



Grazing Cover Crops for Winter Feed, 2015 Update

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Cooperators:

- **Dave and Meg Schmidt** – Exira

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In a Nutshell

- Cover crops can provide a high-quality, low-cost feed during times when farmers would normally be feeding hay and other stored forages.
- Dave and Meg Schmidt planted and grazed cover crops and crop residue to extend their grazing season and reduce hay expenses.
- Over four winter seasons, they have maintained animal performance through feeding a combination of hay and winter grazing.

Key findings:

- Grazing cover crops and crop residue in late fall delayed the onset of regular hay feeding.
- Cows maintained body condition and calves met average daily gain goals while grazing cover crops and crop residue.
- Utilizing cover crops as forage allowed the Schmidts to feed less hay than previous years, while also increasing their herd size.
- Graziers should consider entering into cost-share agreements with row crop neighbors to reduce cover crop establishment costs.

Project Timeline:

September 2014 – May 2015

Background

Feeding the cowherd during the winter months is the greatest expense for forage-based cattle operations. Studies have found that extending the grazing season through the use of stockpiled forages,



Cattle received 46% of their winter feed needs from grazing cover crops and crop residue Nov. 7, 2014 - March 3, 2015.

gleaning of crop residues, and fall and spring grazing of cover crops can reduce reliance on stored forages, thus cutting costs to producers.

Some see the integration of livestock on the land as the final step in making a cover crop program reach its full potential. Not only have soil health improvements been documented, but so have significant savings in feed costs (Hartman, 2014). The practice of grazing cover crops can save a producer up to \$30 per cow per month in feed costs alone, which does not account for the additional value from manure and increased soil organic matter (Lindquist, 2014).

The objective of this research project was to demonstrate the effectiveness of grazing cover crops to extend the grazing season, cut hay costs and provide proper animal nutrition. Dave and Meg Schmidt's ultimate goal is to be able to only feed stored forage for one month of the year -

when gestating cows have high nutritional needs and when the weather is harsh. Over the past four winters, Dave and Meg have kept track of the amount of hay fed and hay costs, kept cover crop seeding records, monitored grazing, animal weights and body condition scores.

Materials and Methods

This research project was conducted by Dave and Meg Schmidt, Troublesome Creek Cattle Co., near Exira in Audubon County from September 2014-May 2015. They have been monitoring winter feed consumption since 2011 and started planting and grazing cover crops in 2012. In the fall of 2014, Dave and Meg worked with Meg's father, Richard, to seed 185 acres of crop ground on Richard's land. Cover crops (cereal rye, wheat, hairy vetch) were aerial seeded on September 25, 2014 into standing corn and soybeans, at a rate of 85 lb/ac (1.5 bu/ac). The cover crops were homegrown, with seed retained

from 2013's harvest. Dave and Meg estimated they cost \$10/bu to produce. Aerial seeding, done by a neighbor, cost \$21/ac, bringing the total cost of the cover crop to \$36/ac. **Table 1** shows the seeding records and costs.

Thirty-seven cattle (calves, heifers and mature cows) grazed 185 acres of cover crops, cornstalks and soybean stubble from Nov. 7, 2014 to March 3, 2015; a total of 116 days. Hay was fed regularly starting on January 31, but cattle still had access to crop fields until March 3. After March 3, the cattle were fed on a lot. Due to wet, muddy conditions in the spring and to ensure there was enough biomass to properly terminate, cattle did not graze cover crop re-growth in April and May. Dave and Meg took extra precaution when grazing on Richard's land, as they do not own it.

Dave and Meg recorded the movement of animals through the cover crop fields, tracked weight and body condition scores (1-9 scale, 1 = emaciated and 9 = obese), and noted the amount and value of hay consumed. Monitoring began when animals were moved from perennial pastures to winter row crop fields, until they were put back on pasture to start calving in the spring – early Nov. through April.

Results and Discussion

Mean monthly temperature and total monthly rainfall in 2014 and 2015, compared to long-term averages near Dave and Meg's farm is presented in **Table 2**. The 11.5 inches of rain in April and May 2015 is what prevented cattle from spring grazing cover crops. The rain also delayed the grazing of perennial pasture, increasing 2015 hay costs.



