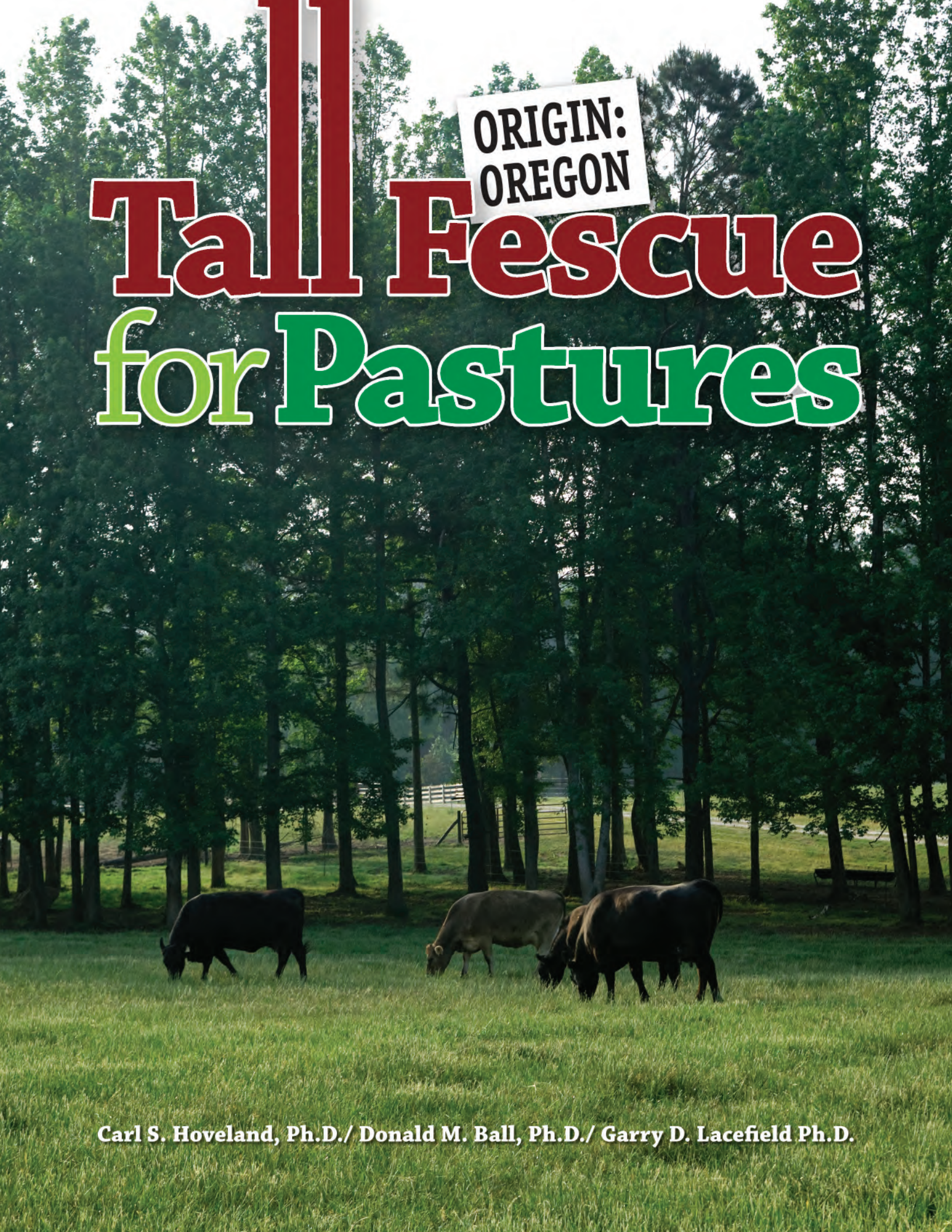
11 Tall Fescue for Pastures

ORIGIN: OREGON



Carl S. Hoveland, Ph.D./ Donald M. Ball, Ph.D./ Garry D. Lacefield Ph.D.

By Carl S. Hoveland, Ph.D.

Terell Distinguished Professor of Agronomy, University of Georgia, Athens, Georgia

Donald M. Ball, Ph.D.

Extension Agronomist/Professor, Auburn University, Auburn, Alabama

Garry D. Lacefield Ph.D.

