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# Cool-Season Annual Grazing Crops For Stocker Calves

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COVER PHOTO. This November pasture scene in a paddock at the Tennessee Valley Substation illustrates typical test pastures and cattle at the northern Alabama location.

# Cool-Season Annual Grazing Crops For Stocker Calves

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**A**LABAMA CATTLEMEN are predominately cow-calf producers, but many could profitably shift to feeder calf production. Expansion of feedlots has increased the demand for feeder steers, so growing out calves to around 700 pounds instead of selling 400-pound stocker calves offers opportunities for extra profit (4).

Along with interest in feeder calf production has come a renewed interest in cool-season annual grazing crops. These pastures offer potential for profitably growing out calves to feeder size (2,6,8,10) and have certain advantages over warm-season perennial grass pastures. Although summer pastures can be used to put on about 200 pounds of gain per calf during the grazing season, it is difficult to have stocker calves ready for such pasture. They must be wintered after weaning and should gain only about 1 pound per day during the period for good utilization of summer pasture (11). Both rate of gain and seasonal gain per animal have been low on perennial summer pastures in Alabama research (3,7,9), even though grazing season has averaged more than 150 days. At the end of summer grazing, steers had a Standard or Utility finish and were approximately 20 months old.

It has been a different story on winter annual pastures in other tests. In a grazing test on oat pastures, stocker calves gained nearly 300 pounds during the grazing season and were ideally suited for finishing on a blended fattening mixture (1). These calves gained 567 pounds per head during the 305-day growing-finishing period.

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Thus, a desirable slaughter steer averaging 948 pounds was produced from a 381-pound stocker calf in 10 months using the oat grazing-drylot system (1).

The use of other cool-season crops and mixtures was evaluated in further studies during 1960 to 1970 at three locations of Auburn University Agricultural Experiment Station. These locations (Tennessee Valley Substation, Belle Mina; Lower Coastal Plain Substation, Camden; and Gulf Coast Substation, Fairhope) are generally representative of northern, central, and southern Alabama with respect to crop growing conditions.

## **EXPERIMENTAL DESCRIPTION AND RESULTS**

### **Tennessee Valley Substation**

The same general procedure was used in establishing pastures grazed throughout the 10-year experiment (1960-69). Only cool-season annual grazing crops were grown on the test area so that land could be plowed in June or July and fallowed during summer. Fallowing helped ensure good stands for early grazing by conserving moisture and controlling weeds. Usually the crop was planted during the last week of August or first week in September. A complete fertilizer was broadcast before planting, providing at least 40 pounds each of N, P, and K per acre. Two additional nitrogen applications of 40 to 50 pounds each were made in January and March.

The experimental area consisted of 8 acres the first 2 years and 4 acres during the remaining years of this study. The Humphreys silt loam soil was underlain by a chert bed 28 to 48 inches below the surface. This chert caused the sward to be more susceptible to drouth, especially during October when rainfall is often deficient in the Tennessee Valley section of Alabama. Rye was seeded at a rate of 1.5 bushels per acre and oats at 3 bushels per acre. Italian ryegrass was included at a rate of 15 pounds and crimson or arrowleaf clover at 10 pounds per acre.

Stocker calves grazed the test pastures from October until May except when lack of forage or weather conditions required that they be removed. When off grazing, cattle were usually fed corn silage and supplement while confined to pens in a pole-type barn. The stocking rate of about two animals per acre was constant within any grazing season.

