

Southern Cover Crops

2016 CONFERENCE FACT SHEET

Introducing Annuals in Grazed Pastures

Bisoondat Macoon (Mississippi State University, Raymond, MS), J.B. Daniel (USDA-NRCS, Farmville, VA), Johnny Rogers (NC State University, Raleigh, NC), Alan Franzluebbers (USDA-ARS, Raleigh, NC)

Annual cover crops provide ecosystem benefits to perennial-based pasture systems by introducing quality forage at opportune times of the year, creating a more diverse farm habitat, and providing opportunities to renovate overused or underutilized areas of the farm. This fact sheet is based on a workshop that covered opportunities to enhance forage availability with annuals, timing of grazing to gain value, choice of annuals in warm- and cool-season dominated pastures, opportunities to renovate perennial pastures, and impacts of annuals on whole-farm production. Characteristics of selected annual species were explored, including broad groups of grasses, legumes, and brassicas. Management was considered for monocultures, simple mixtures, and complex mixtures of annual cover crops. Grazing management strategy and its impact on forage utilization and nutrient distribution were explored. Examples were given for on-farm grazing demonstrations to introduce the concept of planting and grazing annuals to local livestock farmers. Yield, forage quality, and number of grazing days were described. The importance of soil cover, plant diversity, and rooting habits on soil health was discussed. Achieving a balance between production and environmental quality was a theme throughout (Fig. 1). Some suggestions were offered for future research needed to develop better annual forage mixtures.

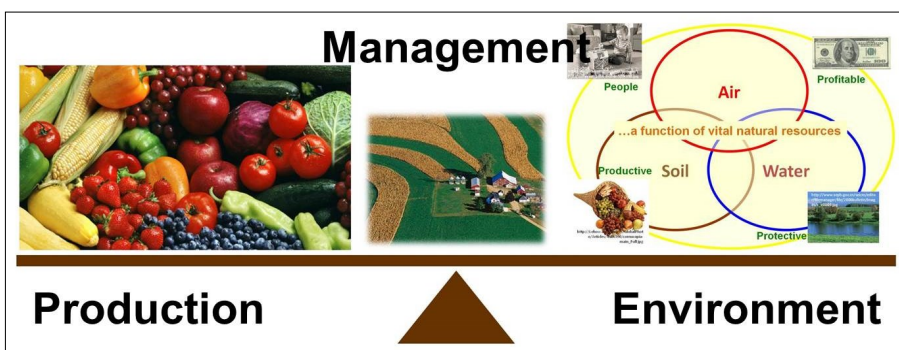


Fig. 1. To achieve high productivity without harm to the environment will require management-intensive systems based on in-depth knowledge and strong cultural values.

Productivity and Environmental Quality

An enormous challenge exists to meet the food demand of an ever increasing human population. Ruminant livestock are critical to meeting this challenge, because they convert cellulosic feedstuffs to high-value meat and milk products. Animal husbandry should ensure productivity and protect the earth's resources for future generations by minimizing negative impacts on the environment without depleting soil resources (Fig. 2).

Cover crops for grazing in perennial pastures can be cool-season annuals overseeded onto dormant warm-season perennial forages or warm-season annuals planted onto suppressed or killed perennial forages.