January 31, 2015 marked the start of the regular hay feeding season. Cattle grazed cover crops and crop residue for three months prior.



2014	Corn ground	Soybean ground
Cover crops seeded	Cereal rye, wheat, hairy vetch	Cereal rye, wheat, hairy vetch
Seeding rate (lb/ac)	85	85
Seed cost (\$/bu)	\$10.00	\$10.00
Seeding date	9/25/2014	9/25/2014
Aerial seeding cost (\$/ac)	\$21.00	\$21.00
Total seeding cost (\$/ac)	\$36.00	\$36.00
Acres seeded (ac)	100	85
Total cost (\$)	\$3,600	\$3,060
Grand total (\$)	\$6,660	

Month	Temperature (°F) ^a		Rainfall/Snow (in) ^{ab}	
	2014-2015	Avg.	2014-2015	Avg.
Sep '14	61	63	7.9	3.43
Oct	51	52	2.3	2.44
Nov	29	37	0.2 + 2.0 snow	1.59
Dec	28	24	0.8	1.04
Jan '15	22	19	0.1 + 10.0 snow	0.85
Feb	14	24	3.0 snow	1.00
Mar	37	36	0.1	2.09
Apr	49	49	4.2	3.44
May	58	61	7.3	4.43
Jun	70	70	10.6	4.87
Jul	73	74	6.1	4.03
Aug	70	72	5.5	4.17

^a Mean monthly temperature for 2014 and 2015 and the long-term temperature and rainfall averages at the Audubon (60 years, approx. 15 mi. from Schmidt's) weather station (Iowa Environmental Mesonet, 2015).

^b Total monthly rainfall and snow for 2014-2015 at the Schmidts' farm (measured by Dave).

Photo A. Spring regrowth of rye in a field ungrazed by cattle. Pictured is 432 lb/ac rye growth. Photo taken April 17, 2015, prior to termination.

Photo B. Spring regrowth of rye in a field grazed the prior fall and winter. Pictured is 288 lb/ac rye growth. Cattle did not graze after March 3, 2015 due to wet, muddy conditions and the need to leave enough biomass to terminate properly. Photo taken April 17, 2015, prior to termination.

Feed Consumption

Tracking the amount of hay offered and calculating the herd's nutritional requirements confirms that cattle obtained most of their nutrition from grazing than from hay in Nov., Dec. and Jan. (**Table 3**).

Animal requirements are based on a standardized expected daily intake of 26 lb of forage dry matter (DM) per 1000-lb animal unit (AU). **Table 3** shows the amount of DM required to feed the cattle in a given month: (number of AU fed) x 26 lb/AU/day x (days in that month). For instance, in November, the cattle required 14.5 tons of DM: 37.1 AU x 26 lb/AU/day x 30 d = 28,938 lb DM = 14.5 tons DM.

The amount of hay consumed each month, in the second column, is based on Dave's hay feeding records and is adjusted to a DM basis according to the forage analysis results conducted by Dairyland Laboratories, Inc. in Arcadia, WI. The third column is how much cover crop and crop residue DM was consumed, estimated as the difference between the animals' requirements and how much hay was fed. As this is a grass-fed operation, the cattle only received what they grazed and what hay was offered.

In March, when animals were not grazing, the amount of hay fed does not match the animals' requirements. This indicates the cattle were slightly underfed this month, and informs Dave they should have been offered over two more tons of hay. Dave will use this information to "score body condition more frequently and will more closely compare animal feed requirements to the nutritional value of the feed offered."

Table 3

2014-2015 monthly animal feed requirements and feed consumption.

	Animal Requirements (tons of DM)	Hay Consumed (tons of DM)	Cover Crop and Crop Residue Consumed (tons of DM)
Nov '14	14.5	0.0	14.5
Dec	14.5	0.9	13.6
Jan '15	14.4	3.7	10.7
Feb	13.2	12.4	0.8
Mar	15.1	12.7	0
Apr	14.7	15.1	0
Total	95.7	40.8	54.9

Across the 2014-2015 winter feeding season (Nov. to April), 46% of the animals' needs were met by cover crops and crop residues. Nearly all of the animals' requirements were met by the cover crops and crop residues in Nov. and Dec. and 74% of animal needs were met by cover crops and grazing in Jan.