Performance data for animals grazing small grain-clover at Belle Mina during the decade of the 60's are reported in Table 1. The

TABLE 1. STEER PERFORMANCE ON COOL-SEASON ANNUAL GRAZING, TENNESSEE VALLEY SUBSTATION, 1960-69

Performance measure	Result, by grazing mixture and year										
	Rye-oats-crimson		Rye-ryegrass						Yuchi-rye-	10-year average	
	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69		ryegrass, 1969-70
Date grazing began.....	10/12	10/24	12/6	11/13	10/19	10/11	10/10	10/10	10/10	10/9	10/21
Date grazing ended.....	4/27	5/8	5/6	4/19	4/6	6/13	6/12	6/6	5/13	6/2	5/15
Days grazed.....	122	119	90	104	109	201	215	212	141	159	147
Number of calves.....	16	15	6	6	8	10	8	7	8	8	
Initial weight, lb.....	434	455	450	481	429	368	484	435	460	414	441
Weight at end of grazing, lb.....	698	735	686	722	628	713	839	672	793	747	723
Gain/head, lb. <sup>1</sup> .....	264	280	236	241	199	345	355	237	333	333	282
Average daily gain, lb.....	1.33	1.41	1.54	1.43	1.18	1.40	1.44	0.99	1.55	1.41	1.37
Gain/acre, lb. <sup>1</sup> .....	528	560	354	362	398	779	710	427	666	576	536
Stocking rate, animals/acre.....	2.0	2.0	1.5	1.5	2.0	2.2	2.0	1.8	2.0	2.0	1.9
Days off grazing <sup>2</sup> .....	76	79	63	65	60	45	31	28	74	77	60
Supplemental feed/animal											
CSM, lb.....	114	120	94	98	98	66	grazed	—	112	33	
Corn, lb.....	150	156	126	130	130	90	other	—	—	—	
Silage, lb.....	2,069	2,501	2,060	1,650	2,184	1,238	forage	—	2,932	—	
Hay, lb.....	—	—	—	—	—	—	—	282	—	253	

<sup>1</sup> Includes gain made from harvested feed supplied while off grazing.

<sup>2</sup> Usually occurred between December 20 and March 1 and generally was a continuous period.

cattle began grazing test pastures as early as October 9 and as late as December 6, but the average date was October 21. The late start in 1962 (December 6) was caused by delayed planting (October 4), which resulted from a change in land management. The average terminal date for grazing was May 15, with the cattle actually grazing 147 days of the possible 207. The 60 days that cattle were off grazing usually occurred between December 20 and March 1. Generally, the off-period was continuous. The usual daily ration while off grazing consisted of corn silage full-fed plus 2 pounds of ground ear corn and 1.5 pounds of cottonseed meal (41 per cent). Harvested feed was essential to success of the grazing program.

Steer calves averaged 441 pounds initially and gained an average of 282 pounds each during the season. Most of this gain (78 per cent, or 219 pounds) could be attributed to grazing because cattle gained only 1.05 pounds daily during the barn-feeding period. Average daily gain (ADG) for the season was 1.37 pounds, but during the actual grazing period it averaged 1.49 pounds. The stocking rate averaged 1.9, but varied from 1.5 to 2.2 animals per acre during this 10-year period.

For 8 of the 10 years a drylot fattening period followed the grazing test. After an average finishing period of 80 days, 23 per cent of the steers graded Choice and 77 per cent had Good carcasses. During the other two years, cattle were sold in May or June as feeders.

An average gain per acre of 418 pounds could be attributed directly to grazing. Including the gain from harvested feed brought total gain to 536 pounds per acre. In either case, the steer gain per acre of land was greater than that obtained on the common warm-season perennial grasses (5). Perhaps more important, animals graded high Standard and low Good at the end of grazing on cool-season annuals as contrasted to high Utility and low Standard after grazing on perennial grass pastures.

### **Lower Coastal Plain Substation**

The same general procedure was followed at the Lower Coastal Plain as for the Tennessee Valley Substation. A 12-acre area of Norfolk sandy loam soil was used continuously during 1960-69 to provide information on grazing of small grains alone or in combination with ryegrass or crimson clover.

Land preparation was started each year in July, with preparation

followed by shallow cultivation to control weeds and conserve moisture. Mineral fertilizer was applied prior to planting at a rate according to soil test recommendations. Oats (3 bushels) and Abruzzi rye (1½ bushels) were rotated annually in the planting mixture. Either crimson clover (15 pounds), ryegrass (15 pounds), or a mixture of both was interplanted with the small grain. Recommended varieties were planted between September 1 and September 15 annually. Approximately 50 pounds of nitrogen was applied when the crops were up and another 50 pounds about February 15.

