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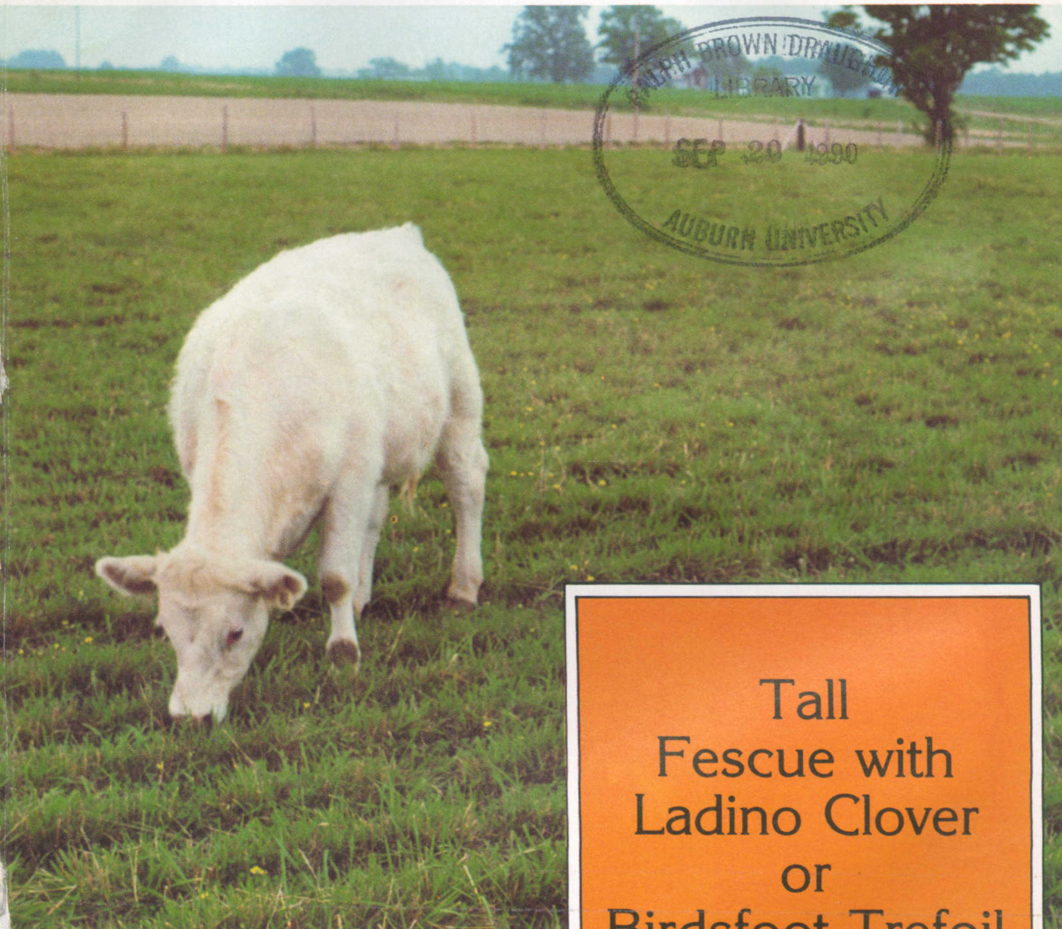

Tall Fescue with Ladino Clover or Birdsfoot Trefoil as Pasture for Steers in Northern Alabama

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TALL FESCUE WITH LADINO CLOVER OR BIRDSFOOT TREFOIL AS PASTURE FOR STEERS IN NORTHERN ALABAMA

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INTRODUCTION

TALL FESCUE *(Festuca arundinacea)* pasture is generally satisfactory for maintenance of beef cows with calves, but average daily gain (ADG) of growing steers has generally been below 1 pound per day *(1)*. The poor animal performance on tall fescue has been associated with a fungus *Acremonium* spp. (in previous studies *Epichloe typhina* was the fungus presumed to be implicated) which may produce a mycotoxin *(4)*. The ADG of steers grazing fungus-free tall fescue over a 3-year period at the Black Belt Substation in Alabama was 1.78 pounds, indicating the potential of this grass.

Gains are improved when ladino white clover *(Trifolium repens)* is a component of tall fescue pasture as demonstrated in one trial in northern Alabama *(2)*. The clover may counteract the effects of a mycotoxin, but this is not proven since the grass was not tested for the presence of a toxic fungus in the grazing experiment cited *(2)*. In northern Alabama, birdsfoot trefoil *(Lotus corniculatus)* has shown promise as a legume for pasture in a clipping trial *(3)*. Fergus, a new pasture-type birdsfoot trefoil, was developed by the Kentucky Agricultural Experiment Station and shows potential for northern Alabama.

