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Tall Fescue in Mississippi

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Tall fescue (*Festuca arundinacea* Schreb.) is the most widely grown, cool-season perennial forage grass in Mississippi (Figure 1), particularly north of I-20 where most of the 300,000 acres of fescue pasture in the state is found. It is one of the more popular perennial grasses in beef cattle-forage systems but is used only infrequently as forage for lactating dairy cows.

Fescue will grow when average temperature is as low as 34°F, but does best at temperatures above 40°F. However, growth is retarded in summer unless adequate moisture is available. Therefore, its dependability for forage production is greatest from October through June.

These are major advantages of tall fescue:

(1) The dense sod produced by the vigorous root system resists breakthrough of animal hooves, especially in winter and early spring when pastures are subject to the most severe damage from animal traffic.

(2) It is quite drought resistant because of its deep root system.

(3) It tolerates wet soils and submersion.

(4) It is more tolerant of alkaline conditions than are many other cool-season grasses.

Major disadvantages are

(1) It is less palatable than most winter annual grasses, especially at advanced stages of growth.

(2) Stands thin with heavy cutting or grazing.

(3) Its slow growth under high temperature-low rainfall conditions supports only limited animal performance from July through September.

(4) It can crowd out clover.

(5) Cattle grazing fescue pastures or consuming fescue hay are susceptible to fescue toxicity.

Good management can overcome some of the problems, and growing clover in fescue is one of the most effective practices. In addition to overcoming or minimizing problems encountered with fescue grown in pure stands, growing clover in fescue increases the quantity and improves the quality of forage, and reduces the amount of

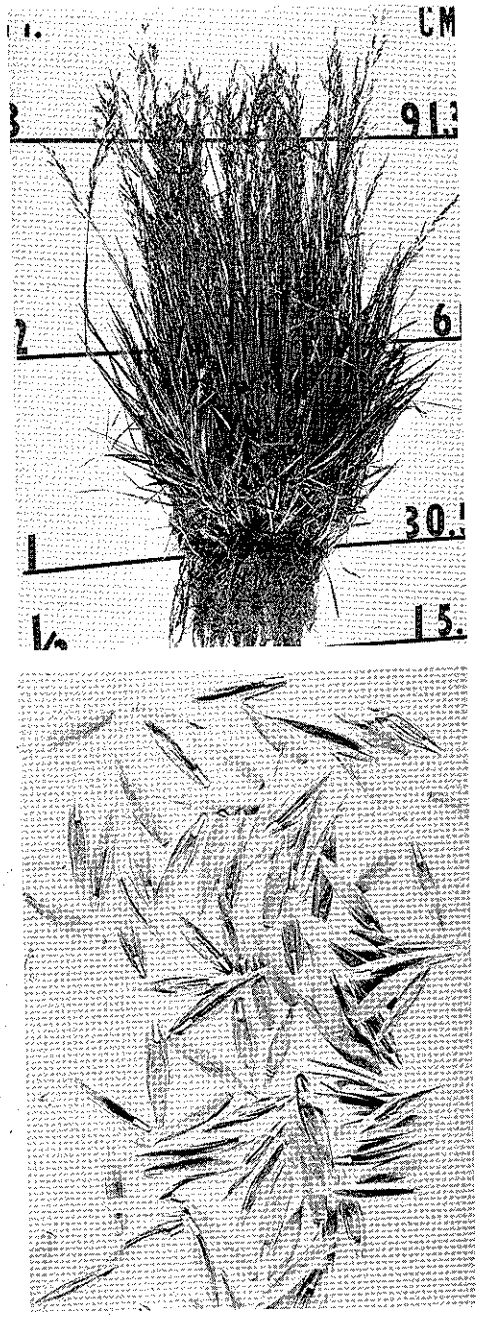

Figure 1. Mature tall fescue plant showing the typical robust growth, coarse texture, dense root system, flat leaves and seed head (top); and tall fescue seed (bottom).

commercial nitrogen required for pasture maintenance.

