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Livestock Research

Winter Feed Monitoring on a Grass-Fed Cattle Farm

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In a Nutshell

- Feeding cows during the winter is the greatest expense for most grass-based operations.
- Grazing cover crops and stockpiled pastures provides low-cost feed during times farmers would normally be feeding hay.
- For many years, Dave and Meg Schmidt have recorded grazing moves and the amount of hay they fed to the herd.
- From 2013 to 2017, they experimented with feeding cover crops, crop residue and stockpiled pastures to cut down on the amount of hay needed.

Key findings:

- During the winters of 2013-2014 and 2014-2015, cover crops and crop residue provided almost half of the winter feed needs for the herd.
- During the winter of 2015-2016, the most hay was fed, because the farmers were not able to plant cover crops the season prior.
- The least hay was fed in 2016-2017, due to a combination of grazing stockpiled pastures along with cover crops and crop residue.
- Calf average daily gains were greatest in 2016-2017.
- Diverse winter forage sources allow the Schmidts to feed less hay, increase the size of their herd and save money.

Project Timeline:

November - April, 2013 - 2017

Dave and Sylvie Schmidt standing in stockpiled annuals post-grazing January 2017

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, gleaning of crop residues, and fall and spring grazing of cover crops can reduce reliance on stored forages, thus cutting costs to producers (Ball et al., 2008).

Farmers Dave and Meg Schmidt operate a diverse livestock farm, Troublesome Creek Cattle Co., in Exira, IA; raising grass-fed and finished cattle and sheep, pigs and poultry. Feeding the 100% grass-fed cattle herd over the winter is a great expense, so they have experimented with feeding different forage sources – hay, cover crops, crop residue and stockpiled pasture to minimize costs. Hay is the most expensive forage to feed during the winter, while the other sources provide winter grazing opportunities.

The objective of this multi-year research project was to record how much hay was fed during the non-growing season, from November to April, each year. Number of animals, calf gains, winter grazing moves, hay fed and money spent on hay were recorded in order to show what each winter feeding period provided to the herd. Dave and Meg'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. The Schmidts' research helped them determine the effectiveness and cost of each feeding scenario in order to help them meet their goal of minimizing the amount of hay fed.

Materials and Methods

This research project was conducted by Dave and Meg Schmidt, Troublesome Creek Cattle Co., near Exira in Audubon County during the non-growing, winter seasons, from 2013 to 2017. They recorded the movement of animals through different lots and pastures, tracked weights on a monthly basis, and noted the amount and value of feed consumed. Monitoring began when animals finished the normal summer grazing and moved to winter crop fields or stockpiled pastures – approximately November through the end of April.

Cover crop grazing

Cereal rye, wheat, hairy vetch and/or oats were planted three out of the four years, for the purpose of grazing during the winter. **Table 1** shows seeding records and costs. In 2013-2014 and 2014-2015, cover crops were aerially seeded by a neighbor. In 2016-2017, cover crops were drilled by Dave.

Stockpile grazing

Stockpiled forage in the pastures was comprised of orchardgrass, red clover, smooth brome grass, tall fescue and Kentucky bluegrass. Generally, the Schmidts stopped grazing pastures in August in order to grow enough to stockpile for winter.

Table 1

Cover crop records on corn and soybean fields planted for grazing during each winter feeding period.

	2013-2014		2014-2015		2015-2016	2016-2017	
Previous crop	Corn	Soybean	Corn	Soybean		Corn	Soybean
Cover crops seeded	rye wheat vetch	rye	rye wheat vetch	rye wheat vetch		rye	oats
Seeding rate (lb/ac)	84	86	85	85		37	141
Seed cost ($/bu)	$9.00	$12.00	$10.00	$10.00		$9.45	$2.75
Seeding date	9/2/13	9/16/13	9/25/14	9/25/14		10/10/16	9/20/16
Application cost ($/ac)	$20.50[X]	$20.50[X]	$21.00[X]	$21.00[X]	No cover crop	$10.50[Y]	$10.50[Y]
Cost of seed + application ($/ac)	$34.00	$39.00	$36.00	$36.00		$24.74	$17.39
Acres seeded (ac)	110	110	100	85		25	75
Cost per field ($)	$3,740	$4,290	$3,600	$3,060		$619	$1,305
Total cost ($)	$8,030		$6,660			$1,924	
Cost per acre ($)	$47.24		$38.82			$19.24	

