



Forage Management

Edward B. Rayburn, Extension Forage Agronomist

October 1993

Tall Fescue Management

Tall fescue (*Festuca arundinacea*) is a grass adapted to a wide range of growing conditions. It is the best forage grass for late fall and winter grazing and when used this way can effectively reduce livestock wintering cost. However, in some situations, tall fescue causes animal production and health problems. Since tall fescue can provide major benefits and cause major problems, farmers' reactions to this forage species are often mixed and intense.

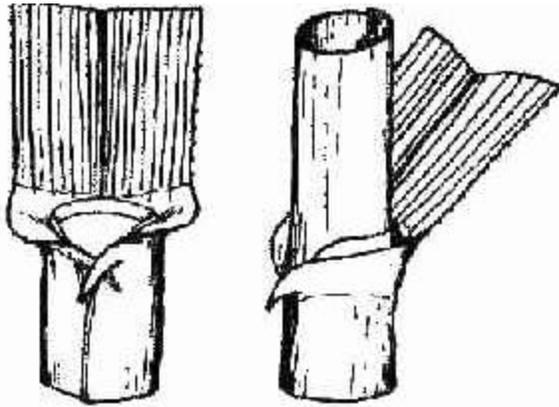
Description

Tall fescue is a vigorous, perennial, bunch grass that may have short slowly spreading rhizomes. Under good management, tall fescue is deep-rooted and forms a dense sod. Tall fescue tolerates wet soils and short periods of flooding, but is also drought tolerant. It is tolerant to low soil pH but is most productive when the soil pH is 5.8 to 6.5, phosphorus and potassium are medium to high, and soil nitrogen is readily available. Because of its wide range of site adaptation and its vigorous seedling growth, tall fescue is often used to seed roadsides and disturbed areas.

Under good conditions, tall fescue will grow to 48 inches or more in height. The seed head is a loosely branching panicle. The leaf of tall fescue is rolled in the bud stage (when the leaf is in the previous leaf sheath) and the plant has a round tiller base.



Tall fescue seed head, plant crown (showing reproductive and vegetative tillers), flower spikelet, and seed.



Vegetative characteristics of the tall fescue leaf blade, collar, ligule, auricles, leaf sheath.

The leaf blades are 1/8 to 1/2 inch wide and 4 to 24 inches long. Tall fescue leaves are a yellowish to dark green color depending on the availability of soil nitrogen. The upper leaf surface is dull with distinct veins running the length of the leaf. The lower leaf surface is smooth and glossy and is slightly keeled. The leaf margin is rough. There is a distinct collar between the leaf blade and the round leaf sheath or "stem." This collar is broad, hairless and yellow-green to cream in color. At the front of the collar there may be short, blunt, claw-like auricles 0.5 to 1.5 mm long. Where the collar meets the sheath there is a short, greenish, membranous ligule about 2 mm long.

Tall fescue is similar in appearance to ryegrass. In fact, some of the new fescue varieties are hybrids of fescue and ryegrass. Tall fescue differs from perennial ryegrass that has a leaf that is folded in the bud stage. It differs from Italian ryegrass that has a smooth leaf margin and a longer, more prominent ligule.

Tall fescue goes to head later than orchardgrass and Kentucky bluegrass. It is similar to these two grasses in that its growing point remains near the ground during vegetative growth. Tall fescue maintains most of its carbohydrate energy reserves in the tiller bases.



Tall fescue vegetative state.

Tall Fescue Endophyte

About 80 percent of the tall fescue in West Virginia is infected with a fungus called an "endophyte" (*Acremonium coenophialum*). An endophyte is a fungus that grows inside another plant, without causing any apparent harm to the host plant and in some cases providing benefits to the host. Tall fescue appears to benefit from the presence of this endophyte. The endophyte produces chemicals called "alkaloids" which protect the tall fescue from insects and nematodes, making the plants more tolerant to marginal soil environments and harsh management conditions. Some of these alkaloids cause poor animal performance and health when consumed at too high a level. The complex of poor animal performance and health problems is called "fescue toxicosis." The main effect of endophyte alkaloids on cattle appears to be on heat regulation and feed intake. The alkaloids can cause abortions and reduced milk production in mares that consume infected tall fescue during pregnancy.

