for Total Digestible Nutrients (TDN) and protein as well as minerals. These tests were taken at the initiation of the stockpile process on July 15. Samples from the same paddocks were analyzed before moving the grazing cows into the paddock on December 1, January 1, and February 1.

Anecdotal notes recorded at the time of testing include any observations about weather, water, snow cover, ice etc. Photographs of the paddocks were taken during grazing.

Cattle in “Charger” Paddock-B-11
OCTOBER

“WEDGE” Paddock-NOVEMBER

"CORN 10A" Paddock
DECEMBER-Body Condition Score 6.63

"PREZ" Paddock
with Snow-NOVEMBER

“CORN 10A” paddock
DECEMBER

LATE DECEMBER

“CORN” Paddock
JANUARY-new bite

“KORZEC” Paddock

“FRONT” Paddock-9
BEFORE SNOW

“Front” Paddock-9
one half grazed

"FRONT" Paddock-9
FEBRUARY 15th

Evaluation of the two groups of cattle, the ones eating stored feed and the ones eating stockpiled feed, was done by evaluating Body Condition Score as well as photos of the animals and photos of their manure patties.

Additionally, we submitted samples of balage from a local vendor in Hardwick to Cornell. These bales were weighed (1015 and 1002 pounds respectively); though all the balage fed throughout came from the same source, we sampled with a forage test twice during the trial period. The cost of these bales was recorded as well, including the transport cost. Balage from this vendor was fed to the control group of eight cattle. This set of data helped us evaluate the value of the winter grazed forage both in dollars and also in quality of feed available to the bovine.

An analysis of price per pound of dry matter was added to the results obtained in 2011/2012.

OUTCOMES AND IMPACTS

WEATHER

It was a mild year for snow although there was a freak snowstorm (10 inches) that blanketed this area in the last week in October. (Power was out for a week and therefore no electric fences). The cattle dug through the snow for feed (about 10 inches deep) for a couple of days, but then the snow melted away

fairly quickly. The rest of the fall was cold with some light snow in December but no significant snow until late January when we had 2.7 inches and 3.5 inches.

BODY CONDITION SCORE (BCS)

The weight and body condition of the animals remained excellent throughout the winter/trial period. Their Body Condition Score (BCS) remained in the BCS 6 to 7 range throughout the winter grazing trial. (See the PDF outlining BCS as a measure of health in the attached documents.) The cattle were evaluated on February 26, 2012 and charted for BCS. The average BCS of the stockpile group was 6.62 and the average BCS of the baleage fed group was 7. The slightly higher average of the baleage fed group is probably a couple of particularly fat cows in that group that were 8's. Photos of the winter grazing in progress are attached as well as photos showing the condition of the cattle in early February.

In late February we ran out of stockpiled feed. On February 21, the cattle were moved from the trial paddocks into an adjacent area and fed balage.

"CORN 10A" Paddock
DECEMBER-Body Condition Score 6.63

"CORN" Paddock 10

January 20th-Body Condition Score 6.63

HERD HEALTH

Our vet pregnancy-checked the herd at that time and commented on the excellent body condition of the cows and calves, noting the similarity between the condition of the group that were fed balage for the duration of the trial and the cattle eating stockpile. I showed him the stockpiled areas where they had been feeding and he was impressed with the grass. I have included photos of a manure patty taken in late January in the "Corn" Paddock-A-10. The manure is an indication of near perfect rumen function on this stockpiled feed. The manure patty was moist, and had the consistency of pudding, which indicates the rumen is getting what it needs for optimal performance.

