Pasture Planning for Winter Forages

Grazing is generally the least expensive way to feed livestock. Forages and management systems that extend the grazing season can increase profit. Gulf Coast states (Texas, Louisiana, Mississippi, Alabama, and Florida) usually have very mild winters. Spring and summer droughts can reduce late-fall and early-winter pasture production. Depending on rainfall, cool-season annual and perennial species can provide high-quality grazing during this season.

You must know how to establish and manage annual forages to maintain successful winter pastures. Availability of winter forage depends on a number of environmental conditions, like rainfall and temperature. However, seeding rates, planting methods, and fertilization also affect when, how much, and how often the established forage can be grazed.

Winter Forage Species

A good winter forage supply can sustain livestock for up to 5 months (**Figure 1**). Planting at the best time and using the right seeding rates are important to a successful forage program (**Figure 2**). Soil texture, pH, water-holding capacity, and grazing pressure can also affect seed germination, establishment, and persistence (**Table 1**).

Healthy stands of cool-season grass/legume mixtures can help extend winter grazing until enough summer forage is available. For example, you can seed arrowleaf, berseem, and crimson clovers in the fall with annual ryegrass or small grains. Producers often plant annual ryegrass and/or small grains with crimson clover because of cost and availability, but arrowleaf and berseem are better choices. In north and central Mississippi, you can seed white clover with tall fescue.

Brassicas like kale, forage rape, turnips, and swedes can help extend the grazing season. To a limited extent, chicory can, also. They are high-quality, high-yielding, and fast-growing forage crops that are suitable for livestock grazing during the early winter and spring.

Brassicas usually work well in an early- to late-fall grazing program. Both aboveground (stems and leaves) and belowground (bulbs) parts can be grazed and can provide excellent forage quality. Plant brassicas no-till or in a tilled seed bed. Allow 6 to 8 inches between rows. Plant to a depth of ¼ to ½ inch. Brassicas are not adapted to poorly drained soils and prefer soils with a pH between 5.3 and 6.8 and medium levels of phosphorus (P) and potassium (K). Apply 50 to 75 pounds of nitrogen (N) per acre at or within 3 days of planting. Brassicas are ready to graze 90 to 120 days after planting. Use a rotational or strip grazing system. Kale has a greater cold tolerance than do other brassicas and can be used in the northern part of Mississippi. It should be planted in

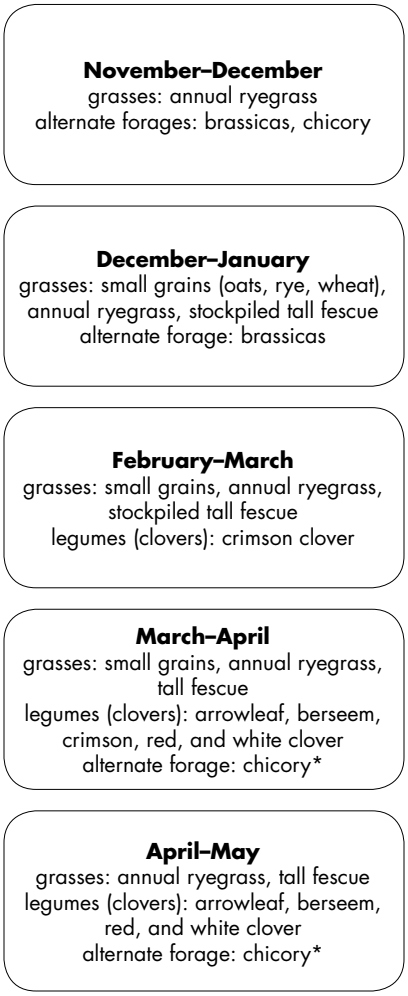

Figure 1. Winter forage availability of different cool-season species in Mississippi.

*Chicory provides forage in late fall and spring only. Chicory is not considered a true winter forage because growth is limited by frost.

