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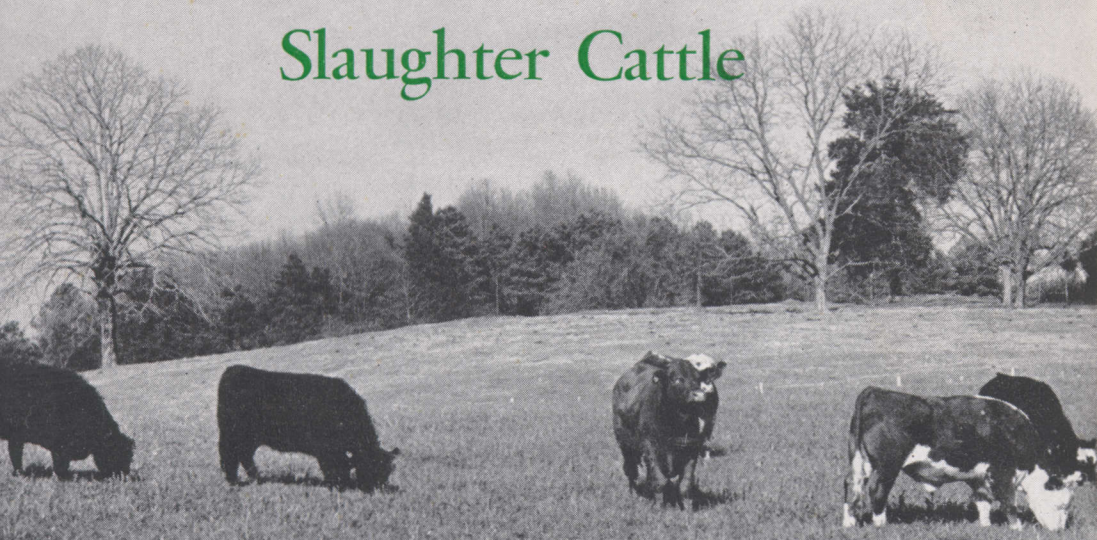
Rye-Ryegrass-Yuchi Arrowleaf Clover for Production of Slaughter Cattle



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Rye-Ryegrass-Yuchi Arrowleaf Clover for Production of Slaughter Cattle

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GRAZING CATTLE on warm and cool season swards is practiced throughout the southeastern United States. There are important advantages and disadvantages for each kind of sward resulting from climate. Cool season forages generally contain more non-cell wall material and are, therefore, generally more nutritious than warm season forages. Yearling cattle usually make more rapid daily gain on cool season than on warm season forages *(1,2,3,4,5,6)*. Results of many tests in Alabama show that yearling cattle grazed on summer pastures gained about 1.2 pounds daily and about 200-250 pounds for the entire season *(1,5,10)*. Also, at the end of the grazing season, the cattle had only a Standard slaughter grade. In contrast, yearling cattle on cool season annual pastures have made daily gain of 2 pounds and a total season gain of 350 pounds *(1,3,4,11)*. Under the usual management system cattle are weaned in late summer or early fall. These animals are to be wintered if they are to make use of the warm season pasture the following year. Management systems will be simplified by the satisfactory grazing program that would circumvent the long winter feeding period necessary when young cattle are held after weaning for warm season pasture.

In the past, cool season pastures have consisted of small grain or small grain with crimson clover and/or ryegrass. In recent years Yuchi arrowleaf clover (*Trifolium vesiculosum* Savi) has shown promise in several Alabama tests *(7,9)*. Yuchi is superior to crimson clover in that it is later maturing and remains produc-

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tive two months longer than crimson clover. More important, Yuchi retains relatively high digestibility under grazing until June, whereas crimson loses nutritive value rapidly during heading in early April (8).

The research reported herein was conducted at the Piedmont Substation near Camp Hill, Alabama, to determine if yearling cattle could be grown and fattened on rye-ryegrass-Yuchi arrowleaf clover pasture.

EXPERIMENTAL PROCEDURE

Rye-ryegrass-Yuchi arrowleaf clover pastures were planted on prepared seedbed during September at the Piedmont Substation in each of 4 years. The topography is quite hilly and the red clay soils are of mixed types. The seeding rates in pounds per acre were Wren's Abruzzi rye, 84; Italian ryegrass, 10; and Yuchi arrowleaf clover, 8. Mineral fertilizer was applied according to soil test. Nitrogen at the rate of 50 pounds per acre was applied in September and again in January.

Yearling, crossbred steers and heifers produced on the Piedmont Substation were used for grazing the pastures each year. In addition a small group of purchased steers was used the third and fourth years.

