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Coastal Bermudagrass For Beef Cows Nursing Calves

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COVER PHOTO. This scene at the Wiregrass Substation, Headland, is typical of the Coastal bermudagrass pastures that can be grown in that section of Alabama.

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Coastal Bermudagrass for Beef Cows Nursing Calves [1,2]

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COASTAL BERMUDAGRASS *(Cynodon dactylon)* is a popular upland grass for perennial summer pasture throughout Southeastern United States. It is adapted to many soil types and responds to high levels of nitrogen *(9,12)*. Although its desirable agronomic characteristics are clearly established, animal performance on Coastal grazing has not been outstanding *(3,12,14)*.

Rollins et al. *(15)* found Coastal bermuda pasture unsatisfactory for dairy cattle. In this study irrigation improved Coastal forage yield, but forage quality was not increased when measured by persistency of lactation. Also, rotational grazing did not improve the quality of Coastal forage for dairy cattle.

Anthony et al. *(3)* reported daily gains by yearling steers to average about 1.25 pounds for the season and total seasonal live weight gain to be about 200 pounds per animal on Coastal pasture. Raising the level of nitrogen fertilization increased both carrying capacity of pastures and total beef production per acre, but did not improve animal rate of gain.

Anthony et al. *(1)* found Coastal forage dry matter digestibility to approach 70 per cent in the early phase of grazing and to decline to approximately 50 per cent in late season. In this study with yearling steers, daily dry matter intake per steer remained

[1] Preliminary reports on this experiment include: ANTHONY, W. B., R. R. HARRIS, AND J. G. STARLING. 1962. Adequacy of Coastal Bermuda Grazing for Beef Cows Nursing Calves. J. Anim. Sci. 21:389; and W. B. ANTHONY, R. R. HARRIS, AND R. R. NIX. 1965. Pastures for Beef Cows Nursing Calves. Auburn Univ. (Ala.) Agr. Exp. Sta. Highlights of Agricultural Research. Vol. 12, No. 1.

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approximately constant throughout the growing season. Because the animals were increasing in size and forage digestibility was declining, the animals were on a declining level of digestible nutrients. This resulted in a gradual decline in rate of gain throughout the grazing period. In other experiments, feeding supplements to steers on Coastal bermuda pasture did not improve rate of gain *(6)*.

In summary, these reports suggest that Coastal pastures may be inadequate as a sole diet for a beef cow nursing a calf. This experiment was designed to (1) ascertain the milk production and calf performance by beef cows grazing Coastal, and (2) measure cow performance on a feeding program more nutritious than Coastal alone.

EXPERIMENTAL PROCEDURE

Coastal paddocks used in this study were established in 1952 on Norfolk Sandy Loam soil at the Wiregrass Substation near Headland, Alabama. There were eight paddocks, each containing 1.75 acres, which had been used in a previous grazing study. A water trough, two cow feeding pens, a calf creep, and shade were supplied in each paddock. Mineral fertilizer was applied annually based on soil tests, and ammonium nitrate was applied each year at the rate to supply 100 pounds of N per acre. Four treatments were included: Group 1 – grazing only; Group 2 – grazing with supplemental feed given the cows; Group 3 – grazing with supplemental feed fed to the calves; and Group 4 – grazing with supplemental feed to both cows and calves.

There were two Coastal paddocks for each treatment, each stocked with two cows with calves. Animals were rotated among the paddocks at 28-day intervals to minimize forage differences. The paddocks were stocked in late March to mid-April and the test ended in September, Table 1. Although there was sufficient forage on the paddocks to carry the cows past the September

TABLE 1. GRAZING PERIODS WITHIN YEARS

Year	Date grazing began	Date grazing ended	Number of days
1960	April 19	September 8	142
1961	March 27	September 9	168
1962	April 20	September 10	143
1963	April 16	September 30	167

TABLE 2. COMPOSITION OF SUPPLEMENTAL FEEDS

Ingredient	1961	1960, 1962, 1963
	Per cent	*Per cent*
Ground ear corn	---	72
Ground shelled corn	78.5	---
Cottonseed meal	10.0	6.0
Soybean meal	---	6.0
Cane molasses	10.0	10.0
Dehydrated alfalfa meal	---	5.0
Defluorinated phosphate	0.5	---
Salt	1.0	1.0

termination date, the grazing period represents essentially all the time within a season when adequate forage was available for a cow nursing a calf.