The alkaloid ergovaline causes the constriction of blood vessels in animals. When cattle are in a warm environment, their main way of losing heat is to increase the blood flow through capillaries under the skin. This carries heat from the inner part of the body to the surface where the heat is lost

to the air. However, if an animal consumes enough alkaloid to constrict these capillaries, the volume of blood flow and the amount of heat moved to the body's surface is reduced. The animal then becomes more subject to heat stress during warm weather. During the heat of summer, cattle grazing endophyte-infected (E+) tall fescue spend a lot of time in the shade, in ponds, or in creeks trying to keep cool. Heat stress can cause reduced feed intake and decreased animal performance. Early embryonic death in cattle during hot weather also may be related to heat stress.

Knowing the life history of tall fescue and its endophyte helps us understand how to manage tall fescue to reduce fescue toxicosis. In cool, spring weather, the tall fescue plant is leafy and palatable. The leaf's growing point is at or below the soil surface. In the vegetative growth stage, the endophyte is located in the fescue's leaf sheath (the "stem" of the leaf below the flat blade). In May, reproductive tillers develop growing points that rise above the soil surface, pushing the seed head up through the leaf sheath. As the plant produces seed heads, the fungal endophyte moves up into the stem. As the seed head and seeds develop, the endophyte invades the new seed. When the seeds fall to the ground and germinate, the endophyte in the seed infects the new plant, continuing the cycle. It appears that the only way the tall fescue endophyte infects a plant is through the seeds from infected plants becoming new infected plants.

E+ tall fescue can become a serious weed in pastures since infected plants are less palatable than other forages. This leads to livestock grazing the more palatable orchardgrass, bluegrass, and clover, leaving the infected fescue to grow and go to seed. Since infected seeds are vigorous and resistant to insects, nematodes, and drought, they can be very competitive. This allows tall fescue to rapidly invade a field.

Managing Tall Fescue for Fall and Winter Grazing

Livestock producers have mixed feelings about tall fescue due to poor animal performance on this forage. There is seldom a problem when tall fescue is used as part of a forage system containing other forages, with the tall fescue being used primarily in the spring and winter seasons. The best use of tall fescue is for late fall and winter grazing. This is called "stockpiling" or "deferred grazing." Stockpiling is the accumulation of forage during a period of active growth for grazing when forage growth is slower. In late fall and early winter, well-managed, stockpiled tall fescue is leafy, palatable, and high in protein, sugars, and digestible energy. When tall fescue is used in cool weather, the cattle are less subject to heat stress and perform better than when it is used in warm weather. Deferred grazing is a cost-effective way of wintering dry beef cattle, ewes, and stocker cattle held for grazing the following summer.

Adequate nitrogen will increase yield and quality of stockpiled tall fescue. Nitrogen can be provided by growing fescue with clovers or by applying nitrogen from commercial fertilizer, manure, or chicken litter. Fescue needs adequate nitrogen to grow actively, produce proteins, and accumulate sugars during the cool fall weather. The accumulation of proteins and sugars makes the fescue more tolerant to freezing and provides a greener, higher quality forage for grazing.

Tall fescue fields having only a small amount of legume in them will respond well to nitrogen fertilization if the other plant nutrients and soil moisture are available. Nitrogen-fertilized tall fescue will withstand freezing weather better than fescue grown with legumes. In the picture below, the areas of darker green were fertilized with higher nitrogen ratio than the lighter green areas.



The green fescue shows high, while the brown fescue shows low nitrogen fertility.

When using nitrogen, apply 50 to 100 pounds nitrogen per acre, depending on the amount of forage desired. Stockpiled tall fescue produces 0.50 to 1.0 tons of additional dry matter per 50 pounds of nitrogen applied. Fertilizer nitrogen should be applied soon after stockpiling starts. If using urea, apply it just before a rain to reduce the loss of nitrogen by volatilization.