PERFECT MANURE-early February

PERFECT MANURE-STOCKPILE GRASS

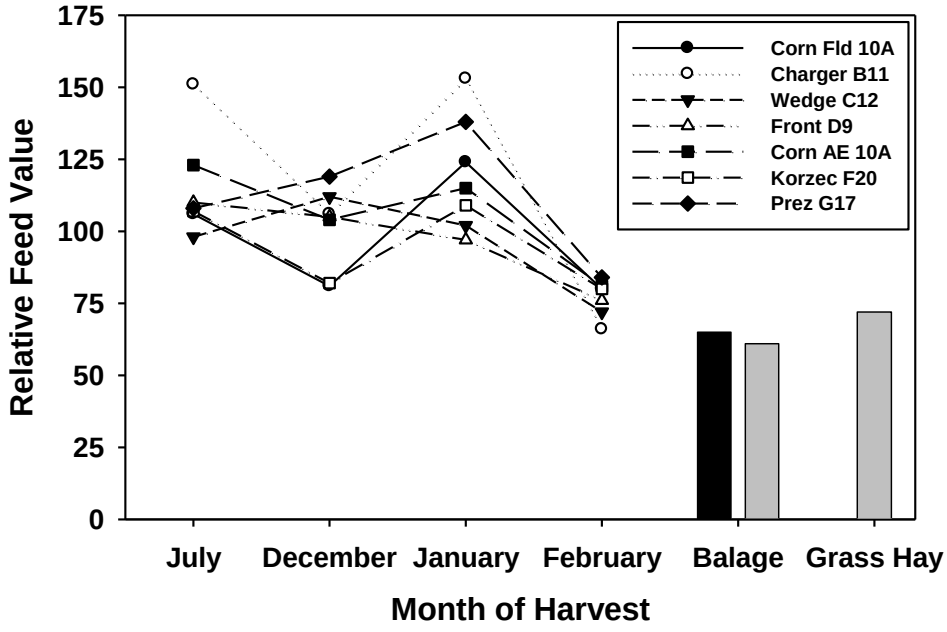
FORAGE ANALYSIS

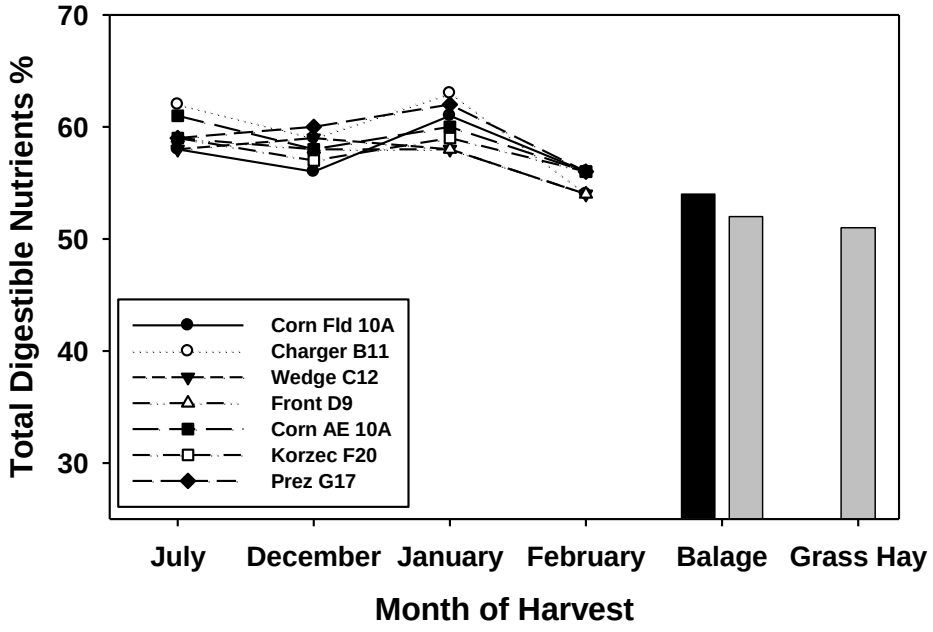
Analysis of the forage test results showed some fascinating results. Steven Herbert, collaborator on the study and Dean of the UMass School of Agriculture, aided the analysis by converting the raw data into graphs that clearly show the trends. In all samples, the trend was for the quality of the grass to decline over the period of the trial, but although there was a decline, the values remained well within acceptable feed values for this class of cattle throughout the study. To compare the stockpiled feed to the stored feeds (baleage and dry hay) we plotted the stored feed values (one point in time instead of