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EXPERIMENTAL PROCEDURE

This report summarizes the results of steer performance over a 2-year period at the Sand Mountain Substation, Crossville, Alabama, on three pasture combinations: (a) Kentucky 31 tall fescue with 150 pounds N per acre, (b) tall fescue with Regal ladino clover, and (c) tall fescue with Fergus birdsfoot trefoil.

Pasture Management

Pastures were established on Hartsells fine sandy loam. Kentucky 31 tall fescue was seeded in October 1977, with the grass-nitrogen paddocks planted in 7-inch rows and the grass-legume paddocks in 14-inch rows. Fergus birdsfoot trefoil and Regal ladino clover were seeded with a cultipacker seeder in March 1978. Three paddocks, each 2 acres in area, were planted to each pasture combination. Grazing for record was begun in fall 1978.

Grass residue was mowed and removed from paddocks each September. Nitrogen was applied at a rate of 75 pounds per acre in September and again in March on the tall fescue-nitrogen treatment. No nitrogen was applied to the tall fescue-legume paddocks. Phosphorus and potassium were applied to all paddocks according to soil test recommendations. Estimates on botanical composition were made at monthly intervals during the grazing season. Pastures were sampled in May or June each year for the fungus, *Acremonium* spp. Understocking of most paddocks occurred during late spring each year so surplus forage was cut for hay.

Management of Grazing Animals

Crossbred steers, weighing approximately 500 pounds, were purchased each September and pre-conditioned for 3 weeks on tall fescue pasture before being put on the experimental paddocks. During the period of January to mid-March grazing was inadequate, therefore all steers were removed from the paddocks and fed tall fescue hay, corn silage, and a soybean protein supplement to maintain gains of approximately 1 pound per day. Animals were weighed at 28-day intervals from October through August. Additional animals were placed on the paddocks during peak periods of pasture growth. Live weight gains of the additional cattle were also recorded.

RESULTS AND DISCUSSION

Pastures

Excess rainfall during the fall of 1977 delayed pasture planting until late October so only tall fescue was planted. Good grass stands were obtained and the clover and trefoil were overseeded in March 1978. Good ladino clover stands were obtained, but trefoil stands were thin on two of the three paddocks planted to this species. Drought during late spring and early summer reduced growth of trefoil. Consequently, trefoil made up only about 13 percent of the total forage in the tall fescue-trefoil paddocks, table 1. Ladino clover stands were excellent and clover made up about 24 percent of the forage in this mixture. The sparse trefoil in the tall fescue sward, figure 1, is in contrast with thick stands of ladino clover, figure 2. Clover competition reduced grass growth in the tall fescue-clover paddocks.

Sufficient numbers of steers were not available to increase the stocking rate on all paddocks the first season, figure 3, and in some paddocks the second year so surplus forage was harvested as hay, table 1. The grass-nitrogen paddocks were definitely understocked during the spring, resulting in an average of 3,400 pounds per acre of hay harvested each year.

A heavy infestation of the fungus, *Acremonium* spp., was found in tall fescue on all paddocks during both years, thus poor animal performance was expected according to previous research at the Black Belt Substation *(4)*.

TABLE 1. ESTIMATED AVERAGE PERCENTAGE LEGUMES IN PASTURES

Pasture	Legume composition of pasture	Hay produced per acre		
		1978-79	1979-80	2-year average
	Pct.	*Lb.*	*Lb.*	*Lb.*
Fescue-ladino clover	24	1,820 b*	0 c	910 b
Fescue-trefoil	13	2,390 b	1,550 b	1,970 b
Fescue + 150 lb. N/acre	0	4,580 a	2,270 a	3,420 a

*Means within a column having the same letter are not significantly different at $P \leq .05$.

FIG. 1. Sparse amount of Fergus birdsfoot trefoil in tall fescue pasture.