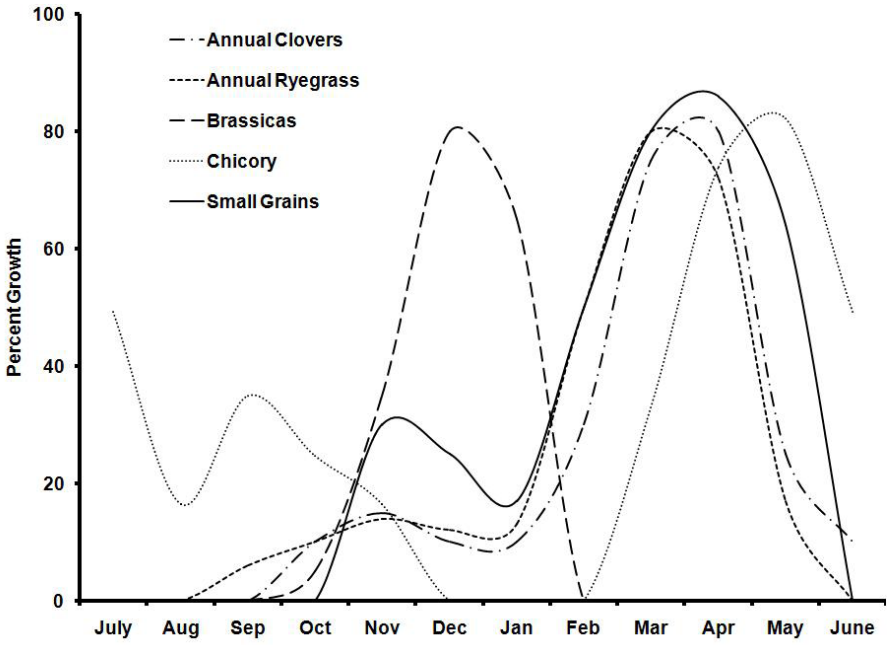

Figure 2. Growth curves of different winter forages in Mississippi.

Table 1. Establishment characteristics of winter forages.

						Tolerance to[3]			
Forage Species	**Seedling Vigor[3]**	**Germination Time (days)**	**Seeding Rates (lb/ac)[4]**	**Planting Dates**	**pH**	**Soil Acidity**	**Poor Drainage**	**Drought**	**Grazing**
Grasses									
Annual ryegrass	G	10	30–40 (15–20)[5]	Sept.–Nov.	6.0–7.0	G	E	F	E
Small grains[1]	E/E/E	10	90–120 (60–90)[5]	Sept.–Oct.	6.0–6.5	F/G/P	F/F/P	F/F/F	G/G/G
Tall fescue (+/-)[2]	G/F	10	20–25 (15–20)[6]	Sept.–Nov.	5.8–6.5	G/F	G/G	G/F	E/F
Legumes									
Arrowleaf clover	F	10	5–10	Aug. 25–Oct. 15	5.8–6.5	F	P	F	G
Berseem clover	G	8	20–25 (10–15)[6]	Aug. 15–Oct. 25	6.5–8.0	P	G	G	G
Crimson clover	G	7	20–30 (15–20)[5]	Aug. 25–Oct. 15	5.5–6.7	G	P	F	F
Red clover	E	7	12–15 (6–8)[6]	Sept.–Oct.	6.5–8.0	F	F	F	F
White clover	F	7	2–3	Sept.–Oct.	6.0–7.5	F	G	P	E

Source: Ball et al., 2002. Southern Forages (3rd Edition). Potash and Phosphate Institute and Foundation for Agronomic Research, GA.
[1]Small grains (oats, rye, and wheat)
[2] + = endophyte-infected (K-31), - = endophyte-enhanced (MaxQ®)
[3]E = Excellent, G = Good, F = Fair, P = Poor
[4]Broadcast
[5]Mixture
[6]Drilled

early September at rates of 3.5 to 4 lb/ac. Turnips should be planted at a rate of 2 to 3 lb/ac. They can produce maximum yields 90 days after seeding. The leaves can be grazed from late November until early spring. Rape has the shortest season of the brassicas and can be planted at a rate of 3 to 4 lb/acre.