The pasture was stocked initially with one steer calf (544 pounds) per acre, but more were added later to effectively utilize the forage. Maximum stocking rate was 1.6 animals per acre, but the average during this 10-year study was 1.32, Table 2.

Cattle remained on the pasture throughout the 186-day period (November 1 to May 5). In periods of inclement weather or when forage was insufficient, they received supplemental feed on pasture.

The gain per head on animals grazed continuously for the season ("testers") averaged 294 pounds for an ADG of 1.58 pounds, Table 2. Average gain per acre from all cattle was 390 pounds.

Calves received some supplemental feed on grazing for various periods during 6 of the 10 study years. The average feeding period during the 6 years was 45 days (27 days as a 10-year average). A mixture of ground snapped corn and cottonseed meal (57:43) or a blended, high-roughage mixture was fed daily in limited quantities when grazing was in short supply. During 1961-62 and 1963-64 silage and supplement were fed for 22 and 57 days, respectively, prior to start of grazing. Weather conditions caused slow growth of forage and the resultant late starting dates, Table 2.

During the first 5 years of the study, steers were fed in drylot for an average of 55 days following the grazing. However, during the latter 5 years they were sold for slaughter directly off the pasture. In 3 of the last 5 years, supplemental feeding was done during periods of inclement winter weather. When cattle were sold directly from grazing, 48 per cent of their carcasses graded Choice and 52 per cent Good. A change in grading standards by the USDA in June 1965 caused a high proportion of young, high-quality cattle to grade Choice and thus contributed to these results. Further, Station-reared, Angus x Hereford steers that matured at an early age were used as test animals during 1965-70, whereas calves were purchased from central Alabama auction markets for the 1960-64 tests.

TABLE 2. STEER PERFORMANCE ON COOL-SEASON ANNUAL GRAZING, LOWER COASTAL PLAIN SUBSTATION, 1960-69

Performance measure	Result, by grazing mixture and year										
	Rye-ryegrass-crimson		Oats-ryegrass,	Rye-ryegrass-crimson		Oats-crimson,	Rye-ryegrass-crimson,	Oats-crimson,	Rye-ryegrass-crimson,	Oats-ryegrass-crimson,	10-year
	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	average
Date grazing began .....	10/29	11/10	10/23	12/4	11/5	11/10	10/20	10/17	11/4	10/15	11/1
Date grazing ended.....	4/28	5/7	4/26	4/24	4/30	5/18	5/3	5/17	5/9	5/12	5/5
Days grazed.....	184	178	190	140	177	189	195	213	186	209	186
Initial weight, lb.....	493	566	495	634	518	589	544	551	490	559	544
Gain/head (tester), lb. <sup>1</sup> .....	291	297	294	204	237	314	316	327	321	339	294
Tester ADG, lb.....	1.58	1.67	1.55	1.46	1.34	1.66	1.62	1.54	1.73	1.62	1.58
Gain/acre, lb. <sup>2</sup> .....	339	325	329	220	358	396	495	489	447	506	390
Days fed supplemental feed <sup>3</sup> .....	0	39	56	35	0	0	24	84	0	34	27
Stocking rate, animals/acre.....	1.16	1.08	1.12	1.17	1.51	1.26	1.57	1.50	1.39	1.49	1.32
Supplemental feed/animal											
Ground snap corn, lb.....	—	108	179	—	—	—	—	—	—	—	—
CSM, lb.....	—	57	45	—	—	—	—	—	—	—	—
HR grow-mix <sup>4</sup> , lb.....	—	—	421	350	—	—	108	804	—	361	—
Carcass grades											
No. Choice.....	—	—	—	—	—	9	7	3	2	8	29
No. Good.....	—	—	—	—	—	3	5	9	10	4	31

<sup>1</sup> Tester cattle are those grazed continuously for the season.

<sup>2</sup> Includes gain made by "put-and-take" cattle.