Figure 1

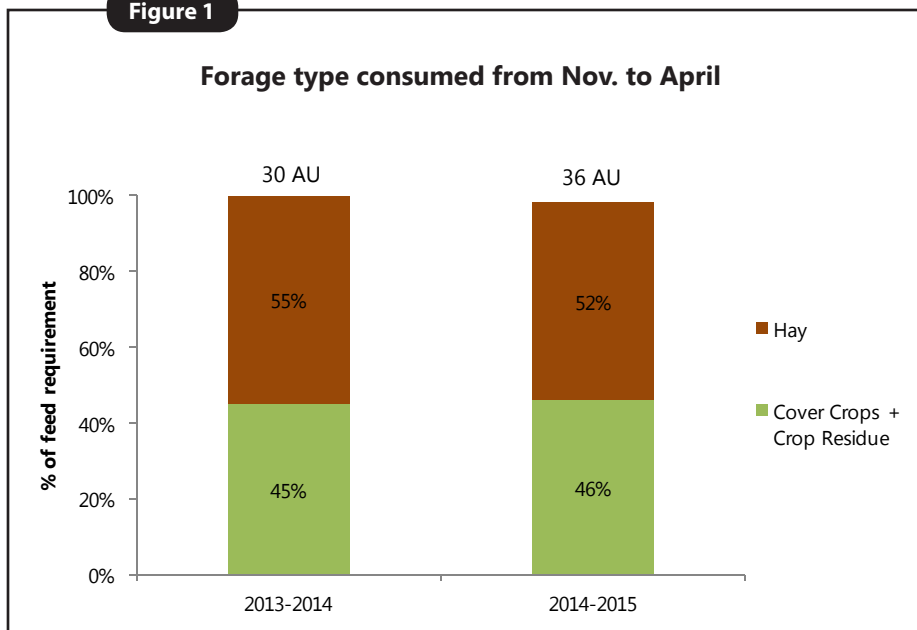


Figure 1. Forage type consumed from Nov. to April each year. In March 2015, animals should have been offered two tons more hay, which is why only 98% of their feed requirements were met in 2014-2015. However, cattle maintained a body condition score of >5 the entire year and met calving goals the following spring.

Figure 1 shows animal feed requirement comparisons between the last two winter seasons. The Schmidts increased their herd by 6 AU (6,000 lb) in 2014-2015. Despite adding more animals and planting 40 less acres of cover crops than the previous year, the herd met their nutritional requirements with a lesser percentage of hay than in 2013-2014. This implies the herd is receiving more from the cover crop – which is attributed to better grazing management. Instead of letting the herd have access to the entire field, Dave and Meg split it into two paddocks. Dave stated, "Splitting the crop ground allowed us to ration out crop residue and gave the rye a chance to grow longer."

The practice of grazing cover crops on crop ground also provides a nearly complete ration. The high protein, highly digestible forage complements the low protein, lower digestible crop residue as the primary energy source (Vough, 2015). Grazing high protein cover crops stimulates the utilization of available corn and soybean residue. Meg believes, "Cover crops are equivalent to a protein lick tub – plus, you don't have to drag it to the field, the soil benefits from the cover crop and there are less compaction issues from where a tub would sit."

Cow body condition and youngstock weights

Body condition scoring (BCS), which assigns scores to animals based on visual evidence of fat cover, was taken six times over the winter feeding season. On a 1-9 scale, BCS scores should range from 4-6. Dropping below 4 puts cows at risk of low milk production and delayed rebreeding in the following year. Scores above 6 are not bad for the animal so much as suggesting that the farmer is wasting money keeping the cow that fat. Over the winter

season, animal condition remained adequate, showing that cattle can keep condition while grazing cover crops. **Figure 2** shows the mean body condition scores of mature animals in Dave and Meg's herd. "The December-March dip in BCS is what we hope to see. I don't think it's economical to let them maintain over 5 BCS all winter, but by February they are in their third trimester of pregnancy and need to be maintaining or gaining condition," said Dave.

