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SERALA SERICEA . . .
COASTAL BERMUDA . . .
GOAR TALL FESCUE . . .
Grazing for
BEEF COWS AND CALVES IN ALABAMA'S PIEDMONT

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Serala Sericea, Coastal Bermuda, Goar Tall Fescue Grazing for Beef Cows and Calves in Alabama's Piedmont

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ECONOMICAL PASTURE is essential for success in a beef cow and calf operation. This is an especially critical need in Alabama's Piedmont area, with its about 2.5 million acres of droughty and eroded clay soils, hilly topography, and higher elevation that limit the adaptation of some pasture species.

Forage species that have been used in the Piedmont area are bermudagrass, sericea, and tall fescue. Common sericea lespedeza was once widely used but it was discarded because of its coarse stems that reduced palatability and nutritive value. Coastal bermudagrass has given good yields of hay in the Piedmont[1], and acreage has increased steadily. However, common bermuda encroachment under grazing conditions and the cost of nitrogen fertilizer make it less desirable. Tall fescue is grown widely for cool season grazing. Goar, a new variety in the Southeast, makes more winter production than Kentucky 31 tall fescue[2].

Renewed interest in sericea has come about because of development of a new fine-stemmed sericea, named Serala, by Dr. E. D. Donnelly at the Auburn University Agricultural Experiment Station, that was released in 1962[3]. Animal performance data on the Serala variety was needed to determine its value as a grazing crop, and such research was begun in 1964 by the Agricultural Experiment Station.

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[1] HOVELAND, C. S. 1960. Bermudagrass for Forage in Alabama. Auburn Univ. (Ala.) Agr. Exp. Sta. Bull. 328.

[2] HOVELAND, C. S. 1967. Goar Tall Fescue. Auburn Univ. (Ala.) Agr. Exp. Sta. Leaf. 75.

[3] DONNELLY, E. D. 1963. Serala Sericea—A New Sericea Variety. Auburn Univ. (Ala.) Agr. Exp. Sta. Leaf. 70.

DESCRIPTION OF THE EXPERIMENT

Performance of beef cows and calves was compared under several grazing systems at the Piedmont Substation, Camp Hill, Alabama, over a 4-year period from 1964 to 1968. Four grazing systems were used: (1) Serala sericea overseeded in the autumn with rye; (2) Coastal bermuda with 100 pounds of N per acre; (3) Coastal bermuda with 150 pounds of N per acre, hay to be made from surplus forage; and (4) Goar tall fescue with 100 pounds of N per acre.

Pasture Management

Each paddock was 1¾ acres in size. There were three replications of each forage species, making a total of 12 paddocks. Soils in the pasture area were mostly Lloyd clay loam with lesser areas of Louisa clay loam and Cecil sandy loam.

Coastal bermuda and Serala sericea were established previous to 1965 when grazing was begun. Goar tall fescue was planted in the fall of 1964. Wren's Abruzzi rye was seeded in the sericea paddocks at the rate of 1 to 1½ bushels per acre in October of 1965, 1966, and 1967.

Lime and mineral fertilizer were applied according to soil test. Coastal bermuda paddocks receiving 100 pounds of N per acre annually had applications in May and July. Other Coastal pastures got 150 pounds of N, with applications in May, late June, and late July. The latter paddocks were cross-fenced to confine animals to half the area in mid-summer so that hay could be made from surplus grass.

Tall fescue was not grazed during the summer months. The grass was rotary mowed to a height of 6 inches in early September to remove unpalatable older growth and weeds. Fifty pounds per acre of nitrogen was applied in September and again in February each year.

Rye planted on the sericea paddocks received 50 pounds of N per acre each fall. Ungrazed rye was rotary mowed in the spring when headed to permit better sericea growth.

Management of Grazing Animals

Grade Hereford cows bred to Shorthorn bulls initially and later to Angus bulls were used in the experiment. Calves were born from October through December and remained with the cows until weaned in late August or early September.

Each 1¾-acre paddock was stocked with a cow-calf unit whenever grazing was available. Additional cow-calf units were added during peak periods of pasture growth. Weighing was done at 28-day intervals.