<sup>3</sup> Calves were fed some supplemental feed during short periods of inclement weather when grazing was inadequate.

<sup>4</sup> A blended mixture consisting of 54 per cent ground corn, 25 per cent ground grass hay, 10 per cent cane molasses, 10 per cent cottonseed meal, and 0.5 per cent each salt and dicalcium phosphate. Mixture is about 12 per cent protein and 60 per cent TDN.



### Gulf Coast Substation

A procedure similar to that at the other two substations was followed at the Gulf Coast, except that four fields were used at different times as test areas during the 9-year period. The Malbis and Orangeburg fine sandy loam soils used were typical of better soils in the Gulf Coast area of Alabama.

Three of the fields were too small (18-23 acres) to accommodate the number of cattle used; therefore, a combination of fields was used for each grazing season. The most common procedure was to plant a field that had been fallowed for early grazing and plant a second one following soybean harvest for later grazing. During periods of lush grazing, only one area was grazed and surplus forage on the other field was plowed under as humus or grazed by other cattle. In the field designated for earlier grazing, land was prepared in July or early August and fallowed until planting in early September. Mineral fertilizer was applied according to soil test in advance of planting. When clover was included in the mixture, no additional nitrogen was applied to the grazed sward. If only small grains and ryegrass were planted, 50 pounds of nitrogen per acre was applied about 30 days after planting and another 50 pounds about February 1.

Oats planted alone were seeded at the rate of 5 bushels per acre, but in combination the rate was reduced to 3 or 4 bushels. Rye or wheat was seeded at the rate of 60 pounds per acre in combination with 15 pounds of ryegrass and 20 pounds of crimson clover. Yuchi arrowleaf clover was substituted for crimson one year; however, results were not representative because the Yuchi was undergrazed.

Beef steers were used as test animals at an initial stocking rate of about one per acre. Beef and dairy heifers were used as "put-and-take" animals to effectively utilize forage. Animal performance data are given in Table 3.

Grazing usually began in November, the average date being November 22. The late beginning in 1961-62 was caused by fall harvesting of soybeans prior to pasture planting. The grazing period averaged ending May 7 for a grazing season of 166 days. Grazing was continuous (November-May) and cattle were not supplemented except for about 50 days each during 1962 and 1963. These non-grazing periods were caused by unusually cold weather. Corn silage plus 2 pounds of ground ear corn daily were fed during the 43-day period when cattle were off grazing in 1962-63. In 1963-64 the cattle

TABLE 3. STEER PERFORMANCE ON COOL-SEASON ANNUAL GRAZING, GULF COAST SUBSTATION, 1961-69

Performance measure	Result, by grazing mixture and year									
	Oats, 1961-62	Oats- ryegrass, 1962-63	Oats- ryegrass, wheat- ryegrass, 1963-64	Wheat- ryegrass, 1964-65	Oats-ryegrass		Oats- ryegrass- Yuchi, 1967-68	Oats-crimson-ryegrass		9-year average
				1965-66	1966-67		1968-69	1969-70		
Date grazing began.....	2/3 <sup>1</sup>	11/23	11/27	11/11	11/23	10/25	11/7	11/28	10/28	11/22
Date grazing ended.....	5/4	5/3	5/29	5/5	4/26	5/2	5/14	5/5	5/4	5/7
Days grazed.....	89	118	182	175	154	188	189	160	188	160
Initial weight, lb.....	530	543	498	482	519	516	562	504	473	514
Weight end of grazing, lb....	731	803	778	722	787	762	840	809	784	780
Gain/head, lb.....	201	260	280	240	268	246	278	305	311	266
ADG, lb.....	2.26	1.61	1.54	1.37	1.74	1.31	1.47	1.91	1.65	1.65
Days fed supplemental feed <sup>2</sup> .....	—	43	61	—	—	—	—	—	—	—
Stocking rate, animals/acre <sup>3</sup> .....	1.28	1.15	1.10	1.06	1.18	1.28	1.28	1.33	1.04	1.19

<sup>1</sup> Area planted late because of harvest of crop grown previously.