Chicory is a forb, not a legume. It can be used for late-fall or early-spring grazing, but its winter growth is limited or cut short by frost. In Mississippi, chicory is considered a short-term perennial (2 to 3 years) with some light frost tolerance, but it is active mostly in summer. It grows best on well-drained or moderately drained soils. You can drill-

plant chicory from September to October in a prepared seed bed or grass sod. Use a rate of 3 to 4 lb/ac at ¼- to ½-inch deep. For mixtures, use 2 to 3 lb of chicory with two-thirds of the usual seeding rate of the other forage. Chicory is often mixed with cool-season legumes because of their nitrogen-fixing capabilities. Apply 35 lb/ac of a nitrogen fertilizer at planting to stimulate establishment. If you seed chicory in a legume mixture, you can reduce the nitrogen application at seeding to 15 to 20 lb/ac. Chicory has a high nitrogen (N) requirement; apply at least 100 to 150 lb N/ac/yr to an established stand at rates of 50 lb N/ac in early spring, early summer, and early fall. Never apply more than 200 lb N/ac/yr. Two cultivars adapted to Mississippi are Puna and Oasis.

Soil Fertility

Winter forages require several specific nutrients for adequate growth (**Table 2**). The availability of these nutrients in the soil is affected by rainfall, materials in the soil, and cropping history. A soil test is the only reliable way to know which nutrients you need and in what amounts you need them. Collect soil samples at least 6 months before planting. Get at least one soil core per acre to produce a composite sample for the field (see MSU Extension Information Sheet 346 *Soil Testing for the Farmer*). Sample to a depth of 4 to 6 inches. Avoid low land, sloping areas, and feeding areas, where unusual soil conditions might affect the analysis. Contact a local Extension agent to get soil-sampling instructions, soil sample boxes, and information sheets.

The first priority for establishing a winter pasture is to adjust soil pH, which is a measure of soil acidity. Apply lime if soil pH is below 5.5. Add lime at least 4 to 8 weeks before planting. It's best to apply lime 6 or more months before you need the pH to increase. You can use dolomitic or calcitic lime; apply it according to soil test recommendations. If you need to add 4 or more tons of lime per acre, split it into two applications.

Annual grasses in a mixture with annual legumes cannot get enough N from the legumes in the fall to meet nutrient requirements. But high N applications can reduce nitrogen fixation in legumes. Most annual clovers do not give enough N to the companion grasses until they begin to die and decay in the spring. Therefore, you need to apply N to clover/ryegrass mixtures. Research indicates that N rates up to 30–50 lb/acre will benefit the early growth of all legumes without severely damaging nodulation and nitrogen fixation. Don't apply N to annual grass/legume mixtures in spring.

To make nitrogen, legumes need to associate with the rhizobia bacteria. If it is not present in the soil, you need to inoculate the legume with the right type of inoculant to ensure proper nodulation. Legumes that grow in response to N do not have effective nodulation. If the soil test recommends that you apply more than 50 to 60 lb N/ac (200 lb 34-0-0), incorporate N into the seedbed before planting.

Fertilizer applications are usually either broadcast or incorporated before planting (**Table 2**). Soil tests do not provide information on nitrogen needs. A general rule is to

Table 2. Soil fertility needs, yield production, and grazing management of winter forages.

