Farmer Experiences with Fall Grazing Cover Crops

Establishing cover crops following grain production is a proven tool to protect soil, reduce erosion, improve water quality, and enhance soil quality. Many research and demonstration projects have focused on using cover crops for spring grazing or spring harvest, but few have focused on the use of cover crops for fall feed. Variable late summer, fall, and winter weather is a factor in the challenge of both research and on-farm success with fall grazing. However, extending the fall grazing season with cover crops can significantly reduce stored feed costs, even if only for a few weeks.

To further explore this topic, Iowa State University Extension and Outreach completed a demonstration project funded by a North Central Risk Management Extension Education grant. Twenty producers from across the state who have fall grazed cover crops for two or more years were interviewed about their experiences. This is a compilation of their comments and research that supports their practices. Cooperators ranged from having two to 30 years of experience seeding cover crops with an average of 10 years of experience per producer. The cooperators averaged almost 400 acres of cover crops seeded annually. Many follow recommendations laid out by ISU Extension and Outreach in Small Grain Cover Crops for Corn and Soybean (PM 1999) (store.extension.iastate.edu/product/12198) and other ISU Extension and Outreach cover crops resources (crops.extension.iastate.edu/cover-crops-resources).

Managing multiple enterprises
There are many advantages of cover crops including reduced soil erosion, improved soil tilth, water infiltration rates, retention, and cycling, reduced weed pressure, disease break in short rotations, and nitrogen capture and recycling. Farmers often point out that cover crops are difficult to justify economically because there appears to be no immediate economic benefit to the grain producer for seeding cover crops. However, cover crops do have immediate economic value when incorporated with a ruminant livestock system. While cover crops can provide a variety of benefits, cover crops complicate the entire farm where they are used, especially when intended for forage as time and skills are required to manage both crops and livestock. Livestock can be essential for the sustainability of some cropping systems although it also increases the complexity of decision making because more factors are involved. The goal of integrating crops and livestock should be the integration of function rather than mere diversification. These functions include nutrient cycling, consumption and processing of crop residues, and pest management. These same concerns were expressed by the cooperators interviewed in this project. All cooperators had seeded cover crops for two or more years prior to the interview, and all were using the forage in a ruminant livestock system. All planned to fall graze, provided the weather and growth conditions allowed it, and most also planned to spring graze at least some of the cover crop acres. On average, these cooperators had fall grazed cover crops for over eight years prior to this study, and 75% of
cooperators also spring grazed cover crops for over eight years. Combined, cooperators seeded about 400 acres of cover crops and fall grazed about 250 of those acres with 139 animals yearly. Not all the cover crops acres seeded were grazed, demonstrating that while the forage potential was valuable to producers, they also recognized other benefits cover crops provided their land.

All cooperators suggested the need to be flexible when integrating grazing cover crops into a row crop operation. For instance, that flexibility may need to come from planting cash crops later in the spring to allow for spring grazing or planting shorter season hybrids or varieties of the cash crop to better accommodate fall grazing. Furthermore, about a third of the cooperators specifically emphasized the importance of planning when it comes to grazing cover crops, and many others implied similar concepts. Cooperators indicated it is important to have a plan B in place just in case plan A does not work. Many stressed that Mother Nature is in control, and some years grazing works great while not at all other years.

Cooperators cited that advance planning involved thinking about what fields to seed to cover crops to provide supplemental forage, adequate water sources, ease of cattle movement, and fencing. Good fencing and access to water, especially during cold weather when livestock are typically grazing cover crops, is very important. One cooperator pointed out the difference in fencing needed for grazing newly weaned calves versus cows. He felt cows or pairs can usually get by with less extensive fencing provided they have already been trained, especially with electrified fences, but tight, permanent fences are needed for grazing feeder calves that may have less respect for fences or are new to a field. Several others pointed out the importance of locating cover crop fields close to working facilities, winter feeding areas, and other fields to save time and make it easier to move cattle to cover crop fields for short periods of grazing. Another cooperator indicated he needed at least a week of grazing to justify the move to fields that required hauling cows.

Costs and benefits
Several cooperators commented on the economic benefit to the cow herd by reduced feed cost, although no direct economic benefit to the agronomic budget. Research has shown that cropping practices become more financially attractive when livestock production can be gained from the system, including the development of Iowa State University partial budgets for corn and beans following cover crops based on input from producers’ actual experiences.

The biggest advantage of cover crops to the livestock producer is reduced feed costs. There are several factors that reduce feed expenses including increased forage tonnage available, improved feed quality and an extended grazing season. Eighty-five percent of the cooperators reported grazing cover crops from 7-90 days with most grazing 20-30 days. A recent Iowa Beef Center extension program evaluation of producers noted an average of 28 days of fall grazing cover crops. More than half of the cooperators in this project said they also grazed cover crops about 31 days in the spring, with some grazing the same fields in both fall and spring. One cooperator grazed sheep, one grazed weaned calves only, and the rest grazed beef cows with or without calves at side.