The following guidelines for establishing and managing fescue pastures are based on results of a number of MAFES studies designed for determining ways of improving the use of tall fescue in beef cattle-forage systems.

PRODUCTION AND MANAGEMENT GUIDELINES [1]

Establishment and Maintenance

Soil Selection---Tall fescue grows well on many soils, but does best on a fertile, moist, fine-textured soil. It will tolerate wet soil and submersion, but these areas should be avoided when possible. Fescue will produce satisfactorily on soil with pH of 4.7 to 8.5, but optimum growth occurs in the 5.5 to 7.0 pH range. Fescue-clover pastures require soil with pH of 6.0 to 7.0.

Fertilization---Apply lime, phosphate and potash to soil test recommendations. In the absence of a soil test apply 60 to 90 pounds of P_2O_5 and K_2O per acre in a 1:1 ratio for establishment, and 40 to 60 pounds per acre in a 1:1 ratio each year thereafter.

High rates of nitrogen are required for high yields. Best results can be expected when equal amounts of nitrogen are applied in fall and spring. Our trials have demonstrated that dry matter production increases with each increase in nitrogen level up to 240 lb/acre (Table 1). However, tall fescue and white clover grown together with no added nitrogen have produced about the same dry matter yields as fescue grown alone with annual applications of 180 lbs of nitrogen per acre.

Seedbed Preparation---Tall fescue grows best in soil tilled 4 to 6 inches deep, then leveled and firmed before planting. It also may be sod-seeded into bermudagrass pastures.

Varieties---Seed of eight commercial varieties of tall fescue have been released (Table 2) and three of these are now recommended for production in Mississippi. 'Kentucky 31' has been the most productive in our tests (Table 3). 'Alta' and 'Goar' produce less dry matter than Kentucky 31, but may be more nutritious. 'Fawn', 'Kenhy' and 'Missouri 96' are now under test in Mississippi.

Planting---Plant between Sept. 1 and Nov. 1, using 15 lbs of high-quality seed per acre, seeded ¼ to ½-in. deep. Seed into bermudagrass sod at the same rate and depth on Oct. 15.

When planting fescue-clover combinations (Figure 2), drill 10 lbs of fescue seed ¼- to ½-inch deep in 20-inch rows and broadcast 3 lbs of white clover[2] seed or 6 to 8 lbs of red clover[2] seed. Inoculate the clover seed with the correct strain of *Rhizobium* just before planting. Be sure to place the seed in direct contact with the inoculum. This normally is accomplished by using a sugar-water solution to stick the inoculum to seed; however, commercial stickers are available.

Table 1. Forage production of tall fescue fertilized with different rates of nitrogen, Mississippi State University, 1965-1969.

Nitrogen rate	Forage Production[1]
Lbs/A	Lbs/A
0	1680 e
60[2]	1920 e
90	3117 d
120	4131 c
180	4179 bc
240	6567 a
Fescue-white clover with no nitrogen added	4897 b

[1]Means in a column followed by a different letter differ at the 5% level of probability as determined by Duncan's Multiple Range Test.

[2]Nitrogen at each rate applied either in spring and fall or split (spring-fall).

[1]The guidelines presented and the varieties recommended in this bulletin are based on the latest MAFES research results available at the time of printing. Refer to the latest **Crop and Fertilizer Guidelines for Mississippi** *or consult your area or county Cooperative Extension Service personnel to determine whether the guidelines and recommended varieties have been changed.*

[2]Refer to the latest **Crop and Fertilizer Guidelines for Mississippi** *or consult your area or county Cooperative Extension Service personnel for variety recommendations.*

Table 2. Commercial tall fescue varieties, by date of release, source of release and varietal characteristics.