No supplements were fed to animals while on pasture. When no grazing was available in mid-winter, animals were removed from the paddocks and fed Coastal bermuda hay and cottonseed meal or a cottonseed meal-urea mixture. During drought periods in summer, cattle were grazed on Coastal pasture not in the experimental area. After calves were weaned in August, cows continued to graze the Coastal bermuda and sericea paddocks for an additional 4 to 8 weeks. Water, salt, and shelters for shade were available at all times.

An attempt was made to maintain at least one cow-calf unit per paddock throughout the growing season. Addition or removal of animals was made according to the amount of forage available.

RESULTS AND DISCUSSION

Grazing Season

Rainfall during May and June varied greatly from year to year, Table 1. Low rainfall during this period delayed growth and reduced the productive season of Coastal bermuda. Serala sericea began growth in late March or early April, from 4 to 8 weeks earlier than Coastal bermuda.

When night temperatures are below 60°F there is little growth of Coastal bermuda. At the test location, average daily minimum temperatures were 39°F in March, 49°F in April, and 56°F in May. The low night temperatures, together with May and June droughts, explain why Coastal bermuda often makes little growth

TABLE 1. RAINFALL DURING SPRING AND SUMMER AT PIEDMONT SUBSTATION OVER THE 4-YEAR PERIOD, 1965-68

Month	Monthly rainfall				
	1965	1966	1967	1968	Average
	In.	*In.*	*In.*	*In.*	*In.*
March	7.47	6.09	2.59	4.19	5.08
April	2.35	3.18	1.22	7.10	3.46
May	0.24	4.40	5.37	2.72	3.18
June	6.31	1.68	6.43	0.91	3.83
July	5.62	4.29	6.56	5.76	5.56
August	4.13	5.59	2.95	4.59	4.32
TOTAL	26.12	25.23	25.12	25.27	25.43

TABLE 2. AVERAGE DATES WHEN GRAZING BEGAN AND ENDED OVER 4-YEAR PERIOD AT PIEDMONT SUBSTATION, 1965-68

Forage	Grazing began	Grazing ended
Coastal bermuda with 150 lb. N	Apr. 5[1]	Sept. 12
Coastal bermuda with 100 lb. N	Apr. 5[1]	Sept. 12
Serala sericea	Apr. 12	Sept. 12
Rye sod-seeded on sericea	Dec. 5 (2 years)	Jan. 6 (2 years)
	Mar. 13 (3 years)	Apr. 12 (3 years)
Goar tall fescue with 100 lb. N	Nov. 15	Jan. 9
	Mar. 14	May 20

[1] Grazing for the first 30 to 50 days was mainly little barley and other weedy grasses volunteering on the Coastal bermuda sod.

before June in the Alabama Piedmont area. Heavier and more dependable rainfall in July resulted in surplus forage on pastures getting high fertilization rates.

The average dates on which grazing began and ended indicate that good spring growth was made on the Coastal bermuda paddocks, Table 2. However, grazing during April and May consisted mainly of little barley (*Hordeum pusillum*) and other weed grasses, which volunteered in the bermudagrass sod.

Serala sericea forage was available for grazing by mid-April. It is likely that overseeding with rye delayed spring growth of the sericea, but this practice extended the grazing season by a month in December and another month in March or early April.

FIG. 1. Serala sericea was grazed well in July, unlike common sericea that becomes tall, woody, and unpalatable, in mid-summer to late summer.