While winter feed cost varies greatly, cooperators estimated the average costs for stored feed was $1.33 per cow per day at the time of this project. This means fall grazing a combination of cover crops and corn residue can save about $26-30 per cow while spring grazing would save $41 per cow. Seeding costs of cooperators averaged $29 per acre with a range from $20-46. If stocked at roughly one cow per acre, grazing either season will cover the costs of seeding the cover crop; however, this is only a rough estimate. Some years, such as 2018 and 2019, may not provide adequate growth for this length of grazing due to a late grain harvest, wet harvest conditions, early frost and cold in the fall, late spring warm up or wet conditions in the spring. A 2018 Iowa State study showed a range in fall forage yield of cereal rye and oat from four fields in Iowa of 342-1,675 pounds dry matter per acre. Two of these fields were grazed for seven or eight days by fall calving cow-calf pairs at a stocking rate of 1.5 pairs per acre. Another fall grazing project resulted in seven to 12 days of fall grazing for stocker calves on a cereal rye and oat cover crop mix
in western Iowa. These numbers may be more realistic for many Iowa producers trying to graze behind a full season cash crop and result in $10-15 per acre feed cost savings based on the $1.33 per cow per day stored feed cost.

Seventy-five percent of project cooperators said they do not assume they will get any fall grazing and have adequate stored feed available in case of unfavorable weather. Some indicated they planned to sell excess stored feed while others shifted excess feed to other cattle enterprises, but all said weather was too risky to not have a backup feed supply.

**Establishment**

**Species selection**

Appropriate species selection is important to insure fall growth for grazing. Cover crop species selection should involve considering the animal's nutritional needs, timing of seeding, when grazing will occur (fall or spring), and limitations by pesticide label restrictions.

Winter wheat and fall rye cover crops provided good grazing yields and protein levels in years moisture is adequate, but not in dry years. These species are frost resistant, so they are suited to both fall and spring grazing. Winter cereal rye is the hardiest of all the winter cereals. Spring cereal grains, like oat or spring barley, produce more forage in warm falls than the winter cereal grains like winter wheat, triticale, and cereal rye. However, winter cereal grains will germinate at lower temperatures. Nevertheless, both spring and winter cereal grains need sufficient growing degree days to really achieve enough growth for grazing.

**Table 1. Iowa Learning Farms survey: types of cover crops used (could list more than one; n=160)**

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
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</thead>
<tbody>
<tr>
<td>Cereal rye</td>
<td>77%</td>
<td>88%</td>
</tr>
<tr>
<td>Radish/turnips</td>
<td>35%</td>
<td>27%</td>
</tr>
<tr>
<td>Oat</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>Other*</td>
<td>13%</td>
<td>12%</td>
</tr>
<tr>
<td>Wheat</td>
<td>4%</td>
<td>7%</td>
</tr>
</tbody>
</table>

*Other includes hairy vetch, clover, winter pea, rapeseed, triticale, and annual rye.

Spring cereal grains and winter cereal grains were the most popular cover crop species used by cooperators, which is consistent with a survey by Iowa Learning Farms looking at what cover crop species farmers are planting (Table 1).

Twelve of the cooperators in this project used a grass-only cover crop. Of those 12, five used only cereal rye while the other seven used a grass mixture, which mainly consisted of cereal rye and oat. Eight of the cooperators used mixtures of predominantly cereal rye, oat, turnips, and radishes.

Nearly half of the cooperators tried mixing in radishes or turnips with a small grain with mixed success. Iowa Learning Farms documented that the earlier the seeding date, the better the success with including a brassica in the mix. Two cooperators tried using a legume such as crimson clover in the mix, but they had little success and wouldn't recommend using a legume. Three have modified their cropping system to include summer annuals such as sorghum, sudangrass, or millets after cover crops in the spring or before seeding cover crops in the fall.

**Pesticide labels**

Project cooperators acknowledged the importance of reading pesticide labels prior to planting any cover crops, especially herbicide labels when grazing or harvesting cover crops for feed. One of the primary reasons for label restrictions on cover crops is that herbicide residues may prevent establishment of cover crops. This may explain the variability on successful stands by early adopters. A second major concern with herbicides prior to cover crops is the lack of research to establish safe residue tolerance for grazing the cover crops. Iowa State University agronomists have summarized corn and soybean herbicides that allow establishment of cover crops for grazing or feeding in [Herbicide use may restrict grazing options for cover crops](CROP 3082) found at store.extension.iastate.edu/product/14454. Label restrictions are based on the time from application to cover crop seeding. Producers also can look up any pesticide label on the [Crop Data Management Systems, Inc. website](https://extension.iastate.edu/) to see whether the pesticide is safe and...
legal to use for planting and grazing at www.cdms.net/Label-Database/Advanced-Search.