Variety	Year Introduced	Released By	Characteristics
Kentucky 31	Early 1940's	Kentucky AES	Most popular variety, grows on wide range of soils, and over a wide temperature range, highly productive, low palatability
Alta	1940	Oregon AES and USDA	Resistant to cold and drought, production similar to Kentucky 31
Goar	1946	California AES and SCS	Early maturity, vigorous, adapts to heavy-textured alkaline soils, grows better in hot weather than other varieties
Kenmont	1963	Montana AES	Similar in appearance to Kentucky 31, but sod slightly denser
Fawn	1964	Oregon AES	Improved digestibility and higher in crude protein, improved seed yield, more vigorous
Kenwell	1965	Kentucky AES and USDA	Improved palatability and quality, disease resistant, later maturity, better with legumes
Kenhy	1977	Kentucky AES and USDA	Ryegrass-tall fescue hybrid derivative, more palatable and digestible, drought tolerant, widely adapted, better cattle gains
Missouri 96	1978	Missouri AES	Cattle gain 35-40% higher, dairy cattle intake higher than on Kentucky 31, Fawn or Kenhy

Management

Realizing the potential of tall fescue in a beef cattle-forage system requires high levels of management. Areas of major concern are (1) maximizing yields of quality forage without stand thinning, (2) seed production and (3) minimizing fescue toxicity problems.

Yield, Quality and Stand Maintenance---One strategy for managing established stands of tall fescue is to apply phosphate, potash and nitrogen to pastures in early September and let parts of the pasture grow (stockpile) until January or February before grazing. However, cattle grazing stockpiled fescue are more susceptible to fescue toxicity. Also, stockpiling of fescue-clover combinations is not practical because the rank fescue growth resulting from deferred grazing will eliminate most clovers.

Rates of forage accumulation in a two-year stockpiling experiment with pure stands of tall fescue increased from September through December, decreased slightly in January and February, and then increased through maturity (Table 4). However, most of the total yield was produced in the first two months after fertilization. Digestibility of the forage was acceptable at all stages of growth, but percentages of green leaves, crude protein content and sugar content decreas-

ed as the fescue grew. Therefore, maintenance of beef cows on stockpiled tall fescue pastures requires protein supplementation, and this management strategy as part of a total forage program should be restricted to animals that do not require a high-quality ration.

Tall fescue-clover combinations yield most when the forage is removed to a stubble height of about 1-inch when the fescue is no taller than 12 inches. Yields of tall fescue-white clover stands in three years of testing were higher when cut to 1-inch stubble height than to 3 inches (Table 5). However, the clover tended to crowd out the fescue, and cutting to a stubble height of 3 inches maintained fescue stands and restrained clover to the 30 to 50% level (Figure 3) that most producers consider desirable.

Regal white clover-tall fescue pastures provided 60 days more grazing than tall fescue alone at the MAFES Brown Loam Branch. Cows on clover-fescue produced fall calves that weaned at 544 lbs. Fall calves from cows on a two-pasture system of bermudagrass-dallisgrass in summer and wheat-ryegrass in winter were weaned at 523 lbs. Winter-calving cows on the

