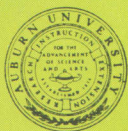


Fescue,
Orchardgrass,
and Coastal
Bermudagrass
Grazing for
Yearling Beef
Steers



AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY

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Auburn, Alabama

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Fescue, Orchardgrass, and Coastal Bermudagrass Grazing For Yearling Beef Steers

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PERENNIAL PASTURES generally cost less to produce and may be grown on soils not suitable for small grains and similar annuals (4,7). However, research has shown that cool-season annual grazing crops are more suitable for slaughter beef production in Alabama than warm-season annual or perennial pastures (3,5,8, 10).

Rye and crimson clover sod-seeded on Coastal bermudagrass or rye on dallisgrass-white clover provided grazing in early March in central Alabama (9). At a stocking rate of about one steer per acre beef gain averaged 285 pounds per acre for the initial 118 days (March-June) of grazing. However, oats-crimson clover and rye-ryegrass-crimson clover pastures planted on prepared land carried more steers per acre and produced more beef per acre than the sod-seeded mixtures.

Even though they are not satisfactory for producing slaughter beef, warm-season perennials such as Coastal bermuda and sericea can be utilized very effectively for grazing or hay in a cow-calf system (2,6). A mixture of vetch and crimson clover was sod-seeded in Coastal bermuda on upland soil and grazed with brood cows and calves (7). This pasture combination produced 387 pounds of calf gain per acre and carried an average of 1.21 cow-calf units per acre from April 8 to October 5.

In an attempt to lengthen the grazing season, dallisgrass-white clover and fescue were interplanted at Alabama's Lower Coastal Plain Substation, Camden, Alabama. Yearling beef steers in this 3-year study averaged gaining 333 pounds per acre when the

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pasture was fertilized with 120 pounds each of N and K_2O and 240 pounds of P_2O_5 per acre (1).

Orchardgrass-white clover pasture has shown potential for yearling steers in northern Alabama (3). Tall fescue is the dominant cool-season perennial crop used for grazing in northern Alabama and would be the standard against which other species would be measured. Information was needed concerning animal response on grass-legume swards as contrasted to grass alone with comparable levels of nitrogen.

EXPERIMENTAL PROCEDURE

Kentucky 31 tall fescue and common orchardgrass, each with and without Regal white clover, were compared to hairy vetch or Explorer rye seeded in Coastal bermudagrass sod as grazing crops for beef steers. The 8-year study (1964-71) was conducted at the Tennessee Valley Substation, Belle Mina, Alabama.

Forages were planted in 2-acre paddocks in Humphreys silt loam soil underlain by a chert bed 28-48 inches below the surface. Paddocks were randomized in a split-block design with six treatments replicated twice. Tall fescue and orchardgrass combinations were planted during the fall of 1962 and spring of 1963 but were not grazed until the spring of 1964. Established stands of Coastal bermudagrass were available from a prior grazing experiment.

Lime and mineral fertilizers were applied according to soil test. Nitrogen was applied in split application at the rate of 150 pounds per acre annually for fescue and orchardgrass without clover, and rye-Coastal bermuda swards. Grass-clover combinations did not receive nitrogen. The vetch-Coastal bermuda sward received 100 pounds of nitrogen per acre annually in two applications.

Nitrogen was usually applied to orchardgrass and tall fescue swards during February, March, and August. The Coastal bermuda swards generally got nitrogen during February, May, and June with the February application being omitted for the vetch-Coastal combination.

Coastal bermuda was heavily grazed during late August and early September to remove as much forage as was practical. Vetch (30 pounds/acre) or rye ($1\frac{1}{2}$ bushels/acre) was drilled into the Coastal bermuda sod in late September. Remaining aftermath growth was then cut closely but not removed.

Good or Choice yearling beef steers of predominately Angus or Hereford breeding and averaging about 560 pounds initially were used as test animals. Animals that grazed for the entire fall or spring-summer season were designated "testers." Other steers were added or removed according to forage availability. All steers were weighed at approximately 28-day intervals during the grazing season. Gain per animal and average daily gain (ADG) data were collected only from testers but results from all cattle were included when gain per acre and stocking rate were computed.

