PRACTICAL farmers of Iowa
working together, always learning

Livestock Research

Pasture monitoring — Troublesome Creek Cattle Co.

Staff Contact:

Margaret Dunn – (515) 232-5661
margaret@practicalfarmers.org

Cooperators:

- **Dave and Meg Schmidt – Exira**

Funding By:

The McKnight Foundation

Web Link:

http://bit.ly/pfi_livestock

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 Schmidts run 30 cows on their farm, which includes 75 acres pasture.
- Schmidts monitored activity daily on their pastures including: seeding, grazing and haying.
- Animal performance, pasture performance and economics are reported here.
- Next, Schmidts hope to experiment with seeding warm-season annuals to supplement pasture production during the summer slump, and will continue taking records on their pastures' diversity, carrying capacity, and economics.

Project Timeline:

May–Oct, 2012-2013

A Schmidt cow grazes on Dave and Meg's farm near Exira, Iowa.

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.

Dave and Meg Schmidt run around 30 cows on their farm, including about 75 acres of pasture or cropground for grazing, and had 15 calves over the course of the trial. The animals are mostly Angus, with some Red Devon, Hereford, and Barzona sprinkled in. They experimented with some cover crop grazing this spring and seeded some warm-season forages for summer grazing.

Materials and Methods

Dave and Meg monitored all activity on 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. They selected one pasture for botanical diversity monitoring, and established three 100-ft transects at representative locations around the pastures. At each transect, four 1-m^2 quadrats were randomly chosen. Within each quadrat, plant species were identified and relative abundance determined, and percent bare ground and litter were estimated.

Results

Cow and calf performance

Mature cow weight (not including those sold, or for whom initial/final weights were not available) was greatest in May when the cows were still pregnant, and declined throughout the summer, as forage availability and the demands of lactation caused some weight and condition loss (**Table 1**). Two-year-old and yearling females gained weight over the season, going from averages of about 1016 to 1150 lb and 709 to 876 lb, respectively. Calf births were spread from January through October, but daily gains averaged 1.78 lb/d for the older calves.

Body condition score (BCS, on a 1-9 scale) was evaluated once a month on all animals a year old or more (**Table 1**). Throughout the entire grazing season, no animals gained or lost more than 1 point on the BCS scale, and maintained an average of 5.3. As expected, across all age groups, BCS rose from April through June (5.1 to 5.6) as forage was more available and highly digestible. It then decreased to just under 5.0 in August and September – correlating with calving and lactation for some, and the "summer slump" in forage production – but rose to 5.5 in October.

Table 1

Cow body weight and body condition score (BCS) at Troublesome Creek Cattle Co.								
	April	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Overall**
	Cow Body Weight (lb)							
Mature cows (3+ years)	1013	1098	1076	1054	1032	1011	1003	1041
Young cows (2-3 years)	1016	1009	1005	1031	1056	1094	1152	1052
Yearlings	709	705	751	794	810	836	876	783
	Cow BCS							
Mature cows (3+ years)	5.10	5.33	n/a	5.00	4.75	4.75	4.75	4.95
Young cows (2-3 years)	n/a	5.25	n/a	5.25	n/a	n/a	5.50	5.33
Yearlings	n/a	n/a	5.64	5.60	n/a	n/a	5.63	5.62

Transects and pasture performance

The Schmidts established three transects on a 10-acre section of cool-season grass-legume-forb pasture. On August 18, they noted which three species were the most common, as well as mean forage heights for that species, and also what other species were present. Orchardgrass was the most prevalent species, followed by smooth bromegrass and tall fescue. White and red clover appeared in moderate amounts, as did the forb, plantain. Bare ground and litter each composed less than 1% of the area within each quadrat.

Table 2

Species diversity on the Johnson pasture at Troublesome Creek Cattle Co.				
Transect	**1**	**2**	**3**	**Average**
Grass	2.4	2.8	2.9	**2.7**
brome	2.0	2.3	3.3	**2.5**
orchard	1.5	1.8	1.4	**1.5**
fescue	2.8	3.0	2.1	**2.6**
timothy	4.0	4.0	4.0	**4.0**
bluegrass	4.0	4.0	4.0	**4.0**
Legume	4.0	3.6	1.9	**3.2**
redclover	4.0	3.3	4.0	**3.7**
whiteclover	.	.	3.5	**3.5**
alsike	4.0	4.0	.	**4.0**
Forb	3.9	3.5	3.6	**3.7**
dandelion	4.0	3.5	3.5	**3.7**
plantain	3.0	.	4.0	**3.5**
ragweed	.	4.0	.	**4.0**
Bare ground	0.9	0.6	0.5	**0.7**
Litter	1.1	1.1	0.6	**1.0**

* Values from 1-4 represent relative predominance of forage species, with 1 being the greatest and 4 being the least.

