

Grazing Cover Crops



COVER CROP TRAINING MODULE

Developed by
Joe LaRose, University of Missouri

Reviewed by
Dr. Harley Naumann and Dr. Ashley Conway (both U of MO), Alan Weber
(producer who grazes cover crops) and Dr. Rob Myers (U of MO)

Funded by
Walton Family Foundation

These training modules are being made available by free use of other educators through University of Missouri and the Midwest Cover Crops Council, which participated in the WFF project supporting development of these modules and provided many of the technical reviewers.



Why Consider Grazing Cover Crops?

- Row crop farmers
 - Recoup cost of cover crops
 - Enhance soil health and fertility
 - Justify diversifying rotations
- Livestock owners
 - Save cost on feed when it is most expensive (winter, late summer slump)
 - Increase herd size
 - High quality forage
 - Rest perennial pastures
 - Calving area

Grazing vs. Harvesting Cover Crops

Harvesting cover crops for stored forage such as hay or baleage can be profitable

However

- Removes nutrients
- Less soil protection
- Reduces food for soil microbes
- No fertilization from grazing livestock



Getting started grazing cover crops

- **Basics:** fencing, water, compaction, management
- **Maximize grazing potential:** choosing cover crops and increasing their growing time
- **Redesigning cropping system:** use cover crops to fill gaps in forage production and to diversify crop rotation

Basics: common concerns

1. Fencing

Fear: Expense

Fact: Electric fencing can be very affordable. Many farmers grazing cover crops do not need permanent exterior fencing

Fear: Electric fencing is a hassle

Fact: Can quickly be put up and taken down with step in posts



University of Maryland Extension

Basics: common concerns

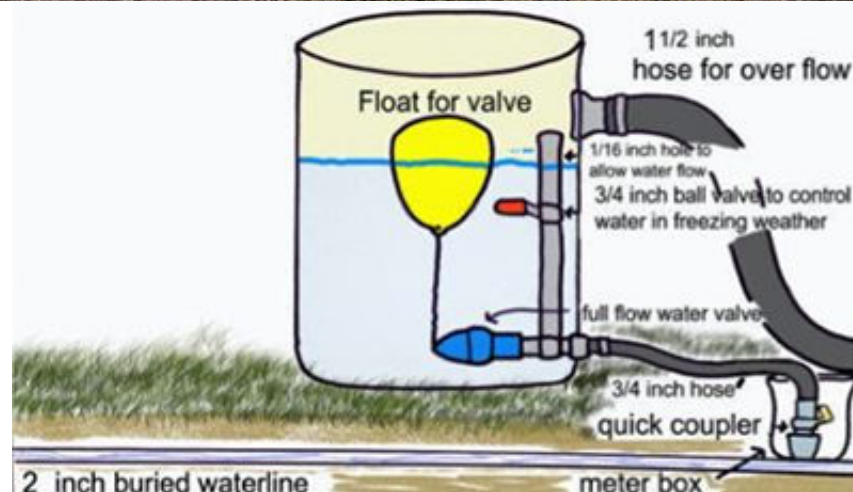
1. Fencing
2. **Water**

Fear: Requires numerous expensive watering systems

Fact: Portable water tanks are affordable and simple to use.