<sup>2</sup> During 1962-63 calves were removed from grazing for the 43-day feeding period, but the following year they were fed on pasture.

<sup>3</sup> Test area of 18 or 38 acres was stocked with beef steers and dairy or beef heifers; stocking rate shown was calculated from total grazing days credited to the pasture.

were fed 4.5 pounds corn-soybean meal mixture plus 4 pounds of grass hay daily for 61 days, with feeding done on pasture.

Steers gained an average of 266 pounds each during the 166-day period (November 22–May 7) for an average daily gain of 1.60 pounds. However, if gain made from harvested feed were excluded when possible (1962-63), the average grazing gain per head was 264 pounds and average daily gain on grazing was 1.70 pounds.

### DISCUSSION OF RESULTS

Animal gain from grazing and harvested feed averaged 536 and 390 pounds per acre for the Tennessee Valley and Lower Coastal Plain substations, respectively. A comparative value was not reported for the Gulf Coast because heifers were used as “put-and-take” animals. The gain data in Table 4 show that steers at the Tennessee Valley averaged gaining 1.49 pounds daily on grazing; but gain was 1.37 pounds daily when the harvested feeding period is included. At the Lower Coastal Plain Substation, gain could not be partitioned because cattle were fed on the pasture, but gain from grazing and supplement averaged 1.58 pounds per day. Harvested feed was needed only twice (1962-63, 1963-64) during the 9 years reported for the Gulf Coast Substation; however, gain could be apportioned between grazing and feed during 1962-63 only. The following year feed was provided while the cattle were on the test pasture; therefore, gain could not be divided as to source.

TABLE 4. GAIN DATA FOR STEERS ON GRAZING, TWO LOCATIONS, 1960-70

Year	Tennessee Valley Substation <sup>1</sup>		Gulf Coast Substation <sup>2</sup>	
	Actual days on grazing	ADG on grazing	Actual days on grazing	ADG on grazing
	<i>Number</i>	<i>Pounds</i>	<i>Number</i>	<i>Pounds</i>
1960-61.....	122	1.34	—	—
1961-62.....	119	1.35	89	2.26
1962-63.....	90	1.28	118	2.07
1963-64.....	104	1.92	182	1.54
1964-65.....	109	1.29	175	1.37
1965-66.....	201	1.72	154	1.74
1966-67.....	215	1.57	188	1.31
1967-68.....	212	1.01	189	1.47
1968-69.....	141	1.62	160	1.91
1969-70.....	159	1.82	188	1.65
AVERAGE.....	147	1.49	160	1.70

<sup>1</sup> Cattle were off grazing an average of 60 days during which time they were fed.

<sup>2</sup> Grazing was continuous and cattle were not supplemented except during severe winters of 1962-63 and 1963-64.

The cattle generally grazed from late October until May and gained at a rate of 1.4 to 1.6 pounds daily. The later starting date at the Gulf Coast Substation was partially a result of land management since the test area usually was double-cropped. In addition, the lower night temperature in the Tennessee Valley probably resulted in less evapotranspiration by plant seedlings. Cooler nights in late August and September at that northern Alabama location had a favorable effect on growth of the cool-season species, resulting in earlier grazing. The summer fallowing procedure practiced routinely at the Tennessee Valley and Lower Coastal Plain substations undoubtedly contributed to earlier grazing because of weed control and moisture conservation.

Stocking rate was considerably higher at the Tennessee Valley Substation (1.9 steers per acre) than at the Lower Coastal Plain (1.3) or Gulf Coast (1.2) locations. However, size of animal affected stocking rate. The average initial weights were 441, 544, and 514 pounds for Tennessee Valley, Lower Coastal Plain, and Gulf Coast, respectively. Metabolic body size ( $W^{0.75}$ ) is more accurate than conventional weight data in estimation of basal metabolism and thus energy required for animal maintenance. Therefore, average initial weights were converted to metabolic body size and multiplied by the average stocking rate to obtain a measure of nutrients provided by an acre of grazing at the three locations. This conversion reduced the differences somewhat; however, an acre of grazing at the Tennessee Valley and Lower Coastal Plain substations produced 42 and 16 per cent more energy, respectively, for maintenance when compared to the Gulf Coast Substation. Stocking rate data reported for the Gulf Coast Substation are not as meaningful as that at the other two locations. At the Gulf Coast, the pasture areas were considerably larger than those at the other substations (18 to 38 acres compared to 8 or 12 acres) and were not stocked at an optimum rate. More emphasis was put on total land utilization at the Gulf Coast Substation, which involved a double-cropping system rather than grazing only.