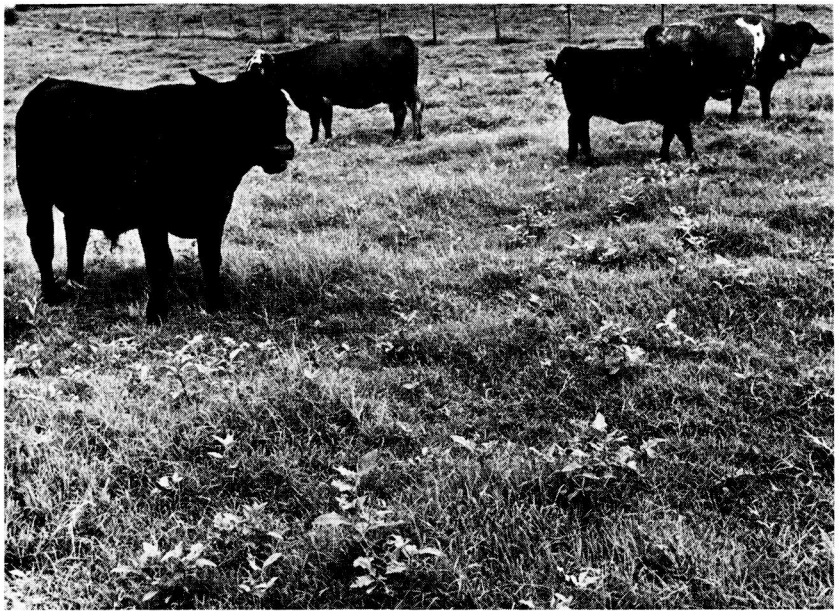


FIG. 2. This Coastal bermuda received 100 pounds of nitrogen per acre. The August 1968 photo shows heavy infestation of horse nettle after 4 years.

Serala sericea was grazed well through the summer and did not develop the tall stemmy growth often seen in common sericea pastures, Figure 1. Coastal bermuda in midsummer had large amounts of rejected stolons in the pasture, Figure 2.

Goar tall fescue was grazed from mid-November to early January and again from mid-March to late May, Figure 3.

Fescue grazing could have been started in late February if more acreage per animal had been available. Even so, little growth of fescue occurred during December and January. Autumn droughts limited the amount of surplus forage that could be saved for winter grazing.

Cow-Calf Grazing Days

The number of cow-calf days of grazing and stocking rate per acre were low on all forage species in the experiment, Tables 3 and 4. Soil moisture conditions in spring were largely responsible for the low carrying capacity at this location. Over the 4-year period, Serala sericea furnished more cow-calf days per acre than Coastal bermuda fertilized with 100 pounds of N per acre. In-

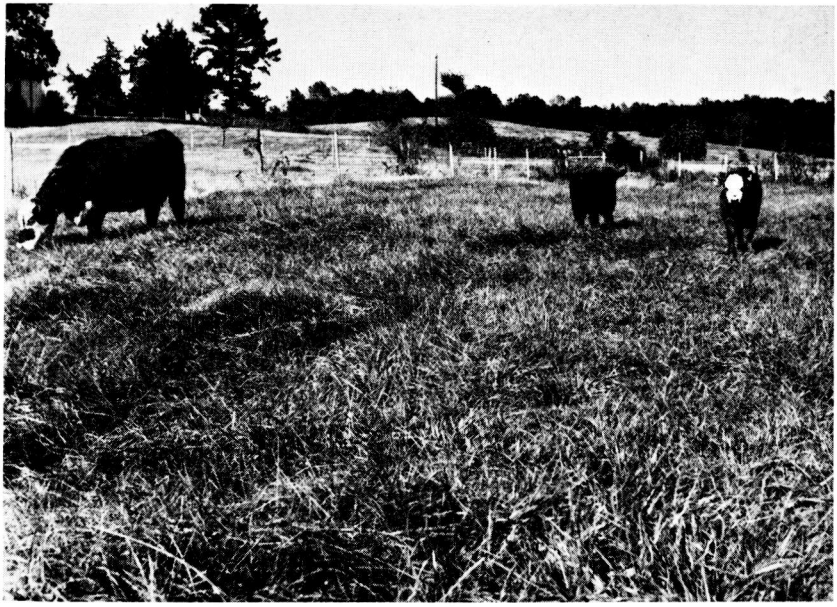


FIG. 3. Late November grazing on plot of Goar tall fescue is shown here.

creasing the nitrogen rate to 150 pounds permitted an increase in the Coastal stocking rate, but resulted in about the same number of cow-calf days per acre as from Serala sericea.

Rye overseeded on sericea added another 34 cow-calf days, and at a higher stocking rate than for sericea alone or bermudagrass with 100 pounds of N. Nevertheless, the small number of additional cow days obtained by overseeding rye hardly justifies the expense of this practice.