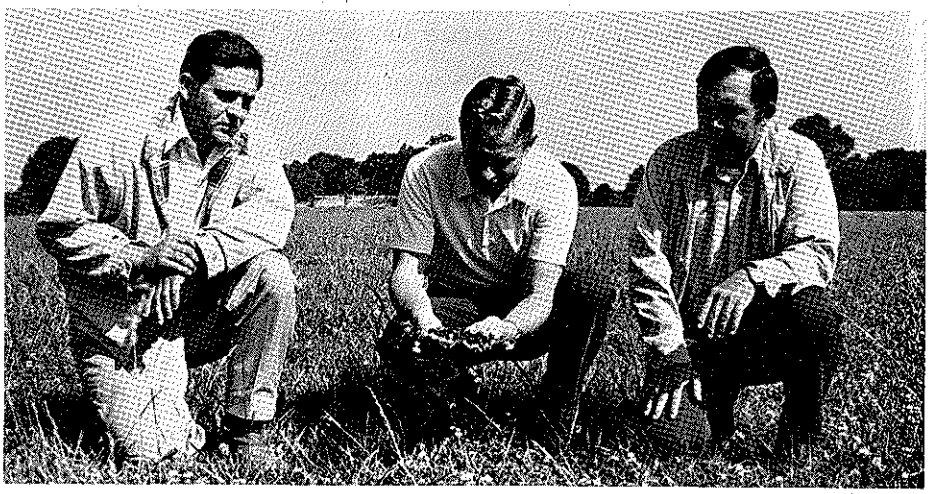

Figure 2. Tall fescue-white clover combinations are popular in Mississippi. Jack Wesli (left), manager of the cooperating farm; W. E. Knight (center), USDA agronomist; and Vance H. Watson are pictured in a tall fescue-white clover pasture near Columbus.

Table 3. Dry matter yields of tall fescue, by variety, Mississippi, 1967-69.

	Dry matter yield		
	1967	1968	1969
		Lbs/A	
Kentucky 31	5959	5483	6021
Alta	5743	5088	5544
Kenmont	5693	5332	5026
Kenwell	5126	4884	5210
Goar	5819	5207	5462
Ky 45-50*	5720	5077	4369
LSD (.05)	N.S.	N.S.	N.S.

*Experimental strain, not released

Table 4. Yield accumulation and quality of tall fescue in stockpiling trials, by month, Mississippi State University, 1968.

Month	Dry matter accumulation	Quality Measures			
		Green Leaves	Crude Protein	Carbo-hydrates	Digesti-bility
	Lbs/A			%	
October[1]	1550	69.8	12.6	8.6	69.7
November	3690	73.8	9.2	14.5	71.5
December	4259	37.2	8.8	13.8	72.9
January	3489	33.9	7.0	9.1	74.2
February	3795	29.4	6.3	7.3	67.4
March	4161	39.6	6.5	6.5	66.4
April	4861	58.4	6.5	9.3	68.5
May	4240	43.8	6.1	12.3	62.8
June	4789	40.6	5.6	7.0	58.0

[1]A two-year-old sod of tall fescue was clipped in late August and fertilized with nitrogen in September. Values presented are the average of three nitrogen levels.

Table 5. Forage yields of tall fescue-white clover stands and estimated percentages of clover in the stands after three years of testing, by fescue row spacing,[1] height of stands at time of cutting and height of stands after cutting, Mississippi State University, 1966-68.

Height of Fescue at time of cutting	Stubble Height	Dry matter yield (three-year averages)				Clover in stands (after three years of testing)			
		Fescue rows spaced at				Fescue rows spaced at			
		10 inches	20 inches	broad-cast	All spacings[2]	10 inches	20 inches	Broad-cast	All spacings[2]
		Lbs/A				%			
6 inches	1 inch	7250	6858	6505	6871 a	75.0	70.0	73.8	72.9 a
6 inches	3 inches	5720	5621	5157	5499 b	45.0	32.5	66.7	48.1 b
12 inches	1 inch	6890	7133	6475	6833 a	83.7	75.0	80.0	79.5 a
12 inches	3 inches	5757	5673	5170	5533 b	53.8	33.8	55.0	47.5 bc
Heading (then 6 inches)	3 inches	5581	4882	4994	5152 b	51.3	47.5	53.8	50.8 b
6 inches	1 inch (no summer cut)	6722	6408	6501	6544 a	38.8	35.0	47.5	40.4 c

[1]Fescue seeded at 15 pounds per acre in 10-inch rows, 20-inch rows and by the conventional broadcast method; white clover broadcast in all fescue seedings at 3 pounds per acre.

[2]Means in a column followed by a different letter differ at the 5% level of probability as determined by Duncan's Multiple Range Test.

clover-fescue required only 60 days of winter feeding, those on the two-pasture grass system required 116 days.

The early bloom stage is the best time for cutting tall fescue for hay. This normally is in early May in central and north Mississippi where most of the fescue in the state is grown.

Seed Production---Tall fescue produces one crop of seed each year and grazed fescue sods can be used for seed production, with highest yields obtained from pure fescue stands. The most important factors affecting seed yield and quality (Figure 4) are levels of nitrogen applied and removal of cattle from pastures by March 30 (Tables 6 and 7).