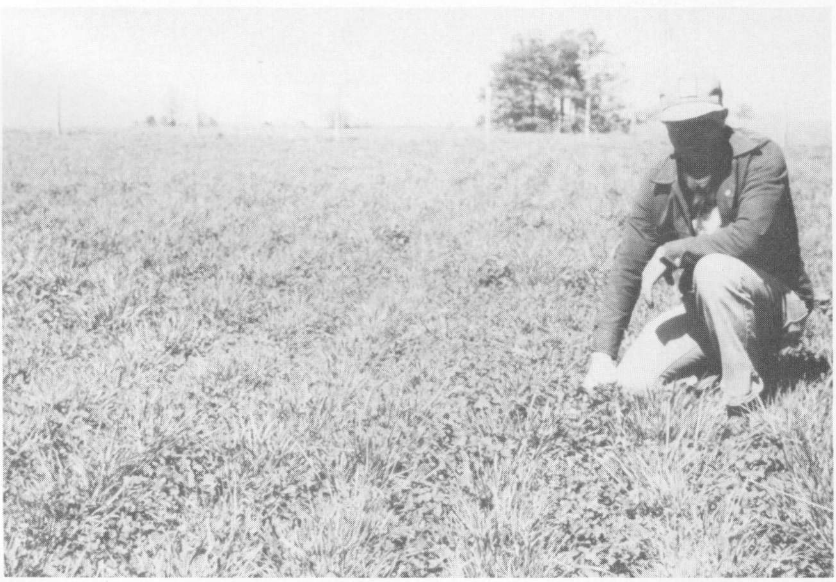

FIG. 2. Thick stand of Regal ladino clover in tall fescue pasture.

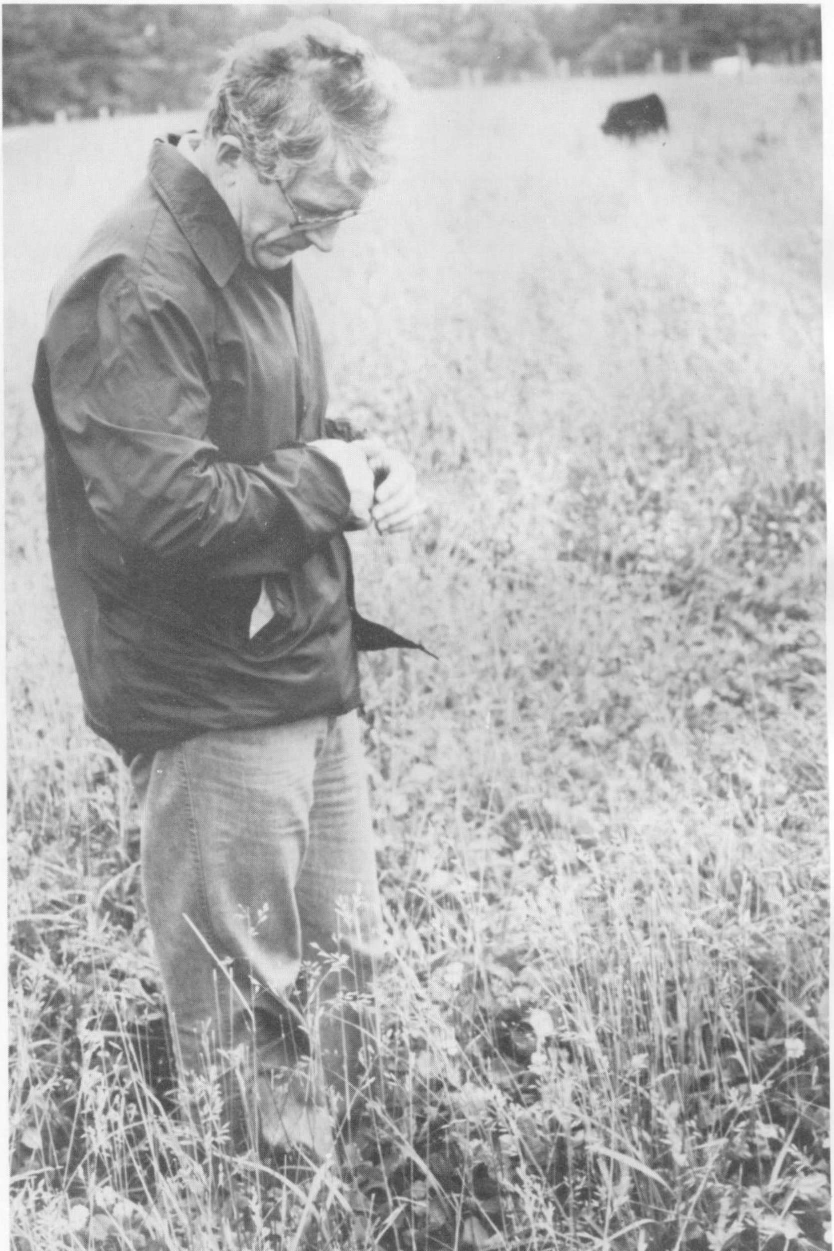

FIG. 3. Understocked tall fescue-ladino clover pasture, April 24, 1979, that was cut for hay.