Goar tall fescue gave only 83 cow-calf days per acre per year, Table 3. Stocking rate was the same as for Serala sericea. The droughty upland site was not ideal for tall fescue, and higher

TABLE 3. COW-CALF UNIT DAYS PER ACRE ON GRAZED FORAGES AT THE PIEDMONT SUBSTATION, 1965-68

Forage	Cow-calf unit grazing days per acre				
	1965	1966	1967	1968	Average
	No.	*No.*	*No.*	*No.*	*No.*
Coastal bermuda with 150 lb. N	168	115	148	88	130
Coastal bermuda with 100 lb. N	144	67	114	88	103
Serala sericea	144	91	166	102	126
Rye sod-seeded on sericea	....	30	32	40	34
Goar tall fescue with 100 lb. N	43	115	88	84	83

TABLE 4. STOCKING RATE OF COW-CALF UNITS ON GRAZED FORAGES AT THE PIEDMONT SUBSTATION, 1965-68

Forage	Daily stocking rate, cow-calf units/acre				
	1965	1966	1967	1968	Average
	No.	*No.*	*No.*	*No.*	*No.*
Coastal bermuda with 150 lb. N	1.20	1.19	0.93	0.63	0.99
Coastal bermuda with 100 lb. N	0.97	0.70	0.71	0.63	0.75
Serala sericea	0.92	0.72	1.19	0.72	0.89
Rye sod-seeded on sericea	----	0.87	1.43	0.71	1.00
Goar tall fescue with 100 lb. N	0.91	1.02	0.96	0.66	0.89

carrying capacity could be expected on bottomland or soil with better moisture relations.

Stocking rate was similar on all forages, Table 4. Heavier stocking would have been possible for 4 to 6 weeks in mid-summer on Coastal bermuda getting 150 pounds of N. However, this is not a practical method on most farms, so the surplus growth was harvested as hay.

Average Daily Gain of Calves

Daily gain differed considerably from year to year and also as the season progressed, Table 5. Calves averaged 1.57 pounds per day gain on Serala sericea. Calf daily gain on Coastal bermuda fertilized with 100 pounds of N was 1.78 – slightly higher than on Serala sericea – but averaged only 1.48 pounds per day on Coastal bermuda getting 150 pounds of N per acre. The reason for this difference between Coastal treatments may be the higher stocking rate at the high nitrogen treatment. Also, animal confinement to half the paddock in mid-summer to permit haymaking allowed less selectivity of forage.

Daily gain was 2.44 pounds on rye during 1966 and 1968, but only 0.77 pound in 1967, Table 5. Overstocking may have caused the extremely low daily gain in 1967, Table 4.

TABLE 5. AVERAGE DAILY GAIN OF BEEF CALVES ON GRAZED FORAGES AT THE PIEDMONT SUBSTATION, 1965-68

Forage	Daily gain per calf				
	1965	1966	1967	1968	Average
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Coastal bermuda with 150 lb. N	1.66	1.33	0.96	1.96	1.48
Coastal bermuda with 100 lb. N	2.03	1.78	1.25	2.05	1.78
Serala sericea	1.25	1.53	1.50	2.00	1.57
Rye sod-seeded on sericea	----	2.38	0.77	2.50	1.88
Goar tall fescue with 100 lb. N	1.28	1.62	0.86	2.22	1.50

Calves on tall fescue averaged 1.5 pounds daily gain over the 4-year period. However, the 1967 gain of 0.86 pound is a sharp contrast to the 2.22 pounds obtained in 1968. Although gains differed greatly from year to year, calf daily gains remained the same throughout the winter and spring season of a particular year.

In contrast to tall fescue, where daily gains remained the same throughout winter and spring, daily gains on Coastal bermuda and sericea declined during the summer. Both species showed a similar decline. Average daily gain on Serala sericea was 2.4 pounds in May, 1.5 pounds in July, and 0.6 pound in August. It is pointed out that the high daily gain in spring on the bermudagrass pastures was made on little barley and other grassy weeds. Serala sericea at this time was generally free of weeds.

Calf Gain per Acre

Annual calf gain per acre was similar on Serala sericea and Coastal bermuda, regardless of N rates on Coastal bermuda, Table 6. These species averaged 181 pounds per acre gain over the 4-year period. A severe spring drought and cool temperatures probably account for the low 1968 gain on Coastal. Serala sericea made considerable growth in April when soil moisture conditions were more favorable, furnishing reserve forage for later grazing.

Although the additional nitrogen on the bermudagrass did not increase calf gain per acre, surplus forage was harvested for hay. Hay yields from this treatment varied from 1 to 3½ tons per acre and averaged 2 tons over the 4-year period (1 ton in 1965, 3½ in 1966, 1¼ in 1967, and 2¼ tons per acre in 1968). Crude protein content of the hay varied from 9.4 per cent in 1965 to 15.2 per cent in 1966. This suggests that Coastal bermuda is better utilized for hay than for grazing in the Piedmont.