Seed can be harvested by direct combining of standing plants or by cutting and windrowing for combining later. Ripe fescue seed shatter when harvested by either method, and harvest losses of 35 to 40% are to be expected.

Removing the residue from combining permits grazing the regrowth by early fall or stockpiling it until winter.

Minimizing Fescue Toxicity---Fescue foot is most prevalent in pure stands of tall fescue that are thick and rank. Cattle grazing tall fescue fertilized with more than 200 pounds of nitrogen annually or with large amounts of chicken litter are particularly prone to fat necrosis. Also, fescue pasture may not provide enough energy for pregnant cows, making them more susceptible to fescue toxicity. These

Figure 3. Clover crowded out the fescue in plots clipped to 1-inch stubble height (left) but was restrained to less than 50% of the fescue-clover mixture in plots clipped to 3-inch stubble height (right).

management practices lessen the risk of fescue toxicity:

(1) Use fescue-legume mixtures. Clover improves the quality of forage and minimizes risks of fescue toxicity.

(2) Do not apply nitrogen to fescue-clover mixes and use no more than 200 lbs of nitrogen per acre per year on pure fescue stands.

(3) Do not fertilize fescue with high rates of chicken litter.

(4) Supplement pasture with grain or good quality hay for pregnant cows, and during stress periods such as cold winters.

(5) Graze pastures rotationally and cut excess growth for hay.

Table 6. Forage and seed production and quality of seed produced by tall fescue fertilized with different rates of nitrogen, Mississippi State University, 1967-68.

Nitrogen Rate	Production[1]		Seed Germination[1]
	Forage[2]	Seed	
Lbs/A	------Lbs/A------		%
0	1698 c	111 b	75.4 b
60	4335 b	378 a	85.7 a
120	6712 a	500 a	86.1 a

[1]Means in a column followed by a different letter differ at the 5% level of probability as determined by Duncan's Multiple Range Test.

[2]Dry matter

Table 7. Forage and seed production and quality of seed produced by tall fescue, by date of last harvest before allowing fescue to mature, Mississippi State University, 1967-68.

Date of Last Harvest[1]	Production[2]		Seed Germination[2]
	Forage[3]	Seed	
	------Lbs/A------		%
No Harvest	5278 a	561 a	85.0 a
March 15	4625 a	469 a	85.3 a
March 30	4727 a	471 a	84.5 a
April 15	3455 b	176 b	74.9 b
April 30	3134 b	0 c	---

[1]Last harvest before allowing fescue to mature

[2]Means in a column followed by a different letter differ at the 5% level of probability as determined by Duncan's Multiple Range Test

[3]Dry matter

Fescue Toxicity

Fescue toxicity appears in at least three forms---fescue foot, fat necrosis and poor animal performance (also called summer slump or summer syndrome). No one knows whether these forms of toxicity represent separate problems or are different symptoms of the same problem; whether toxin is produced by fescue or by a fungus growing on fescue. Some cattle are more susceptible than others to fescue toxicity.

Cattle with fescue foot don't gain well and may die, in severe cases. Rough hair, arched back and soreness in one or both rear legs are early symptoms. Later, skin at the junction with the hoof becomes red and swollen, and the animal gets more and more lame. The tip of the

tail may get sore too. Hooves, tail tip and ear tips may slough off in advanced stages, and cattle won't eat well and become emaciated. Animals will recover, in most cases, if the disease is not too advanced. The remedy is to remove the animal immediately from the fescue pasture or hay ration.

Fescue foot usually appears between late fall and early spring, when it is cold, rainy or overcast. The disease has been reported in all parts of Mississippi but not in all counties.

Fat necrosis is sporadic and not easily detected. Lesions of hard fat develop in the abdomens of cattle with the disease, and a weight loss occurs when the lesions begin to interfere with the digestive process. Large accumulations of the hard fat often lead to death. The disease has been reported only in cows that are more than two years old, most often in hot weather after they have grazed fescue for eight or ten months.