Cattle Performance

Calendar grazing days on all pastures averaged about 2 months the first fall and about 3 months the second fall, table 2. The trefoil paddocks furnished fewer calendar days of grazing compared with ladino clover and tall fescue-nitrogen.

Approximately 130 days of spring grazing were obtained on all forage treatments during the first season in contrast to only 118 days during the second season. This reduction was caused by drought.

TABLE 2. CALENDAR GRAZING DAYS FOR STEERS ON TALL FESCUE AND TALL FESCUE-LEGUME PASTURES AT SAND MOUNTAIN SUBSTATION

Pasture	1978-79			1979-80		
	Fall	Spring	Total	Fall	Spring	Total
Fescue-ladino clover	67 a*	132 a	199	93 a	118 a	211
Fescue-trefoil	67 a	132 a	199	70 b	118 a	188
Fescue + 150 lb. N/acre	67 a	129 a	196	98 a	118 a	216

*Means within a column having the same letter are not significantly different at $P < .05$.

The daily stocking rate was similar for all pastures in fall of both years, table 3. In spring of the first season, stocking rate of tall fescue-ladino clover and tall fescue-nitrogen was higher than for tall fescue-trefoil. During the second spring, stocking rate was highest, (2.96 steers per acre) for tall fescue-nitrogen, and lowest (1.69 steers per acre) for tall fescue-trefoil. When averaged over the 2-year period, the stocking rate was lowest for tall fescue-trefoil because of the poor trefoil stands and reduced tall fescue growth.

TABLE 3. DAILY STOCKING RATE PER ACRE FOR STEERS ON TALL FESCUE AND TALL FESCUE-LEGUME PASTURES AT SAND MOUNTAIN SUBSTATION

Pasture	1978-79		1979-80		Average
	Fall	Spring	Fall	Spring	
	No.	*No.*	*No.*	*No.*	*No.*
Fescue-ladino clover	0.84 a*	1.69 a	1.50 a	2.50 b	1.63 a
Fescue-trefoil	0.84 a	1.15 b	1.29 a	1.69 c	1.24 b
Fescue + 150 lb. N/acre	0.84 a	1.75 a	1.50 a	2.96 a	1.76 a

*Means within a column having the same letter are not significantly different at $P < .05$.

Although beef gain per acre was similar for all three pasture combinations during fall in both years, spring gains were highest on tall fescue-ladino clover, table 4. During spring of the second season, 478 pounds of beef per acre were produced on ladino clover which resulted in 714 pounds per acre for the 1979-80 season. This was achieved without any nitrogen fertilizer. The high beef gain produced on tall fescue-ladino clover the second season with a high stocking rate, resulting in no surplus hay, indicates the great potential of this low-cost pasture combination.

TABLE 4. TOTAL BEEF GAIN PER ACRE FOR STEERS ON TALL FESCUE AND TALL FESCUE-LEGUME PASTURES AT SAND MOUNTAIN SUBSTATION

Pasture	1978-79			1979-80			2-year average
	Fall	Spring	Total	Fall	Spring	Total	
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fescue-ladino clover	61 a*	389 a	450	236 a	478 a	714	582
Fescue-trefoil	63 a	243 b	306	150 a	340 b	490	398
Fescue + 150 lb. N/acre	56 a	206 b	262	214 a	271 b	485	374

*Means within a column having the same letter are not significantly different at P < .05.

The ADG of steers during fall was similar on all three pasture mixtures but was higher the second season compared to the first, table 5. Spring ADG of steers was highest on tall fescue-legume pastures. For the entire season, the 2-year ADG was more than 1.5 pounds per day on grass-legume pastures as compared with only 1 pound on tall fescue-nitrogen. Even though trefoil stands were thin and the amount of trefoil in the forage was small, the legume apparently had a beneficial effect on steer gains. Although ADG on tall fescue-nitrogen was low, and similar to that obtained in previous trials *(2)*, it is apparent that a legume in the sward can offset, to a considerable extent, the effect of fungus-infested grass.

TABLE 5. AVERAGE DAILY GAIN OF TESTER STEERS ON TALL FESCUE AND TALL FESCUE-LEGUME PASTURES AT SAND MOUNTAIN SUBSTATION

Pasture	1978-79		1979-80		2-year average
	Fall	Spring	Fall	Spring	
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fescue-ladino clover	1.15 a*	1.64 a	1.67 a	1.67 a	1.53 a
Fescue-trefoil	1.24 a	1.25 ab	1.79 a	1.76 a	1.51 a
Fescue + 150 lb. N/acre	1.07 a	0.81 b	1.46 a	0.92 b	1.06 b

*Means within a column having the same letter are not significantly different at P < .05.