Grade Hereford cows with young calves at side were purchased at auction in February and March each year for use in the study. Therefore, four sets of animals were used in the 4-year study. Only cows with sound udders and producing not less than 3 pounds of milk daily were used. After cows and calves were assembled, male calves were castrated. The cows were assigned at random to the treatments, except that each paddock was stocked with a cow nursing a steer calf and a cow nursing a heifer calf. An attempt was made to breed the cows during the experiment by hand mating.

The same supplemental feed mixture was used for both cows and calves each year, Table 2. Four pounds of the grain mixture was fed each cow each morning. The two feed bunks within each paddock were separated by panels so that each cow consumed her full feed allowance. The grain allowance provided total digestible nutrients sufficient for 8 to 9 pounds of milk production, assuming maintenance and other essential non-lactation requirements were met by grazing. Calves were full-fed fresh feed daily and they could not eat with their dams.

Milk production was measured by use of the oxytocin procedure developed by Anthony et al. *(2)*. The cows were milked prior to beginning of the grazing season and at 28-day intervals throughout the test period. Milk yield was adjusted to fat corrected milk (FCM) produced in 24 hours. Criteria used to measure treatment effects were: (1) changes in live weight of cows and calves, (2) calf weight gain per acre, and (3) dam milk production. Data were analyzed by accepted statistical methods and means compared by Duncan's Multiple Range Test *(8)*.

RESULTS

The set stocking rate of two cows with calves per paddock (1.14 cows per acre) proved to be adequate since there was ample but not excessive forage available for all 28-day grazing periods in all years. Some paddocks produced more grazing than others, but rotation of treatments on paddocks minimized the effect of this variable .

Cow Performance

LIVE WEIGHT CHANGE. Group 1 cows (control) gained significantly less than cows on the other treatments, Table 3. Group 3 cows (calves fed) gained about the same as fed cows in Group 2. Feeding the calves was additive with feeding the cows in terms of cow weight gain (compare groups 3 and 4, Table 3). The grazing season live weight gain per cow for groups 1-4 were 113, 167, 167, and 181 pounds, respectively, Table 3. Cow gain per acre of pasture was significantly increased by supplemental grain feeding.

TABLE 3. INFLUENCE OF SUPPLEMENTAL FEED ON PERFORMANCE OF COWS GRAZING COASTAL BERMUDA PASTURE

Treatment	Average daily gain[1]	Season gain per animal[1]	Season gain per acre[1]	Milk production FCM[1]
	Lb.	*Lb.*	*Lb.*	*Lb.*
Control, Group 1	0.75c[2]	113c	130c	10.7c,d
Cows fed[3], Group 2	1.09d	167d	192d	12.0d
Calves fed, Group 3	1.10d	167d	191d	8.7c
Cows and calves fed, Group 4	1.19d	181d	207d	10.4c,d

[1] Each value is an average of four animals for each of 4 years. Each cow was milked five times in 1960 and 1963 and six times in 1961 and 1962.

[2] Values within a column having the same letter designation are not different ($P>.05$).

[3] Cows were hand fed 4 pounds of a high-grain mixture per head daily.

MILK PRODUCTION. Cows fed grain on Coastal pasture (Group 2) did not produce significantly more milk than the control group (Group 1), but their average production was the largest of all groups, Table 3. The least amount of milk was produced by cows whose calves were creep fed (Group 3). Milk production in the control group remained relatively high (compare groups 1 and 2).