The first year there were two treatment groups. One group grazed the rye-ryegrass-Yuchi arrowleaf clover pasture; the second group was confined to drylot and full-fed corn silage and hand fed 1 pound per head daily of a supplement containing urea, cottonseed meal, and minerals (Auburn-65). At the time animals were allotted to treatment, a 24-mg. Stilbestrol pellet (DES) was placed in an ear of each steer. At the termination of the experiment a portion of the animals was sold for slaughter and carcass data were obtained. Although live grades among the steers were similar, the larger animals were selected for slaughter.

The second test year too few animals were available for two treatment groups. Therefore, the experimental animals available were assigned to the rye-ryegrass-Yuchi arrowleaf clover pasture. These animals also received DES. At the end of the grazing season they were sold directly for slaughter and carcass data obtained.

During the third test there were four experimental groups of cattle:

Group 1 – Confined to drylot and full-fed corn silage and fed 4 pounds of whole corn and 1 pound of protein supplement (Auburn-65) per head daily.

Group 2 – Confined to drylot and full-fed whole corn and fed 6 pounds of corn silage and 1 pound of protein supplement (Auburn-65) per head daily.

Group 3 – Grazed rye-ryegrass-Yuchi arrowleaf clover and provided whole shelled corn ad libitum.

Group 4 – Grazed without supplement on rye-ryegrass-Yuchi arrowleaf clover.

All these animals received DES (ear implant). Only steers were in Groups 1 and 2; heifers and steers were in Groups 3 and 4. When the experiment was terminated all animals were slaughtered and carcass data obtained.

The treatment groups for the fourth year were the same as those described for the third year with a minor exception. A pool of animals was carried in Group 1 for adding to Groups 3 and 4 as required for proper utilization of forage. The initial stocking rate for Group 3 was 1.43 animals per acre; for Group 4, 1.00 animal per acre.

RESULTS

First Year

The animals grazed the pasture from December 13, 1967 to June 3, 1968 (174 days). Pastures were stocked at the rate of one animal per acre. Steers on grazing made an average gain of 351 pounds or 2.01 pounds per head daily; the drylot cattle gained 261 pounds or 1.50 pounds per head daily, Table 1. The corn silage used for the drylot group was of poor quality and had a low grain content. Cost of gain on the pasture was 12.65 cents per pound as compared to 19.93 cents on silage, Table 1. The animals on pasture produced high-Good carcasses, whereas carcasses from the silage cattle were average-Good.

Rye and ryegrass stands were excellent in 1967-68 but dry autumn weather delayed grazing. Yuchi arrowleaf clover stands were thin in several areas but growth was good in late spring. Volunteer crimson clover furnished some grazing in late March.

TABLE 1. STEER PERFORMANCE ON PASTURE AND IN DRYLOT, 1967-68

Item	Rye-ryegrass-Yuchi grazing	Silage with supplement
Days on test, December 13 to June 3	174	174
Number of animals	10	10
Initial average weight, lb.	580	580
Final average weight, lb.	931	841
Gain, lb.	351 (51)[1]	261 (47)
Average daily gain, lb.	2.01	1.50
Daily feed		
Silage, lb.	----	53
Auburn-56	----	1
Feed cost/animal, dol.[2]	40.00	51.01
Feed cost/lb. gain, cents	12.65	19.93

[1] Standard deviation of means were 51 and 47, respectively.

[2] Feed cost: grazing, $40/acre; corn silage, $10/ton; Auburn-65, $80/ton.

Second Year

The steers grazed the pasture from December 2, 1968 to June 3, 1969 (183 days) and gained 438 pounds per head or a daily gain of 2.39 pounds, Table 2. The stocking rate of one animal per acre was too low in spring. Surplus forage during April 4 to May 16 was utilized by stocking with additional heifers. During this 42-day period the heifers made a daily gain of 2.64 pounds per head. The total steer and heifer gain per acre was 517 pounds, Table 2. Based on a pasture production cost of $40 per acre, this

TABLE 2. PERFORMANCE OF YEARLING CATTLE ON RYE-RYEGRASS-YUCHI ARROWLEAF CLOVER, 1968-69

Number of steers, December 2 to June 3	14
Av. age at slaughter, days	622
Av. initial live weight, lb.	574
Av. final live weight, lb.	1,012
Gain, lb.	438
Days, number	183
Average daily gain, lb.	2.39
Extra 10 heifers April 4-May 16	
Av. initial weight, lb.	565
Av. final weight, lb.	676
Gain, lb.	111
Days, number	42
Average daily gain, lb.	2.64
Total gain—steers and heifers per acre, lb.	517
Feed costs of gain, dol./cwt.	$9.13
Total animal grazing days per acre—steers and heifers[1]	218
Carcass data av. for 12 steers[2]	
USDA grade	High Good
Marbling	slight
Ribeye, sq. in.	12.18
Carcass weight, lb.	611

[1] Includes 75 days for steer dying of meningitis.

