

QUALITY SEED GROWN IN OREGON

# Tall Fescue for Forage



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**Tall fescue** (formerly *Festuca arundinacea* and now *Lolium arundinaceum*), a native of Europe, is the most widely grown cultivated perennial pasture grass in the USA. Most of the tall fescue acreage in the nation is 'Kentucky 31,' a variety that originated from an ecotype that developed on a farm in eastern Kentucky. Private and public breeding programs have resulted in development of many other varieties.

### Advantages of Tall Fescue

1. Easy to establish.
2. Long growing season.
3. Stands generally persist for many years.
4. Dense sod resists breakthrough of animal hooves, especially in winter and early spring when pastures are subject to severe damage from animal traffic.
5. Drought-tolerant because of its deep root system.
6. Grows in a wide range of soil and environmental conditions.
7. Well suited for extending the grazing season via stockpiling.
8. Tolerant of poor grazing management.
9. Resistant to most pests.
10. Can be used to provide pasture and hay for livestock, turf and soil conservation.

### Disadvantages of Tall Fescue

1. Aggressive growth habit can crowd out clovers, especially when undergrazed.
2. Slow growth under high temperature conditions.
3. Poor animal performance when a toxic fungal endophyte is present in the grass.

### Adaptation

Tall fescue is the dominant forage species in an area in the USA referred to as "The Fescue Belt." This is an area that extends roughly from central Indiana to central Alabama and from eastern Oklahoma to eastern North Carolina. However, this grass can be grown in many other areas, especially in the Upper Midwest, Northeast and humid portions of the Pacific Northwest. It is also grown in the Intermountain Region from Oregon to Colorado.



## ESTABLISHMENT

### Soil Selection

For best growth, tall fescue requires moist loam or clay soils. It is more tolerant of poor drainage than most other grasses. Deep, sandy soil should be avoided. It is tolerant of a wide range of soil pH, but optimum growth occurs in the range of 5.0 to 7.0.

### Fertilization

Lime, phosphorus and potassium should be applied according to soil test recommendations. Tall fescue responds well to nitrogen fertilization. Forage production increases with nitrogen levels up to 240 lb. N/acre. Tall fescue and white clover grown together can produce yields about the same as annual applications totaling 180 lb. N/acre.

### Seedbed Preparation

Tall fescue can be successfully seeded using many techniques including a traditional prepared seedbed and no-till, providing the result is uniform seed distribution, proper seeding depth (1/4 to 1/2 inch) and good seed-to-soil contact. When planted on a prepared seedbed, use of a cultipacker-seeder or drill will help ensure success and permit a lower seeding rate. With broadcast plantings, it is highly advisable to use a cultipacker after putting out seed. With no-till planting, suppression of existing vegetation is critically important.

### Planting Date

In the lower South (e.g. Alabama, Georgia), planting should be done in September-October. In the upper South (e.g. Kentucky, Missouri, Virginia), late summer seedings are best. Early spring plantings can be successful, but are more susceptible to weeds and summer droughts.

## THE TALL FESCUE ENDOPHYTE

Seed of Kentucky 31 tall fescue first became commercially available in 1943, and millions of acres were planted in the 1940s, 1950s and 1960s. It became an important source of nutrition for cattle and other livestock, in addition to being widely used for turf and conservation. Laboratory analyses indicated that tall fescue has good nutritive value, but animals sometimes performed poorly on it, and three animal disorders were eventually recognized. The umbrella term “fescue toxicosis” is often used to refer generally to tall fescue-related animal disorders.

**Fescue foot** – Animals have rough hair coats, loss of weight, fever, tenderness of legs, loss of hooves and tail, congested blood vessels and may die. Fescue foot occurs infrequently, generally during winter, and is mainly confined to the northern tall fescue-growing regions.