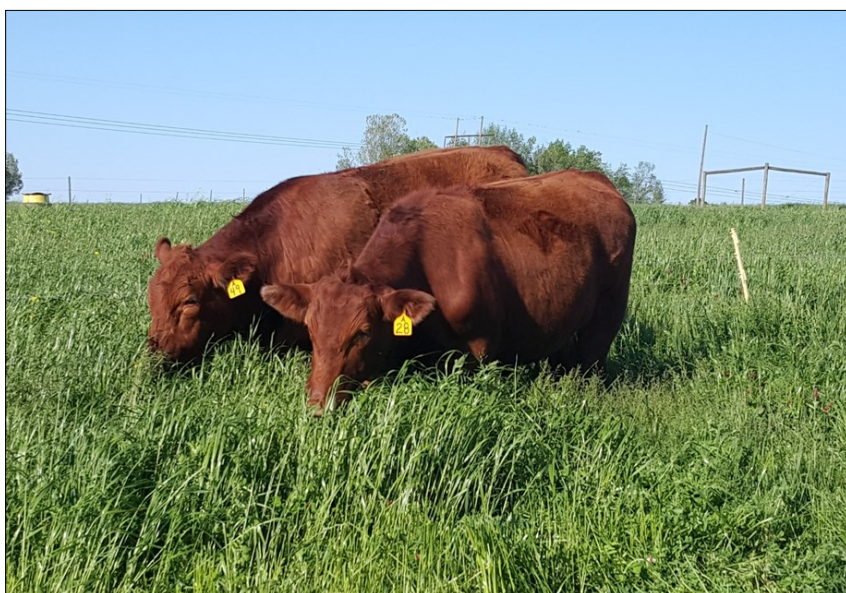


Fig. 2. Red Angus grazing Ray's Crazy Mix for cool season. Photo: Johnny Rogers

The Case for Overseeding Cool-season Annuals onto Dormant Warm-season Perennial Forages

Benefits of overseeding include intensifying grazing management to increase yield per land area by extending the grazing season into the winter, minimizing soil loss and degradation by maintaining year-round vegetative cover, and adding value to production systems through animal gain over winter (e.g. 2 lb/day can be expected from high-quality cool-season forages).

A major concern with winter grazing of annuals is compaction from animal traffic. Compaction is more dictated by condition and management of surface soil. There may be an increase in soil bulk density with winter grazing, but it generally leaves little effect on subsequent production. Another concern is that cover crops can complicate management. The learning curve on how to manage diverse pastures can be steep. Timing of establishment is critical. Herbicide residuals must also be considered.

Types of Forages

The most typically grown cover crops are grasses and legumes, including annual ryegrass, rye, wheat, oat, clovers, and vetch. Some brassicas are gaining attention, such as forage radishes, turnips, and rape (Fig. 3, 4, 5). Brassicas may be preferred by grazing animals and they produce large amounts of forage mass early in the winter season.

Brassicas and annual grasses generally provide large quantities of forage, e.g. 2 to 3 times more than legume crops. Most cool-season cover crops are high in nutritive value in terms of digestibility and crude protein concentration. Moisture concentration can vary greatly. Brassica species at grazing will often exceed 95% moisture, while grasses may be nearer 70% moisture.

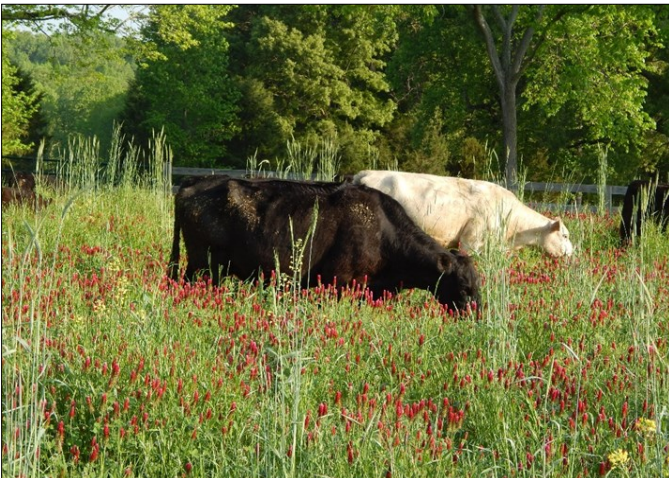


Fig. 3. Cattle grazing mixture of rye, crimson clover, and rapeseed. Photo: Ronnie Nuckols

Legume cover crops (e.g. clover, hairy vetch, field pea) have a symbiotic association with nitrogen fixing bacteria to gain nitrogen from the atmosphere that will feed the plant. Legumes provide high nutritive value and reduce N fertilizer requirements of the grazing system. Non-legume species (e.g. rye, ryegrass, oat, turnip) recycle existing soil nitrogen and other nutrients to reduce leaching losses.



