

AGRICULTURAL GUIDE

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Tall fescue

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Tall fescue is well adapted to the soil and weather conditions of Missouri. It is especially adapted to the hazardous growing conditions of south Missouri and will produce more forage on acid, wet soils of sandstone and shale origin than other cool season grass. Fescue is one of the more drought resistant field plants grown in Missouri. It will also maintain itself under rather limited fertility conditions. Fescue may be used not only as a forage, but is ideal for waterways, ditch and pond banks, and farm lots and lanes.

Animals will readily graze fescue during April, May and early June and again in the fall, but show reluctance to accept it during summer months of June, July and August.

It is the best adapted cool season grass available for stockpiling (accumulating growth) for use in the fall and winter. Thus it can provide much of the fall and winter feed for a beef cow herd.

Tall fescue should be part of a forage program, not all of it. Give fescue a rest during the late summer when cattle perform inadequately on it and let the growth accumulate for use in the fall and winter. If fescue is used in the summer, make every effort to maintain some species of legume with it. Fescue used exclusively for fall and winter stockpiling is usually maintained in a pure stand.

Tall fescue may be used successfully in forage programs for most beef cow herds, but is not recommended for use as a forage for producing dairy cows.

Varieties

Several tall fescue varieties are suitable for Missouri. All new varieties of tall fescue have very low amounts or are free of the endophyte fungus and will say so on the bag. Older varieties like Kentucky 31 are also available in the endophyte-free form. Check the seed tag to be sure of endophyte infection levels.

All yield and animal performance data suggest little difference exists between varieties under good growing conditions (Table 1). Varieties such as Fawn have variable animal performance depending on se-



A fescue-ladino clover mixture will furnish better quality feed than tall fescue alone. Also, it will produce as much forage as fescue alone fertilized with 80 pounds of nitrogen per acre.

verity of rust infection. In rust-free years, average daily gains of animals grazing Fawn tall fescue are not different from other varieties. However, gains are significantly reduced when leaf rust is a problem.

Mozark and Martin are newly released varieties bred and developed at the University of Missouri's Southwest Research Center in Mt. Vernon. Both were selected for high hay and seed yields. Mozark also has excellent resistance to crown rust. Martin was selected to have higher magnesium content to help reduce outbreaks of grass tetany in cattle. Animal performance is limited for Martin.

Seeding mixtures

Because of differences in growth habits, palatability and time of the year when they should be used, other grasses should not be included with tall fescue at seeding time. However, one or two legumes should be used in the seeding mixture with fescue, although

Table 1. Summary of several low endophyte (<5%) or endophyte free tall fescue varieties.

Variety	Relative days to flowering after 4/30 ¹		DM yield tons/acre			Animal performance full season	Disease	Relative seed yield ²	
			MO	IA	KY				
Kentucky-31	29.5	25	3.25	3.5	3.5	1.4 - 1.5# ADG under good mgmt.	Intermediate rust	100	(100)
Fawn	26	16	3.2	4.0	4.3	variable by season	Rust prone	100	(46)
MO-96	32	24	3.3	3.6	—	1.4 - 1.6	Superior Rust resistant	80	(61)
Martin	27	18	—	3.8	4.7	1.5 ³	Superior Rust resistant	110	(71)
Mozark	(similar to MO-96)		3.3	3.5	—	1.4 - 1.6	Superior	105	(76)
Kenhy	31	15	3.8	3.7	4.2	1.4 - 1.6	Rust prone	90	(83)
Johnstone	—	—	—	—	3.4	1.4 - 1.6	Rust prone	80	—
Forager	27	17	—	—	4.1	1.3 - 1.6	Intermediate	80	—

¹Ames, IA; 1982, 1983.

²estimated value for Oregon

()three year average for Mt. Vernon.