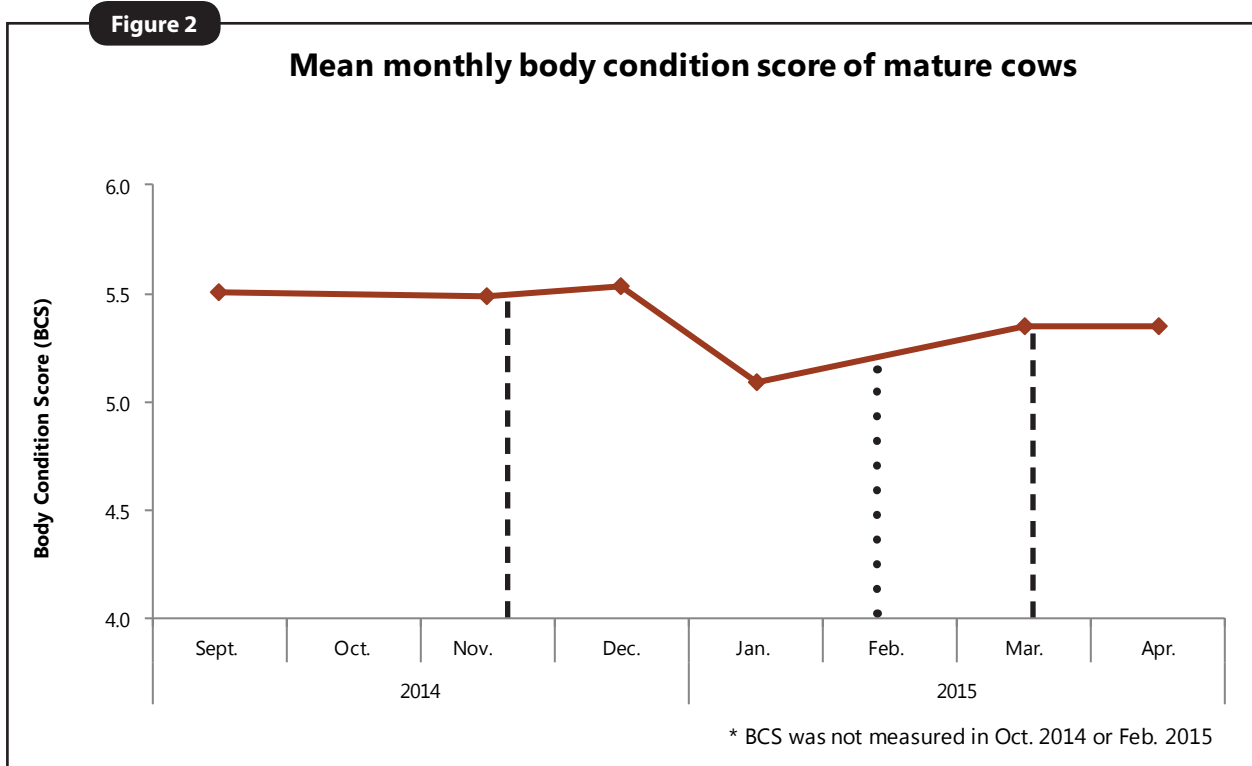


Figure 2. Mean monthly body condition score of mature cows. The dashed vertical lines represent when cattle were turned into the crop field with cover crops (Nov. 7) and when they were taken out (Mar. 3). The dotted vertical line represents the date when hay started to be fed on a regular basis (Jan 31).

Dave and Meg weighed growing animals once a month. **Figure 3** shows the mean body weights of yearlings and calves in the herd. As expected, the animals gained weight as they got older. From late Sept. to April, calves gained an average of 1.5 lb/day; the yearlings gained 0.9 lb/day. Dave's winter average daily gain goals for animals destined to finish at 20 months of age are: 1.3 lb/day for calves and 1 lb/day for yearlings. These numbers tell Dave his calves were gaining enough daily, but his yearlings should be gaining at least 0.1 lb/day more.