Extension Agronomist/Professor, University of Kentucky, Princeton, Kentucky

Establishing New Tall Fescue Pastures

Tall fescue (*Festuca arundinacea*), a native of Europe, is the most widely grown cultivated perennial pasture grass in the USA. Most of the tall fescue acreage in the USA is Kentucky 31, a variety originating on a farm in eastern Kentucky. Extensive breeding programs have developed many improved varieties.

Advantages of tall Fescue

1. Easy to establish.
2. Grows well over a long period of the year.
3. Stands persist for a long time.
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. Tolerant of wet soils, submersion, soil acidity and alkalinity.
7. Tolerant of poor grazing management.
8. Resistant to most pests.

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 fungal endophyte is present in the grass.

Adaptation

The northern limit of dependable tall fescue production extends from northern Missouri and southern parts of Illinois, Indiana, Ohio, and West Virginia over to the Atlantic Coast. The southern limit of major adaptation in the USA extends from eastern Oklahoma and across Arkansas, central Mississippi, Alabama, and Georgia. High summer temperatures, drought, nematodes, and competition from aggressive warm season perennial grasses limit its use on Coastal Plain Soils of the Gulf Coast region. Tall fescue is also grown in the mild-climate West Coast region from northern California to Oregon and Washington. It is also grown in the inter-mountain region from Idaho to Colorado.

Soil Selection

For best growth, tall fescue requires moist loam or clay soils. It is tolerant of poor drainage. Deep sandy soil should be avoided. It is tolerant of a wide range of soil pH, but optimum growth occurs in the 5.0 to 8.0 pH range.

Fertilization

Apply lime, phosphorus, and potassium according to soil test recommendations. In the absence of a soil test, apply 60 to 90 pounds of P and K per acre in a 1:1 ratio for establishment. Tall fescue responds well to nitrogen fertilization. Forage production increases with nitrogen levels up to 240 lbs. N/acre. Tall fescue and white clover grown together will produce yields about the same as annual applications totaling 180 lbs. N/acre.

Seedbed Preparation

Although satisfactory tall fescue stands can be obtained with little seedbed preparation, dependable stands require tillage. Soil should be well-tilled to destroy all existing vegetation, leveled, and firmed before planting. A cultipack seeder or drill will insure success and permit lower seeding rates.

Planting Date

In the lower South (Alabama, Georgia), planting should be done in September-October. In the upper South (Kentucky, Missouri, Virginia) planting can be winter (late February, March and early April). Planting on the Midwest is best done in early spring (March-April).

Fescue Toxicosis

Tall fescue is the most widely grown cool season perennial grass in the USA. Laboratory analyses indicate that tall fescue has good forage quality — adequate crude protein and satisfactory digestibility, but often animals perform poorly on it. Research on this problem has provided answers and developed solutions so that good animal performance can be obtained on tall fescue.

Animal Syndromes Associated with Tall Fescue

Three syndromes are associated with tall fescue:

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

2. 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 of Northern Georgia and Arkansas where large amounts of broiler litter are applied to tall fescue.

3. Fescue toxicity - Often called 'summer slump' because of extreme symptoms in hot weather, and 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 occurs where tall fescue is the principal diet of the animal, and economic losses from this syndrome are high.

Cause of Fescue Toxicity

A fungal endophyte, *Acremonium coenophialum*, is associated with fescue toxicity and possibly the fescue foot and fat necrosis syndromes. The fungus lives inside the stems, leaves, and seed of the tall fescue plant and is not visible externally. The fungus causes the grass to produce toxic alkaloids which are harmful to animals eating the forage. Surveys made in several states indicate that most tall fescue pastures are infected at levels high enough to reduce animal performance.

Effect of Fungal Endophyte on Animal Performance

1. Beef Steers - Average daily gain (ADG) of yearling steers on tall fescue pastures has been poor throughout the year, usually about 1 lb./day or less for the season. The ADG's of steers grazing endophyte-free pastures has been 50 to 100% higher than on infected pastures with no visible symptoms of the syndrome. Thus, ADG's of 1.5 to 2.0 lb./day can be expected on endophyte-free tall fescue. Tall fescue hay and seed infected with the endophyte are also highly toxic and sharply reduce animal gains.