The presence of legumes in tall fescue greatly increased total gain per steer, table 6. Ladino clover increased yearly gains by about 100 pounds and trefoil by about 50 pounds compared to tall fescue-nitrogen. This demonstrates the vast improvement a small proportion of legume can contribute in a tall fescue pasture.

Steers on both the legume-grass mixtures had excellent appearance from the standpoint of hair coat and finish. Animals on the tall fescue-nitrogen paddocks had rougher hair coats at the end of the grazing season each year.

TABLE 6. GAIN PER STEER ON TALL FESCUE AND TALL FESCUE-LEGUME PASTURES AT SAND MOUNTAIN SUBSTATION

Pasture	1978-79			1979-80			2-year average		
	Fall	Spring	Total	Fall	Spring	Total	Fall	Spring	Total
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Fescue-ladino clover	61 a*	201 a	262	157 a	195 a	352	109 a	198 a	307
Fescue-trefoil	63 a	140 b	203	100 b	200 a	300	82 b	170 b	252
Fescue + 150 lb. N/acre	56 a	100 c	156	142 a	108 b	250	99 a	104 c	203

*Means within a column having the same letter are not significantly different at $P < .05$.

SUMMARY

A grazing study with yearling steers was conducted for 2 years at the Sand Mountain Substation on: (a) Kentucky 31 tall fescue plus 150 pounds nitrogen per acre, (b) tall fescue-Regal ladino clover, and (c) tall fescue-Fergus birdsfoot trefoil.

More than 210 calendar days of grazing were obtained on tall fescue-ladino clover and tall fescue-nitrogen, but because of poor trefoil stands, slightly less were obtained on tall fescue-trefoil the second season.

Stocking rate per acre was lower on tall fescue-trefoil (1.24) than on tall fescue-ladino clover (1.63) and tall fescue-nitrogen (1.76 steers ler acre).

Beef gain per acre was highest on tall fescue ladino clover—582 pounds as compared to 398 pounds on tall fescue-trefoil and 374 pounds on tall fescue-nitrogen.

Average daily gain of steers was higher, more than 1.5 pounds per day, on tall fescue with ladino clover or trefoil as compared to only 1.06 pounds on tall fescue-nitrogen.

Annual gains per steer were increased by 100 pounds on ladino clover and by 50 pounds on trefoil as compared to tall fescue-nitrogen.

Tall fescue was infested with the fungus, *Acremonium* spp., which is suspected to produce a harmful mycotoxin. Legumes appear to partially or completely offset the adverse effects of fungus-infested tall fescue.

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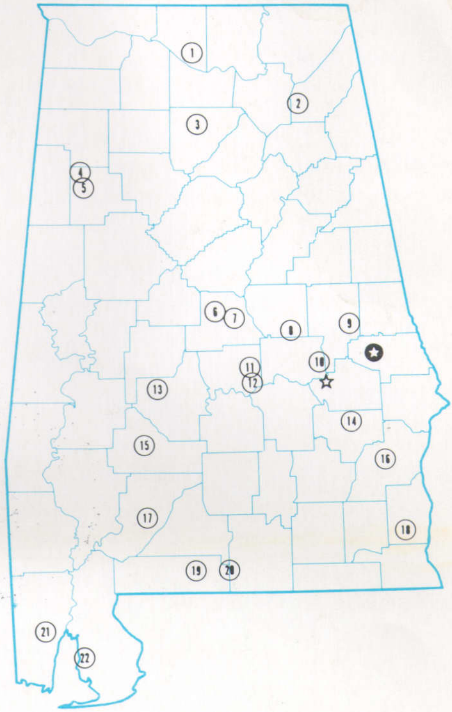

Research Unit Identification

⊛ Main Agricultural Experiment Station, Auburn.
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Foundation Seed Stocks Farm, Thorsby.
7. Chilton Area Horticulture Substation, Clanton.
8. Forestry Unit, Coosa County.
9. Piedmont Substation, Camp Hill.
10. Plant Breeding Unit, Tallassee.
11. Forestry Unit, Autauga County.
12. Prattville Experiment Field, Prattville.
13. Black Belt Substation, Marion Junction.
14. The Turnipseed-Ikenberry Place, Union Springs.
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16. Forestry Unit, Barbour County.
17. Monroeville Experiment Field, Monroeville.
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