Cow and calf performance on Coastal or Tifton 85 Bermudagrass pastures with aeschynomene creep-grazing paddocks

V. A. Corriher,* G. M. Hill,*2 J. G. Andrae,† M. A. Froetschel,‡ and B. G. Mullinix Jr.§

*Department of Animal and Dairy Science, University of Georgia, Tifton 31793; †Department of Entomology, Soils and Plant Science, Clemson University, Clemson, SC 29634; ‡Department of Animal and Dairy Science, University of Georgia, Athens 30602; and §Experimental Statistics, University of Georgia, Tifton 31793

ABSTRACT: Cow and calf performance was determined in a 2-yr, $2 \times 2$ factorial, grazing experiment using Coastal or Tifton 85 (T85) replicated Bermudagrass pastures (4 pastures each; each pasture 4.86 ha), without or with aeschynomene creep-grazing paddocks ($n = 4$, 0.202 ha each, planted in May of each year, 13.44 kg/ha). On June 10, 2004, and June 8, 2005, 96 winter-calving beef “tester” cows and their calves were grouped by cow breed (9 Angus and 3 Polled Hereford/group), initial cow BW (592.9 ± 70.1 kg, 2-yr mean), age of dam, calf breed (Angus, Polled Hereford, or Angus × Polled Hereford), calf sex, initial calf age (117 ± 20.1 d, 2-yr mean), and initial calf BW (161.3 ± 30.4 kg) and were randomly assigned to pastures. Additional cow-calf pairs and open cows were added as the forage increased during the season. Forage mass was similar for all treatment pastures ($P > 0.70$; 2-yr mean, 6,939 vs. 6,628 kg/ha, Coastal vs. T85; 6,664 vs. 6,896 kg/ha, no creep grazing vs. creep grazing). Main effect interactions did not occur for performance variables ($P > 0.10$; 2-yr means), and year affected only the initial and final BW of the calves and cows. The 91-d tester calf ADG was greater for calves grazing T85 than Coastal (0.94 vs. 0.79 kg; $P < 0.01$), and for calves creep grazing aeschynomene compared with calves without creep grazing (0.90 vs. 0.82 kg; $P < 0.03$). Calf 205-d adjusted weaning weights were increased for calves grazing T85 vs. Coastal (252.9 vs. 240.3 kg; $P < 0.01$) and for calves with access to creep grazing (249.9 vs. 243.3 kg; $P < 0.05$). The IVDMD of esophageal masticate from pastures had a forage $\times$ creep grazing interaction ($P < 0.05$; Coastal, no creep grazing = 57.4%; Coastal, creep grazing = 52.1%; T85, no creep grazing = 59.1%; T85, creep grazing = 60.0%), and IVDMD was greater ($P < 0.05$) for T85 than for Coastal pastures. Cows were milked in August 2004, and in June and August 2005, with variable milk yields on treatments, but increased milk protein ($P < 0.05$) for cows grazing T85 compared with Coastal pastures in August each year, contributing to increased calf gains on T85 pastures. These results complement previous research with T85 and indicate increased forage quality and performance of cattle grazing T85 pastures. Calf gains on T85 pastures and for calves on creep-grazed aeschynomene paddocks were high enough to influence the efficiency of cow-calf operations.

Key words: aeschynomene, Bermudagrass, calf gain, creep grazing, milk

INTRODUCTION

Bermudagrass, a warm-season perennial grass, is grown extensively throughout the southeast for use as pasture and as harvested forage. Tifton 85 Bermudagrass has greater quality and yields compared with Coastal Bermudagrass (Burton et al., 1993). Tifton 85 produced more DM with improved fiber digestibility than Coastal, resulting in greater gains and utilization by cattle (Hill et al., 1993; Mandebvu et al., 1999; Hill et al., 2001a). Additional research has documented increased digestibility of Tifton 85 hay compared with Coastal hay at differing maturity dates (Hill et al., 2001b). Tifton 85 has lower concentrations of ether-linked ferulic acid than Coastal, with decreased ether bonding in lignin in Tifton 85, which results in enhanced ruminal microbial digestion of this forage (Mandebvu et al., 1999; Hill et al., 2001a,b).