2. Beef cows and calves - Reproduction is reduced in beef cows grazing infected tall fescue pastures. Both cow and calf weight gains are reduced. Milk production of cows can be reduced by 50 percent.

3. Dairy cows - Milk production is reduced on infected tall fescue. Milk persistence of dairy cows grazing endophyte-free tall fescue has been similar to that on ryegrass pasture.

4. Horses - Mares grazing infected tall fescue may have longer gestation, reduced foal weights, abort their foals and produce little or no milk.

Fungus Establishment and Distribution

This slow-growing fungus lives its life inside the tall fescue plant. The Acremonium fungus is spread only through the seed with no known dissemination by pollen, wind, or rain. Cattle and horses can distribute seed in feces from infected to non-infected pastures. Animals should not be allowed on clean fields for a minimum of 3 days following consumption of endophyte-infected seed. Pastures free of the fungus should remain that way for a long time and result in good animal performance. Pastures with a low to medium number of infected plants can be expected to increase infection level over time as the more vigorous infected plants spread and dominate the sward.

The fungus dies in about a year under normal seed storage conditions in the southeastern USA. Under cooler seed storage conditions, the fungus will survive longer. This means that old seed can be planted with a fair chance of establishing a fungus-free pasture. However, germination and vigor of old seed will be decreased, and there is always a chance of some endophyte survival so the new pasture will have a low level of infection.

Solutions to the Problem

1. Growing a legume with a fungus-infected tall fescue can partially offset the adverse effect of toxicosis. Planting Ladino and/or red clover, birdsfoot trefoil, or alfalfa in tall fescue sod will greatly improve animal performance on infected pastures.

2. Feeding hay other than fungus-infected tall fescue in winter when cattle are grazing toxic fescue can partially offset the toxicity problem. Bermudagrass,

orchardgrass, ryegrass, bromegrass, alfalfa, sericea lespedeza, or fungus-free tall fescue hay can be used.

3. Avoid heavy application of broiler litter or nitrogen fertilizer on infected tall fescue when it is the sole source of pasture or hay.

4. The best and only long-term solution to the problem is replanting infected tall fescue pastures with seed having a low level of the fungal endophyte. Oregon grown tall fescue seed, laboratory tested, and certified to contain less than 5% fungal endophyte, can be planted with the assurance that an essentially fungus-free pasture will be established which will result in superior animal performance.

Reestablishing Existing Fungus-Infected Tall Fescue Pastures with Low-Endophyte Seed

Why Replant Existing Tall Fescue Pastures?

Animal performance can be poor on tall fescue pastures. This poor performance is associated with a seed-transmitted fungal endophyte. Beef steer daily gains have been 50 to 100% higher on endophyte-free as compared to heavily infected tall fescue. Since many tall fescue pastures are heavily infected with the fungal endophyte, replanting with low-endophyte seed offers a great opportunity to increase animal productivity.

The Problem of Old Seed in the Pasture

Tall fescue seed are produced during May and June and drop on the ground. If these seed are endophyte infected, they will germinate and grow at the time when low-endophyte seed are planted in September and October. Thus, it is essential to not allow any seed production the year when replanting is planned. Tall fescue seed do not survive a long time in the soil, and after 18 months there is only a small amount of seed that germinates. Also, after a year, the endophyte in infected seed will generally die so that seed of any plants which survive and germinate will produce endophyte-free plants.

Tillage and Cropping

Ideally, on fairly level land, the old infected sod can be completely destroyed by tillage and/or chemicals, then planted with a row crop such as corn, grain sorghum, soybeans, cotton, or wheat for one or two years. The old sod residue will enhance row crop production while largely eliminating the problem of old tall fescue seed. Low-endophyte tall fescue can then be planted on a prepared seedbed with good success.

Sod-Seeding Low-Endophyte Seed

Many tall fescue pastures are located on hill lands not suited for row crop production and with the potential for serious soil erosion, so sod seeding is desirable. Where low-endophyte seed is to be planted in existing infected sods, several factors must be considered:

1. Tall fescue should not be allowed to produce seed the year of replanting.

2. The sod should be grazed or clipped to remove excess growth.

3. All of the old sod must be completely killed with an herbicide. This can be done by spraying Gramoxone or Roundup about 4 weeks before planting and again at planting time. An even better method is to spray the tall fescue in spring, drill a summer annual grass into the killed sod, followed by herbicide again to kill surviving tall fescue plants at planting.