Seeding methods
Interseeding, aerial seeding, drilling, and broadcasting are common cover crop seeding methods. Seventy percent of the cooperators drilled their cover crops after harvest, almost half aerially seeded, and one quarter broadcasted their cover crop seed. Note that almost half cooperators reported using more than one seeding method depending on the weather, previous crop, and if they intended to graze it or not.

Each seeding method has its pros and cons. For instance, while aerial seeding provides an earlier seeding date, there are often mixed results due to conditions at the time of seeding along with being able to achieve good seed-to-soil contact. Additionally, while drilling tends to give the most consistent stand, the biggest downfall is having a later seeding date since producers must wait to seed until after the cash crop is harvested.

For those interested in aerial seeding, timing of seeding into a standing cash crop should be based on crop maturity, rainfall pattern, and calendar date (ideally August 15 to September 15). Try to aerial-seed when the lower leaves have “fired” up to the ear leaf in corn or when the leaves first begin to yellow in soybean. Most producers who had tried aerial seeding had better luck if they could time seeding right before a rain. It is not recommended by extension field agronomists or cooperators in the survey to aerial seed in dry conditions.

Seeding rates
Seeding rates used by cooperators varied depending upon seeding methods and species planted. In general, cooperators said they used higher seeding rates if they broadcasted or aerial seeded the cover crop, and they used lower seeding rates if they drilled the cover crop. Seeding rates used by the cooperators ranged from 32 pounds or one bushel of oat per acre to 120 pounds of a grass blend per acre. For more information on specific seeding rates based on individual fields see the Midwest Cover Crops Council’s Cover Crop Decision Tool at mccc.msu.edu/covercroptool/covercroptool.php. Cooperators’ cost of cover crop establishment (seed plus seeding method) ranged from $20-45 per acre.

Grazing management
Four cooperators rotationally grazed the cover crops and stover in an effort to control the diet and improve utilization of the lower quality corn stover, while 14 cooperators continuously grazed the covers. However, several indicated they move from field to field, so are essentially rotationally grazing by field. All included crop residue along with the cover crop, so it is difficult to determine what part of the ration is due to the cover crop versus the crop residue.

Cover crops are high in crude protein, making them a nice companion to low quality forages like corn residue because they provide the protein that might otherwise need to be supplemented. Nutrient analysis of cover crops will vary depending on forage species and stage of growth. Using the Iowa State studies as a guide would indicate vegetative cereal rye and oat would average around 20% dry matter at the time of grazing, 20-25% crude protein, and 60-75% total digestible nutrients (TDN) (Table 2). By most standards, this would be considered a very high quality feed, although quite wet, which opens a huge range of opinions on cattle management when grazing cover crops.

Six cooperators mentioned the importance of having forage dry matter to complement the cover crop. That forage dry matter might come from a variety of sources including the corn stover, waterways, grass fence lines, headlands, or simply providing additional dry forage. This practice has been a common recommendation, although research to quantify the dry matter supplementation benefit has not been as straightforward.

Table 2. Nutritional value of fall sampled cereal rye and oat cover crop mix (dry matter basis) established at Iowa State University outlying farms.1

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Average</th>
<th>Minimum</th>
<th>Maximum</th>
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<tbody>
<tr>
<td>Dry matter</td>
<td>21.2%</td>
<td>14.6%</td>
<td>27.1%</td>
</tr>
<tr>
<td>Crude protein</td>
<td>24.3%</td>
<td>20.3%</td>
<td>30.0%</td>
</tr>
<tr>
<td>Acid detergent fiber</td>
<td>20.8%</td>
<td>13.8%</td>
<td>30.1%</td>
</tr>
<tr>
<td>Neutral detergent fiber</td>
<td>31.3%</td>
<td>23.0%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Total digestible nutrients (calculated)</td>
<td>69.8%</td>
<td>53.9%</td>
<td>78.2%</td>
</tr>
</tbody>
</table>

1Adapted from Lundy et al., 2018, 2019, and 2020.
One theory regarding how dry matter might improve forage utilization is that a dry supplement will slow down rumen passage rate. However, when tested, low quality roughage supplementation did not influence passage rate, forage utilization, or weight gain when steers grazing wheat pasture were supplemented with wheat straw. Additionally, in Argentina, growing heifers were supplemented with alfalfa hay while grazing oat pasture and they did not have improved gains or reproductive rates.