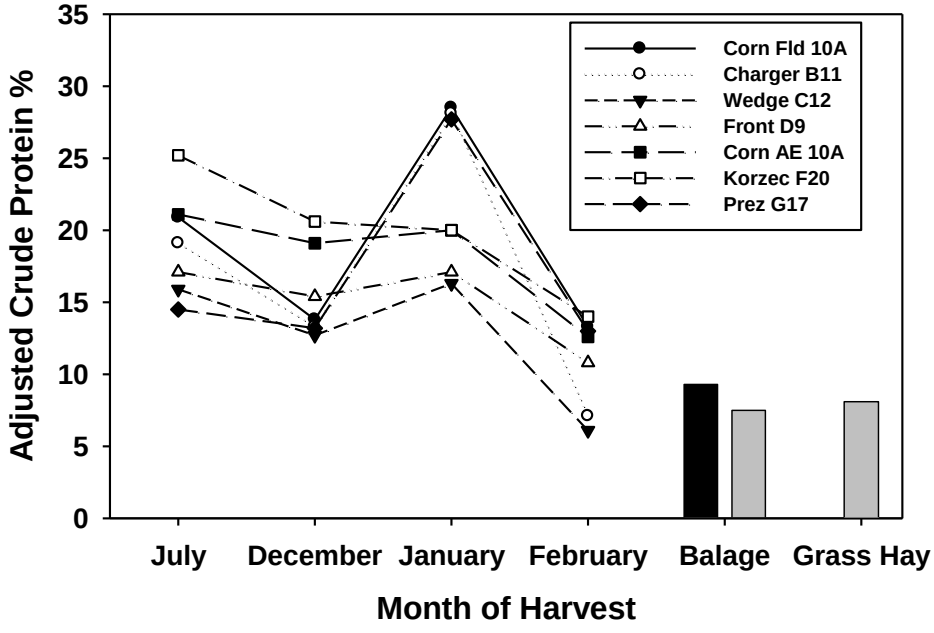
fluctuations over time) as a bar graph insert to show that the quality of the feed stockpiled in the field—even at the end of the trial period—was still equivalent or better than the samples of baleage and hay!

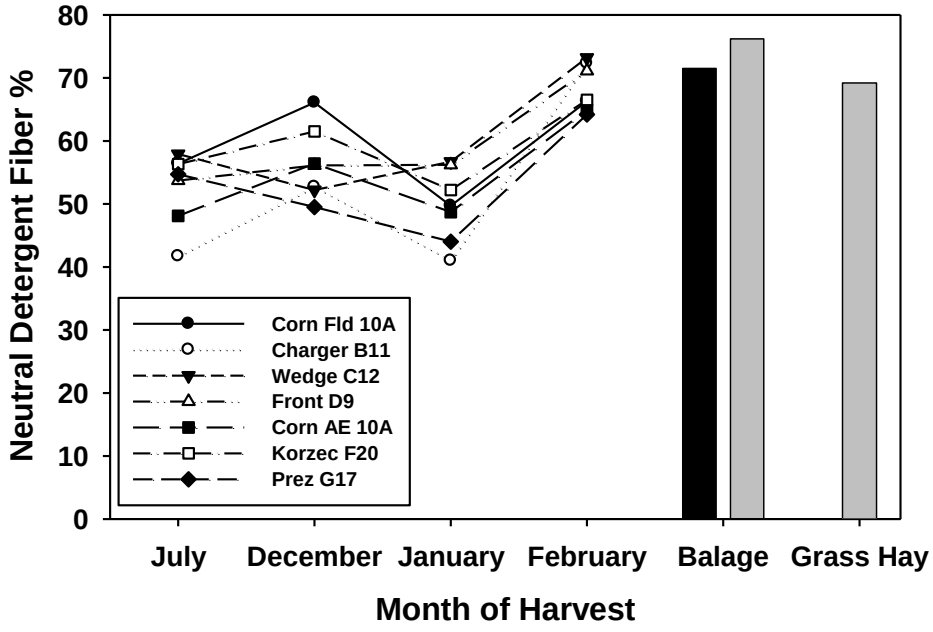
Stephen and I discussed the wide range of fluctuation that some of the samples showed (you can see some spikes and dips on the graphs) and attributed it to the possible variables in the sampling. He suggested that if someone were going to replicate this trial, five samples per sample date for each paddock might be taken to even out the results. Lots of variability is possible in that we returned to our stake marking the sample spot over the months of the trial and simply pulled up some grass; I am sure that sometimes there was more grass or clover in the handful obtained to send in for sampling. In spite some variability in the samples, the trends are quite clear and indicate that while the feed declines over the course of the winter, this stockpiled feed is still better than many stored feeds for maintenance and growth of a cow-calf herd in winter in central Massachusetts.