[2] Two steers were retained for other use.

total animal gain per acre cost $7.74 per hundredweight; if heifer gain is omitted, the cost of gain made by the steers was $9.13. The steers were sold directly for slaughter and yielded high-Good carcasses, Table 2. Excellent stands of Yuchi arrowleaf clover, rye, and ryegrass were obtained in 1968-69. The autumn was extremely dry so the pasture could not be grazed until December. Rye furnished most of the early season forage and Yuchi arrowleaf clover produced most of the grazing from April to June. Heavy grazing by cattle kept clover vigorous and leafy in late spring. Ryegrass furnished grazing in late February and March. Ryegrass was also valuable in furnishing a better sod and reducing pugging by cattle in wet weather.

Third Year

For the third year the test period was 209 days from November 11 to June 8, Table 3. Live weight gains per steer were: Group 1

TABLE 3. PERFORMANCE OF YEARLING CATTLE ON RYE-RYEGRASS-YUCHI ARROWLEAF CLOVER PASTURE AND DRYLOT FEED, 1969-70

Item	Group 1 drylot corn silage	Group 2 drylot whole corn	Group 3 grazing + corn	Group 4 grazing only
Days on test, November 11-June 8	209	209	209	209
Number animals	10	10	14	14
Weight change				
Steers				
Initial, lb.	529	517	543	543
Final, lb.	856	965	955	923
Gain, lb.	327	448	412	380
ADG, lb.	1.56	2.14	1.97	1.82
Heifers				
Initial, lb.	------	------	488	486
Final, lb.	------	------	840	804
Gain, lb.	------	------	352	318
ADG, lb.	------	------	1.68	1.52
Carcass data				
Grades				
Choice, pct.	------	100	55	21
Good, pct.	90	------	45	79
Standard, pct.	10	------	------	------
Average weight, lb.	491	597	553	524
Dressing pct.	57.4	61.9	61.5	60.7
Feed consumed daily				
Corn silage, lb.	43	7	------	------
Whole corn, lb.	4	15.5	9.9	------
Auburn-65, lb.	1	1	------	------
Feed cost/lb. gain, cents[1]	23.31	23.45	23.56	10.53

[1] Cost of feed items were: pasture, $40 per acre; shelled corn, $2.70 per cwt.; and Auburn-65, $4.00 per cwt.

(corn silage) 327, Group 2 (drylot-whole corn) 448, Group 3 (grazing and corn) 412, and Group 4 (grazing only) 380 pounds.

Steers fed whole corn on pasture, Group 3, consumed an average of 9.9 pounds of corn daily, but gained only 0.15 pounds daily more than steers grazed without corn, Group 4. Carcass grade, however, was improved by feeding grains, Table 3. The lowest feed cost of gain among the four treatments was the group grazed without corn, Group 4. Under the conditions of this test, steers full fed corn in drylot returned more money above feed cost than steers fed corn on pasture, Table 3. Excellent stands of all species were obtained and grazing was begun November 11, 1969. The long cold winter with continuous low temperatures below normal sharply reduced pasture growth. Available grazing was limited in February but cattle were not removed from the pasture. Rye furnished most of the grazing until late March when considerable Yuchi arrowleaf clover and ryegrass were available. Vigorous growth by the latter two species in April resulted in heavy surplus growth which was not utilized. Since no additional animals were added, clover and ryegrass grew 2 to 3 feet tall by May and forage quality, particularly of ryegrass, declined.

Fourth Year

The fourth year test period was 207 days covering the period November 13 to June 7, Table 4. Live weight gains (pounds) per steer for animals in each treatment continuously for 207 days were: Group 1 (corn silage) 357, Group 2 (drylot – whole corn, 143 days) 343, Group 3 (grazing and corn) 483, and Group 4 (grazing only) 409. The pasture stocking rates for Groups 3 and 4 should be of great importance in evaluating the performance data of steers on these treatments. The animals per pasture acre per period for these two treatments were as follows:

Period	*Group 3*	*Group 4*
November (18 days)	1.43	1.00
December (31 days)	1.43	1.00
January (31 days)	1.43	1.00
February (28 days)	1.43	1.00
March (31 days)	2.07	1.36
April (30 days)	2.00	1.50
May (31 days)	2.36	1.79
June (7 days)	2.36	1.93
Total animal days per acre	366	263