**Bovine fat necrosis** – Characterized by the presence of hard masses of fat along the intestinal tract from the abdomen to the rectum, this syndrome results in digestive upsets and difficult births. It is a result of heavy nitrogen fertilization of pastures with large amounts of broiler litter or other nitrogen fertilizer. It has been a problem in areas such as northern Georgia and Arkansas where large amounts of broiler litter were applied to tall fescue.

**Fescue toxicity** – Often called ‘summer slump’ because of extreme symptoms in hot weather, it is widespread through tall fescue growing regions. It is characterized by poor animal gains, reduced conception rates, intolerance to heat, failure to shed winter hair coats, elevated body temperatures, increased respiration rate and nervousness. Fescue toxicity is usually observed where tall fescue is the principal diet of the animal. Economic losses from this syndrome are high.



In the 1970s a shocking discovery was made. It was learned that a fungal endophyte (*Acremonium neotyphodium*, now classified as *Epichloe coenophiala*) is associated with the three syndromes discussed above. An endophyte is a fungus that lives *inside* the stems, leaves and seed of a plant and is not visible externally. A laboratory analysis is required to determine if it is present.

The endophyte in Kentucky 31 tall fescue produces toxic alkaloids that are harmful to animals eating the forage. Surveys in several states have revealed that in most Kentucky 31 tall fescue pastures, a high percentage of plants are infected with this toxin-producing fungus.

## TOXIC-ENDOPHYTE EFFECTS ON ANIMAL PERFORMANCE

**Beef steers** – Average daily gain (ADG) of yearling steers on toxic-endophyte tall fescue pastures is typically about 1 lb./day or less for the season. The ADG of steers grazing endophyte-free pastures is usually in the range of 1.5 to 2.0 lb./day. Hay, and especially seed, of toxic-endophyte tall fescue also contain toxins, and sharply reduce animal gains.

**Beef cows and calves** – Reproduction in beef cows grazing toxic-endophyte tall fescue is often reduced (10 to 20 percent or more).

**Dairy cows** – Milk production of dairy cows grazing toxic-endophyte tall fescue pastures is sharply reduced, often by as much as 50%. Milk production of dairy cows grazing non-toxic tall fescue pastures has been similar to that on ryegrass pasture.

**Horses** – Mares grazing toxic-endophyte tall fescue pastures may have longer gestation, reduced foal weights, abort their foals or produce stillborn foals, and produce little or no milk.

## Endophyte Status Categories of Seed

Since discovery of the tall fescue endophyte, much research has been conducted that has allowed a better understanding of the situation. This slow-growing fungus lives its life exclusively inside the tall fescue plant. It is transmitted *only* through seed. If there is no toxin-producing fungus present in a tall fescue plant, no fungus toxins will *be* present.

As a result of increased understanding of the tall fescue endophyte and its relationship with tall fescue plants, grazing animals and the environment, there are

new options available. There are now three endophyte categories of tall fescue seed. Varieties in the first category (toxic-endophyte tall fescue) produce toxins that can cause fescue toxicosis symptoms. Varieties in the other two categories (endophyte-free tall fescue and novel endophyte tall fescue) do not produce toxins.

**Toxic-endophyte tall fescue** – Kentucky 31 is the most prominent example. Animals grazing pastures containing a high percentage of toxic-endophyte plants are likely to be adversely affected by endophyte toxins.

**Endophyte-free tall fescue** – A number of varieties are commercially available that do not contain an endophyte. Therefore, they produce no toxins, and neither animal gains nor reproduction are reduced by toxins. However, the tall fescue endophyte produces some compounds that enhance pest resistance and stress tolerance in tall fescue plants. Therefore, endophyte-free tall fescue may not persist well in stressful environments or when pastures are over-grazed. This is especially true in the lower part of the Fescue Belt. In milder climates such as the northern part of the Fescue Belt, endophyte-free tall fescue persists well.

### Novel Endophyte Tall Fescue

A major forage research development was identification of endophyte strains that do not produce the toxins referred to above, but that do produce the compounds that enable fescue persistence. “Novel endophyte” is the term scientists use for a fungus that was selected and subsequently inserted into a plant for the purpose of getting particular results.