4. In the lower South, seeding can be done in late September or October. In the upper South, planting may be done from late August to early October or from late February to early April.

5. Low endophyte tall fescue seed should be planted at 15 to 20 lb./acre using a sod-seeder. It is important that the sod be cut open, the seed placed at a depth of 1/4 to 1/2 inch, and covered with a packer wheel. A grain drill is not satisfactory as discs may not penetrate the sod, and seed coverage is poor.

Fertilization

Apply lime, phosphorus, and potassium to soil test recommendations. Nitrogen at a rate of 30 to 40 lb. N/acre should be applied at planting, followed by 50 lb. N/acre when plants are 4 to 6 inches tall. If broadleaf weeds are a problem, 2,4-D can be applied for control.

Will Endophyte-Free Tall Fescue Remain Endophyte-Free?

In recent years a fungus, (*Acremonium coenophialum*), was discovered in tall fescue. This fungus is an endophyte which grows inside tall fescue plants, and has been associated with poor weight gains and lowered conception rates of cattle, reproductive problems in horses, and poor milk production in dairy animals. It is therefore not surprising that many producers are interested in planting and growing non-infected tall fescue. Endophyte-free seed is readily available. An important question which continues to arise is: 'Will endophyte-free tall fescue remain endophyte free?'

How The Fungus Spreads

The fungus is exclusively seed-transmitted. It is not 'contagious' and does not move from plant-to-plant. It is not insect-transmitted or harbored in the soil. Whether or not a plant is infected depends on whether the seed from which that plant arose was infected. However, this does not necessarily mean that the planting of non-infected tall fescue seed will assure establishment of a totally non-infected stand or that if such a stand is obtained that it will remain non-infected forever.

Elimination of Existing Infected Plants

The first step in converting an endophyte-infected tall fescue field to endophyte-free fescue is to kill the existing infected plants. This can be done with herbicides and/or tillage. However, either approach can result in 'escapes.' Many producers have thought they had killed an infected stand and later learned they did not. Live plant material under the soil surface can result in re-establishment weeks after it appears the stand has been eliminated. The best approach is to not immediately replant endophyte-free tall fescue after attempting to kill existing infected plants. Growing some other type of crop in the area for at least one growing season 'smothers' escapes and allows assessment of the effectiveness of the attempt to kill the existing infected tall fescue.

Sources of Infected Seed

If there are infected seed present in a field planted to non-infected tall fescue, they may germinate and become established as infected plants. Thus, to prevent the possibility of volunteer infected plants, a field which contains infected tall fescue plants should not be allowed to produce seed during the year of reestablishment. Cattle can also carry infected seed into a non-infected pasture. Research in Alabama has shown that if cattle consumed infected seed, up to 12% of it can germinate after passing through the animals' bodies. Furthermore, about 12% of these seed which can germinate (1.4% of the total) will contain viable endophyte and can result in infected plants. Therefore, animals which have grazed an infected pasture should not be allowed to graze a non-infected pasture for at least 3 days. In some cases, a non-infected pasture which has an infected pasture in its watershed could have infected seed washed into it. Fortunately, there appears to be little chance that wind or wild animals are likely to introduce any significant amount of infected seed into an area, because in some areas non-infected pastures have remained non-infected for many years, even though separated from infected pastures by only a barbed wire fence.

Changes in Infection level

Some pastures have been monitored for endophyte level for over 10 years. The finding is that non-infected pastures tend to remain non-infected unless infected seed is introduced, and highly infected pastures remain highly infected. However, pastures having intermediate levels of infection tend to slowly increase in infection level. This is not because non-infected plants become infected. It is because infected plants are more stress tolerant than non-infected plants. As a result, when they are growing together in competition under stress, the death rate of non-infected plants is slightly higher, and they are gradually replaced by infected plants. Also, infected plants tend to produce more seed than non-infected plants, and thus infection level tends to increase over time.