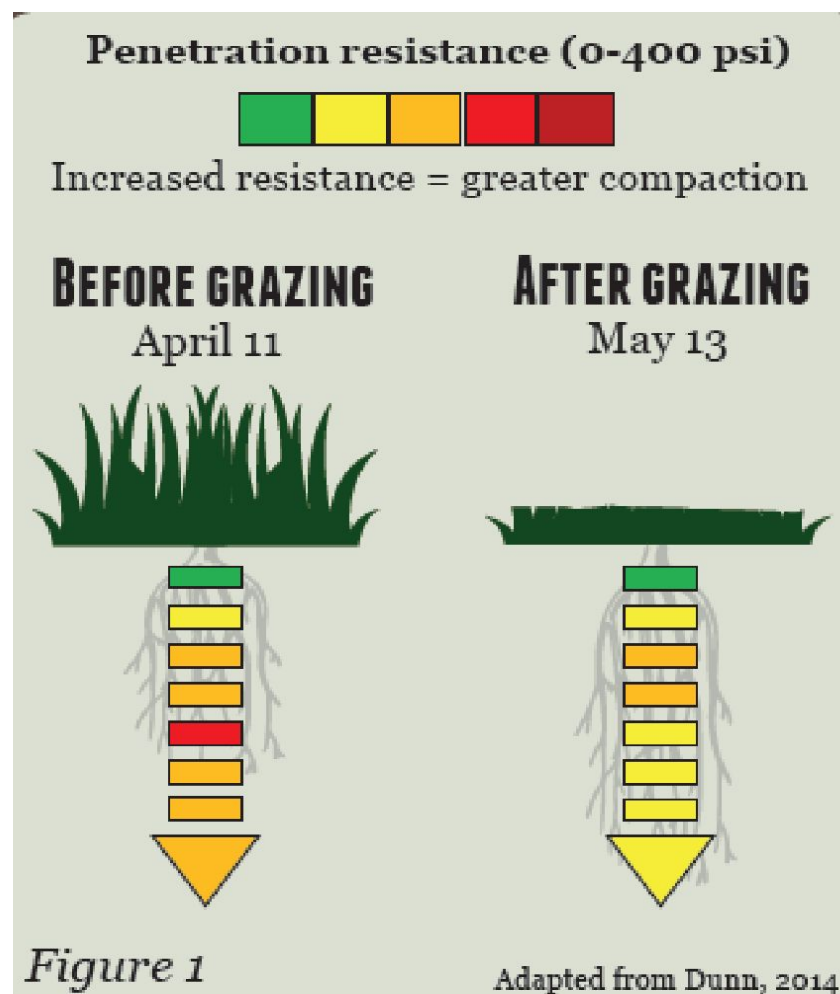
Fear: Winter water problems

Fact: Continuous flow systems are a well-established solution to winter water. Also, cattle can walk up to a mile back to water in cool temperatures



Basics: common concerns

1. Fencing
2. Water
3. **Compaction**
 - Grazing cover crops can decrease compaction overall by increasing soil aggregation.
 - Shallow compaction from hoof traffic has little to no impact on corn and soybean yields
 - Rotate livestock
 - Use sacrifice lots during wet periods



Basics: management

- Practice rotational grazing if possible
- To graze regrowth in spring, keep above 3 inches in winter so plants have the energy to grow quickly in the spring



Maximize grazing potential

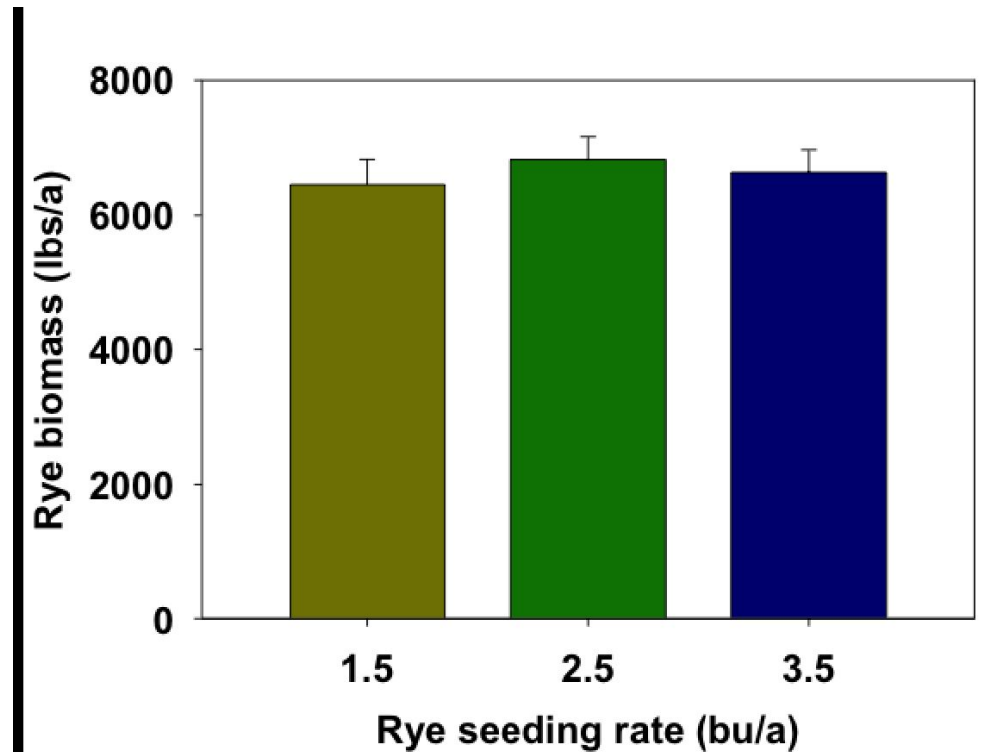
1. *Managing cover crops for grazing*

- Seeding rate

- i. Increased 1.5-2X for small grains, legumes a small amount
- ii. No change for brassicas

- Fertility

- i. Typically not worth investment



Ryan et al. 2011

Maximize grazing potential

1. *Managing cover crops for grazing*

- Seeding rate
- Fertility

• **Extend season**

- i. Fly on cover crop
- ii. Interseed (V6-V7 most common timing)
- iii. Earlier maturing cash crops
- iv. Corn silage, popcorn
- v. Plant green



Cereal rye interseeded into corn.

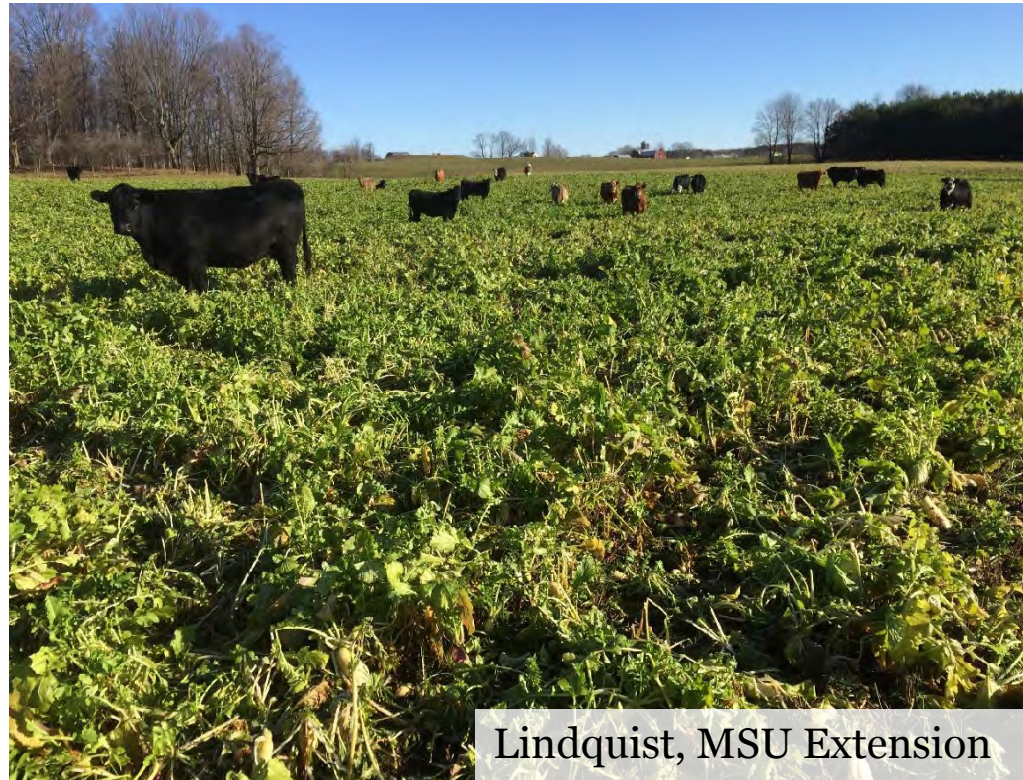
Anna Cates, University of Minnesota Extension

Maximize grazing potential

1. Managing cover crops for grazing
2. **Picking cover crop species and variety**
 - Nutritive Value
 - Yield
 - Regrazing potential

Maximize grazing potential

1. Managing cover crops for grazing
2. Picking cover crop species
3. **Mixes**
 - Reduces risk
 - Cover crop failure
 - Toxicity
 - Better animal nutrition
 - Soil health



Lindquist, MSU Extension

Grasses

The most common and forgiving cover crops can provide valuable forage

	Average daily gain	Total Gain
Small grain	lb/day	lb/acre
Wheat	1.8	180
Cereal Rye	1.6	336
Annual ryegrass	1.8	511

Grass options: cool-season

- Cereal rye- Reliable, easy to establish
- Winter wheat- Keeps palatability later in spring
- Triticale- similar to cereal rye and winter wheat
- Barley- Low lignin content
- Oats- Good fall growth, does not overwinter



Edwin Remsberg- SARE

- Annual ryegrass- Retains green tissue most of the winter
 - Rapid fall growth
 - Stockpiles well

Grass options: warm-season

- Corn- Very palatable, more cold tolerant than other warm-season grasses. Inexpensive. No prussic acid
- Sorghum- drought and heat tolerant. Lots of biomass, but not regrazable. Can be stockpiled.
- Sorghum-sudangrass- Palatable, can graze multiple times. Stockpile potential.
- Pearl millet- Can be regrazed. High protein but does not stockpile well. No prussic acid.

Brassicas

- Some species can produce 3 or more tons/acre
- Some can grow after frost and overwinter
- Tubers can be grazed
- High in protein, best if combined with a grass or even hay. <2lb per acre seeding rate



Brassica options

- Forage radish- fast developing
- Turnips- leaves and tuber consumed
- Canola- overwinters, can be regrazed
- Kale- very cold-hardy, retains quality late into winter



Edwin Remsberg, SARE



Edwin Remsberg, SARE

Legumes

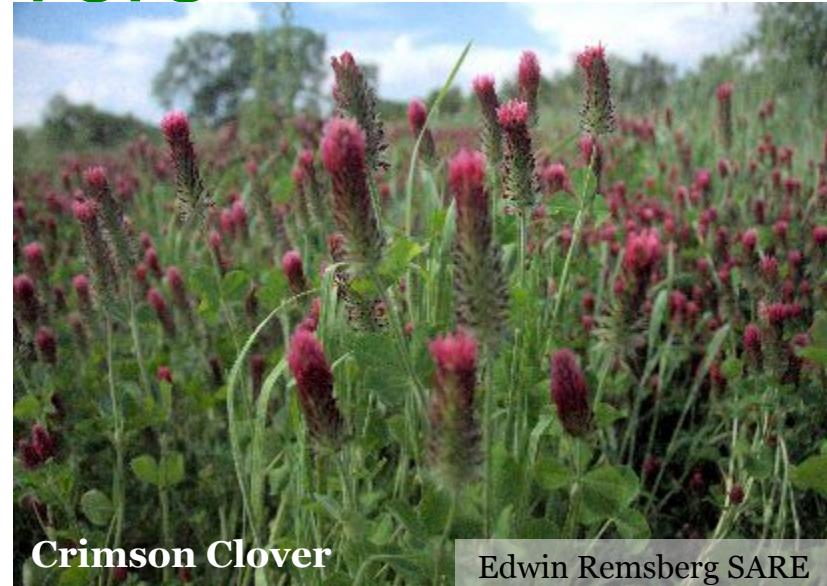
- Excellent nutritive value
- Do not tolerate heavy grazing well
- Slow fall growth
- Potential for bloat if they make up too much of some livestock's diet



Rob Kallenbach

Legume options: clovers

- Crimson clover- some varieties are more winter hardy than others
- Red clover- can be harder to terminate, but very winter hardy
- White clover- can tolerate heavy grazing
- Berseem clover- as good quality as alfalfa, but not winter-hardy
- Balansa clover- cold hardy and heat tolerant. Hollow stems make better quality at maturity



Legume options: other cool-seasons

- Austrian winter pea- consider white flowered varieties with less hard seed
- Hairy Vetch – *can be toxic to cattle and horses*, especially black angus. Keep at <10% of stand
- Common vetch- tolerates grazing fairly well
- Medics- only fair forage value. May have antibiotic and antifungal effects



Austrian winter pea

NRCS



Hairy vetch

NRCS

Legume options: warm-season

- Sunn hemp- fast growing (~6ft by 60 days). Will regrow if lightly grazed
- Soybeans- originally a forage crop.
- Cowpeas- reliable, heat-adapted legume. Can regrow after grazing if planted early
- Mung bean- similar to cowpea, but faster growing and more drought tolerant



Other broadleaf options

Broadleaves: Best used in mixes

- Sunflower- produces lots of biomass in short season
- Okra- contains high levels of vitamins
- Flax- low fertility needs and hardy, but not very palatable. Best in a mix
- Buckwheat- fast emerging and growing. Can cause photosensitivity if it makes up >30% of forage
- Safflower- Very palatable until maturity. Use spineless varieties



Rob Myers

Toxins: nitrates

- Grasses, brassicas, and legumes can accumulate dangerous levels of nitrates during and after period of plant stress
 - Use cover crop mixtures with plants from different families
 - Avoid grazing 5 days after drought ends or after frost
 - Manage grazing to allow to keep animals consuming upper plant parts (nitrates tend to accumulate in grass stems)

Forage Nitrate (ppm dry forage)	Guidance
<4,500	Safe to feed with adequate feed and water
4,500 - 6,500	Safe under most conditions but, if feeding pregnant animals, restrict to one-half (1/2) of the ration
6,500 - 9,000	Limit to one-half (1/2) of the ration
9,000 - 15,000	Limit to one-third (1/3) of the ration
15,000 - 18,000	Limit to one-quarter (1/4) of the ration
>18,000	Potentially lethal, very risky, dilute carefully

Toxins: prussic acid

- Sorghum-related grasses accumulate prussic acid in leaves during drought and after a non-killing freeze
 - Wait until 18-24 inches to graze, includes regrowth
 - Avoid grazing for 5 days after frost
 - Keep animals off drought stressed plants
 - Include non-sorghum species in mix



University of Minnesota Extension

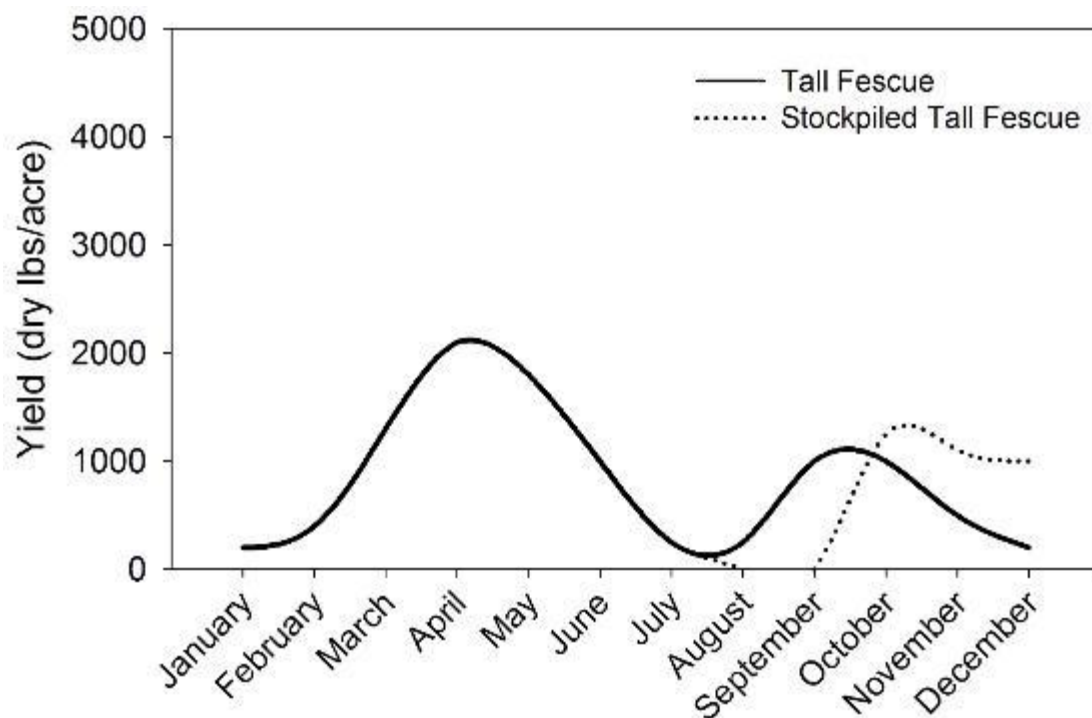
Redesigning cropping systems

- **Profit-** income from livestock can more than replace lost crop revenue from lower value crops
- **Revenue Diversification-** reduces risk and income variability
- **Synergy-** livestock health can benefit from grazing high quality cover crop forage. Soil health improves faster with animals in the system = better and/or more consistent crop yields

Redesigning cropping systems

Use cover crops to fill forage gaps in perennial systems

- summer slump: warm-season cover crops after a small grain or winter pea
- winter- stockpiled warm-season covers and/or cool season cover crops



Redesigning cropping systems

Adding small grains to corn/soybean rotation

- Creates opportunity to graze warm-season cover crops
- Can fill summer forage gap
- Alleviate fescue toxicosis



Grazing economics

Factors that influence grazing economics:

- Infrastructure costs (fencing, water)
- Type of livestock operation
- Cover crop seed costs
- Establishment costs
- Cover crop growth
- Cost-share

Economics examples

SARE Cover Crop Economics

Calculated a **\$49.23 per acre** annual return from grazing cover crops

Assumptions:

- Cereal rye generates 1500 lbs. dry matter/acre
- 50% of rye biomass is lost from hoof action & selective grazing
- 750 lbs./acre of rye replaces 1093 lbs./acre of hay when 78% of hay is utilized and hay is 88% dry weight
- Hay is valued at \$80/ton
- Savings of \$5.50 per acre for reduced machinery, fuel, and labor costs from not hauling hay
- Portable electric fencing and water are available

Economics examples

Practical Farmers of Iowa

1. Cereal rye, wheat, or triticale seeded in early September produced 0.07-0.47 tons/per
 - Hay replacement = **\$6.22 - \$41.78 per acre**
2. Winter covers following rye or wheat, planted early August, produced 1.76-3.74 tons/acre
 - Hay replacement: **\$156.44 - \$332.44 per acre**
3. Mixes of grasses and brassicas produced between 0.19-3.81 tons/acre
 - Hay replacement = **\$8.00 - \$338.67 per acre**

Economics examples

Pasture Project

1. North Dakota- steers grazed for 31 days on cool season covers interseeded into corn at V6. Net profit was **\$185.85 per acre.**
2. Minnesota- stockers grazed cover crop following winter wheat. Net profit **\$153 per acre.**

Leases

There are many ways of doing cover crop leases, but there are some common factors to consider:

- Cost of cover crop seed and establishment
- Fencing- clarify ownership and maintenance
- Forage yield and value
- Grazing time

Rental rate example

- Fee per acre
- Fee per lb of gain (performance)
- Animal Unit Month (AUM) method

AUM grazing rate formula using PQF:

$$\frac{A}{C} \times \frac{B}{C} \times C = \frac{\text{Pasture rent per animal unit month}}{C}$$

A = market price per ton of hay, B = pasture quality factor,
C = animal unit equivalent (AUE)

For this method, the market value of baled hay and the quality of the pasture are entered into an equation with the appropriate AUE. "A" in the equation is hay market price per ton. "B" is a pasture quality factor. "C" is the AU conversion factor.

Overlooked benefits: calving

- Healthier winter/spring calves on cover crops
 - “Cleaner”, less mud and disease
 - Nutrition: high quality forage available for lactating cows



Jason Johnson, USDA-NRCS, Iowa



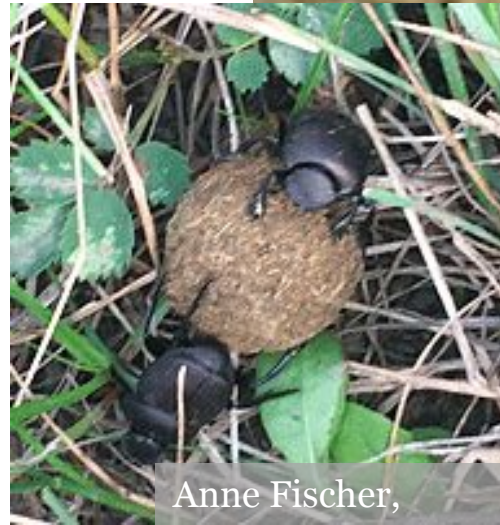
David Cope

Overlooked benefits: wildlife

- Less slug and vole problems by removing some plant residue
- Wildlife
 - Birds can benefit from more varied plant heights that result from grazing
 - Dung beetles and other beneficial insects



Nick Sloff



Anne Fischer,



MU Extension

Summary

- Grazing cover crops can be profitable for row crop operations and livestock operations
- Often perceived to be more complicated than it is
- Beneficial for soil health if proper grazing techniques are used
- Create opportunity to diversify cropping systems and fill gaps in forage availability