Calf Performance

The 4-year average daily and total season gain for calves in groups 1, 2, 3, and 4 were (in pounds); 1.84, 283; 1.80, 279; 2.05,

TABLE 4. INFLUENCE OF SUPPLEMENTARY FEED ON PERFORMANCE OF CALVES NURSING COWS GRAZING COASTAL BERMUDA PASTURE

Treatment	Average daily gain[1]	Season gain per calf[1]	Season calf gain per acre
	Lb.	*Lb.*	*Lb.*
Control, Group 1	1.84c[2]	283c	324c
Cows fed, Group 2	1.80c	279c	318c
Calves fed[3], Group 3	2.05c,d	315c,d	359c,d
Cows and calves fed[3], Group 4	2.14d	336d	383d

[1] Each value is an average of 16 calves and 4 years.
[2] Values within a column having the same letter designation are not different ($P>.05$).
[3] Calves consumed 4.68 pounds of grain per head daily.

315; and 2.14, 336, respectively, Table 4. Improving the dam's ration did not significantly increase calf performance. On the other hand, creep feeding calves increased calf gain and total gain per acre. Feeding both cows and calves significantly increased calf gain (Group 1 vs. Group 4).

Correlation-Regression Study

Cow daily gain was negatively correlated with milk production for all treatments and for treatments within years ($r = -.380$). The reduced cow gain per unit increase in milk production was small and ranged from −0.001 to −0.084 units, Table 5. Cow gain was least affected by milk production in Group 2, where only cows were fed grain.

Calf gain was not closely related to level of milk production by dams, Table 5. Only when the cows were fed grain (Group 2) was there an appreciable correlation between calf gain and dam's milk ($r = .39$). The year effects of dam's milk on calf gain were large, Table 6. In 3 of the 4 years, dam's milk was positively related to calf gain; in the other year the correlation coefficient was

TABLE 5. SIMPLE CORRELATIONS (r) AND REGRESSIONS (b) AMONG CERTAIN ANIMAL DATA BY TREATMENT FOR ALL YEARS

Treatment	Cow ADG with milk production		Cow ADG with calf ADG		Calf ADG with cow's milk production	
	r	*b*	*r*	*b*	*r*	*b*
Grazing	−0.51	−0.04	−0.06	−0.07	0.11	0.01
Cows fed	−0.02	0.00	0.06	0.07	0.39	0.03
Calves fed	−0.67	−0.08	0.60	0.86	−0.29	−0.03
Cows and calves fed	−0.54	−0.07	0.26	0.47	0.14	0.01

TABLE 6. SIMPLE CORRELATIONS (r) AND REGRESSIONS (b) AMONG CERTAIN ANIMAL DATA BY YEARS FOR ALL TREATMENTS

Year	Cow ADG with milk production		Cow ADG with calf ADG		Calf ADG with cow's milk production	
	r	*b*	*r*	*b*	*r*	*b*
1	−0.20	−0.02	0.59	0.75	−0.16[1]	−0.02
2	−0.16	−0.02	−0.01	−0.02	0.35	0.02
3	−0.57	−0.04	0.07	0.07	0.01	0.00
4	−0.24	−0.04	−0.06	−0.09	0.10	0.01

[1] Average milk production for all cows was lower than for other years.

negative (−0.16). This small negative coefficient resulted, in part, from the relative low milk production by all cows during the first test year. When data for all years were pooled, the correlation between calf daily gain and dam's milk was not significant (r = 0.109); by regression analysis, one unit of increase in milk resulted in only 0.0020 unit increase in calf gain.

DISCUSSION

Most years (3 of 4) the Coastal pasture had not made sufficient growth for stocking until mid-April, Table 1. Since the grazing period ended in September, Coastal furnished only about 5½ months of grazing. This is a relatively short time, especially since beef calves usually remain on their dams until they are 7 to 8 months of age. These results indicate that the short grazing season may be Coastal's greatest weakness for beef production.

Cows nursing calves and supplied only Coastal pasture during the short grazing season gained an average of 113 pounds per head and produced an average of 10.7 pounds of milk daily. Thus, Coastal pasture furnished an adequate diet for the beef cows. Supplemental feed improved cow weight gain, but induced only a small increase in milk production. This is additional evidence that Coastal bermuda pasture supplied most needed nutrients. Nevertheless, energy intake from Coastal forage may be too low for maximum performance and weight maintenance of brood cows. For cows poorly wintered, 113 pounds of gain on summer pasture might not be adequate for efficient production the following season. Milk production by cows in the control group (Group 1) was about the same as reported for beef cows grazing dallisgrass-clover pasture at the Black Belt Substation *(5)* and various pastures at the Piedmont Substation *(4)*. Thus, it appears that length of grazing season may be more restrictive

than forage quality for efficient beef production on Coastal bermudagrass pasture.