We had intended to take brix samples of forage, but found that the dry stockpile samples and the dry hay did not allow us to squeeze liquid to measure with a refractometer.




Total Digestible Nutrients %
70
60
50
40
30
Corn Fld 10A
Charger B11
Wedge C12
Front D9
Corn AE 10A
Korzec F20
Prez G17
July
December
January
February
Balage
Grass Hay
Month of Harvest


Adjusted Crude Protein %
35
30
25
20
15
10
5
0
Corn Fld 10A
Charger B11
Wedge C12
Front D9
Corn AE 10A
Korzec F20
Prez G17
July
December
January
February
Balage
Grass Hay
Month of Harvest


Neutral Detergent Fiber %
80
70
60
50
40
30
20
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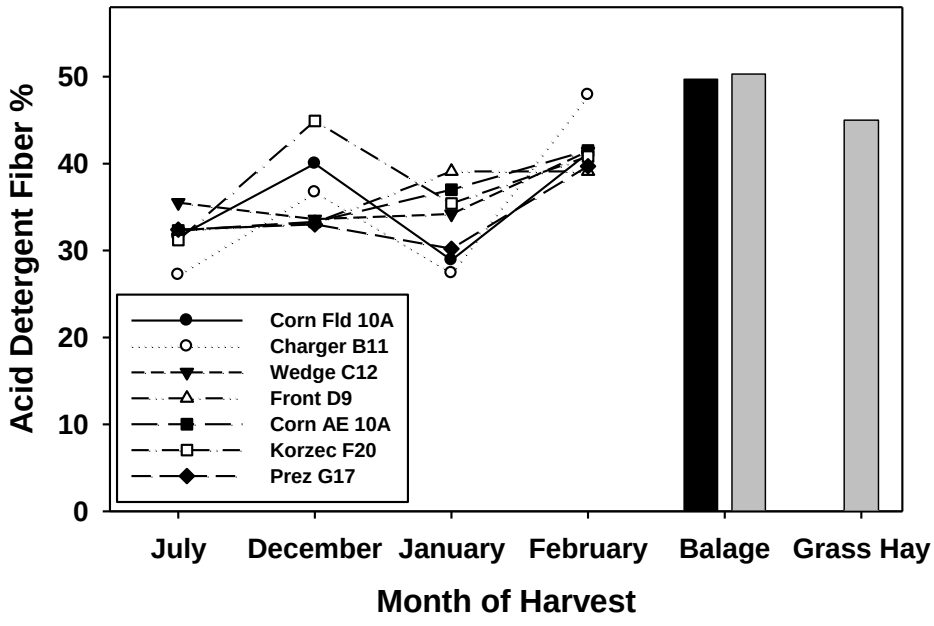
0
Corn Fld 10A
Charger B11
Wedge C12
Front D9
Corn AE 10A
Korzec F20
Prez G17
July
December
January
February
Balage
Grass Hay
Month of Harvest


Acid Detergent Fiber %
50
40
30
20
10
0
Corn Fld 10A
Charger B11
Wedge C12
Front D9
Corn AE 10A
Korzec F20
Prez G17
July
December
January
February
Balage
Grass Hay
Month of Harvest

COST COMPARISON

At the going rate of $50 per bale in this area, the cost of providing the daily dry matter needs of a bovine with a non-growing season pasture system are staggering. The financial data shows conclusively that extending the grazing season by stockpiling can result in dramatic cost savings for the producer.

Locally, dry round bales or wrapped round bales cost about $50.00 per bale. A herd of 35 cows eats 2 bales a day. Considering only the months of November, December, January and February, the value of the stockpile could be worth $100 per day times 120 days, or $12,000.00. This does not include the cost of diesel and depreciation on a tractor to deliver the bales to the cows. My partner in the Rotokawa Cattle Company in PA had his part of the herd inside a building, and incurred the cost of bedding and the labor to spread it, as well as the cost of hay and feeding it, and is looking at purchasing a large manure spreader to move the manures back to the land.