Novel endophyte fescue (NEF) has been a great success. Since 2000, hundreds of thousands of acres have

been planted in the USA, plus a substantial quantity has been planted in other countries, especially New Zealand (novel endophyte perennial ryegrass is even more widely planted than NEF in that country).

Here are three important facts. First, gains of animals grazing NEF have been similar to those obtained with endophyte-free fescue (sometimes almost twice the gain as on toxic Kentucky 31). Second, the reproductive rates of animals grazing NEF are often considerably better as well. Third (in view of the potential stand loss problems with endophyte-free fescue), a point of special interest is that NEF has proven to be tough and persistent. Several NEFs are now commercially available in the United States, and more are expected in the near future

It can be argued that NEF represents one of our most promising opportunities for cost efficient livestock production. For example, gains of yearling beef animals grazing NEF can approach 2 lb./day, and calf weaning weights can be 50 or more pounds higher than with toxic-endophyte fescue. When clover is grown with NEF, gains are even better, while nitrogen fertilizer expenses are reduced or eliminated. NEF can greatly improve the economics of livestock production on many farms where tall fescue is adapted.

### Strategies For Minimizing Or Eliminating Impact of the Endophyte

1. Animals are more adversely affected by endophyte toxins during hot weather. Also, toxin levels tend to be highest in late spring, early summer and early autumn. Thus, avoiding grazing of livestock at certain times can reduce the extent to which toxins affect animals.
2. Growing a legume with toxic-endophyte infected tall fescue can partially offset the adverse effect of endophyte toxins. The legumes most commonly used in this regard are white and/or red clover.
3. Feeding hay other than fungus-infected tall fescue in winter when cattle are grazing toxic fescue can partially offset the toxicity problem.
4. It is judicious to avoid heavy application of broiler litter or nitrogen fertilizer on toxic-endophyte infected tall fescue when it is the sole source of pasture or hay. Heavy fertilization with nitrogen favors toxin production, plus it tends to cause tall fescue to dominate a pasture stand, resulting in a high percentage of the diet of grazing animals to be toxic-endophyte tall fescue.



5. Seeds contain higher levels of toxins than other plant parts. Therefore, it is helpful to minimize consumption of seed via grazing management or clipping, or use of a chemical that suppresses seedheads.
6. The best, and only long-term, solution to the problem is replanting toxic-endophyte infected tall fescue pastures with non-toxic endophyte seed. This could be either an endophyte-free variety or a novel endophyte variety.

About 90 percent of the cool-season perennial grass seed sold commercially in the USA is produced in the Willamette Valley in Oregon. Oregon-grown tall fescue seed is produced by full-time growers in this area, which is often referred to as “the grass seed capital of the world.” In this valley the soils and climatic conditions are virtually perfect for seed production. Efficient harvesting, cleaning, processing and worldwide marketing also contribute to making this valley the world leader in quality grass seed production.

## RE-ESTABLISHING TALL FESCUE PASTURES

Since most tall fescue pastures are heavily infected with toxic fungal endophyte, there is much potential for increasing animal performance. Killing a toxic-endophyte stand and replanting with seed of endophyte-free or novel endophyte fescue offers a great opportunity to increase animal productivity on a long-term basis.

### Guidelines for Re-establishment

1. Prevent any toxic-endophyte plants in the field to be planted from making seed during the year of establishment. This is to prevent establishment of volunteer toxic-endophyte plants.
2. Make absolutely certain that in a field to be re-established, as many toxic-endophyte infected tall fescue plants as possible (preferably all of them) are dead before non-toxic tall fescue is planted. Growing of another crop in the field for at least one growing season is desirable.
3. Purchase seed *known* to be endophyte-free or novel endophyte fescue.
4. If the seed will be no-till planted, the sod should be grazed or clipped to remove excess growth. The old stand must be completely killed with an herbicide.