Fig. 4. Brassicas (l to r): rapeseed, daikon radish, and turnip. Photo: J.B. Daniel

Brassicas are often deep-rooted, and can increase subsoil water storage capacity by enhancing aeration, increasing infiltration, and improving nutrient acquisition and redistribution. Animals grazing pure stands of brassicas may be subject to bloat and mixtures with grasses can reduce the problem. Grazing small strips using temporary fencing can control access.



Fig. 5. Multi-species cover crop mixture of oat, rye, hairy vetch, daikon radish, and rapeseed. Photo: J.B. Daniel

Mixed Species Grazing

Multiple-species cover crops have potential to provide numerous soil benefits and improve pasture quality. Maintaining species diversity can be difficult due to grazing selection preference and overgrazing. Rotational grazing may help reduce loss of desired species and improve grazing “efficiency”. Also, rotational grazing can lead to more uniform nutrient distribution through feces deposition, which would maintain soil fertility throughout the pasture.

Extending the Grazing Season with Annual Forages

Planting annual forages either onto cropland or into suppressed or killed perennial pastures may have an important role to play in many animal grazing systems. Annual forages offer higher quality feedstuffs, an alternative to toxic tall fescue, opportunity for pasture renovation, and potential soil health improvements.

Annual cover crop forages are not a traditional practice. Beef cattle producers may be naturally apprehensive, because they rely heavily on perennial pastures. In developing an alternative to perennial-only pastures, producers might question the high variable cost of production compared to an established perennial system. They might also ask, “Why would I do this from a production standpoint? Will it pay and what benefits will I get from it?”

Annual cover crops might be appropriate for grass fed/finished livestock systems because there is a need for fresh, nutritious forage for adding weight to weaned animals, i.e. yearling stockers and retained heifers. Annual cover crops might also fit in a general livestock operation to (a) provide supplemental forage in fall while stockpiling tall fescue, (b) provide forage early to allow perennials to fully green up, and (c) use in transition periods when renovating pastures.



Fig. 6. Engagement of producers is important. Photo: J.B. Daniel

Grower Experiences

Rogers Cattle Company near Roxboro, North Carolina has had experiences with warm- and cool-season annuals for extending the grazing season in a predominantly tall fescue based beef cow-

calf operation. Mixtures using warm-season annuals and mixtures using cool-season annuals used by Rogers Cattle Company are presented in Table 1 and Table 2.

Table 1. Mixtures with warm-season annuals (% by weight).

Forage Type	2012	2013	2014	2015	Simple Mix	2016	2016
Soybean	30%	20%					
Cow Peas	25%	25%	42%	61%	70%	31.3%	70%
Sorghum-Sudan	17.5%	25%	18%*	16%*	30%*		
Pearl Millet	5%	10%	6%	7%		62.5%**	30***
German Foxtail	5%	5%					
Sunflower	7.5%	5%	4%	4%			
Radish	5%		5%	7%			
Turnips	2.5%	2.5%					
Rape	2.5%						
Pasja Brassica		2.5%					
Mastergraze Corn/Soybean			20%				
T-Raptor Brassica			5%	3%		6.2%	

*Two varieties AS 6501 and AS6201
 ** Exceed BMR Miller and ***Tifleaf III Millet

Table 2. Mixtures with cool-season annuals (% by weight).

	2012	2013	2014	Simple Mix	2015	2015
Ryegrass		6.6%	7.1%		13%	13%
Crimson Clover	18%	10.6%	9.9%	18%	10%	10%
Jerrad Oats	82%	19.9%	20%	82%	77%	
Cosaque Black Oats						77%
Vetch		13.2%	12.4%			
Winter Pea		23.9%	23.6%			
Turnip		1.6%	2.4%			
Radish		3.9%	3.7%			
Wheat		19.9%	19.9%			

The following information is shared from a field demonstration (Fig. 6) established in central Virginia on the Ronnie Nuckols farm with a goal of providing:

- Good fall growth and quality for November grazing;
- Regrowth potential for nutritious spring grazing; and
- Conservation benefits such as ground cover, species diversity, soil penetrating roots, and feeding microbes.