In contrast, while moving the stockpiled herd with a single electrical wire daily did take time and energy, it did not involve fossil fuel or motorized equipment. The weather was cold enough and the land frozen so that there was little disturbance of the soil as the herd moved across the land. The financial facts continue to argue strongly for stockpiled pasture versus stored feeds.

Balage is a popular feed for cattle in this area since it allows producers to cut and store feed earlier in the growing season since the grass is baled and wrapped when it is quite wet. This allows “haying” before there is sufficient warm weather and day length to dry hay in the field. Wrapped bales also eliminate the need for a barn or storage facility for the feed since the plastic wrapped bales can sit outside with no loss of feed due to weathering. The quality of the resulting fermented grass is quite good and the cattle eat it readily. One of the huge disadvantages of balage is the plastic that remains after feeding, which makes quite a pile of waste that cannot be recycled and is landfilled or incinerated. (Incineration captures only 20% of the energy in the plastic.) Picking up and paying for disposal of the plastic is a costly part of the process of feeding balage.

The financial challenge is that these bales weigh almost exactly 1000 pounds, but actually only contain 39 to 42 percent dry matter. Since the dry matter is what cattle eat, the calculations on cost need to be based on dry matter not gross weight. Typical calculations for daily feed intake for a bovine are .025 percent or .03 percent of body weight. For ease of calculation, we will use the Animal Unit calculation, which is 1000 pounds for a typical mature bovine.

A typical cow (1000 pounds) will consume, therefore, 25 to 30 pounds of dry matter per day. It is important to calculate the cost per pound of dry matter for any feedstuff. The cost per pound of baleage is fairly easy to calculate, whereas to value of pasture is harder to measure accurately.

A 1000-pound baleage bale that is 40 percent dry matter delivers 400 pounds of dry matter. Cost of a bale is typically 50 dollars to 55 dollars per bale, so therefore the cost of each pound of dry matter is

12.5 cents. A 1000-pound cow eats approximately 30 pounds of dry matter per day; therefore feeding baleage for the 180 day non-growing season will cost .125 cents per pound times 30 pounds or 3.75 dollars per day times 180 days for a total of 675.00 dollars for the non-growing season.

Pasture rent or lease in this area costs 25 dollars per acre. An acre of land will conservatively generate 150 pounds of dry matter per acre-inch. This is a low estimate and assumes a fairly sparse sward. Assuming a stockpiled sward of 6 inches (our average was 6 to 14 inches in the winter of 2011 to 2012 and ours was dense—see photos), this would generate 900 pounds of dry matter per acre (6 inches times 150 pounds per acre inch). Therefore, one cow could be fed on this acre for thirty days if she ate 30 pounds of dry matter per day (900 pounds divided by 30 pounds per day equals 30 days). The cost per pound would be 900 pounds divided by the lease amount of 25 dollars per acre and therefore the cost per pound would be 2.7 cents per pound. The cost per day based on a 25 dollar per acre lease, with the cow consuming 30 pounds per day, would be 81 cents and therefore the cost for the non-growing season would be 145.80 dollars.

One of the reasons stored feeds are so expensive is the cost of equipment and fuel to harvest the hay. Two farmers in our area shared with us their cost parameters for the cost of making haylage or balage. They both agreed that it costs approximately 40 dollars per bale once all costs are measured including machine purchase, repair, depreciation and labor. Most farmers make about 10 to 11 bales per acre in this part of the Northeast on an annual basis (first and second cutting). Therefore, the typical net profit per acre from a round bale balage operation in the Northeast is 100 dollars per acre. This same hay costs me, the producer, 500 dollars per acre (10 bales at 50 dollars per bale) before I truck it and move it to the paddock.

Note that one of the challenges with winter grazing is water for the stock, and this should be a key consideration in a winter grazing plan. In our case, we are fortunate to have a spring development that was designed and installed with the help of the NRCS. This water system works by gravity and runs all winter long, in all weather conditions, and does not freeze because the water is always moving. The cattle had to walk for quite a distance to get from the grazing areas to the water, though we did not consider this a problem; we assume that some exercise is beneficial.