TABLE 4. PERFORMANCE OF YEARLING CATTLE ON RYE-RYEGRASS-YUCHI ARROWLEAF CLOVER PASTURE AND DRYLOT FEED, 1970-71

Item	Group 1 drylot corn silage	Group 2 drylot whole corn	Group 3 grazing + corn	Group 4 grazing only
Days on test, November 13-June7	207	143	207	207
Number of steers[1]	10	10	18	14
Weight change				
Initial, lb.	627	618	575	610
Final, lb.	984	961	1,058	1,019
Gain, lb.	357	343	483	409
ADG, lb.	1.72	2.40	2.34	1.98
Carcass data				
Grades				
Choice, pct.	40	50	58	5
Good, pct.	60	50	42	95
Standard, pct.	0	0	0	0
Average weight, lb.	572	592	660	618
Dressing pct.	58.0	61.5	62.3	60.6
Feed consumed daily				
Corn silage, lb.	34.5	7.2	-----	-----
Whole corn, lb.	4.0	17.1	13.1	-----
Auburn-65, lb.	1.0	1.0	-----	-----
Feed cost/lb. gain, cents[2]				
Harvested feeds	19.8	26.7	18.4	-----
Pasture cost	-----	-----	5.86	9.62
Total	19.8	26.8	24.26	9.62

[1] Only animals on test for full test period.

[2] Cost of feed items were: pasture, $50 per acre; shelled corn, $3.30 per cwt.; and Auburn-65, $4.00 per cwt.

Therefore, the stocking rate of the paddocks remained constant until March when additional cattle were added to each group. These additional cattle came out of the pool of animals carried in Group 1.

Steers fed whole corn on pasture, Group 3, consumed an average of 13.1 pounds of corn daily. The daily gain for animals in this treatment for 207 days was 2.34 pounds; steers on grazing for 207 days without corn (Group 4) had an average daily gain of 1.98 pounds. Steers grazing 207 days without corn gained 409 pounds each; steers grazing 207 days with corn (2,712 pounds of corn per head) gained 483 pounds each. When corn was fed steers in Group 3, the number of animal days per acre of grazing was increased by 103, a 39 per cent increase. Animals full fed corn silage and a minimum amount of corn and supplement (Group 1) gained an average of 357 pounds for the 207 day test period (Table 4). These animals consumed a daily ration consisting of 34.5

pounds of silage, 4 pounds of whole corn and 1 pound of Auburn-65. This daily ration cost 34 cents (19.8 cents per pound). In contrast, the non-supplemented steers on rye-ryegrass-arrowleaf clover pasture gained 409 pounds per head and the pasture cost per pound of gain was 7.66 cents. When grain was fed to steers on pasture (Group 3) the gain was increased to 483 pounds per head, but the cost of gain was increased to 23.09 cents per pound.

Utilization of Group 4 (grazing only) pastures was excellent. With increased stocking rate in spring, rye was well grazed, permitting excellent clover and ryegrass growth from March to June. In contrast, Group 3 (grazing and corn) cattle grazed rye poorly in late winter so surplus rye accumulated and clover and ryegrass growth was limited by shade.

Group 2 (drylot fed whole corn and supplement) were fed only 143 days. At this time, it was judged that these animals were properly finished; therefore, they were sold for slaughter. The carcass information on this group of cattle is given in Table 4. The information on this group of cattle should be helpful in appraising the value of rye-ryegrass arrowleaf clover (Groups 3 and 4) for producing slaughter cattle.

DISCUSSION

The use of rye-ryegrass-Yuchi arrowleaf clover proved to be a valuable means of growing yearling cattle to slaughter finish. The average live weight gain per steer for years 1-4 were 351 pounds, 438 pounds, 380 pounds, and 409 pounds, respectively. Thus, the 4-year mean gain per steer was 395 pounds. This is sufficient gain per animal for the system to be profitable even when there should exist a negative margin between the purchase and sale prices per pound for the animal. Carcasses from these animals graded Good to low Choice and did not have undesirable pigmentation of the fat cover. Dressing percentages (DP) for cattle directly off grazing were 60 per cent or higher. This is a very desirable dressing percentage for pasture-produced slaughter cattle, but it is somewhat higher than the value for cattle off similar pasture at other places in Alabama.