Another theory on why supplementation is needed is that the mature cow simply cannot eat enough to meet her intake requirements. For cattle on predominately forage diets, gut fill will restrict intake. However, gut fill is highly related to the fiber content of a feed or forage rather than the weight of the feed consumed. Fiber in the Iowa State studies ranged from 15-30% acid detergent fiber (ADF) and 25-36% neutral detergent fiber (NDF), neither of which would be considered high enough to limit forage intake (Table 2).

There are a couple of other explanations for why a cow grazing a lush cover crop might benefit when supplemented. One is that if there is not adequate growth, a cow is limited on forage availability. This not only refers to total tons of forage available, but also to how much forage she can consume in one bite, and how many bites she can take each day. Another reason is that cover crops are high in rumen degradable protein. High degradable protein and the highly digestible forage results in a high passage rate. Dairy cattle research has found that too much degradable protein in a high passage rate diet reduces fertility and increases energy requirements due to a higher liver demand. Thus, cattle grazing high protein cover crops may benefit from an energy supplement to improve the protein and energy ratio in the diet. In beef cattle, a reduced fertility response to high protein diets has yet to be observed, and some preliminary data at Iowa State suggests that cows grazing high protein cover crops may actually breed earlier in the season. Many of the cover crop species used are high in energy as well, so determining if beef cattle reach the point where they need supplemented is not well documented. As the forage grows and matures, the question of an unbalanced protein to energy ratio concern diminishes.

Another question is when to start grazing cover crops. Two cooperators suggested an early start to grazing and not letting cover crop growth get ahead of the cows. They suggested beginning grazing when the forage is about six inches tall, or as soon as the forage is rooted enough to prevent pulling out when grazed. This is probably true for spring grazing cows when the temperature is increasing and so is grass growth, but in the fall the days are getting cooler and grass growth is slowing. This also is dependent on the stocking density of the field, and high stocking density would benefit from increased forage growth prior to grazing. A Practical Farmers of Iowa demonstration project by Filbert measured cover crop biomass on three farms in the Raccoon River Valley. Cooperators seeded the cover crop of their choosing and measured the biomass available at the time of fall grazing turnout. No attempt was made to measure additional growth accumulated during the growing season. The biomass varied greatly, depending on the species planted, planting date, cover crop growth, and sampling date. Biomass ranged from 140-7,620 pounds dry matter per acre. Five of the sites followed corn or soybean and had dry matter biomass yields of 140-940 pounds per acre. Sites following small grains or popcorn had biomass yield ranging from 380-7,620 pounds per acre because the earlier harvest allowed an earlier seeding date and longer growing season for the cover crops.

Animal health concerns

While there have been reported cases of animal health concerns when grazing cover crops, as discussed in ISU Extension and Outreach publication "Managing Cattle Health Issues When Grazing Cover Crops" (IBC 0129) (store.extension.iastate.edu/product/15455), none of these cooperators reported any animal health concerns while grazing. Additionally, no cooperators reported concerns or issues with nitrate or sulfur toxicity; however, that is a possible concern when grazing cover crops. A review of Canadian cover crop research showed that nitrate poisoning from annual cereal crops can be a problem. Prolonged drought followed by rain, heavy applications of fertilizer or manure, drought stress, or hail and frost damaged conditions can lead to nitrate poisoning. Studies have shown that cover crops can accumulate nitrate and...
sulfur levels above that which is considered toxic. However, these thresholds were developed using dried hays high in nitrate or nitrate salts, and there is evidence that cattle can tolerate higher levels of nitrate when grazing these fresh annual forages.

Comments about soil compaction from grazing cover crops were brought up by three of the cooperators and tends to be a common limitation brought up by producers in Iowa. Many studies have looked at how grazing cover crops influences soil compaction. Research and demonstration projects have found that grazing cover crops does not cause compaction, and, in some cases, a grazed cover crop field had less soil compaction compared to fields with no cover crops and no grazing. Additionally, some of these studies have gone a step further and noted that the compaction levels reported, regardless of grazing or not, are below the thresholds that would restrict crop and root growth. It is recommended by cooperators on this study, as well as extension specialists, to remove livestock from fields when conditions are wet or to have a sacrifice area and to also move mineral feeders, water, or bale rings around to reduce animal congregating in the same area and causing compaction issues if possible.

**Summary**

Establishing cover crops in Iowa to ensure adequate growth for grazing in the fall is feasible but not a sure bet every year. Despite the challenges related to early seeding and warm growing weather, fall grazing of cover crops can be an economical source of feed for beef cattle. Even in years when there is not enough forage for grazing in the fall, there may still be the opportunity to graze or mechanically harvest feed in the spring depending on the cover crop species utilized. Six cooperators in the project encouraged first-time cover crop grazers to start small but “just do it.” While fall grazing may not be a success every year, in the long run Iowa cooperators feel it has been beneficial to their farming and livestock enterprises. Cooperators also encouraged new users to not give up if the first year doesn’t work well.

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**References**


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