Cool-season annual cover crops were planted in 1.5 to 2 acre plots on 2 September 2014 according to the following:

1. Diversity mix, consisting of spring oat (32 lb/acre) + forage rye (36 lb/acre) + ryegrass (10 lb/acre) + hairy vetch (10 lb/acre) + winter pea (10 lb/acre) + radish (1 lb/acre) + rapeseed (1 lb/acre);
2. Soil Builder Plus (triticale, crimson clover, hairy vetch, annual ryegrass, and radish) planted at 120 lb/acre;

3. 'Double Play' provided by Lancaster Ag Products, consisting of triticale (89 lb/acre) + oat (67 lb/acre) + annual ryegrass (23 lb/acre) and fertilized with Meadow Top Dress (15-5-5) at 300 lb/acre.;
4. Simple mix, consisting of forage rye (98 lb/acre) + rapeseed (2 lb/acre); and
5. Medium mix, consisting of spring oat (64 lb/acre) + annual ryegrass (15 lb/acre) + crimson clover (10 lb/acre).

Estimated dry matter production in early November at the time of initiation of grazing by replacement heifers was 1,475 to 2,200 lb/acre with crude protein of 25 to 31% and total digestible nutrients of 72 to 76%. A total of 22 replacement heifers (850 lb) grazed for 37 days on 9 acres. This was the equivalent of 77 animal unit grazing days per acre.

Spring regrowth occurred and allowed grazing of 43 cows and 40 calves for 22 days from mid-April to early-May. This was the equivalent of 170 animal unit grazing days per acre. Estimated yield was 1390 to 2650 lb/acre with crude protein of 20 to 24% and total digestible nutrients of 69 to 73%.



Fig. 7. Johnny Rogers explaining options for temporary fencing at field day. Photo: Alan Franzluebbbers



Fig. 8. Grazed summer annuals. Photo: Alan Franzluebbbers

Moving Forward

Some practical observations from using annual forages include:

- Burn down previous growth with glyphosate is important for establishment with summer annuals.
- Use the right species, planted at the right time to match goal.
- Calibrate drill and set depth before planting whole field.
- Provide the plant food needed to get optimum production.
- Impressive yields on marginal soils with limited fertilizer.
- Opportunity and desire to stagger planting dates and stage grazing intervals.
- While cover crops growing, need patience to wait to graze.
- Establishment cost is a concern.
- Merits of simple vs. diverse mixtures remain debatable.
- Reduces weather risk.
- Provides excellent quality forage.
- Improves soil health.
- Very effective in eliminating tall fescue and reducing some weed populations.

Further research is needed on best options in different environments for types of annual cover crop mixtures, best seeding rate combinations, most effective planting dates, impacts of fertility on utilization and yields, and studies on soil microbial activity as affected by types of annual cover crops and grazing management strategies.

Additional Information

Amazing Grazing - <https://cefs.ncsu.edu/extension-and-outreach/amazing-grazing/>.

Virginia Forage and Grassland Council - <http://vaforages.org/>.

Winter annual grasses for grazing - <http://extension.msstate.edu/publications/publications/forage-winter-annual-grasses-for-grazing>.



This product was developed with support from the Southern Sustainable Agriculture Research and Education (Southern SARE) program, which is funded by the U.S. Department of Agriculture—National Institute of Food and Agriculture (USDA-NIFA). Any opinions, findings, conclusions or recommendations expressed within do not necessarily reflect the view of the Southern SARE program or the U.S. Department of Agriculture. USDA is an equal opportunity provider and employer.