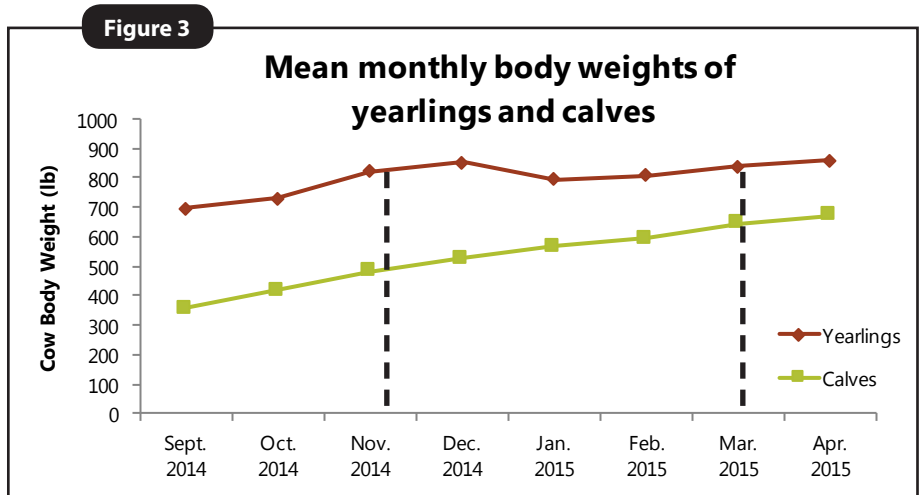


Figure 3. Mean monthly body weights of yearlings and calves. The dashed vertical lines represent when cattle were turned into the crop field with cover crops (Nov. 7) and when they were taken out (Mar. 3).

Economics

The Schmidts essentially offset three months of feeding hay by grazing cover crops and crop residue. The feed, equipment and labor costs for winter grazing and hay feeding were calculated. This cost was then compared to the cost of feeding 100% hay with no grazing. Also, the Schmidts benefited from cover crop cost-share, and these savings are included for additional comparison.

Graze + Hay:

Dave and Meg make some of their own hay and purchase the rest. The hay they purchased cost them on average \$74/ton; less than the market value of hay in January 2015, which was \$130/ton (USDA, 2015). Dave and Meg regularly fed hay from Jan. 31 to April 30; on average feeding one large round bale every other day for 90 days. During this time period, they incurred 46 bale feeding events (at times feeding multiple bales) which equated to 49 tons of hay.

When applying the market value to the home-raised and purchased hay, the value of 49 tons of home-raised and purchased hay combined is \$6,370. Setting bales out for cattle took about 15-30 minutes of tractor time and twice as much human time. 46 bale feeding events required 14 equipment hours and about 28 human hours. From a previous PFI Cooperators' Program research report on grazing cover crops for winter feed the Schmidts were involved in (Dunn et al., 2014), consider the following cost estimates:

- Fuel cost: 14 hrs x 5 gal/hr x \$3.50/gal = \$245
- Labor cost: 28 hrs x \$15/hr = \$420
- Total = \$665
- \$6,370 (total market value of hay) + \$665 (fuel & labor) = \$7,035 total hay expenses

When cows were grazing on cover crops and crop residue, it took about 15 min to check cows on days they were out grazing. Cattle grazed, and were supplemented very little hay from Nov. 7 – Jan. 31; for 85 days. Cover crop establishment costs were \$6,660.

- Labor cost: 0.25 hr/d x \$15/hr x 85 d = \$319
- \$6,660 (cost of cover crops) + \$319 (labor) = \$6,979 total grazing expenses
- Totaling hay + grazing expenses together:
- \$7,035 (hay expenses) + \$6,979 (grazing expenses) = **\$14,014 total winter feed expenses**
- On an animal unit per day basis: \$14,014 (total expenses)/174 days total/36 AU = **\$2.24/AUD**

100% Hay:

From Nov. to April, the herd required 86.5 tons of DM, which equates to about 102 tons of hay. The time period between coming off fall pasture and being turned out onto spring pasture was 174 days. If bales were fed every other day, this equates to 87 bale feeding events:

- 102 tons of hay required x \$130/tn = \$13,260 hay expense
- Fuel: 26 hrs x 5 gal/hr x 3.50/gal = \$455
- Labor: 52 hrs x \$15/hr = \$780
- \$13,260 (hay) + \$1,235 (fuel & labor) = **\$14,495 total winter feed expenses**
- On an animal unit per day basis: \$14,495 (total expenses)/174 days/36 AU = **\$2.31/AUD**
- \$14,464 (100% hay) - \$14,014 (graze + hay) = **\$481 saved** when grazing and feeding hay