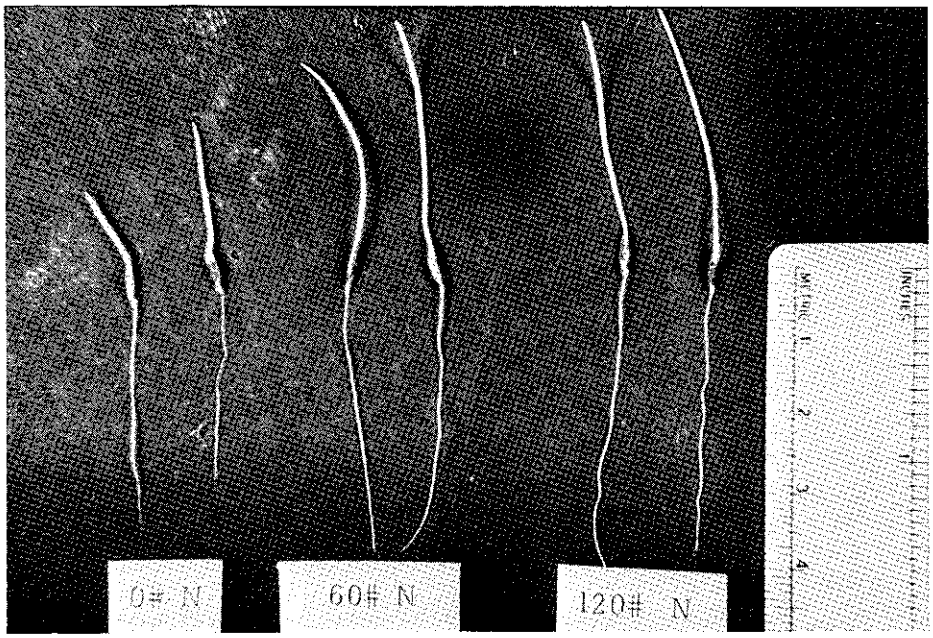

Figure 4. Vigorous tall fescue seedlings (right) show influence of nitrogen on seed quality.

Summer slump or summer syndrome is difficult to detect because it usually occurs in late summer under high temperatures, and symptoms are similar to heat stress in cattle. Symptoms are progressively poorer gain, rough hair, scours, rapid respiration, excessive urination and fever. Poor animal performance is of indefinite duration and usually disappears with the onset of cooler weather.

Diseases and Insects

Diseases have not been a major problem in fescue production in Mississippi; however, severe outbreaks of crown rust (caused by *Puccinia coronata* Corda. var. *coronata*) have been reported in Alabama. Rust reduces yield, palatability and forage quality, and may cause stand thinning. The disease usually is worst under the warm, moist conditions of early spring, and normally disappears after late spring grazing. Alta and Kentucky 31 are resistant to some races of the disease-causing fungus.

Tall fescue is susceptible to two fungi (*Helminthosporium dictyoides* and *H. vagans*) that can cause severe seedling blight. Both fungi can be active at any time; however, *H. dictyoides* is most active in spring and fall, *H. vagans* in summer. Kenwell is resistant to both, while Alta and Kentucky 31 are susceptible to both.

Root rot in tall fescue (caused by *Rhizoctonia solani* Kuhn) can be a serious problem in stand establishment and a threat to stand longevity. The disease is worst in warm and humid weather; for example; during a wet spring.

A leaf-spot disease caused by a species of *Cercospora* has been found on tall fescue in Kentucky. Kentucky 31 appears to be more resistant than Alta.

Several kinds of nematodes prune the roots of tall fescue, reducing yield and thinning stands. Nematode problems are most prevalent in fescue grown in light-textured soils. There are no good nematode control measures.

Tall fescue is relatively free of insect pests. However, fall armyworms (*Spodoptera frugiperda*) have been seen feeding in tall fescue pastures in Mississippi in late summer and early fall.

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