Aeschynomene (Aeschynomene americana L.) is a high-quality tropical legume with protein levels in the canopy reaching 21 to 24% (Hodges et al., 1982). Aeschy-
nomene has the potential to furnish high-quality grazing during a crucial period when the quality of perennial grass does not meet the needs of calves. Bermudagrass pastures supply adequate nutrition for pregnant or lactating cows during spring and early summer; however, they may not provide adequate nutrition for growing calves during late summer, before weaning. Creep grazing is the utilization of a high-quality forage species by calves during the preweaning stage. If calves have access to quality legumes in creep-grazing areas, late-summer preweaning calf gains may be improved on Bermudagrass pastures. Although Tifton 85 was released in 1993, experiments documenting large-scale, replicated cow-calf grazing performance on Tifton 85 were released in 1993, experiments documenting large-scale, replicated cow-calf grazing performance on Tifton 85 were not reported.

Our objectives were to compare cow-calf performance on Tifton 85 vs. Coastal pastures, and to determine performance of calves that creep-grazed aeschynomene paddocks during the summer before weaning.

MATERIALS AND METHODS

All cattle were managed under procedures approved by the University of Georgia Animal Care and Use Committee Guidelines.

Small-Plot Yield and Forage Quality Experiment

Three replicated small plots (5 × 7-m plot area) of Tifton 85 and Coastal Bermudagrass (Cynodon dactylon L.) were established on Tifton sandy loam soils in 2001, at the Coastal Plain Experiment Station (Tifton, Georgia). Plots were used in other yield studies before July 2004, when they were prepared for a yield experiment. On August 26, 2004, the plots were mowed to a stubble height of approximately 5 cm, to initiate a new yield and quality study. Four harvests were made at intervals of approximately 2 wk beginning September 10, 2004. Fertilizer was applied on August 26, 2004 (224 kg/ha, 24-6-12 ratio of N:P2O5:K2O). Four quadrats (each 0.1 m2) were clipped to ground level in each plot, and the clipped samples were oven-dried at 60°C for 72 h. Pooled estimates were converted to a moisture-free basis using pooled DM values. Plot DM yields were determined, and IVMD of the 4- and 6-wk samples were determined using the DAISY incubator procedure (Ankom Technology, Macedon, NY).

Grazing Experiment

Summer cow and calf performance was determined in a 2-yr, replicated 2 × 2 factorial experiment using Coastal or Tifton 85 (T85) Bermudagrass pastures (4 pastures each of 4.86 ha each) without or with aeschynomene creep-grazing paddocks (0.202 ha of creep-grazing area in each creep-grazing pasture, planted in May of each year at 13.44 kg/ha). The creep areas were divided by electric fences, with access through wooden creep gates (4-m long (6 openings, 38-cm wide) by 1.22-m high) to each 0.202-ha paddock. Aeschynomene was planted using a Brillion Seeder (Brillion Iron Works Inc., Brillion, WI). The Coastal and T85 pastures were established several years before initiation of this grazing experiment. Bermudagrass pastures (Tifton sandy loam soils) were fertilized with a blended fertilizer (24-6-12, N:P2O5:K2O, at 336, 280, and 224 kg/ha, respectively, in March, early June, and late July each year) following historical Bermudagrass fertilizer recommendations.

In the variable stocking rate study that began on June 10, 2004, and June 8, 2005, 96 winter-calving “tester” beef cows and their calves were grouped by cow breed [9 Angus and 3 Polled Hereford/group], initial cow BW (592.9 ± 70.1 kg, 2-yr mean), age of dam, calf breed (Angus, Polled Hereford, or Angus × Polled Hereford), calf sex, initial calf age (117 ± 20.1 d, 2-yr mean), and initial calf BW (161.3 ± 30.4 kg, 2-yr mean) before groups were randomly assigned to pastures. Because a smaller number of Polled Hereford cows were used in each group, they were assigned based on cow and calf initial BW, initial calf age, and calf breed. Cows and calves were grazed in a put-and-take (Mott and Lucas, 1952) grazing management system. Cows similar to the tester cows in BW, age, background, and breeding were designated as “grazer” cows and were used to adjust forage mass in pastures. Additional grazer cows included dry pregnant cows and replacement heifers (18 mo of age). Total pasture forage mass was targeted at approximately 2,800 kg of DM/ha to provide enough forage to allow detection of differences in the nutritive value of the forages unlimited by forage mass. At 14-d intervals beginning in June, forage mass was estimated using a double sampling procedure. Four quadrats (each 0.1 m2) were clipped to ground level in each pasture, and clipped samples were oven-dried. Pooled estimates were converted to a moisture-free basis using pooled DM values. Stocking rates were adjusted by addition or removal of grazer cows to achieve the targeted 2,800 kg of DM/ha in each pasture. Cows and calves were weighed at 28-d intervals, and initial and final BW were the means of consecutive daily full BW. A commercial mineral [NaCl (maximum) 16.8%; Ca (maximum) 19.2%; P (maximum) 8.0%; Mg (maximum) 1.0%; Cu (maximum) 0.15%; Zn (maximum) 0.27%; and Se (maximum) 0.003%; Beef 8, W.B. Fleming Co., Tifton, GA] was provided free choice along with water in each pasture.