³One year's data.

the stand may eventually be used as a pure species for winter stockpiling. The legumes will be predominant for several years and will furnish a high quality forage and serve as a source of nitrogen while the fescue is becoming established. Some examples of seeding mixtures and rates are as follows:

- *(a) Tall Fescue - 15 lbs
Korean lespedeza - 15 lbs
- *(b) Tall Fescue - 15 lbs
Medium red clover - 8 lbs
- *(c) Tall Fescue - 15 lbs
Alfalfa - 10 lbs
- (d) Tall Fescue - 15 lbs
Ladino clover - 1 lb

*one-half pound of ladino clover may also be added to the mixture

Establishment

Fescue and accompanying legumes (with the exception of lespedeza, which should be winter or early spring seeded) may be seeded in the spring, fall or winter. Spring seedings should be made before April 15th to avoid annual weeds and early summer droughts. Fall seedings (August-September) usually have far less weed competition and more favorable moisture conditions than late spring seedings. Seeding fescue with a hessian fly resistant wheat is often advantageous. Wheat will protect the soil from erosion and furnish additional grazing.

Seedings should not be made later than August 31st in extreme north Missouri, September 15th in

central Missouri and September 30th in south Missouri. If drought conditions prevail past the seeding deadline, sow the wheat and overseed the fescue and legumes in the wheat during January or February. Graze the wheat in the fall and again in the spring. Spring growth may also be harvested as hay. Begin spring grazing as soon as the soil is firm. Fall grazing will not harm the new grass and legume seedings unless trampled during wet weather. For more detailed information on how to make fescue seedings see UMC Guide 4650.

Fertility practices at seeding time

Take soil tests before making a new seeding. Several alternative fertility plans are available; select the one which best fits the individual situation. Plan A on the soil test report suggests higher plow down applications of phosphorus and potassium than plan B if the soil tests are extremely low in these elements. Plan B, while recommending lesser amounts of phosphorus and potassium at seeding time, suggests larger amounts of these nutrients as annual top-dressings than if plan A was followed at time of establishment.

Fescue (like most grasses) has limited response to rock phosphate. Unless legumes are to be maintained with the fescue, only processed phosphate should be used to meet the phosphorus requirements. Grasses are very inefficient utilizers of rock phosphate and must depend upon the legumes to make it available for them.

A liberal supply of processed phosphorus helps to promote root development and plant establishment. While small amounts of nitrogen and potash are also of benefit at seeding time, too high a concentration of these elements will interfere with germination and discourage inoculation of the legumes.

The starter fertilizer is more effective when banded into the soil rather than broadcast.

Managing fescue-legume mixtures

Although animal performance is not as high on fescue as on most other cool season grasses during the summer, many producers use it because it withstands close grazing and drought. Under these conditions maintaining a legume with the fescue improves animal performance and increases the level of forage production during the summer period.

Legumes are difficult to maintain in a fescue sod, but there are a number of management practices that help to prevent their disappearance from the mixture.

Legumes can be reestablished in fescue sods without completely destroying the old sod and without complete loss of production during the first season. That operation is outlined in detail in UMC Guide 4651 "Renovation of Grass Sodds with Legumes".

Fescue-Medium Red Clover: Medium red clover has many advantages as a companion legume with fescue. It is easy to establish, produces well in the summer time, and has moderate resistance to drought. Cattle gain well on it, and it only rarely produces bloat. It is also considered one of the most efficient legumes in the fixation of nitrogen from the air. The variety Kenland is best adapted to Missouri and has resistance to diseases which shorten the life of other varieties. Use only Certified Kenland.

Table 2. Effect of Nitrogen on Yield and of a Tall Fescue-Lespedeza Mixture*

Lbs. Nitrogen	Total Yield (tons)	Percent of Total Harvested after July 1st
0	1.56	53%
30	1.60	35%
60	1.61	27%
90	1.95	18%

*Agronomy Department, University of Missouri data.