Tall fescue stands containing over 30 percent legume will show little benefit from applying nitrogen for increased production. When legumes are used to provide nitrogen, the fall growth can be lightly grazed to use the legume before it is lost to freezing weather. Weaned calves can make good use of this high-quality legume forage. The grass can then be saved for later use by dry cows. If the legume forage is not used before or shortly after frost, the usable forage yields from legume-tall fescue stands will be reduced. Tall fescue stands containing clover or lespedeza should be grazed close during the winter or spring to encourage the establishment of legume seedlings. Dragging the pasture in early spring will spread the manure and seeds, ensuring a better distribution of seedlings and plant nutrients. By grazing the area after dragging, the cattle will walk the seed into the soil surface, improving seedling establishment.

Stockpiling tall fescue for winter grazing has to be planned. Due to low light intensity and cool temperatures, little forage growth occurs after mid-October. For high yield and quality, stockpiling of tall fescue should

start between mid-July and mid-August. The earlier stockpiling starts, the greater the late fall and winter yield will be. If fescue is stockpiled before July, quality will be lower but yield will be about the same. Research shows that stockpiled tall fescue yield is determined by the number of days the stand is allowed to stockpile (Days) and the product of the days and the rate of nitrogen fertilizer applied (Nrate). The dry matter yield will vary due to differences in fall weather, soil conditions, and management before stockpiling and at harvest. The following equation predicts the effect of days regrowth and nitrogen rate on December dry matter yield per acre (prediction error over three years was ± 500 lb/a).

$$\text{Dry matter yield lb/a} = (17.6 \times \text{Days}) + (0.0825 \times \text{Days} \times \text{Nrate}) - 767$$

The quality of stockpiled tall fescue is adequate for beef cows and ewes and is better than much of the hay put up for these animals. If fertilized with 50 to 100 pounds actual nitrogen in July or August, the forage harvested in early December will yield 2,000 to 4,000 pounds dry matter per acre, containing 11 to 16 percent crude protein and 60 to 65 percent digestible energy.

To decrease forage waste and provide uniform animal nutrition, strip-graze the stockpiled tall fescue. If animals are allowed free access to stockpiled tall fescue, they will eat only a part of the forage and trample much of the feed into the ground. By providing only what the herd will consume in one to seven days, more forage will be eaten and less walked into the ground. One acre of a dense 8- to 10-inch-high tall fescue stand will feed 50 to 60 1,200-pound cows for one day. In extremely cold weather, forage intake may be higher.

Cattle will graze stockpiled tall fescue through fresh snow up to 8 inches deep. However, if the snow has a hard crust, cattle will require supplemental feeding. Sheep learn how to paw the snow off stockpiled

feed and can graze through the snow as well as or better than cattle.



Winter grazing tall fescue in West Virginia

Close grazing will increase forage use and decrease the competitive nature of infected fescue. This helps maintain more legumes in the stand. If you have endophyte-free (E-) tall fescue, leave more stubble (2 to 4 inches) at the end of the grazing cycle to provide for a vigorous growth that will help ensure long-term stand persistence.

When grazing tall fescue during cold weather, livestock do not refuse the forage near manure piles as they do during summer grazing.

Managing E+ Tall Fescue in the Summer

Weight gains of yearling steers grazing E+ tall fescue decrease about 0.1 pound per day per 10 percent increase in endophyte infection level. To improve summer animal performance, E+ tall fescue can be managed to encourage other forages in the stand, which will dilute the endophyte effect.

These can be grasses like bluegrass or crabgrass, or legumes such as red clover, white clover, or annual lespedeza.

Maintaining a legume in the stand will increase animal weight gain by about 0.3 pound per day over nitrogen-fertilized infected fescue. To maintain legumes in a tall fescue stand, lime and fertilize the field to maintain soil test pH of 5.8 to 6.5 and phosphorus and potassium in the medium to high range. Avoid using nitrogen fertilizers such as poultry litter, manure, or commercial

nitrogen fertilizers. Applying these materials, especially in the spring, will stimulate the grass growth, crowd out clovers, and increase fescue toxicosis.