Pasture Quality

Mature steers previously fitted with esophageal cannulas grazed each of the 8 treatment pastures in June, August, and September each year. In 2004, 2 esophageally cannulated steers were used to sample each pasture at each sampling date; in 2005, 2 steers were used in June and 4 steers were used in August and September to sample each pasture. Cannulated steers grazed Coastal Bermudagrass pastures before and after each
forage mass sampling. Cannulated steers were confined in a drylot with a 24- to 36-h feed restriction before each sampling period. This procedure was used because Fisher et al. (1989) reported no difference in forage particle size distribution or forage quality when esophageally cannulated steers were either fasted with no adaptation to forage, or not fasted and adapted to the forage being grazed and sampled. In our study, cannulas were removed as the steers sampled each pasture, and forage masticate was collected with small-mesh fishing nets. Steers were allowed to graze unrestricted in each pasture until 0.5 to 1.0 L of masticated forage was collected. Extrusa samples (forage and saliva) were quick-frozen in liquid nitrogen at the pasture site. Samples were stored (−15°C), and the entire sample was subsequently lyophilized. The dried masticate samples were ground through a 1-mm screen in a Wiley mill (Arthur H. Thomas, Philadelphia, PA) in preparation for chemical analyses and IVDMD determination.

Freeze-dried masticate samples were analyzed for AIA and CP (micro-Kjeldahl; total N × 6.25) using AOAC (1991) procedures. The NDF and ADF were determined using methods described by Van Soest et al. (1991). The DAISY incubator (Ankom Technology) was used to determine IVDMD of forages samples from the freeze-dried masticate from pastures in the grazing experiment.

**Milk Production and Quality**

Angus cows with calves, with similar age and BW of the dam, and similar calf age, sex, and breed were selected for milking. Cows were milked once in yr 1 (n = 40, 5/grazing pasture; August 10, 2004, d 61) and twice in yr 2 (n = 48, 6/grazing pasture; June 28, 2005 (d 20) and August 9, 2005 (d 62)). The average postpartum interval when the cows were milked was 176 d in yr 1, and 139 and 181 d in yr 2. Calves were separated from dams for 5 h and then allowed to nurse for 30 min at approximately 12 h before milking. Each cow was injected i.m. with 2 mL of acepromazine (Vedco Inc., St. Joseph, MO) and 1 mL of oxytocin (Vedco Inc.) before milking. For sedation, the acepromazine was administered 10 min before milking. Each cow was milked with a portable milking machine, and the milk was weighed and stirred and 2 samples (30 mL each) were collected. One milk sample from each cow was frozen and retained and another sample at each milking date was analyzed for somatic cell count, fat, and protein (Southeast Milk Inc., Belleview, FL).

**Statistical Analyses**

The small-plot yield experiment was analyzed as a randomized complete block, in which DM yield was the average of 4 clippings at different dates during the growing season, and IVDMD of the forages was the mean of the 4-wk and 6-wk clipping dates used in 2004. Cow and calf data from the grazing experiment were analyzed as a randomized complete block with 2 replications. The 4 treatments were arranged as a 2 × 2 factorial with cow-calf pairs as sampling units using the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC), with least squares means adjusted for covariate effects. Covariate adjustments included calf birth weight, age, initial BW, and cow age. Calf sex and breed and cow breed were also included in the model. Statistical analyses of the grazing data from the esophageally cannulated steers and laboratory analyses of masticated forage were conducted using the GLM procedure of SAS. Milk weights, milk fat, and milk protein were analyzed using the MIXED procedure of SAS for each milking in each year. Milk weight, milk fat, and milk protein percentages were analyzed as a split plot, with the main plot being the 8 pasture treatments arranged as a factorial with 2 replications; subplots were the 5 (yr 1) or 6 (yr 2) cow-calf pairs selected in each pasture. The following covariates were considered in the milk analyses: calf age, calf BW, age of dam, and cow milk EPD. Calf sex was also included in the model. Unless otherwise noted, significance levels are reported at P = 0.05.