Cattle grazed tall fescue and orchardgrass combinations for a short period during the fall but were removed during mid-winter because of insufficient forage. When steers were not grazing test swards, they had limited grazing on tall fescue-orchardgrass pasture and were fed corn silage and supplement in amounts sufficient to maintain body weight.

RESULTS

Coastal bermuda containing sod-seeded rye or vetch did not provide grazing during the fall but the tall fescue and orchardgrass pastures did. The average beginning date for fall grazing was September 25; with the grazing period varying from 47-58 days, Table 1. During this fall period the steers gained an average of about 1 pound daily when pastures were stocked at the rate of about two steers per acre. Their total gain was slightly less than 100 pounds per acre.

The primary grazing season for the swards tested in this study occurred between March and September. The average starting

TABLE 1. PERFORMANCE OF STEERS DURING FALL GRAZING SEASON¹ 1964-70

Sward	Date on	Date off	Days on grazing	Gain/acre	Grazing days/acre	Stock rate steers/acre	ADG
				<i>Lb.</i>			<i>Lb.</i>
Fescue + N.....	9/25	11/22	58	110	119	2.16	0.98
Fescue-clover.....	9/25	11/15	51	99	103	2.06	0.93
Orchard + N.....	9/25	11/11	47	91	91	1.89	1.01
Orchard-clover.....	9/25	11/15	51	93	106	2.00	0.95
Vetch-Coastal B.....	Not stocked during fall months						
Rye-Coastal B.....	Not stocked during fall months						

¹ Values reported are means of 7 years and 2 replications.

TABLE 2. AVERAGE DAILY GAIN OF STEERS GRAZED CONTINUOUSLY FOR THE SPRING AND SUMMER SEASON¹ 1964-71

Year	Fescue + N	Fescue- clover	Orchard + N	Orchard- clover	Vetch- Coastal B.	Rye- Coastal B.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
1.....	1.69	2.11	1.70	2.03	1.02	1.34
2.....	1.18	1.46	1.98	1.58	1.29	1.38
3.....	1.34	1.49	2.04	2.01	1.39	1.38
4.....	1.20	1.60	1.78	1.65	1.25	1.07
5.....	0.92	1.58	2.00	2.20	1.73	1.35
6.....	1.48	1.74	1.76	1.66	1.21	1.36
7.....	0.82	0.64	1.19	1.57	1.05	1.20
8.....	1.94	1.47	1.62	2.10	1.39	1.38
Av. ²	1.31 ^a	1.46 ^b	1.77 ^c	1.83 ^c	1.29 ^a	1.30 ^a

¹ Each value is an average of 2 replications and a minimum of 4 steers.

² Values having unlike superscripts are different, $P < .01$.

date for tall fescue grazing was March 18; for orchardgrass it was 5 days later. Grazing on rye-Coastal bermuda began at essentially the same time (March 19) but the hairy vetch-Coastal bermuda grazing began 16 days later (April 4). The spring-summer grazing season averaged 92 days for tall fescue and orchardgrass but much longer (161 days) for Coastal bermuda swards. The grazing season on fescue and orchardgrass pastures ranged from 85 to 108 days.

Steers grazed continuously for the spring-summer season gained faster on orchardgrass than on fescue or the Coastal combinations, Table 2. The inclusion of white clover in the orchardgrass sward did not significantly improve rate of gain (1.83 vs. 1.77 pounds ADG); however, it did result in a higher ADG when used with tall fescue (1.46 vs 1.31 pounds). Steer gains on the Coastal bermuda grazing (1.29, 1.30 pounds) were very similar to those observed in many studies conducted throughout Alabama. Results reported in Table 3 indicate that steers generally gained rapidly (1.6-2.8 pounds, ADG) during the first month on grazing; however, rate of gain declined as the grazing season progressed. Steers grazing Coastal bermuda after July 10 averaged gaining 0.60 pound daily for the remainder of the grazing season, Table 3.