Grazing cover crops and feeding hay over the winter saved the Schmidts \$481 over feeding 100% hay. This value does not incorporate the forage quality value of the cover crop or the soil health benefits from the cover crop. Dave stated, "A grazier could afford to contribute the \$480 dollars saved on hay expenses towards the establishment of cover crops to graze." These calculations show that by keeping cattle on the land during the winter reduces equipment and labor costs while reducing the hay bill.

Graze + Hay + Cost-Share:

Keep in mind that the above estimates do not include any cover crop cost-share benefits. Dave and Meg worked out a deal with Richard where they pay for seed and Richard pays for aerial application. Incorporating this cost savings breaks down as follows:

- \$6,660 (establishment of cover crops) - \$3,885 (cost of aerial application) + \$319 (labor) = \$3094
- \$3,094 total cost of grazing expenses
- Totaling hay + grazing expenses together:
- \$7,035 (hay expenses) + \$3,094 (grazing expenses) = **\$10,129 total winter feed expenses**
- On an animal unit per day basis: \$10,129 (total expenses)/174 days/36 AU = **\$1.62/AUD**
- \$14,495 (100% hay) - \$10,129 (hay + graze + cost share) = **\$4,366 saved** when incorporating cost-share

This estimate encourages graziers to enroll in cost-share programs or work out agreements with landowners and row crops farmers to split cover crop establishment costs. **Table 4** sums up the calculations for each scenario.

Table 4

Cost comparisons for winter 2014-2015 feeding scenarios.

	Graze + Hay	100% Hay	Graze + Hay + Cost-Share
Winter feed costs total	\$14,014	\$14,495	\$10,129
Winter feed costs per AUD	\$2.24	\$2.31	\$1.62

Table 5

Comparison of hay consumption and costs across four winter feeding seasons.

	2011-2012	2012-2013	2013-2014	2014-2015
Winter feeding season (days)	134	140	90	90
Animal units (AU)	19	23	30	36
Total hay consumed (tons)	28	50	48	49
Market value of hay (\$)	\$3,700	\$7,000	\$6,700	\$6,370

Table 5 shows the comparison of hay consumption and hay costs over the last four winters at the Schmidts’ farm. Their feed costs have increased by less than \$3,000 compared to four years ago, despite them feeding 17,000 more pounds of cattle (17 AU). They have accomplished this by being able to feed a lesser percentage of hay to their herd each winter.

Conclusion

Over the four years the Schmidts have tracked winter feed intake, they have increased their herd size from 19 AU to 36 AU and have been able to successfully offset the amount of hay fed by extending their grazing season through cover crops. Conducting this on-farm research helped Dave to see “year four numbers were similar to previous years which confirms accuracy and tells me that we’re saving money by grazing cover crops.”

The 2015-2016 winter will be a bit different than past years, as Dave and Meg ran into issues that prevented them from fall seeding cover crops in Sept. 2015. The issues preventing them from establishing cover crops were due to a neighbor not doing any aerial seeding this year and Meg’s dad enrolling land into CRP. Dave added, “By the time the beans were combined, I didn’t think there was enough time to drill oats before the projected first frost, so rye wouldn’t have grown enough in the fall to be worth having to kill it and we’ve never grazed in the spring due to mud.” To continue establishing cover crops worthy of grazing in the fall and winter, they need to find a cost-effective way to interseed cover crops into standing crops in August.

Because cattle will not be grazing cover crops into the winter, Dave knows that the 2015-2016 winter will prove to be less economical. He will keep hay feeding records, and then be able to compare expenses to past years, further understanding the financial value cover crops offer. When asked his future plans Dave said, “I plan to go out of my way to keep grazing cover crops on row crop land and continue to establish relationships with neighboring row crop farmers.” Dave hopes his research results help convince other farmers that cover crops can provide high-quality off-season feed while benefiting the soil.



Meg, Dave and Silvie Schmidt along with their farm dogs, Burl and Elbie.

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