[X]Cost charged to Dave Schmidt by neighbor who aerial seeded cover crops
[Y]Cost to drill based on ISU custom rate (Plastina, et al., 2016)

Results and Discussion

Mean monthly temperature and total monthly rainfall from 2013 to 2017 is presented in **Table 2**. Weather during the growing season affects the crop residue biomass that will be available for grazing. Fall temperatures and precipitation determine establishment and growth of cover crops, especially non-frost hardy species like oats and brassicas. Cold, windy and wet weather increases the feed needs of livestock and ice or deep snow can cause grazing difficulties. Fall and winter precipitation causes stockpiled pastures to decline in quality. "Some farmers talk about years when corn stalks last longer than other years; this is probably due somewhat to corn variety but also to the weather factors above," said Dave.

Table 2

Average monthly temperature (F°) and rainfall (in.) for 2013-2017[X].

	2013-2014		2014-2015		2015-2016		2016-2017	
Month	*Temp*	*Rain*	*Temp*	*Rain*	*Temp*	*Rain*	*Temp*	*Rain*
Nov	32	1.31	29	0.54	41	3.47	43	1.18
Dec	17	0.24	28	0.84	30	5.46	22	1.30
Jan	15	0.10	22	0.23	18	0.68	23	1.24
Feb	14	0.94	14	1.02	27	1.30	32	1.17
Mar	30	0.59	37	0.14	42	1.18	37	2.77
Apr	47	2.91	49	4.49	49	3.94	49	2.43
May	59	3.64	58	6.45	57	7.73	57	8.12
Jun	70	10.26	69	7.99	73	2.33	70	2.69
Jul	67	3.26	71	6.42	72	4.09	74	2.95
Aug	70	12.03	68	6.95	71	5.60	69	7.87
Sep	61	5.55	67	8.49	66	7.85	68	1.61
Oct	51	4.95	52	1.67	54	2.30	54	4.57

[X]Weather data from Audubon weather station, approx. 15 miles from Schmidts' farm (Iowa Environmental Mesonet, 2017).

Forage Consumption and Forage Type

The percentage of hay consumed by the cattle herd during each non-growing season is shown in **Figure 1**. The remainder of the herd's ration was fulfilled by a mix of cover crops, crop residue and stockpiled pasture, depending on the year. Herd size is listed in animal units (AU) which equate to 1,000 pounds of animal.

The amount of hay consumed each month is based on Dave's hay feeding records and is adjusted to a dry matter (DM) basis according to the forage analysis results conducted by Dairyland Laboratories, Inc. in Arcadia, WI. The non-hay portion of the ration was calculated by figuring the herd's feed requirements during each month of the non-growing season and subtracting from that how much hay was fed according to Dave's records. In other words, the amount of cover crops, crop residue and stockpiled pasture consumed was reported as the animals' feed requirements less how much hay was fed. As this is a grass-fed operation, the cattle only received what they grazed and what hay was offered.

Animal requirements are based on a standardized expected daily intake of 26 lb of forage DM per AU (Berger, 2013). Examples of this calculation can be found in past research reports (Filbert and Schmidt, 2015).