Steers grazing the orchardgrass and fescue combinations for the entire spring-summer season gained an average of 121 to 160 pounds per animal, Table 4. Steers grazing the Coastal bermuda swards gained 196 to 219 pounds. The higher gain per

TABLE 3. AVERAGE DAILY GAIN BY 28-DAY PERIODS, OF STEERS GRAZED CONTINUOUSLY FOR THE SPRING-SUMMER SEASON¹ 1964-71

Sward	Grazing periods							Season ADG
	3/18-4/15	4/16-5/13	5/14-6/11	6/12-7/9	7/10-8/7	8/8-9/4	9/5-9/27	
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	
Fescue + N.....	1.64	1.34	0.95	0.81	-----	-----	-----	1.31
Fescue-clover.....	1.80	1.23	1.42	0.27	-----	-----	-----	1.46
Orchard + N.....	2.16	1.73	1.34	-----	-----	-----	-----	1.77
Orchard-clover.....	2.05	1.93	1.56	1.19	-----	-----	-----	1.83
Vetch-Coastal B.....	2.82	1.63	1.35	1.24	0.61	0.79	0.44	1.29
Rye-Coastal B.....	2.17	1.42	1.54	1.13	0.58	0.77	0.39	1.30

¹ Values reported are 8-year averages.

TABLE 4. AVERAGE GAIN PER STEER GRAZED CONTINUOUSLY FOR SPRING-SUMMER SEASON¹ 1964-71

Year	Fescue + N	Fescue-clover	Orchard + N	Orchard-clover	Vetch-Coastal B.	Rye-Coastal B.
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>
1.....	132	163	118	140	152	200
2.....	134	165	180	144	227	272
3.....	134	158	204	201	203	229
4.....	122	150	138	124	180	136
5.....	77	130	157	188	254	226
6.....	119	155	136	136	180	235
7.....	85	72	89	170	157	212
8.....	162	125	78	178	216	245
Av.....	121 ^c	140 ^{bc}	137 ^{bc}	160 ^b	196 ^a	219 ^a

¹ Each value is an average of 2 replications and a minimum of 4 steers; means having unlike superscripts differ, $P < .05$.

animal on Coastal bermuda pastures resulted from the longer grazing season since ADG was lower.

Total gain per acre, Table 5, for tall fescue and orchardgrass pastures was similar, ranging from 200 to 268 pounds. Gains for the Coastal bermuda combinations were much higher (493 to 530 pounds). The high yields per acre on Coastal bermuda resulted from the long grazing season and high carrying capacity.

For the swards in this experiment, slightly more than 40 per cent of the total gain per acre was obtained during the first one-third of the grazing season. About 75 per cent of total per acre gain for these same swards occurred during the initial two-thirds of the grazing season. The year-to-year variation in gain per

TABLE 5 TOTAL GAIN PER ACRE, ACCUMULATED BY PERIODS^{1,2} 1964-71

Sward	Grazing periods							Season total
	3/18-4/15	4/16-5/13	5/14-6/11	6/12-7/9	7/10-8/7	8/8-9/4	9/5-9/27	
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	
Fescue + N.....	115	206	256	268	-----	-----	-----	268 ^a
Fescue-clover.....	118	178	240	244	-----	-----	-----	244 ^a
Orchard + N.....	90	154	197	200	-----	-----	-----	200 ^a
Orchard-clover.....	82	170	238	244	-----	-----	-----	244 ^a
Vetch-Coastal B.....	103	190	287	388	447	488	493	493 ^b
Rye-Coastal B.....	130	220	335	422	483	525	530	530 ^b

¹ Periods are approximately 28 days, March to September.

² Values reported are 8-year means of 2 replications and those with unlike superscripts differ, $P < .01$.

TABLE 6. TOTAL GAIN PER ACRE, BY YEARS¹ 1964-71

Sward	Year								8-yr. x
	1	2	3	4	5	6	7	8	
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>
Fescue + N.....	271	266	338	249	240	310	190	289	268 ^a
Fescue-clover.....	235	268	228	170	274	421	139	219	244 ^a
Orchard + N.....	176	214	224	144	338	264	144	95	200 ^a
Orchard-clover.....	244	175	239	155	264	374	294	208	244 ^a
Vetch-Coastal B.....	468	415	559	478	545	466	431	586	493 ^b
Rye-Coastal B.....	595	561	532	350	501	605	490	605	530 ^b

¹ Values are means of 2 replications; those having unlike superscripts differ, $P < 0.01$.

acre was significant but treatments ranked similarly among years, Table 6.