Red clover is a short-lived perennial and often disappears from the stand after 2 or 3 years unless special precautions are taken. Although red clover will thrive in more acid soils than alfalfa the soil pH should be maintained above 5.8 to increase persistence. It also responds to potash fertilization. The annual use of a 0-1-3 ratio of fertilizer helps maintain red clover in a fescue stand.

To encourage red clover in fescue for more than 2

or 3 years, manage the clover to produce seed. This should initially be done the second year after establishment. Usually the second crop or cutting is used for seed. Remove the first fescue and red clover growth early in the grazing season. More seed will be produced if the pasture is rested beginning in July. After the seed heads have filled and turn brown to black, the growth may again be grazed.

The fescue grown with red clover should not be allowed to grow so tall as to smother the clover. Keep the early growth grazed off.

Fescue-Ladino Clover: Fescue and ladino mixtures have been used for many years in Missouri. Ladino is considered an excellent fixer of nitrogen and is very palatable. It is most often faulted because of the inability of ladino to withstand drought and because of its bloat-producing tendencies.

If a consistent fescue ladino mixture is desired, graze the early pasture closely to prevent smothering. The sod may also be overseeded each year during January or February with 2 lbs. of ladino per acre at the same time it is topdressed with phosphate and potash.

Fescue-Alfalfa: Alfalfa in a fescue mixture is best adapted to well drained, high fertility soils. Alfalfa, especially under grazing conditions, usually does not persist too long in a fescue mixture.

Fescue-Lespedeza: It is usually difficult to achieve yields of 2 tons of hay equivalent or more per acre and still maintain lespedeza in the stand. Yields can be increased by using the variety Summit lespedeza rather than Common Korean. Lespedeza does not furnish as much nitrogen to the fescue as other legumes but when additional nitrogen is added the lespedeza may disappear from the stand. Yet many producers are willing to sacrifice some yield in order to maintain the lespedeza because it furnishes a quality feed during the summer months, when fescue production and quality is low. Most of the production of lespedeza occurs after June 15 while the greatest amount of fescue growth is in the spring. See Table 1.

Three management practices help to maintain lespedeza in the mixture.

(1) **Limited nitrogen** fertilization. Even 30 lbs. of nitrogen per acre has reduced the amount of lespedeza in the mixture. See Table. 1.

Table 3. Effect of Nitrogen on Yields of Grass-Legume Mixtures (4-year average)*

Nitrogen Rate	Alfalfa-Orchardgrass	Alfalfa-Bromegrass
0	4.6 tons	3.9 Tons
30	4.8 tons	3.9 T
60	4.8 tons	4.0 T
90	4.7 tons	3.9 T

*University of Missouri Agronomy Department Data.

It is sometimes possible to use small amounts of nitrogen (e.g. 30 lbs.) and still maintain lespedeza in a fescue-lespedeza mixture under strict management practices. Apply the nitrogen in the late summer and graze the fescue very close during the early part of the growing season.

(2) *Grazing Management* - Graze the fescue during the spring to remove early fescue competition and give the lespedeza an opportunity to grow. Remember that lespedeza is an annual and must produce a seed crop in the fall so that it may reseed. Enough lespedeza growth must be maintained during late August and early September to allow a seed set.

(3) *Overseeding* - Additional lespedeza seed may be overseeded into the sod during the winter months if the amount of lespedeza is decreasing. If the fescue is closely grazed and the sod is somewhat open, the lespedeza seed may be broadcast without disturbing the sod. But if the sod is very dense and there are no open areas, it may be necessary to till the sod with a disc or field cultivator for the seed to become established.

Fertilizing fescue-legume mixtures

Use a soil test to determine phosphorus and potassium needs.

When legumes make up as much as 30 or 35 percent of the stand do not use nitrogen fertilizer. When these stands are top-dressed with fertilizer containing nitrogen the growth looks darker and appears more lush, but research shows that production is not increased. See Table 2.

A fescue-legume mixture will remove about 12 pounds of phosphate and 40 pounds of potash from the soil for each ton of hay produced.