Figure 1

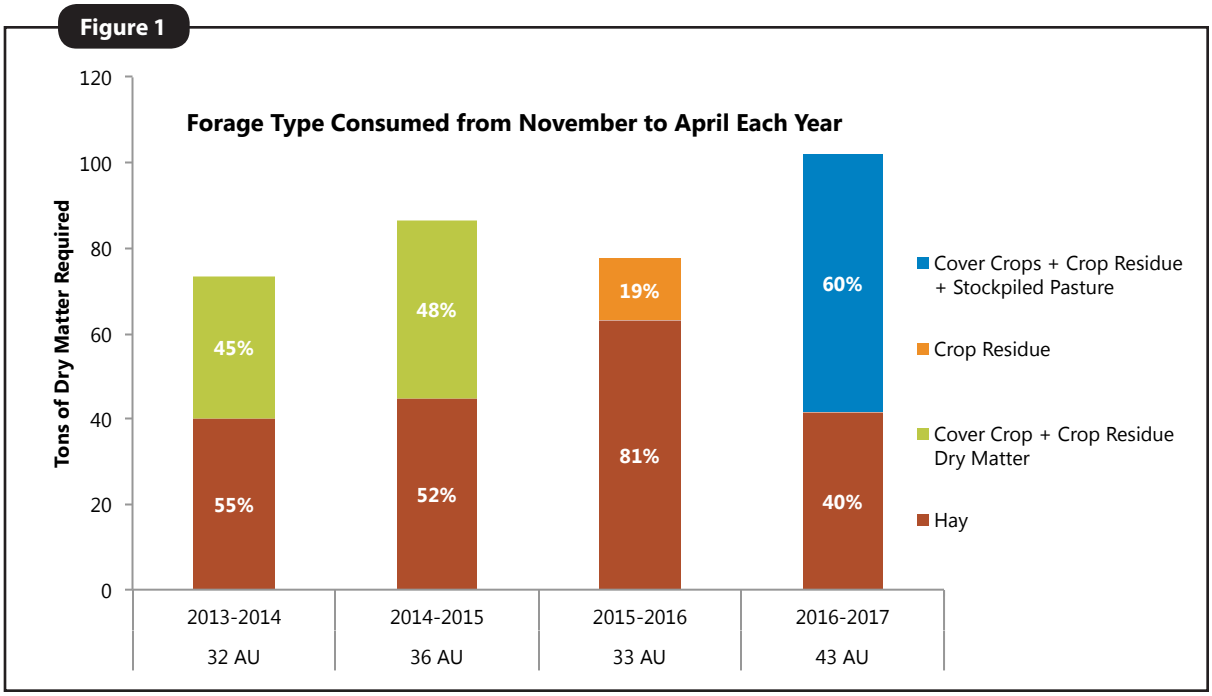

Figure 1: Forage type consumed by the cattle herd from November to April each year. Herd size is shown in Animal Units (AU).

2013-2014 & 2014-2015

During these non-growing seasons, cattle grazed cover crops and crop residue, receiving 45% and 48% of their needs from the cover crops and residue, respectively. The second year, the herd received 3% more from the cover crops and crop residue, while also increasing in size by 4,000 lb (4 AU). Instead of letting the herd have access to the entire field, like the first year, Dave and Meg split the field into two paddocks. "Splitting the crop ground allowed us to ration out crop residue and gave the cereal rye cover crop a chance to grow longer," explained Dave.

Very little hay was fed in the months of November and December both years because cattle were turned into the cover crops fields between late October and early November. Cattle received 21 tons of DM in 2013 and 28 tons of DM in 2014 from the cover crops and crop residue during these two months (Dunn and Schmidt, 2014; Filbert and Schmidt, 2015).

2015-2016

The most hay was fed during this winter, making up 81% of the herd's ration from November to April. Dave and Meg were not able to plant cover crops in September of 2015 due to a neighbor not doing any aerial seeding that year and Meg's dad enrolling land into the Conservation Reserve Program (CRP). "Not only did we feed a lot more hay than usual, but the finishing animals lost weight on the corn stalks and they kept breaking through the fences, even before it looked like they were out of stalks," remarked Dave. Not grazing cover crops caused an observable increase in the amount of hay fed to the herd.

2016-2017

The least amount of hay was fed during this winter, making up 42% of the herd's ration from November to April. Important to note, herd size increased to 43 AU, an increase of 10,000 pounds of animals, from 33 AU the year prior. The combined use of stockpiled pastures, cover crops and crop residue made up 59% of the herds' winter feed, allowing the Schmidts to minimize hay consumption to 41% of their diet. Cattle consumed 50% less hay with a herd that was 25% larger, compared to the prior winter.

"Last year [2016-2017] was our first time with significant stockpile grazing and the finishers are the heaviest we've ever had them at this point in time. We were able to dramatically reduce the amount of time the cattle were fed hay in the lot – roughly early February to mid April. Perennial stockpile really pays because we can graze it shorter to the ground when it's dormant, so animal days per acre go way up," stated Dave.

Grazing stockpile during the dormant season also allowed cows to safely graze fescue, which grows in the Schmidts' pastures. Most fescue is infected with a fungal endophyte that is toxic to cattle, but the concentration of this toxin decreases in the fall and winter (Hancock, 2008). "Grazing fescue as stockpile is an advantage because it retains quality better than anything else and they won't eat it any other time of the year," added Dave.