5. Get the new stand off to a good start by planting the seed at the correct time, at an adequate rate and at the proper depth. Do not plant any other species at the same time as the tall fescue is planted. Clover can be interseeded later.
6. Apply fertilizer and lime according to soil test recommendations.

### Guidelines for Maintaining Non-Toxic Tall Fescue

1. Do not graze new stands until young plants have a sufficient root system. For best results from a late summer seeding, harvest the first forage for hay the following spring. Begin rotational grazing after sufficient regrowth.
2. Maintain soil fertility and pH according to soil test recommendations.
3. Do not allow livestock simultaneous access to non-toxic and toxic-endophyte tall fescue (minimum of 3 days off toxic-endophyte before going to non-toxic pasture).
4. In non-infected fields, avoid feeding hay that might contain toxic-endophyte tall fescue seed.
5. Try to prevent seedhead formation, especially if low or intermediate levels of infected plants are known to be present.
6. Do not graze or cut tall fescue closer than 3 to 4 inches.

**Note:** Additional detailed information about the tall fescue endophyte is provided in a publication titled, “Understanding The Tall Fescue Endophyte,” available free of charge from: Oregon Tall Fescue Commission, P.O. Box 3366, Salem, OR 97302. Phone: 503-364-2944; [www.oregontallfescue.org](http://www.oregontallfescue.org)

## GRAZING

Toxic-endophyte Kentucky 31 tall fescue can be grazed continuously, but will usually provide more and better quality pasture forage when grazed rotationally. Endophyte-free and novel endophyte varieties must be rotationally grazed. Yield, forage nutritive value and persistence will be best when pastures are subdivided so that a paddock can be grazed to a height of 3.5 to 4.0 inches and then rested, thus allowing time for regrowth before the next grazing.

## GROWING CLOVER WITH TALL FESCUE

Clover in tall fescue pastures provides several advantages:

1. Improves the average daily gain of grazing animals.
2. Increases weaning weights of calves.
3. Improves conception rate of cows.
4. Reduces likelihood of grass tetany in cows.
5. Provides nitrogen from atmosphere through fixation, thus reducing or eliminating the need for nitrogen fertilization.
6. Often extends the grazing season as compared to tall fescue alone.
7. May increase total forage yield, especially as compared to tall fescue receiving little or no nitrogen fertilizer.
8. Reduces fescue toxicosis problems that occur with toxic-endophyte infected tall fescue.

Several legumes can be grown with tall fescue, but white clover and red clover are by far the two most commonly planted. In general, it is best to not plant clover at the same time as tall fescue is planted. Otherwise, the clover may offer excessive competition to the young tall fescue plants. General guidelines for planting clover into a sod are as follows:

1. Apply fertilizer and lime according to soil test recommendations.
2. Reduce grass competition (in old, thick sods) by heavy grazing. Mowing, herbicides and/or light tillage can also be used to accomplish this.
3. Decide which clover to plant. Red clover is more productive in terms of annual yield, but plants usually live for only 2 or 3 years. However, red clover has an upright growth habit that competes well with grasses. White clover plants will usually live for several years, and are quite tolerant of close grazing. Red clover is a particularly good choice for a hay field or a field that is rotationally grazed to allow some rest between grazing events. White clover is most commonly used in pasture situations.

**Note:** Additional detailed information about growing clover in tall fescue is provided in a publication titled, “Putting Clovers in Grass Pastures,” available free of charge from the Oregon Clover Commission, P.O. Box 3366, Salem, OR 97302-0366. Phone: 503-364-2944; [www.oregonclover.org](http://www.oregonclover.org)

## STOCKPILING FORAGE

Stockpiling is a general term that refers to the practice of allowing forage to grow ungrazed for a period of time and then later allowing animals to graze it, virtually as “standing hay.” This is an excellent way to reduce hay requirements and increase the grazing season. Tall fescue is especially well suited for use of this technique because it holds its quality late into the season and the leaves have a waxy coating that resists deterioration from the elements.