Guidelines for Establishing Endophyte-Free Tall Fescue

1. Make absolutely certain that as much infected tall fescue as possible in a field to be reestablished (preferably all of it) is dead before planting non-infected tall fescue. Planting of another crop for at least one growing season is desirable.

2. Purchase seed known to be free of the endophyte. Any level of endophyte infection can be detrimental to the long-term endophyte-free status of the new pasture.

3. Get the stand off to a good start by planting the seed at the correct time, in a good seedbed, at an adequate rate, and at the proper depth, and apply any needed fertilizer and lime.

4. Do not plant any other species at the same time the fescue is planted. Clover can be interseeded later.

5. Do not graze or cut the tall fescue closer than 3 to 4 inches.

Guidelines for Maintaining Endophyte-Free Tall Fescue

1. Maintain soil fertility and pH according to soil test recommendations.

2. Do not allow livestock simultaneous access to infected and non-infected tall fescue (minimum of 3 days off infected before going to non-infected).

3. In non-infected fields, avoid feeding hay which might contain infected tall fescue seed.

4. Try to prevent seedhead formation, especially if low or intermediate levels of infected plants are known to be present.

5. Do not graze or cut tall fescue closer than 3 to 4 inches.

Summary

Non-infected tall fescue offers a great opportunity for improvement of animal performance. However, there are some management concerns associated with obtaining and keeping, a non-infected stand which do not apply to infected tall fescue. Non-infected tall fescue plants do not become infected, but it is possible for a non-infected field, and especially a partially infected field, to eventually become a highly infected field through improper management. With proper management, non-infected fields will remain non-infected indefinitely.

Tall Fescue Hay

Tall fescue is the most important and widely adapted cool season grass grown in the U.S. This persistent, easy to establish grass is grown on over 35 million acres in the U.S. Although pasture-type tall fescue is grown primarily for grazing, hay is harvested from many fescue acres at least once during the growing season each year. Like other cool-season grasses, tall fescue produces the majority of its total growth during the first one-third of the growing season. Growth is slow during July and August, followed by increased production during autumn. 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, with higher yields being associated with adequate rainfall, proper fertilizer applications and harvest management.

Fescue Hay Quality

Many factors influence the quality of tall fescue hay including: soils, fertility, endophyte status, state of maturity when harvested, time of harvest, conditions during curing, handling and storage conditions, and of course, weather. This publication will address two of the most important factors, each of which can be greatly influenced by producers: *stage of maturity* and *endophyte status*.

1. Stage of Maturity: Of all the factors affecting fescue hay quality, stage of maturity when harvested is the most important and the one where greatest progress can be made. 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. Research has shown that delaying the first harvest from early flowering to the seed stage can result in more than a 45 percent loss in protein. Digestibility drops at a rate of almost 9.5 percent per day for each day harvest is delayed beyond the early flowering stage. Conversely, fiber and lignin (anti-quality components) increased 21 and 36 percent, respectively, over that same period. Average daily gains with growing beef steers decreased from 1.4 lbs./day for tall fescue hay cut in the boot stage to 0.42 lbs./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. 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.

2. Endophyte Status: Studies with animals consuming endophyte infected fescue hay have usually shown lower levels of production than animals consuming endophyte free fescue hay. Auburn University researchers found a 57 percent reduction in average daily gain and a 12 percent reduction in intake when steers were fed endophyte infected hay compared to endophyte-free hay. In additions, steers fed infected hay had an elevated body temperature, while steers on endophyte-free hay had a normal body temperature. Endophyte infection in tall fescue hay is one reason it has typically come to be viewed as low quality. When the endophyte is eliminated, tall fescue compares favorably with orchardgrass in quality.

Guidelines for Producing and Harvesting Quality Tall Fescue Hay

1. Soil test and fertilize to ensure adequate fertility.

2. Use adapted varieties.

3. Use legumes with tall fescue to improve yield and quality, fix nitrogen, and improve summer production.

4. Seed at recommended rates and dates. Inoculate legume seed.

5. Control pests.

6. Harvest at proper stage of maturity (boot to early flowering stage for first cut; subsequent cuts at 4-6 week intervals as growth permits).

7. Keep harvesting equipment in good condition.

8. Check weather forecast daily: weather conditions during harvest are critical. Rain damage not only lowers forage quality and quantity, but also increases the total harvest time.

