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Livestock Research

Pasture Monitoring 2013 – Frog Hollow Farm

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In a Nutshell

- Livestock farmers who manage animals on pasture face the challenge and opportunity of improving profitability and productivity on what is often a fixed land area.
- The Hopkins manage a meat goat herd of just over 100 animals.
- Mike and Cheryl monitored treatments to their pastures, including seeding, grazing, and haying.
- With continued monitoring, stronger correlations may be drawn between forage species composition as influenced by grazing and seeding,

Project Timeline:

May–Oct, 2012-2013

Hopkins goats grazing a mixed-species pasture.

Background

Livestock farmers who manage animals on pasture face the challenge and opportunity of improving profitability and productivity on what is often a fixed land area. Increasing forage yield and forage quality allow more animals to be raised on that acreage, or may allow for maintaining a given herd size without the need for stored feeds. At the same time, continuous living cover on pastures provides real environmental benefits: covered ground suffers less erosion and runoff and has improved soil quality. Diverse pastures including legumes and warm-season forages can provide year-round feed for an animal herd, reducing both the fiscal and environmental cost of harvesting, storing, and feeding hay. To improve forage yield and quality, Practical Farmers have experimented with seeding different forages into existing pastures, and have monitored the performance of the livestock, the forage, and the soil.

The Hopkins manage a meat goat herd of just over 100 animals (about 70 mature does) and graze about 30 acres. This spring they seeded some pastures with the "Herbal Blend" of forages from Blue River Hybrids (chicory, plantain, sheep parsley, small burnet, vetch), and others with combinations of legumes (red clover, birdsfoot trefoil, and alfalfa) and forbs (forage brassica, chicory). Grazing started in May and ended (for purposes of the trial) in October.

Materials and Methods

Mike and Cheryl monitored treatments to their pastures, including seeding, grazing, and haying. Animal weights and body condition scores were taken at the trial's beginning and end, and more often when possible. Movement of animals into and out of paddocks was recorded, to estimate carrying capacity and pasture rest. In each observed pasture, two 100-ft transects were established for observation once during the summer. At each transect, four 1-ft2 quadrats were randomly chosen. Within each quadrat, plant species were identified and relative abundance determined, and percent bare ground and litter were estimated.

Doe and kid performance

Twelve does and the three bucks were evaluated for body condition score four times over the grazing season. All kids were weighed at birth and at weaning, the weaning weights were adjusted for a standard 90-day weaning age, and average daily gain (ADG) was calculated.

Body condition scores (BCS, on a 1-5 scale of emaciated to obese) was consistently greater for bucks than for does ($P < 0.05$), and lactating does had lower BCS than did other does ($P < 0.01$; **Table 1**). However, when analyzing within different physiological states of the does (yearling, dry, or lactating) more differences emerge, and the groups differed at different dates (status*date, $P < 0.01$). Yearling and dry does had greater BCS in July than in other months, whereas lactating does had their lowest BCS in July, which increased through to the end of the season. This likely reflects the effect of lactation energy demand coupled with low forage availability during the "summer slump."

Table 1

Goat body condition score (BCS) at Frog Hollow Farm.

Date	BCS		Category	BCS
6/21/2013	2.80		bucks	3.08 a
7/20/2013	2.93		all does	2.81 b
9/5/2013	2.73		lactating does	2.38 b
9/25/2013	3.00		dry does	3.31 a
overall	2.86		yearling does	3.25 a

Within a category, means followed by different letters differ ($P < 0.05$).

Birth weights and adjusted weaning weights of kids did not differ by sex; however, three orphaned kids had lower birth and weaning weights compared to their peers (**Table 2**). Interestingly, when comparing kids born earlier in the year (March) to those born later (May/June), there were no differences in birth weights, but the early-born kids had significantly greater adjusted weaning weights and average daily gains ($P < 0.05$). Cheryl noted that summer kids generally don't gain as well as those born earlier in the spring, likely because of buildup of parasites in the pastures and loafing areas.

Table 2

Youngstock body weight and average daily gain (ADG) at Frog Hollow Farm

Category	Birth weight (lb)	90-d adjusted weaning weight (lb)	ADG (lb/d)
bucklings	9.1	33.5	0.27
doelings	8.9	34.1	0.28
March kids	9.1	36.7 a	0.31 a
May/June kids	9.0	31.6 b	0.25 b
overall	9.0	33.8	0.27

Within a column, means followed by different letters differ ($P < 0.05$).

Transects and pasture performance

Mike and Cheryl evaluated two transects in each of three paddocks, one seeded with the Herbal Blend, alfalfa, and red clover; another seeded with alfalfa and red clover; and the third seeded with birdsfoot trefoil, red clover, forage brassica, and chicory. The percent ground cover of individual species was determined, as well as the amount of bare ground; results are shown in **Table 3**.