Under pasture conditions it is more difficult to evaluate the amounts removed. Grazing animals will waste approximately $\frac{1}{3}$ of the total growth available to them and this is returned directly to the soil. While manure is not deposited evenly across the field, most studies show about 12 to 15 percent of a pasture area is covered with manure by grazing animals each year. If there is an estimated 3 tons of hay produced from a pasture field, then a 0-20-60 fertilizer per acre, applied each year, should maintain production.

If fescue-legume mixtures were established under marginal fertility conditions then a more liberal topdressing program would be advisable. Soil test pasture fields every 3 or 4 years and adjust the topdressing program to those results.

Fescue foot

Fescue foot is a non-infectious disease sometimes found in cattle grazing tall fescue. Fescue foot has

been confused with foot rot, frozen feet and mechanical injuries.

Fescue foot is a serious condition and should not be allowed to run its course. Remove affected animals from fescue as soon as lameness is noted.

Although fescue foot may occur under many different environmental conditions, the following pattern associated with the problem usually emerges:

- a. Noticable lameness appears with onset of cold weather (below 15°F) and snow and/or ice cover, but has occasionally been noted in warm weather.
- b. Symptoms include arched back, rough hair coat, stiffness in gait that is especially noticeable in the cool mornings and swelling of rear limbs about the dewclaw. In severe cases, the loss of rear hoof or hooves, tail and switch and outer one-third of the ears may occur.
- c. Symptoms usually appear five to fifteen days after turning into a new pasture. However, cases have occurred on fields which were continuously pastured.
- d. Fall regrowth and total yearly accumulated fescue have usually caused the problem. A correlation seems to exist between the length of time that fescue is stockpiled and frequency of outbreaks of fescue foot.

The main preventative method is one of good management for both tall fescue and the cattle. Pastures composed of tall fescue and legumes appear to give less trouble than pure stands of tall fescue. The grazing of fall regrowth or yearly accumulated growth before severe weather in Jan-Feb. reduces the chance of Fescue Foot. Fescue on Soil-Bank land of the 1960's when released caused the most severe problems. Removing all the vegetative growth once a year (pasturing, baling, clipping) appears to be helpful. Nitrogen fertilizer rates should be consistent with production needs and not excessive. Experimentally, forage from fescue produced by applying 300 pounds of nitrogen per acre, collected in January, has caused symptoms similar to fescue foot.

Hay made before October has not been reported toxic. But hay known to be toxic, harvested in mid-winter, remains toxic throughout the winter. Toxic fescue left in the field does not appear to have any influence on the next year's growth with respect to toxicity.

Some pastures have a history of repeated fescue foot outbreaks, but in general the outbreaks are non-recurring. Part of the explanation may be that some herds or individuals within a herd are more sensitive than others.

Whether the toxin is produced by a fungus by the grass in response to a fungal infestation or by the grass under certain other environmental conditions has not been determined. Cooperative Research work with the Northern Regional Laboratory, USDA, is

being carried out to determine the chemical that causes fescue foot and the source of that chemical will then be studied.

Note—Thanks to Dr. George Garner for his help in preparing this section on fescue foot.

Tall fescue for Fall and Winter

Fescue has more resistance to low temperatures than orchardgrass, brome grass, timothy or reed canarygrass. Its leaves remain green later into the winter than other pasture grasses.

Despite the retention of its green color, fescue grows very little after October 15 in Missouri. It is the ability of fescue to remain green rather than its ability to grow very late in the fall and early winter that makes it adaptable for winter stockpiling.

Higher average daily gains have been achieved with fescue than with orchardgrass or reed canarygrass during the fall period. Evidently a higher level of energy is maintained in the fescue than in other species during the fall period. In addition the heavy sod nearly eliminates mud and is resistant to trampling during wet weather.