The general approach is to clip or graze a pasture to about 3 to 5 inches about 90 days before the end of the grazing season. Then around 60 units of nitrogen fertilizer are applied and livestock are excluded from the area in order to allow the forage to accumulate. Once a killing frost has occurred, animals can be allowed to graze the stockpiled forage, as opposed to feeding hay or other stored feed.

It is important to ration the accumulated forage to the animals, otherwise, much of it will be wasted by trampling and fouling. Strip grazing in which animals are given access to only a one- to three-day supply at a time works best. This can be accomplished by moving a single strand of electric wire across the pasture at various intervals.

## TALL FESCUE HAY

Although forage-type tall fescue is grown primarily for grazing, hay is harvested from many fields at least once during the growing season. Tall fescue produces most of its growth during the first one-third of the growing season. Although the major share of tall fescue total production normally occurs during the spring, autumn growth can be substantial, especially when nitrogen fertilizer is applied and rainfall is adequate. Total seasonal production of tall fescue is affected by weather, fertility (especially nitrogen) and cutting or grazing management. Hay yields of 2 to 4 tons per acre are common.

Many factors influence the quality of tall fescue hay including weather conditions during curing, handling techniques and storage conditions. However, two of the most important factors are discussed below.

**Stage of Maturity:** As tall fescue plants advance from the vegetative to reproductive (seed) stage in spring, they become higher in fiber and lignin content, but lower in protein, digestibility and acceptability to livestock. In one study, average daily gains with growing beef steers decreased from 1.4 lb./day for tall fescue hay cut in the boot stage to 0.42 lb./day for hay cut in the late flowering stage. For best quality hay, the first harvest should be made when the seed heads of the plants are in the boot to early flowering stage of growth (in most areas this is in May). Since tall fescue only flowers once each year, subsequent cuts should be made at 4-week intervals as growth permits. Early cut hay will be leafier, more

digestible and consumed in larger amounts than late cut hay. Autumn harvested hay is of especially high quality.

**Endophyte Status:** Auburn University researchers found a 57 percent reduction in average daily gain and a 12 percent reduction in intake when steers were fed toxic-endophyte infected hay compared to endophyte-free hay. In addition, steers fed infected hay had an elevated body temperature, while steers on endophyte-free hay had a normal body temperature. Infection with a toxic-endophyte is one reason why tall fescue hay has typically come to be viewed as low quality. When the endophyte is eliminated, tall fescue hay quality compares favorably with orchardgrass, assuming similar management for both grasses.

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# Oregon tall fescue seed delivers improved yield and palatability for your prized animals.

It's all in the seed. All of the advanced research, quality production practices, careful cleaning, purity and germination testing plus timely delivery are part of each and every one.

Tall fescue is the most widely used grass for cultivated pastures. Once established, it is one of the most durable of forage grasses. Tall fescue has a long growing season and establishes a dense sod that resists erosion and trampling by grazing animals. Once established, roots reach a depth of three to six feet, drawing moisture even during long, dry spells. Tall fescue persists perennially over a long period and thrives in a variety of soil types and conditions. Tall fescue pastures give a good return for minimal management investment.

About 90% of cool-season grass seed sold in the United States is produced in Oregon, and for good reason. Oregon-grown tall fescue seed is produced by full-time growers in the grass seed capital of the world - where ideal growing conditions contribute to the inherent quality of our product.

Today's new tall fescues have considerable improvements over older types. They mix well with other species and legumes in the same pasture. Using legumes will help increase weaning weights of calves and improve conception rate in cows. Legumes also reduce the need for additional nitrogen in a tall fescue pasture.

Every bag or container of tall fescue seed bears an analysis tag which states the seed's origin. Insisting on Oregon-grown seed assures you that the value added is included in every seed.



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