One measure of pasture carrying capacity is the number of animal days per acre. Orchardgrass pastures supported the fewest steer days per acre (114, 130), with fescue being better (163, 202), Table 7. The Coastal combinations were much superior in terms of carrying capacity (401, 414). Calculated as steers per acre daily for the season, the values become 2.13 for fescue + N, 1.81 for fescue-clover, 1.27 for orchardgrass + N, 1.46 for orchardgrass-clover, 2.26 for vetch-Coastal, and 2.45 for rye-Coastal.

About 35 per cent of the total annual rainfall occurred between the first of March and end of June, Table 8. The average rainfall in March was 5.6 inches and progressively decreased each month to 2.7 inches in June. Rainfall averaged 4.7 and 4.1 inches for the months of July and August, respectively. The average annual rainfall during this 8-year experiment (52 inches) was the same as the longtime average.

TABLE 7. STEER DAYS PER ACRE, BY YEARS 1964-71

Sward	Year ¹								8-yr. x ²
	1	2	3	4	5	6	7	8	
Fescue + N.....	157	216	235	214	190	217	236	149	202 ^b
Fescue-clover.....	112	176	164	128	159	234	222	149	168 ^b
Orchard + N.....	104	108	118	80	149	152	145	59	114 ^a
Orchard-clover.....	120	108	118	94	124	202	182	96	130 ^a
Vetch-Coastal B.....	384	382	422	403	344	412	410	452	401 ^c
Rye-Coastal B.....	384	441	420	334	373	472	419	468	414 ^c

¹ Values are means of 2 replications.

² Those values with unlike superscripts differ, $P < 0.01$.

TABLE 8. SUMMARY OF RAINFALL (INCHES) FOR MARCH THROUGH AUGUST 1964-71

Year	March	April	May	June	March-June subtotal	July	Aug.	July-Aug. subtotal	Mar.- Aug. subtotal	Annual rainfall
1964.....	12.7	11.1	2.6	1.5	27.9	4.4	2.7	7.1	35.0	63.1
1965.....	7.9	4.8	1.1	4.5	18.3	6.0	3.6	9.6	27.9	40.9
1966.....	2.2	4.0	7.6	1.6	15.4	3.6	3.6	7.2	22.6	48.3
1967.....	1.4	2.6	4.2	5.4	13.6	7.3	8.8	16.1	29.7	62.8
1968.....	6.2	3.8	4.2	0.7	14.9	3.0	4.2	7.2	22.1	43.4
1969.....	2.6	6.4	6.6	1.4	17.0	3.2	2.6	5.8	22.8	53.3
1970.....	6.8	8.8	2.6	4.6	22.8	4.1	4.3	8.4	31.2	48.6
1971.....	5.2	2.9	3.1	2.3	13.5	5.9	3.0	8.9	22.4	51.2
8-year average.....	5.6	5.6	4.0	2.7	17.9	4.7	4.1	8.8	26.7	51.5

TABLE 9. ANIMAL PERFORMANCE FROM FALL PLUS SPRING-SUMMER GRAZING 1964-71

Sward	Fall ¹				Spring-summer ²				Total annual gain per acre
	Gain per tester steer	Tester ADG	Gain per acre	Length grazing season	Gain per tester steer	Tester ADG	Gain per acre	Length grazing season	
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Days</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Days</i>	<i>Lb.</i>
Fescue + N.....	57	0.98	110	58	121	1.31	268	95	378
Fescue-clover.....	47	0.93	99	51	140	1.46	244	93	343
Orchard + N.....	47	1.01	91	47	137	1.77	200	90	291
Orchard-clover.....	48	0.95	93	51	160	1.83	244	89	337
Vetch-Coastal B.....	Not stocked during fall				196	1.29	493	153	493
Rye-Coastal B.....	Not stocked during fall				219	1.30	530	169	530

¹ Values are means of 7 years and 2 replications.

² Values are means of 8 years and 2 replications.

Animal performance data from the fall and spring-summer grazing seasons combined are shown in Table 9. The total annual gain per acre averaged about 340 pounds for tall fescue and orchardgrass swards. Just slightly less than 100 pounds of gain was produced during the fall and the remainder during spring-summer. All of the 512 pounds per acre produced on the Coastal bermuda pastures was obtained during the spring-summer season.