9. Handle hay at the optimum moisture content (in case for each operation).

10. Store bales (both square and big packages) in a manner which will minimize storage loss. Feed to minimize loss and maximize feed conversion to animal product.

Establishment and Management of Clover in Tall Fescue Sods

Why Plant 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. Reduces fescue toxicosis problems which occur with endophyte-infected tall fescue.

Establishment of Clover in Newly Planted Tall Fescue

The availability of improved tall fescue varieties and endophyte-free seed offers an opportunity to establish pastures with higher animal production potential than existing endophyte-infected pastures. To establish new tall fescue-clover pastures on prepared land:

1. Destroy all existing vegetation, level, and firm the seedbed before planting.
2. Apply lime, phosphorus, and potassium according to soil test recommendations.
3. In the lower South, plant in September to October. In the upper South, planting can be done during late February, March and early April.
4. Drill tall fescue at 10 to 15 lb./acre in 14-inch rows to reduce competition with clover.
5. Seed Ladino clover at 1 to 3 lb./acre or red clover at 5 to 10 lb./acre with a cultipack-seeder so clover seed is not planted more than 1/2 inch deep.
6. Inoculate clover seed with proper inoculum before planting.

Establishment of Clover in Existing Tall Fescue Sods

1. If broadleaf weeds are present, apply 1 to 4 pints/acre 2, 4-D and, if dogfennel or smartweed are present, also use 0.5 to 2 pints/acre of Banvel.
2. Apply lime and fertilizer according to soil test recommendations.
3. Graze or clip closely to remove excess growth.
4. Plant during October, November, or February in the lower South; March in the upper South.
5. Plant clover with a no-till planter at 1 to 3 lb./acre of Ladino or 5 to 10 lb./acre red clover in drill rows 9 to 10 inches apart. Be sure clover is inoculated with fresh inoculum, using a sticker such as Sirup.
6. Control grass competition by close grazing, mowing, or chemical supressants to allow newly-seeded legume to become established. Application of Gramoxone herbicide at a low rate at clover planting time will suppress the grass and favor the seedlings.
7. Keep a close watch for various feeding insects, especially crickets, and apply a labeled insecticide such as Diazinon or Lorsban granules at the first sign of their presence. These foliage-feeding insects can completely destroy small clover seedlings in sod if not controlled.
8. An alternative low-cost method is to broadcast plant clover seed in closely-grazed pastures during January or February in the lower South, February or March in the upper South. Hoof action by grazing animals provide some seedbed preparation. Although stands may be more erratic with this method, the low cost makes it attractive.

Management of Established Tall Fescue-Clover Pastures

1. Fertilize annually according to soil test recommendations. Clovers require adequate potassium for good growth, or they will not compete with tall fescue.
2. Nitrogen fertilization of tall fescue-clover pastures causes the grass to crowd out the clover. If clover growth is inadequate in autumn, low rates of nitrogen will provide additional tall fescue until clovers are growing adequately.
3. Maintain adequate stocking rate in spring and utilize heavy pasture growth or tall fescue may crowd out the clover. Close grazing favors Ladino clover.
4. Have poloxolene blocks available to grazing animals in spring when clover growth may be heavy and bloat can be a hazard.
5. Reseed pastures every 2 to 3 years in the lower South as clovers rarely persist much longer.

ORIGIN: OREGON

TALL FESCUE

"With the ever-increasing cost of diesel, grain and fertilizer, the longer I can keep my cattle grazing is money in the bank."

We've had novel endophyte fescue in place in this pasture for four or five years now, and this past summer we experienced the worst drought I can remember here in the Southeast. The grass would turn totally brown and we still had cattle on it – we just didn't have grazing for anything, then we'd get a small rain – maybe a quarter of an inch or so – and remarkably just a few days later it'd be green again. I kept cattle on this pasture year-round and it provided grazing like nothing else that I have could done, so it's been an excellent forage crop for us here at Homestead.

Banks Herndon, Homestead Angus Farm, Opelika, Alabama

ORIGON QUALITY TALL FESCUE

Oregon Tall Fescue Commission
1193 Royvonne Avenue S, Suite 11 / Salem, OR 97302
Visit our website for more information: http://forages.oregonstate.edu/organizations/seed/osc/default.cfm