CONCLUSION

Therefore, a farmer could afford to pay 100 dollars per acre to lease pasture/hay land to graze in the non-growing season and still spend less than s/he would buying hay—a lot less: 100 dollars per acre rather that 500 dollars per acre. Here is the calculation: 900 pounds dry matter per acre divided by 30 pounds per Animal Unit per day equals 30 days of grazing. At 100 dollars per acre lease, each pound of dry matter would cost 11.1 cents per pound; therefore 30 pounds times 11 cents equals 3.33 dollars per day times the 180 days of the non-growing season for a total cost of 599.40 dollars. Therefore leasing land for 100 dollars per acre and grazing it in the winter would be less expensive than buying the wrapped bales mentioned in the example explained above at a cost of 675 dollars for the non-growing season, a savings of 175 dollars per Animal Unit.

PUBLICATIONS AND OUTREACH

- I hosted a workshop at the Morss Farm in Hardwick that was sponsored by NOFA MA and the East Quabbin Land Trust. The title of the workshop was Save the Planet; Eat More Grass-fed beef. The workshop was from 10:00 am to 3:00 pm on Saturday May 12, 2012 at the EQLT headquarters in Hardwick, MA and included power point presentations, a grass-fed burger lunch and then a tour of the Morss farm and cattle. One of the topics covered was the economics of grazing and the cost savings from extending the grazing season and lowering or eliminating the cost of stored feeds.

- The feedback from this seminar was quite positive and NOFA called for us to do a full day presentation and field day in 2013. This was held Saturday May 11, 2013 at the EQLT (sponsored by NOFA) and included a lunch of 100% grass-fed beef burgers as well as a couple of presentations in the morning and then a field day in the afternoon looking at cattle in the field and then catching cattle in the squeeze chute to evaluate them using linear measurement and Body Condition Score. The presentation included a power point presentation that included photos of the Winter Grazing Trial.

- Another presentation was part of the annual NOFA conference, which took place August 10-12, 2012 in Amherst, MA. The workshop was on Saturday at 1:00 and the workshop description was, 112) Grass-fed Beef: Genetics, and Grazing Season Extension

- I will be presenting at the NOFA Conference in 2013 (August 11, 2013 at the 8:30 am workshop period). The topic is profitability of 100% grass-fed beef and the Winter Grazing trial findings will be a central part of the presentation since our conclusions support the proposition that it is dramatically less expensive to extend the grazing season versus feed stored feeds.

- I have submitted a RFP to the Yale Food Systems Symposium, October 18 & 19, 2013, about sustainable agriculture and will highlight the trial at that presentation.

- In June of this year I spoke to the graduating class of chefs from the International Culinary Center at Blue Hill at Stone Barns and also addressed the staff of Blue Hill restaurant and shared the information about grazing an extended season as critical to the economic viability of livestock farming in the Northeast.

- I have a draft of an article that will be published in the Stockman Grass Farmer this fall (2013) and will send the article to Country Folks and Lancaster Farming for publication as well.

- I will print this final report with the associated photos and graphs for distribution at my NOFA presentation and to share with any folks that inquire. Once the final report is complete and filed I will send a copy of it to my newsletter mailing list and it will be posted on my website www.ridgeshinn.com.

FUTURE RECOMMENDATIONS

There are many variables including the quality and density of the grass that is stockpiled, the terrain of the farm (low, wet land probably will not work well), access to water and of course the weather events that will impact success for farmer implementing these ideas. For example, periodically there will be an ice storm that will prevent grazing. But if farmers plan to graze more of the year, each day that the cattle graze puts significant money back in the farmer's pocket.[1]

In the future I would put aside more land for stockpiling, as we ran out of stockpiled feed in mid-February; with more we could have gone through March.

Regarding more research, (1) another trial could obtain additional baleage samples for analysis to compare with the stockpiled feed. (2) More cattle could be included in both the control group and the group feed stockpiled feed. (3) Two or more breeds of cattle could be used in a larger study to determine breeds that are well suited for 100% grass-fed-and-finished programs.

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