Hay + Cover Crop Costs

Table 3 shows the comparison of hay consumption and hay costs over the last four winters at the Schmidts' farm. Numbers are reported in hay consumed per AU and cost of hay per AU. Hay costs for 2016-2017 were $3,787 – a savings of $2,691 from the year prior. Cattle consumed the least hay per AU in 2016-2017 because they were able to graze stockpile and cover crops, which lowered the cost of hay to below $0.50 per animal unit day (AUD). Cover crops were grazed in both the fall and spring, unlike 2013-2014 and 2014-2015 when cover crops were not grazed in the spring due to mud concerns. These numbers clearly show that in 2015-2016, when cattle did not graze cover crops or stockpiled pasture, hay expenses were the highest.

Table 3

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

	2013-2014	2014-2015	2015-2016	2016-2017
Animal units (AU)	32	36	33	43
Total hay consumed (tons)	50	53	75	52
Hay consumed per AU (tons/AU)	1.56	1.47	2.27	1.21
Cost of hay paid by Schmidts ($)	$4,292	$3,124	$6,478	$3,787
Cost of hay DM per AUD[X] ($/AU/180 days)	**$0.74**	**$0.48**	**$1.09**	**$0.49**
Cost of hay @ $80/ton ($)	$4,000	$4,240	$6,000	$4,160
Cost of hay per AUD @ $80/ton ($)	**$0.69**	**$0.65**	**$1.01**	**$0.54**

[X]Cost of hay per animal unit day (AUD) represents the cost to feed one AU (1,000 lb of animal) per day from Nov. 1–Apr. 30 (approx. 180 days) each year.

The last two rows of the table standardize hay costs at $80 per ton, in comparison to the cost of hay actually paid by the Schmidts each year. Showing the standardized hay cost lets the farmers compare year-to-year expenses without having to consider the variability of hay prices.

It is important to look at the added expenses of cover crops, which are calculated in **Table 4**. Cover crops were planted and grazed three out of the four years. Cover crop expenses (seed and planting) totaled $47 per acre in 2014, $39 per acre in 2015 and $19 per acre in 2016 (Dunn and Schmidt, 2014; Filbert and Schmidt, 2015; Plastina et al., 2016). Each winter, the cost per animal unit day (AUD) decreased. These data show the most economical winter feeding season was in 2016-2017, when cattle grazed stockpiled pastures and cover crops.

Table 4

Comparison of animal units, hay and cover crop costs across four winter feeding seasons.

	2013-2014	2014-2015	2015-2016	2016-2017
Animal units (AU)	32	36	33	43
Cost of hay ($)	$4,292	$3,124	$6,478	$3,787
Cost of cover crops ($)	$8,030	$6,660	N/A	$1,924
Cost of hay + cover crops ($)	$12,322	$9,784	N/A	$5,711
Cost of hay + cover cops per AUD[X] ($/AU/180 days)	**$2.13**	**$1.51**	**N/A**	**$0.74**

[X]Cost of hay + cover crops per animal unit day (AUD) represents the cost to feed one AU (1,000 lb of animal) per day from Nov. 1–Apr. 30 (approx. 180 days) each year.

In the three years when cover crops were planted on row crop fields, half of the cover crop expenses were paid for by the crop farmer whose land the cover crops were planted on. This is not reflected in **Table 4**, which reports the full cost of the cover crops.

In addition to economics, the nutritional profile of each forage source should be considered, but was not measured for this study. "Stockpile and cover crops will almost always be better feed than stored forage because stored forage can never be higher quality than it was when fresh," said Dave, "Early in the non-growing season stockpiled forage has a nutritional profile comparable to fresh forage."

Calf Weights and Gains

Dave and Meg weighed growing animals approximately once a month. The weights nearest the beginning and end of the winter feeding period were used to figure average weights and average daily gains (ADG). **Figure 2** shows the growth of calves during the non-growing season. **Table 5** reports the average weight of the calves in the herd near the beginning and end of the non-growing seasons and ADG each winter.

Calves were lightest in 2013-2014, because of a higher proportion of fall born calves than other years, thus the calves were younger than subsequent years. Dave's winter average daily gain goals for animals destined to finish at 20 months of age are 1.3 lb per day for calves. Dave met his goal three out of the last four winters. The only winter this goal was not met was the winter of 2015-2016, when no cover crops or stockpile were fed. ADG was the highest in 2016-2017. "I think this is primarily due to better late-season feed and the result of ever-improving year-round management as we continue to gain experience," explained Dave.