Maintaining legumes in fescue that is stockpiled for winter feed is generally difficult. However, recent research indicates that it is possible to produce about 75 percent as much fall growth with legumes as with 80 pounds of nitrogen on straight fescue that is applied in August.

Several management steps must be followed if the legume method is to be successful. Spring growth should be grazed or cut for hay soon after fescue is out of the boot stage or in early flower. Spring growth of fescue is more competitive than fall growth.

Cattle should be removed from these fields no later than the first of August if maximum fall production is to be achieved.

Many legumes must be reseeded periodically during winter. This usually is done by broadcasting legume seed on the existing sod during January or February.

If fescue produces up to its potential, 60 to 70% of its total production will usually occur by July 1. Most of the later growth occurs in August and September. For this reason nitrogen fertilization to stimulate fall growth on straight fescue sods should be applied in the late summer. Dry matter produced after August 1 in several Missouri trials would indicate that 60-80 pounds of N would probably be enough to encourage maximum production in this period.

While it is from nitrogen that the greatest benefits for stockpiling fescue occur, don't forget phosphorus and potassium. Soil testing is the best way to determine phosphorus and potassium needs. In summary two points to remember about fertilizing fescue intended for fall and winter uses (1) keep the ratio of nitrogen high and (2) apply it early enough (July 15th) so that

the fescue has an opportunity to use it.

To obtain best results in both quantity and quality from stockpiled fescue, the early spring or elongated growth should be removed by grazing, haying or clipping by June 1. Failure to remove the early elongated growth tends to dilute the quality of the vegetative growth that follows. Also, later production may be inhibited if the early growth is not grazed or clipped.

Many producers harvest a seed crop from the fescue and then stockpile the regrowth for winter use. If a good seed crop is desired the following year, clipping of the fescue soon after seed harvest is essential.

Another system to maximize fescue for fall and winter is to harvest hay from the early growth and to stockpile the later growth in the field or "on the stump". For producers who own a round baler, the bales may be left in the field to conserve labor in handling, storing and feeding. Research has verified that this is one of the most efficient ways to handle a beef herd. This is especially true if the cattle are limited to 4 or 5 weeks supply of bales and/or accumulated fescue at a time.

If cows are restricted to a smaller area, they will usually require about 30 to 35 pounds of hay and accumulated growth per day. However, if they are allowed free access to a large area they will often eat and waste as much as 55 pounds of hay per cow per day.

Don't waste 40% of the winter hay supply by failing to use limited grazing. An easy way to do this is with an electric wire. Install the post in good weather in September or October before grazing starts. Make each grazing area of a size so that cattle will clean it up in 3 or 4 weeks. Start grazing in the area where the water supply is located. As an area is grazed off, remove the wire and take it to the next set of posts.

This system not only saves feed, but has an added advantage in times of snow and ice. There will usually be an area in which the fescue is tall enough that cattle will trample the snow into the mat of fescue and will be able to find feed to graze.

The limited access system of winter grazing has considerable merit with stockpiled fescue with or without round bales.

Managing pure fescue stands for hay and grazing

If pure fescue stands are used for hay, high yields can be expected if fertilizer is applied during the winter or very early spring. This is especially true for the nitrogen portion of the fertilizer.

Fescue to be used for hay should receive at least 60 pounds N during winter. But if a yield of three tons or more is desired, at least 200 pounds of N in

split applications (120-80) should be used. Phosphorus and potassium may be applied anytime during the year with satisfactory results. The same management practices apply for early grazing as well as for hay. If much fall pasture is desired, then fertilizer should be reapplied in July. This practice is outlined in section, "Tall Fescue for Fall and Winter" in this Guide.

Fescue will withstand closer grazing and more abuse than most cool season grasses. But it can be

overgrazed to the point that vigor as well as production is reduced. Don't graze closer than 3 or 4 inches, and allow at least 30 days for the fescue to recover.

Seed Production

Producing fescue seed involves special fertility and management practices which are outlined in detail in UMC Guide 4670.