	Soil Fertility Needs (lb/ac)						
Forage Species	**N**	**P**	**K**	**Average Dry Matter (lb/ac/in)**	**Estimated Seasonal Yields (tons/ac)**	**Beginning Grazing Target Height (in)[4]**	**Rest Period (days)**
Grasses							
Annual ryegrass	100–150[3]	20–50	20–50	210	2.0–6.0	6–12	7–15
Small grains[1]	60–80[3]	30–60	50–60	150	2.0–3.5	8–12	7–15
Tall fescue (+/-)[2]	100–150[3]	40–60	50–70	210	2.0–4.0	6–8	15–30
Legumes							
Arrowleaf clover	–	60–80	60–80	130	1.5–2.0	8–10	10–20
Berseem clover	–	60–100	80–100	130	2.0–2.5	8–10	10–20
Crimson clover	–	60–80	80–100	200	1.5–2.5	8–10	10–20
Red clover	–	60–80	120–160[3]	220	2.0–3.5	8–10	10–20
White clover	–	20–30	50–70	200	2.0–4.0	6–8	7–15

Source: Ball et al., 2002. Southern Forages (3rd Edition). Potash and Phosphate Institute and Foundation for Agronomic Research, GA.
[1]Small grains (oats, rye, and wheat)
[2]+ = endophyte-infected (K-31), - = endophyte-enhanced (MaxQ®)
[3]Split applications.
[4]Do not graze below 3-inch stubble height to allow a faster recovery time.

apply 1 pound of nitrogen per acre per grazing day. Limit single applications of N to no more than 60 lb/acre to reduce the liklihood of nitrate toxicity. You can broadcast phosphorous (P) and potassium (K) and incorporate them with a disk. If you broadcast P fertilizer, increase the application rate by 50 percent. Potassium (potash) is usually broadcast at planting or incorporated into the seed bed before seeding. Boron (B) is usually required for legume production. Use potash with boron added (0-0-60+B) for legumes, especially on sandy soils.

Grazing Management

Sustainability of winter forages also depends on grazing management and stocking rates. Try a rotational, limit, or strip grazing system to manage winter forages. Remember that these forage species should provide forage for at least 5 months. Using a controlled grazing system will give more recovery time and better forage use over time. Animals should be allowed to graze short periods of time (6 to 12 hours or 1 to 3 days) to maintain these forages in the vegetative stage and reduce bloat problems in legume/grass mixtures.

Where clovers are present, livestock should be removed completely or partially during the time of maximum seed production. Reduced grazing pressure or no grazing should last at least 2 to 3 weeks to allow for reseeding.

Rotational grazing is recommended for chicory pastures. A rest period of 25 to 30 days between grazing periods is best for chicory. Leave a stubble height of 2 to 3 inches after grazing. Under some conditions, chicory plants may send up flowering stalks (bolt), which are unappetizing to livestock. Mow in late spring to remove seed stalks and maintain leaf development. Chicory cannot be used for hay because of its high water content. Spring-seeded chicory can be grazed after 80 to 100 days, depending on the climate.

It is important to get an estimate of how much forage you have. One way to determine the amount of forage is by measuring the height of the sward and using estimates of available forage per inch of height (**Table 2**). Make sure the plants have produced enough leafy material before increasing grazing pressure. **Table 2** provides some guidelines for appropriate grazing height for each species. Recovery time is also very important. Do not graze pastures below 3 inches to allow needed rest periods and maintain productivity (**Table 2**). Following these management practices gives pasture plants enough leaf material to photosynthesize and shortens recovery time between grazings.

Stockpiling Tall Fescue

Late August or early September is a good time to begin stockpiling tall fescue. Graze or clip old growth before stockpiling. Remove cattle, apply 40 to 80 lb N/acre, and allow grass to accumulate growth until November or December (preferred). Strip grazing makes the best use of high-quality stockpiled pastures. Use a temporary electric fence to restrict animals to a small area that can be grazed in a few days. Then move the fence to open up a new section of the field. Stockpiled tall fescue could reduce hay feeding days by up to 50 percent.

Planning a successful winter forage system depends on three main things: knowing the characteristics of the selected species, knowing livestock nutrient requirements, and knowing management strategies that can increase forage utilization and animal performance.

When selecting and establishing winter forages, consider soil conditions, climate, fertility needs, and intended use (pasture/hay). Managing a winter forage system for livestock may require more maintenance, but the system can save money, provide nutrition, and reduce environmental concerns.

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