The total gain per tester steer for the continued spring-summer grazing season averaged 208 pounds for Coastal bermudagrass. The sum of tester gain for the fall and spring-summer seasons averaged 196 pounds for orchardgrass and 182 pounds for tall fescue, Table 9. Calves grazing tall fescue and orchardgrass mixtures gained an average of 360 and 314 pounds per acre, respectively, when grazing seasons were combined. The days of maintenance between November and March for these cattle were 118 and 129 for tall fescue and orchardgrass, in order. Stocking rates were about two animals per acre for tall fescue and 1.6 for orchardgrass pastures when fall and spring-summer grazing seasons were combined.

DISCUSSION

Animal performance was poor on fescue and orchardgrass during the fall months, even though these crops were not grazed from June 20 until September 25. Stocking rate was approximately two steers per acre during the fall and rate of gain was low (1 pound daily) during the 50-day grazing period.

A direct comparison of the advantage gained by sod-seeding vetch or rye on Coastal bermuda was not provided in this experiment. However, during a previous year (1959), Coastal bermuda, without the sod-seeded crops, was grazed from May 12 to September 14. Steers gained an average of 119 pounds per head or 0.95 pound daily during that 126-day grazing season. Gain per acre was 313 pounds. Sod-seeding furnished earlier grazing (March 19, April 4) and higher gain per acre (about 500 pounds) because of the longer grazing season and higher ADG.

SUMMARY

Tall fescue and orchardgrass each containing white clover or receiving 150 pounds of commercial N per acre annually were

compared as pastures for steer calves. Coastal bermudagrass with sod-seeded vetch or rye was also evaluated in this 8-year experiment.

Beef gain averaged 360 and 314 pounds per acre annually from fescue and orchardgrass, respectively. Slightly less than 100 pounds of this gain was produced during the fall.

Rye or vetch seeded in Coastal bermudagrass sod produced an average of 512 pounds of gain per acre annually. All of this was produced during the spring-summer period.

Total gain per animal from tall fescue and orchardgrass grazing averaged 182 and 196 pounds, respectively, with approximately 50 pounds of this being obtained during the 50-day fall grazing period. Steers grazing Coastal bermuda with sod-seeded rye or vetch averaged 208 pounds of gain per head.

Inclusion of white clover in orchardgrass swards did not improve ADG of grazed steers (1.77 vs 1.83 pounds); however, a higher rate of gain was observed when clover was grown with tall fescue (1.31 vs 1.46 pounds). Commercial N (150 pounds/acre) was used with grass stands to replace legume N from grass-legume mixtures.

For the swards evaluated in this test, slightly more than 40 per cent of animal gain per acre was obtained during the first one-third of the spring-summer grazing season. About 75 per cent of the gain occurred in the initial two-thirds of the grazing season.

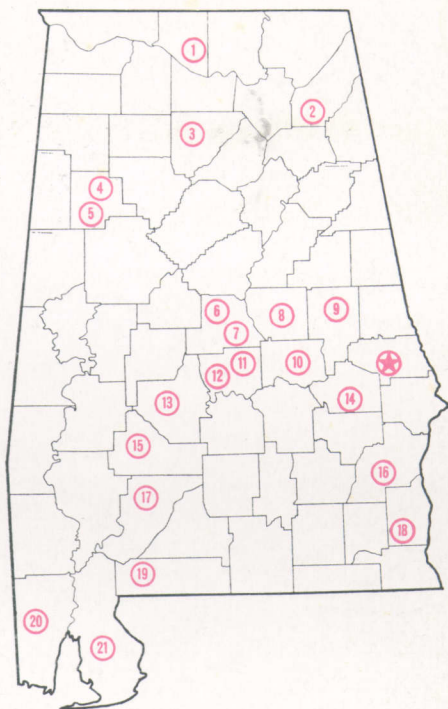
Stocking rates averaged 2.02, 1.56, and 2.54 steers per acre for fescue, orchardgrass, and Coastal bermudagrass pastures, respectively, when fall and spring-summer grazing seasons were combined.

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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.