Both calf weaning weight and cow weight gain were increased by creep feeding calves. Creep fed calves apparently nursed less frequently and this resulted in a decline in milk secretion. Creep feeding calves nursing cows on Coastal pasture, therefore, becomes one means of improving cow weight gain. This may be a valuable finding since it would permit a higher carrying capacity on Coastal pasture. In this test nitrogen fertilizer was applied at 100 pounds of N per acre annually and carrying capacity averaged 1.14 cows per acre. At this same location in an earlier experiment, applying 300 pounds of N per acre annually to Coastal permitted an average daily stocking rate of 3.5 yearling steers. This increased stocking with an additional 200 pounds of N would double the cow carrying capacity used in the current test. Under this higher rate of stocking, creep feeding the calves could become a significant adjunct to improved cow performance.

Milk production of cows in this test was equal to expected levels *(1,4,5,7,10,13)*. However, it was noteworthy that improving the ration of the dam without improving it for the calves did not significantly increase milk production. Since feeding grain to both calves and cows increased calf gain and cow performance, there is justification for continued research to find a pasture species or combination that would be superior to Coastal for beef cows nursing calves. Nevertheless, the results indicate that first consideration should be given to improving the feed supply available directly to the calf. Supplying grain in a creep is one means of doing this. Feeding the cow to get more milk, which might indirectly result in higher calf performance, proved to be unproductive; in fact, the effect was negative.

SUMMARY

Beef cows nursing calves were grazed on Coastal bermudagrass pastures in four treatment groups: (1) grazing only, (2) grain ration (4 pounds) to cows, (3) grain ration (creep) to calves, and (4) grain ration to cows and calves (creep). Experimental animals were beef-type cows with calves that were purchased in March-April at public auction. The test was operated 4 years and four sets of cows were used. Cows were allotted to treatment so as to place a heifer and a steer calf on each paddock. There were two paddocks for each treatment; the groups were rotated

to minimize pasture differences. Cows were milked at 28-day intervals.

Calves receiving supplemental feed made more gain than calves not fed. However, only when both calves and their dams were fed grain was there a significant increase in calf gain over the control group. Feeding the cows did not increase calf gain although it slightly increased dam milk production. Dams of creep fed calves produced less milk than dams of non-creeped calves, probably because creep fed calves nursed less often. Combining all treatment groups, one unit increase in dam's milk produced 0.002 unit increase in calf daily gain. Summer weight gain of the cows grazed on Coastal without supplemental feed was significantly lower than on the other treatments. Creep feeding the calves improved cow weight gain over the control to the same extent as feeding grain to the cows. The pasture stocking rate was 1.14 cows per acre. Calf weights produced per acre for groups 1-4 were 324, 318, 359, and 383 pounds, respectively.

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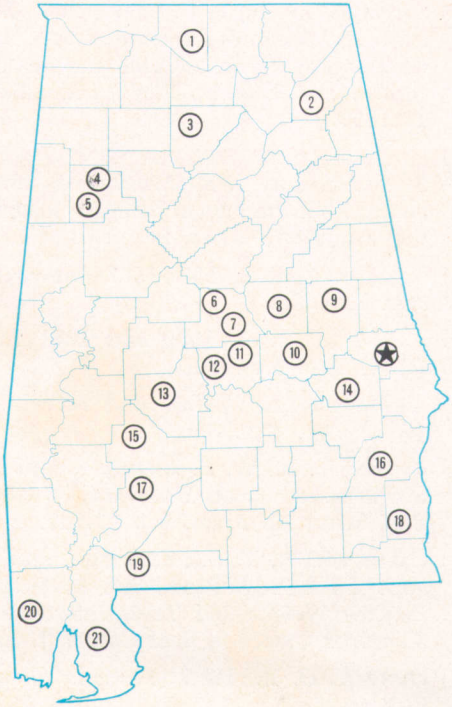

Research Unit Identification

★ 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.
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.