Results from overseeding rye on sericea were disappointing,

TABLE 6. BEEF CALF GAIN PER ACRE ON GRAZED FORAGES AT THE PIEDMONT SUBSTATION, 1965-68

Forage	Per acre calf gain				
	1965	1966	1967	1968	Average
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Coastal bermuda with 150 lb. N	238	176	198	130	185
Coastal bermuda with 100 lb. N	248	125	195	152	180
Serala sericea	236	122	180	170	178
Rye sod-seeded on sericea	---	69	−7	88	50
Goar tall fescue with 100 lb. N	67	200	92	171	133

Table 6. In 1967 the calves lost weight, and in the other 2 years averaged 78 pounds per acre gain. However, when the gain on rye is added to the gain on Serala sericea, this becomes the most productive program. However, it is doubtful if the additional gain would pay the cost of nitrogen and overseeding the rye.

Tall fescue averaged 133 pounds per acre calf gain, Table 6. Total gain the establishment year was low, but low gains were also made in 1967, when there was a severe April drought. In the better rainfall years of 1966 and 1968, total gains were equal or superior to those on Coastal bermuda and Serala sericea. Direct comparisons between forage species were difficult, especially since tall fescue production came during the cool season when calves were smaller. It is apparent that when moisture conditions are suitable, Goar tall fescue can extend the grazing season 3 to 4 months beyond that of warm season species. Thus, tall fescue can be a useful part of a grazing system with warm season forage species.

Slaughter Grade and Market Value of Calves

For 3 years the calves from the experimental pastures were graded for slaughter finish at end of the grazing season. Calves that grazed fescue were later placed on Coastal bermuda. The data in Table 7 indicate no important differences among the swards in grade or market value of calves. However, there was ⅓ grade range in average grade between years.

TABLE 7. SLAUGHTER GRADE AND MARKET VALUE OF BEEF CALVES ON GRAZED FORAGE AT THE PIEDMONT SUBSTATION, 1965-68

Forage	1965		1966		1967	
	Grade	Value	Grade	Value	Grade	Value
Coastal bermuda with 150 lb. N	Good—	$111.62	Std.+	$115.96	Good	$121.14
Coastal bermuda with 100 lb. N	Good—	108.57	Std.+	116.80	Good	128.72
Serala sericea	Good—	106.04	Std.+	115.01	Good	123.11
Goar tall fescue[1]	Good—	105.65	Std.+	115.26	Good	128.11

[1] Calves were grazed on Coastal bermuda after they were removed from tall fescue.

Cow Performance

Weight changes by beef cows during the grazing season are common and not of great importance unless severe losses occur.

TABLE 8. COW GAIN PER ACRE ON GRAZED FORAGES AT PIEDMONT SUBSTATION, 1965-68

Forage	Per acre cow gain				
	1965	1966	1967	1968	Average
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Coastal bermuda with 150 lb. N	205	137	149	87	144
Coastal bermuda with 100 lb. N	224	135	109	103	143
Serala sericea	95	48	27	88	64
Rye sod-seeded on sericea	...	148	−35	44	52
Goar tall fescue	55	−24	73	80	46

In this experiment, cows maintained their weight on all forages except rye in 1967 and tall fescue in 1966, Table 8. Cows on the two Coastal bermuda treatments gained more weight than those on Serala sericea. However, most of this gain was in April and May when cows were grazing little barley and other weedy grasses. In most years, cows lost weight during August when grazing both Coastal bermuda and Serala sericea. It is desirable for summer gains to be greater than those recorded in this experiment if cows are to be subjected to a scarcity of winter feed.

Pasture Stands

Some changes had occurred in the species composition of certain pastures by the end of the 4-year experimental grazing period. Tall fescue stands remained relatively constant with only a small invasion of common bermuda on the driest sites. Serala sericea had also been invaded by bermudagrass where original stands had been thin.

Coastal bermuda from a 1955 planting that was fertilized with 100 pounds of N per acre annually became increasingly infested with common bermudagrass each year. Common bermuda covered 30 to 70 per cent of the area in these paddocks. Common bermuda invasion was less in the more recently planted Coastal bermuda receiving 150 pounds of N. This may account for the reduced number of cow-calf days per year on pastures getting the lower rate of nitrogen. Horse nettle (*Solanum carolinense*) produced large amounts of seed and increased rapidly each year in Coastal bermuda under both nitrogen levels. This serious weed pest was not grazed by cattle, Figure 2.