Cattle at the Tennessee Valley Substation were removed from grazing and fed at the barn for an average of 60 days during the average 207-day grazing season. The off-period occurred every year during this 10-year study; thus it is necessary in the Tennessee Valley area to provide supplemental feed during a non-grazing period each year. Removal from grazing was necessary because of inclement

weather with its accompanying wet soil conditions or shortage of forage.

Winter conditions at Camden, in central Alabama, were not as severe as at the Tennessee Valley; therefore, cattle received harvested feed only 6 out of the 10 years. They were fed on pasture, and that seems to be an acceptable management practice for the Lower Coastal Plain Substation.

Cattle can usually graze cool-season annual forages continuously from November until early May at the Gulf Coast Substation. The 2 years during this study in which cattle were removed were unusual and among the coldest on record. Steer calves had an average daily gain on grazing of 1.49 pounds at the Tennessee Valley and 1.70 pounds at the Gulf Coast Substation during this study, Table 4. Average grazing gain per animal was 219 and 272 pounds, respectively, at the two locations. Comparable data were not reported for the Lower Coastal Plain Substation because cattle were fed as necessary during the winter while on pasture.

These small grain-clover pastures should produce about 400 pounds of beef per acre with adequate seedbed preparation, early planting, adequate fertilization, and good grazing management.

### SUMMARY

(1) Stocker beef steers weighing about 450 to 500 pounds gained at an average rate of 1.4 to 1.6 pounds daily while grazing small grain-clover pastures supplemented as needed. Average gain per animal from October to May was 266 to 294 pounds.

(2) Animal gain per acre from such grazing averaged 416 and 314 pounds for the Tennessee Valley and Gulf Coast substations, respectively.

(3) Cattle at the Tennessee Valley Substation had to be removed from grazing for an average of 60 days during each winter. Comparable animals were kept on the pasture all winter at the Lower Coastal Plain Substation; however, some harvested feed was provided an average of 45 days during 6 of the 10 years studied. Supplemental feed was not required in 7 of 9 years in the Gulf Coast test.

(4) Cool-season annual grazing was an excellent method of producing a 700-pound feeder steer from a 400-pound stocker calf. Good and Choice slaughter steers were produced directly from grazing when calves weighed about 550 pounds initially and optimum grazing conditions existed.

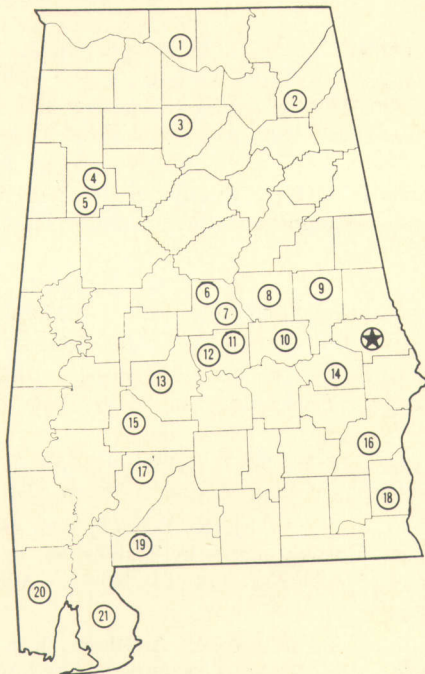


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## AGRICULTURAL EXPERIMENT STATION SYSTEM OF ALABAMA'S LAND-GRANT UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, live-stock, 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.