Feeder Weights and Gains

The weights of feeder steers destined for finishing were taken nearest the beginning of the winter feeding period and the weight nearest each slaughter date were used to figure ADG, as reported in **Table 6**. 2013-2014 weights are not reported because there were very few steers that year and they all went to the locker at different times.

Figure 2

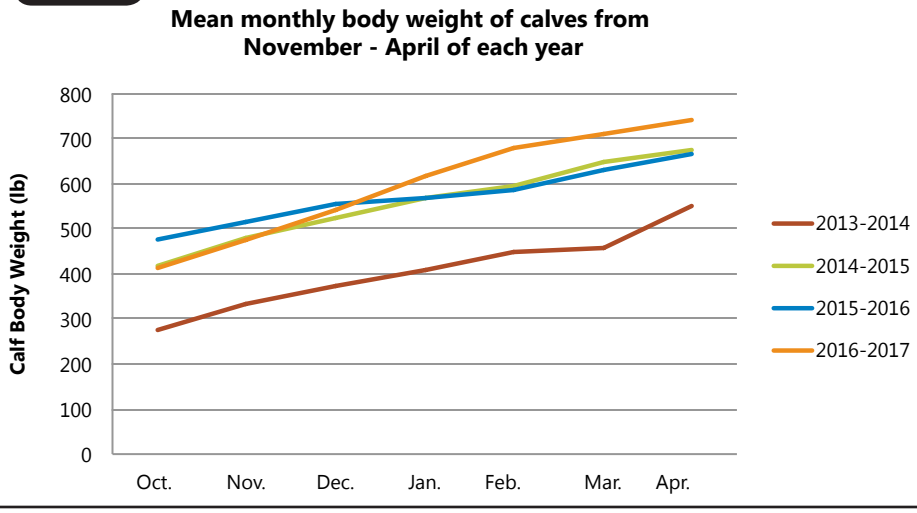

Figure 2: Mean monthly body weights of calves during the non-growing season each year.

Table 5

Average calf weights and mean ADG during the non-growing season each year.

	2013-2014	2014-2015	2015-2016	2016-2017
Avg. calf weight near beginning of non-growing season, Oct. (lb)	275	418	476	411
Avg. calf weight near end of non-growing season, Apr. (lb)	551	674	667	743
No. days, Oct.-Apr.	196	184	177	204
Avg. daily gain (ADG) (lb/day)	1.41	1.39	1.08	1.63

Table 6

Steer average slaughter weights and mean ADG during non-growing seasons.

	2014-2015	2015-2016	2016-2017
Avg. steer weight near slaughter (lb)	1,006	995	1,009
Avg. daily gain (ADG) (lb/day)	1.33	0.94	0.98

"We try to destock as much as possible before winter," said Dave, explaining that most finisher steers go to slaughter in late December at approximately 1,000 lb. Ideally, Dave wants finished steers to weigh between 1,100-1,200 lb and gain 1.0-1.5 lb per day during the months of November and December.

Sylvie Schmidt checking on cattle as they graze stockpiled perennial pasture

Conclusion

Years of tracking winter feed intake has led the Schmidts to conclude that incorporation of stockpiled pasture is necessary to decrease costs and work towards their goal of only feeding hay for one month per year. In 2016-2017, the Schmidts fed the least hay per animal unit, 1.21 tons per AU, and their costs were the lowest, $0.74 per AUD.

In preparation for the winter of 2017-2018, the Schmidts stockpiled about 37 acres of pasture for 45 AU of cattle. They did not plant cover crops to be grazed this year, after learning about potential herbicide residues that restrict grazing. "I'll be very happy if we could equal our 2016-2017 costs per AUD this coming winter. I don't think we'll be able to beat $0.74 per AUD without grazing cover crops and crop residue," explained Dave, "We should be able to graze stockpiled annual and perennial pasture well into December. When that feed source is gone we will feed baleage; wrapped oats that were cut at flowering and wrapped alfalfa and orchardgrass. Once that's gone we'll have to buy dry hay."

Into the future, they will focus on managing their pastures throughout the growing season in order to have enough stockpile late in the fall. "It takes a little extra planning because any stockpile-grazed pasture needs to catch up in the spring and shouldn't be grazed until June. We are still working on getting pastures established and I think we can really start some effective stockpiling when pastures comprised of warm season natives can be grazed in July and August." Dave and Meg hope these research results aid other farmers when deciding how to extend their grazing season and cut winter feed costs.

Sylvie Schmidt checking on cattle as they graze stockpiled perennial pasture

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