Results of this experiment suggest that common bermuda can be expected to invade and dominate Coastal bermuda in the Piedmont when continuously grazed. This problem does not occur

to such an extent on sandy soils. When Coastal bermuda is managed for hay, shading reduces the invasion by common bermuda. Common bermuda encroachment is likely to be a problem with Serala sericea where a continuous grazing program is practiced. This would not be a serious problem on farms having a fixed number of animals. In this case a surplus of sericea will generally accumulate in mid-summer, and dense shading by the sericea will likely limit common bermuda competition. Higher rates of nitrogen on Coastal bermuda can be expected to delay common bermuda invasion.

SUMMARY AND CONCLUSIONS

Grazing studies with beef cows and calves were conducted over a 4-year period at the Piedmont Substation on Coastal bermudagrass with 100 pounds of nitrogen per acre, Coastal bermuda with 150 pounds of N, Serala sericea, rye sod-seeded on sericea, and Goar tall fescue.

(1) Calf gain was similar on Coastal bermuda and Serala sericea, averaging 180 pounds per acre annually. Increasing the nitrogen level on Coastal bermuda from 100 to 150 pounds did not increase calf gain per acre, but furnished 2 tons of hay in addition to grazing.

(2) Serala sericea furnished 126 cow-calf grazing days per acre per year, as compared with 103 days for Coastal bermuda getting 100 pounds of N per acre. The application of 150 pounds of N to Coastal bermuda resulted in 130 cow-calf grazing days per year.

(3) Average daily gain of calves and stocking rate of cow-calf units were similar on Serala sericea and Coastal bermuda. Daily gain of calves declined on both forages in July and August.

(4) Most of the grazing in April and May on Coastal bermuda came from volunteer weedy grasses.

(5) Coastal bermuda is probably better utilized for hay than grazing in the Piedmont.

(6) Rye sod-seeded on sericea furnished less than 2 months of additional grazing but resulted in only a low calf gain per acre.

(7) Goar tall fescue produced 133 pounds per acre calf gain and only 83 cow-calf grazing days per acre annually.

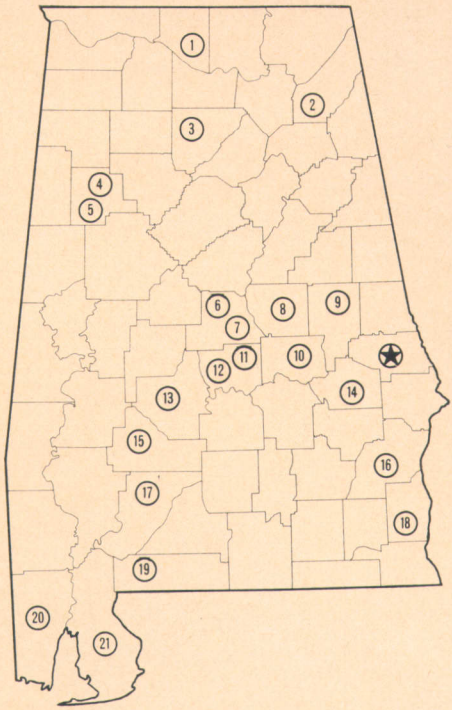
(8) Pasture effects on calf slaughter grade and market value were small and not of practical importance.

(9) Since Serala sericea did not require nitrogen fertilizer to provide a grazing season equal in length to Coastal bermudagrass, it furnished pasture at lower cost.

(10) Results of this experiment suggest that an economical beef cow-calf forage system in the Piedmont can be based on Serala sericea and tall fescue grazing with supplemental feeding of Coastal bermuda hay in mid-winter.

AGRICULTURAL EXPERIMENT STATION SYSTEM OF ALABAMA'S LAND-GRANT UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.

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. Thorsby 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. Tuskegee Experiment Field, Tuskegee.
15. Lower Coastal Plain Substation, Camden.
16. Forestry Unit, Barbour County.
17. Monroeville Experiment Field, Monroeville.
18. Wiregrass Substation, Headland.
19. Brewton Experiment Field, Brewton.
20. Ornamental Horticulture Field Station, Spring Hill.
21. Gulf Coast Substation, Fairhope.