A stocking rate of one yearling animal per acre generally proved satisfactory for all 4 years until spring. Each year additional cattle could have been added to the pastures in March. Based on the results, this type pasture should not be stocked with more than one animal per acre until March. During the fourth

year it was possible to measure the influence of grain supplement on stocking rate (Group 3 vs. Group 4, fourth year). By feeding whole corn, the stocking rate per acre was 1.43 animals until March 1. From March until June the pasture carried two or more animals per acre.

This experiment was designed primarily to evaluate grazing for the production of slaughter cattle. Cattle that grazed rye-ryegrass-Yuchi arrowleaf clover made exceptional live weight gain and dressed desirable carcasses; but this experiment also provided information to compare drylot feeding with the pasture feeding. For 3 of the 4 years, a group of cattle was fed silage and supplement. The average weight gains per steer for each of the 3 years were 261 pounds, 327 pounds, and 357 pounds. Although these gains were lower than gains for comparable cattle on pasture, they were judged to be satisfactory. The cost of gain for the silage cattle was higher than the cost of gain for the pasture cattle. During the fourth year, surplus cattle were carried on silage for adding to the pasture group when forage growth permitted. This proved to be a valuable procedure and should permit more efficient utilization of the cool season pasture for the production of slaughter cattle.

For the third and fourth years that the experiment was operated, groups of cattle comparable to those on grazing were confined to drylot and full fed whole corn and supplement, Tables 3 and 4. These cattle made satisfactory gain and finished more rapidly for slaughter than cattle on grazing without feed. However, the feed cost of gain was much larger for these cattle than for cattle on grazing without corn. No doubt the drylot feeding plan used in this experiment could be improved. This practice can be useful for certain producers. Most likely, the drylot feeding will not prove as profitable as a cool season grazing program. In this experiment, the drylot fed cattle yielded higher grading carcasses that were generally more acceptable for the current fed cattle market. Nevertheless, the cattle in this experiment that were grazed without grain supplement produced very acceptable carcasses without excess fat.

Based on a purchase price of feeder cattle at 32 cents per pound and feed cost as shown in Footnote 2 of Table 4, the gross return above cost of feeder and feed per steer for the fourth year for grazing only was $87.50; for grazing with whole corn and supplement, it was $51.27; for silage feeding in drylot, it was $26.91;

and for drylot feeding on whole corn and supplement, it was $15.18.

This experiment clearly reveals the potential for producing quality beef carcasses by grazing yearling cattle on rye-ryegrass-Yuchi arrowleaf clover pastures.

SUMMARY

Rye, ryegrass, and Yuchi arrowleaf clover were produced in combination on the soils of the Piedmont area of Alabama and grazed by yearling cattle. Ear implants of DES were used; some cattle were slaughtered directly off the pastures. Other groups of yearling cattle kept in drylot were fed corn silage or whole corn and a small amount of corn silage.

The pastures were grazed 174, 183, 209, and 207 days for years 1-4, respectively.

The average gains per steer during the grazing period for each of the 4 years were 351, 438, 380, and 409 pounds, respectively. The stocking rate was one steer per acre until March. Increased stocking was possible from March to June.

Feeding whole corn to the steers on pasture increased steer daily gain and carcass finish, but also increased the feed cost of gain. Grain feeding permitted a 39 per cent increase in stocking rate.

Carcasses of steers slaughtered directly off pasture graded USDA Good or better. Objectionable fat pigmentation was not observed.

Feed cost of gain was lowest for steers produced on rye-rye-grass-arrowleaf clover without supplemental feed.

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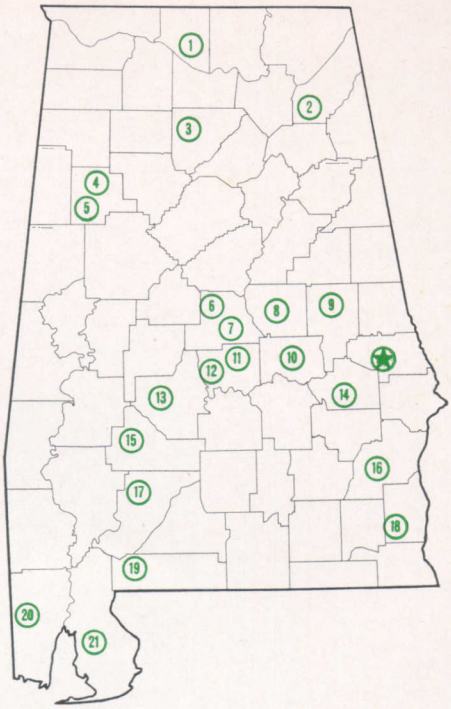

Research Unit Identification

★ 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.
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12. Prattville Experiment Field, Prattville.
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