Don't let E+ tall fescue grow too tall in the spring before turning in the cattle. If you are using rotational grazing management, turn the cattle in when the grass is 4 to 6 inches tall and graze to a 1-inch stubble height. This management allows white clovers and Kentucky bluegrass to be more competitive and increase in the stand to reduce the toxic effects of the endophyte. If cattle are continuously grazing, try to maintain a short canopy (2 to 3 inches tall) to encourage white clovers and bluegrass. Clip the tall fescue flower heads early to prevent seeding and to prevent cattle eating the seed heads that are high in alkaloids. This will also result in better tillering and vegetative regrowth. When harvesting tall fescue for hay, take the first cut when the grass is in the late boot or early heading stage of development. This will minimize the amount of alkaloids in the forage and maintain forage quality so that feed intake will be higher.

Eradicating E+ Tall Fescue Stands

In most cases, fescue toxicosis can be reduced or eliminated by management. This is done by increasing other grasses and legumes in the stand to reduce the intake of the toxic alkaloids. Another option is to use E+ tall fescue at times of the year when the animals are less affected by the endophyte alkaloids. This would be in the cool weather of spring, late fall, and winter, and when cows are dry. However, there may be situations when the eradication of E+ tall fescue is economically the best alternative. This occurs on highly productive soils and where a relatively high-value animal product is being grown.

However, eradication of an existing E+ tall fescue stand is the last management option recommended. The practical success of the other two options, and the costs and risks associated with killing an established sod

and establishing a new sod, weigh heavily against eradication. Evaluate your expected returns and costs carefully before pursuing this alternative.

Three management requirements have to be addressed and adhered to, in order to make eradication a success. The manager must be willing to commit to:

1. the management required to kill the E+ tall fescue stand;
2. preventing the reintroduction of E+ tall fescue seed;
3. managing the new seeding for stand maintenance.

If you are willing to accomplish the three management requirements, be prepared to take two years to accomplish the task. The steps required are:

1. select a site on which machinery can be used;
2. soil test and add the lime, phosphorus, and potassium needed to establish a grass clover stand;
2. plan for the exclusion of E+ tall fescue seed to prevent the encroachment of new E+ fescue seedlings;
4. a. prevent seed head formation by the E+ fescue plants for one to two growing seasons before killing the stand using herbicides and no-till or minimum-till site preparation and planting, or
b. kill the infected stand by growing an annual crop like corn or sorghum for two years;
5. plant an adapted perennial grass such as orchardgrass or E- tall fescue;
6. prevent reintroduction of E+ tall fescue seed to the field from seed on haying equipment; seed in winter fed hay, manure and bedding; or in manure from cattle which previously grazed in an E+ fescue pasture containing ripe seed heads,
7. manage for the maintenance of the established perennial species.

It is possible to eradicate E+ tall fescue and to establish other perennial forages such as orchardgrass and E- tall fescue. These forage stands can be maintained for years if

the manager prevents the introduction of E+ tall fescue seed and maintains the established forage through proper harvest and fertility management.

Managing E- Tall Fescue

Tall fescue varieties that are free of the endophyte are available. These varieties are more palatable and will not cause health and performance problems encountered with E+ tall fescue. However, E- varieties require more careful management than E+ varieties.

New varieties of E- tall fescue are developed by placing seed in a warm, dry environment that kills the endophyte but retains seed viability. The E- seed is then planted and the seed produced by these plants is free of endophyte and sold as E- seed.

Use rotational grazing when pasturing E- tall fescue-clover stands. Start animals grazing when the plants reach an 8- to 10-inch height and remove the livestock when they have grazed most of the stand to a 2- to 3-inch stubble. Use a paddock occupation period of 7 days or less. Longer grazing stays or continuous grazing may result in overgrazing and the death of the E- plants. In the spring, it takes about 3 weeks, while in the summer it takes about 5 to 6 weeks for the plants to regrow to the desired pregrazing height. Use legumes such as ladino and red clover in the stand to supply nitrogen and to obtain increased animal performance.

Note that the recommended management for E- tall fescue is much different than that for E+ tall fescue. The recommendations for the E+ tall fescue are designed to reduce the vigor of the fescue plants and to encourage other grasses and legumes that are tolerant to close grazing. This helps reduce the toxic effects of the endophyte. The management of E- fescue is directed to maintain a healthy, vigorous tall fescue stand that will resist the encroachment of weeds, including E+ seedlings that might get into the field.