Dave meticulously recorded when his animals entered and left paddocks, and the total number of animal unit days (AUD) provided by the paddock. An AUD is the amount of forage consumed by a 1000-lb cow nursing a calf in one day; approximately 26 lb of forage dry matter (DM) per day. Grazing began April 15 and went through Oct 20 (for purposes of this report). Overall, Dave estimated that a total 5160 AUD were required – about 30 AUD, for about six months – to feed his animals, and the pastures provided 4675 of those (approximately 61 tons of forage DM). Generally, pasture production estimates are made using an assumed forage removal rate of 50%; Dave estimated that on some pastures the cows took closer to 60% of the standing forage, which may account for the 485 AUD deficiency. Overall he averaged 62 AUD/acre over the experimental period, and was able to give pastures an average 56 days of rest, which should be sufficient for forage regrowth even during the "summer slump."

Economics

Dave also submitted the seeding and Dave also submitted the seeding and rental costs associated with his pastures. Some, owned by the family, had no rental cost; others ran between $65 and $200/acre. Averaging over the entire grazed acreage, rent cost about $120/ac. Two pastures were seeded; one was a cropfield drilled with oats and rapeseed, and then later with a mix of millet and sorghum-sudangrass for summer grazing. C4 plants such as these are more heat-tolerant and grow when cool-season pasture production declines. Another had cereal rye, winter wheat, and hairy vetch cover crops planted in the fall of 2012; these were grazed briefly in the spring, then harvested, and then the area was seeded with the C4 mix. Across all acres, the seeding cost averaged about $35/ac, bringing per acre expenses to $156.

From those pastures, the Schmidts got 4675 AUD, or about 62 AUD/ac. The cost per grazing-day can then be estimated:

- $156/ac ÷ 62 AUD/ac = $2.52/AUD

Since an AUD is equivalent to 26 lb of forage:

- $2.52/AUD ÷ 26 lb/AUD = $0.10/lb forage

For perspective, hay prices in midsummer 2013 in Iowa ranged from $0.08-$0.10/lb (ISU Extension).

This does not take into account the grain and straw harvested from the cover crops, however; nor does it consider stockpiled forages that will be grazed this winter on one pasture. Dave estimates an additional 20 days of grazing from a stockpiled pasture: about 630 AUD (20 days at 31.5 animal units/day). In a less dry year with more forage productivity, the cost per AUD would likely decrease even further. Dave and Meg hope to experiment again with warm-season forages or cover crops to provide affordable yet high-quality grazing during the summer, and to reduce their cows' need for hay.

The data can also be used to estimate production and profitability, now and in the future. At the moment, Dave and Meg are running about 30 animal units (half are cow-calf pairs, and half are yearlings). Some yearlings will be kept as replacements, but others will be finished out.

- Total acres: 75
- Average AU: 31.5
  (15 pairs at 1.2 AU each, and 15 finishing yearlings at 0.9 AU each)
- Weight gain
  - Yearlings: 600 lb gain x 15 yearlings = 9000 lb
  - Calves: 500 lb gain x 15 calves = 7500 lb
- Weight gain per acre: (9000 + 7500 lb) ÷ 75 ac = 220 lb/ac

These are rough numbers, but provide good information for Dave and Meg now and in the future. He hopes to improve his gains per acre in the future, citing a Stockman Grass Farmer article by Allan Nation that reported 300-500 lb/ac of gain for beef cattle in Ohio.

What's that gain worth? Using the average live price for finished beef cattle (USDA-AMS) in early December, Dave and Meg could expect $131.95/cwt for their finished yearlings.

- Value of sold or retained livestock (assume all 15 yearlings are sold)
  - Yearlings: 15 yearlings x 1200 lb x $1.3195/lb = $23,751
- Return per acre: $23,571 ÷ 75 ac = $316.68/ac

This can be compared to the cost of seeding and rent for the pastures to estimate profit:

- "Profit" = returns – expenses = $316.68 – 156 = $160.68/ac

These 'napkin calculations' are extremely rough. Actual revenues are considered, and the expenses of labor and machinery usage are not included. This also does not capture the winter feed expenses, costs of processing and marketing, etc. But, even quick math like this helps producers determine if their enterprises are feasible.

Conclusions and Next Steps

Dave and Meg Schmidt hope to experiment with seeding warm-season annuals to supplement pasture production during the summer slump, and will continue taking records on their pastures' diversity, carrying capacity, and economics.

References

Barnhart, S. Mid- to late- July, 2013 hay price update. Iowa State University Extension. http://www.iowabeefcenter.org/ISUhayreports/2013/July-2013HayReport.pdf

Janovick, N. A., J. R. Russell, D. R. Strohbehn, and D. G. Morrical. 2004. Productivity and hay requirements of beef cattle in a Midwestern year-round grazing system. Journal of Animal Science 82:2503-2515. http://www.journalofanimalscience.org/content/82/8/2503.full.pdf+html

Miller, A. J., D. B. Faulkner, R. K. Knipe, D. R. Strohbehn, D. F. Parrett, and L. L. Berger. 2001. Critical control points for profitability in the cow-calf enterprise. Professional Animal Scientist 17:295-302. http://pas.fass.org/content/17/4/295.full.pdf+html

USDA-AMS. 5 area weekly weighted average direct slaughter cattle report. Accessed 13 Dec 2013. http://www.ams.usda.gov/mnreports/lm_ct150.txt

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.