The only statistical difference observed was in bare ground between paddock B, which had about 7.5%, and paddocks A and C, which had essentially none ($P < 0.05$). Despite the lack of statistical differences, it is notable that paddocks A and B were seeded with alfalfa while C was not; this seems to be reflected in the forage composition. Paddock B also seemed to have as much or more total forbs, compared to the others; this is odd because it was only seeded with alfalfa and red clover. Checking the pastures in the future will disclose how much of each species and variety will remain in the long term.

The Hopkins' recorded when and where they moved animals during the grazing season. They aimed for a 6-inch residue height on the pastures, though sometimes certain species were grazed down further. The main paddocks varied in the stocking rates they were faced with, anywhere from 9.5 to 14.2 adult animals per acre. At an average body weight of 130 lb for a mature doe, this equates to about 1235–1846 lb/ac, or 1.24–1.85 AU/ac. Lactating does will consume about 3.5% of their body weight per day as forage dry matter (Rashid 2008), so one of the Hopkins' does will consume about 4.55 lb of forage daily. The entire herd then consumed about 323 lb of forage DM/d. The goats rotated between three of the paddocks, going back to paddock B (the largest) most often, and grazing for an average of 30.5 days at a time. Rest periods averaged 38.5 days. Through the end of the trial in early October, the paddocks supported 0.73 animals per acre per day (0.10 AU/ac/d). Since paddock B was grazed the most, which may have contributed to the increased bare ground seen in the transects.

Cheryl Hopkins with her goats at Frog Hollow Farm.

Table 3

Pasture diversity at Frog Hollow Farm

	A	B	C
Total grass	85.3	73.4	88.9
Total legumes	10.4	15.0	7.4
clover	8.1	12.5	7.4
alfalfa	2.3	2.5	0.1
Total forbs	4.4	6.6	2.4
chicory	3.6	3.8	1.0
parsley	0.8	2.8	1.4
Weeds	0.0	5.0	1.3
Bare ground	0.0 b	7.5 a	0.0 b

Values represent a percent of total forage, estimated visually. Across rows, values followed by different letters differ ($P < 0.05$).

Economics

Equipment, fuel, and labor for pasture seeding came to about $10/ac, whereas seed cost from $26-$52/ac (**Table 4**). Pasture productivity cannot be totally attributed to the new inter-seedings; the paddocks were already established cool-season grass-legume pastures that were only supplemented with new seedings. Still, with continued monitoring, stronger correlations may be drawn between forage species composition as influenced by grazing and seeding, in addition to forage production. This year, paddocks B and C were grazed the most, and yielded similar amounts of grazed forage (calculated using estimates of daily DM intake and overall goat-days per acre). Thus the cost was spread out over a lot of forage harvested, so the cost per pound of forage dry matter was very low (**Table 5**).

Table 4

Pasture establishment costs, carrying capacity, and value per grazing day at Frog Hollow Farm.

Paddock	Size (ac)	Seeding	Seeding cost ($/ac)	Total cost ($/paddock)
A	5	herbal blend, alfalfa, RC	35.96	179.80
B	7.5	alfalfa, RC	53.56	401.70
C	5	BFT, RC, forage brassica, chicory	62.06	310.30

Table 5

Estimated paddock productivity and ost of forage at Frog Hollow Farm.

Paddock	Size (ac)	Total days grazed	Total goat-days/ac	Estimated DM consumption (lb/ac)	Cost ($/lb forage DM)
A	5	69	979.8	4458.09	0.01
B	7.5	99	937.2	4264.26	0.01
C	5	15	213.0	969.15	0.06

Conclusions

Mike and Cheryl Hopkins will monitor these pastures in the future, observing the longevity of the forage species they seeded. They may try seeding additional forage species to reduce parasite loads in the goats, which will involve more monitoring. Cheryl said she hopes to improve her rotation scheme next year to allow pastures more rest time, which will aid their regrowth and recovery, and also prevent parasite buildup.

References

Browning Jr., R. On-farm performance testing for meat goat doe herds. Tennessee State University. http://www.tnstate.edu/faculty/rbrowning/documents/TSU%20Performance%20Fact%20Sheet%20col.pdf

Rashid, M. 2008. Goats and their nutrients. Manitoba Goat Association. http://gov.mb.ca/agriculture/livestock/goat/pdf/bta01s08.pdf

PFI Cooperators Program

PFI's Cooperators' Program gives farmers practical answers to questions they have about on-farm challenges through research, record-keeping, and demonstration projects. The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs.