

Integrating Grazing into Cropping Systems: Cover Crop Species and Crop Rotation Considerations



PennState Extension



Credit: Justin Brackenrich

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Why Graze Cover Crops

Cover crops are used not only to prevent soil erosion and increase soil health, but they can also be used as a feed source for grazing livestock. Moreover, grazing not only reduces stored feed costs but can boost the ecosystem and provide value to the cropping system by making the system like how it would occur in nature.

Grazing cover crops takes planning and management, but when implemented properly this practice allows the producer to get maximum returns from cover cropping. Grazing

cover crops can be looked at from two different perspectives: using the dry matter produced through nutrient scavenging and considering it “bonus” forage for animals or planning for this feedstuff as part of the rotation and trying to maximize its growth. This may involve manipulating the rotation to accommodate various cover crops. This document will focus on management and rotation changes necessary to incorporate grazing into a cropping system.

Summer Annuals (Warm Season)

Summer annuals, otherwise known as warm-season annuals, prefer warmer soils at planting, making them ideal for crop rotation with small grains or early harvested crops. If the goal is to maximize yields of the summer annuals or stored forages followed by late grazing, their planting time would be like that of corn and soybeans, giving them a longer growing season.



Sudangrass is a summer annual grass that can be positioned into a crop rotation to provide grazeable forage during the typical summer slump in cool-season grass growth. *Credit: Dave Hartman*

Summer annuals can be planted as a single species, as is often the case with the grass species, or as a mixture of several species. Many summer annual cover crops are used in seeding mixtures and can be grazed. A few of the more common species can be found in Table 1.

Table 1. Common Summer Annuals		
Grasses		Legumes
Forage Sorghum	Sorghum-Sudangrass	Cowpeas
Sudangrass	Millet	Soybeans
Teff	Tillering Corn	Sunn Hemp

Some crop rotations don't have a place for summer annuals. However, modifying the rotation can be quite simple. In some areas, shortening the maturity of soybeans or corn can allow enough time in the fall to plant a winter annual small grain, to be followed by the summer annual. Another option would be to plant a winter annual after corn silage or chopped soybeans, followed by a summer annual the following year. A third option would be planting spring grains, such as oats, or forage mix, followed by a summer annual. To tailor a system will take some planning and understanding of operational goals to ensure forage and cash crop demands are still being met.

Other concerns associated with summer annuals are prussic acid and nitrate poisoning. Prussic acid, or hydrocyanic acid, occurs within a plant as a response to damage or stress. Prussic acid occurs at highest levels in leaves of young sorghum and sorghum crosses during periods of drought, after frost, or after herbicide injury. To reduce risk of livestock injury, limit intake (feed animals before turning-in to graze,

to prevent overeating), provide access to plenty of clean water, do not graze suspect or damaged forages for seven days after a drought or killing frost, and do not graze plants less than eighteen inches. Pearl and foxtail millets do not accumulate prussic acid at toxic levels and are an excellent option for grazing cover crops.

Nitrate poisoning can occur when grazing livestock on annual grass species following a drought-ending rain. The plants temporarily take up more nitrate than would normally occur. This is more likely to happen in fields that receive heavy applications of nitrogen either in the form of fertilizer or manure. To reduce risk of nitrate poisoning, use recommended nitrogen fertilizer rates for planted species and increase grazing height (nitrates accumulate in lower portions of stalks), and wait to graze until several days after a significant rain. Nitrate testing on the suspect forage is also an option.

These conditions are more commonly associated with grasses but can also be associated with the legumes and brassicas.

For more information on summer annuals, review **Alternative Forages for Spring and Summer Planting** (<https://extension.psu.edu/alternative-forages-for-spring-and-summer-planting>).

Winter Annuals (Cool Season)

Winter annuals, or cool-season annuals, are crops planted from late summer to early fall, grown over winter, which can be harvested in both the fall and the subsequent growing season. Many of the species considered options for cover crop grazing are also regarded as row crops. Cereals such as winter wheat, winter barley, and cereal rye can be flash grazed in the spring, with little yield loss to grain harvest. This makes them an excellent option for operations needing spring forage but wanting to maintain grain production. Crimson clover, hairy vetch, and winter peas can be added to grass species mixtures to increase forage palatability and quality, while adding plant species diversity and building soil nitrogen for continued cropping. A list of common winter annuals can be found in Table 2.

Table 2. Common Winter Annuals		
Grasses		Legumes
Cereal Rye	Annual Ryegrass	Crimson Clover
Triticale	Winter Wheat	Hairy Vetch
Winter Barley		Winter Peas



A mixture of triticale, winter peas, and crimson cover. This cover crop mix provides an excellent blend of legume and grass to support livestock production. *Credit: Justin Brackenrich*

Mixed plantings of winter annuals, and often brassicas, can be grazed early in the spring. This leaves time to establish a corn or soybean crop after termination.

Some winter annuals, like rye, wheat, and legumes (depending on the winter), can be dormant seeded (planted during the dormant season). However, to ensure standability and biomass for spring grazing, it is necessary to establish winter annuals earlier than a dormancy seeding. For some cereals, we observe the Hessian fly-free date, meaning we avoid planting before a county-specific date to limit the risk of Hessian fly problems. For others, we want to have six weeks of establishment before frost. This will allow them to have adequate leaf and root development before winter. Geographic location is an important factor in achieving adequate establishment time. Eastern and southern regions of Pennsylvania could modify corn and soybean maturities to establish winter annuals. Operations in the northern region of Pennsylvania must plant after corn silage or soybean silage. Another option for planting would be following harvest of a spring forage or summer annual.

For information on seeding dates and rates, review **Plant Cover Crops ASAP** (<https://extension.psu.edu/plant-cover-crops-asap>).

Brassicas

Brassicas produce a high-protein, highly digestible forage. Feeding too much, without acclimating the animals, can result in bloat and animal health concerns. To reduce this risk, keep the brassica percentage low within mixes (one to two pounds/acre), slowly transition the livestock onto the feed (graze only one to two hours per day, while slowly increasing duration over a period of seven to ten days), and provide plenty of free-choice dry hay. Commonly used brassicas can be found in Table 3.

Table 3. Common Brassicas		
Kale	Daikon Radish	Turnip
Rape	Mustard	Turnip Hybrids

For more information on brassica management, review **Agronomy Facts 33—Use of Brassica Crops to Extend the Grazing Season** (<https://extension.psu.edu/use-of-brassica-crops-to-extend-the-grazing-season>).

Oats

Oats are a common forage species used as a cover crop and can be utilized in a variety of applications. Since oats winter kill, they will need to be mixed in a blend of other species to provide continuous cover, but they grow quickly and can often be grazed within thirty days of planting. Planted in the late summer or fall, oats mixed with other grasses, brassicas, and/or legumes can provide significant tonnage and quality when grazed. Removing some of the accumulated oat dry matter, and trampling the remainder with livestock, will not only feed livestock, but continue to build soil health through organic matter cycling.



Oats can be drilled into crop residue, after fall harvest, and later used for a late fall or winter feed source for livestock. This is a mix of oats and winter peas. *Credit: Justin Brackenrich*

Intercropping as a Strategy to Establish Cover Crops for Forage

Crop managers may consider using interseeding tactics to establish cover crops for grazing. Establishing clover into vegetative wheat during the winter is an old practice that will normally result in a large amount of forage growth after

wheat is harvested for grain during the summer. Forage grasses can also be planted with wheat in the fall. Another technique involves establishing cover crops into vegetative corn during the V-4 to V-6 stages with the goal of having well-established cover crops after corn harvest. This will require specialized equipment in a no-till system but can be accomplished with a spinner spreader when planting into tilled soil. If goals include interseeding, special consideration must be paid to your herbicide program to avoid damage to the cover crop.

Using Later Hayfield Growth for Grazing

Some farmers may want to harvest late-growth hay through grazing, rather than a mechanical harvest. This is an individualized decision that may differ from year to year based on several factors.

Conclusion

Not only do cover crops have the potential to reduce soil erosion and build healthier soils, but they can also create resources for animal feeding. Many species of cover crops can be incorporated into cropping systems for grazing—it is just a matter of tailoring the operation to incorporate them.

Sources:

Penn State Agronomy Guide

<https://extension.psu.edu/plant-cover-crops-asap>

<https://extension.psu.edu/use-of-brassica-crops-to-extend-the-grazing-season>

<https://www.sare.org/publications/building-soils-for-better-crops/cover-crops/>

<http://notill.org/sites/default/files/grazing-cover-crops-how-to-guide.pdf>

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