**RESULTS AND DISCUSSION**

**Small-Plot Yield and Forage Quality Experiment**

A small-plot experiment was conducted to determine yield and nutritive value of Coastal and T85 Bermudagrass to provide information on ungrazed forage production that could support the larger cow-calf continuous grazing study. In the experiment, DM yield at the 8-wk harvest was greater (P < 0.01) for T85 than for Coastal (Figure 1), and CP at the 2-wk harvest was greater (P < 0.01) for Coastal than for T85. Dry matter yield increased with maturity (P < 0.01), but CP decreased with maturity (P < 0.01) for both Coastal and T85. There was a forage × sampling date interaction (P < 0.05) for NDF increasing more for T85 than Coastal after the 4-wk harvest. A forage × sampling date interaction (P < 0.05) occurred for IVDMD, and the IVDMD was increased more (P < 0.05) for T85 than Coastal samples at both the 4-wk and 6-wk maturity. Both T85 and Coastal had decreased IVDMD at 6-wk compared with 4-wk. The T85 IVDMD was only slightly depressed at 6-wk compared with 4-wk samples, but Coastal plots had lesser IVDMD at 6-wk compared with 4-wk samples. Even more dramatic was the increased (P < 0.05) IVDMD of T85 compared with Coastal at 6-wk maturity. Despite high NDF concentrations in T85 forage samples, the relatively high IVDMD values suggest that fiber was highly digestible, and these results agree with previous research (Hill et al., 1993; Mandebvu et al., 1999). Hill et al. (1993) reported that IVDMD was increased for T85 compared with Coastal in two 3-yr, small-plot yield and quality experiments. Mandebvu et al. (1999) reported increased IVDMD and greater 72- and 96-h in situ DM digestion in T85 than in Coastal samples from plots harvested from 2-wk to 7-wk matu-
Cow-calf grazing performance 2765

Figure 1. Comparison of Tifton 85 (T85) with Coastal (C) Bermudagrass at 2-wk intervals in a small-plot experiment. a) Dry matter, kg/ha; SE = 220.9, LSD = 719.3, 8 df; b) CP, %; SE = 1.5, LSD = 2.56, 8 df; c) NDF, %; forage × sampling date interaction, forages at each date, SE = 1.88, LSD = 6.48, 6 df; dates for each grass, SE = 0.90, LSD = 2.94, 8 df; d) IVDMD, %; forage × sampling date interaction, forages at each date, SE = 0.78, LSD = 3.05, 4 df; dates for each grass, SE = 0.46, LSD = 1.80, 4 df.

Cow and Calf Grazing Experiment

In the 2-yr cow-calf study, available forage mass in each pasture was targeted at 2,800 kg of DM/ha. This forage mass allowed adequate forage for gain and maintenance of yearling steers, and prevented forage shortages when rainfall distribution and amounts were unfavorable (Hill et al., 1993). The rainfall measurements for the current study are shown in Figure 2, and data for May was included because of possible carryover effects on forage growth when the experiment was initiated in early June annually. Rainfall in May was similar between years and near levels of the 80-yr average. Rainfall in June was greater than average in both years, with more than twice as much in June 2004 and about 50% more rainfall in June 2005. During July and August 2004, rainfall was considerably below average; rainfall was near average for these months in 2005. The experiment ended in early September of each year, and forage production and cattle performance were likely influenced more by rainfall in August than in September. Rainfall was apparently not limiting for forage production, because DM remained well above the forage mass target level of 2,800 kg/ha throughout the study (Figure 3, a and b).

Initial cow BW was different between years (2004, 579.2 ± 75.3 kg; 2005, 606.5 ± 61.4 kg; P < 0.01), as was initial calf BW (2004, 155.1 ± 32.3 kg; 2005, 167.5 ± 27.1 kg; P < 0.01). This was the only instance of year affecting cow or calf performance during the experiment. Year did not interact with treatments (P > 0.20), main effect interactions did not occur (P > 0.10) for cow and calf variables, and least squares means were
adjusted for significant covariate effects, as indicated
in Table 1. Calf-adjusted weaning weights and 205-d
weaning weights, including Beef Improvement Federa-
tion (2006) adjustments for sex and age of dam, were
greater \( (P < 0.01) \) for T85 than for Coastal, and these
weights increased \( (P < 0.05) \) for creep grazing compared
with no creep grazing. The 91-d tester calf ADG was
greater \( (P < 0.01) \) for calves grazing T85 than for those
grazing Coastal, and greater \( (P < 0.03) \) for calves on
creep grazing than for calves with no creep grazing. Calf gain/ha increased \( (P < 0.03) \) for calves grazing T85
compared with Coastal Bermudagrass. Cow performance
was improved on T85 compared with Coastal, with
greater cow 91-d ADG \( (P < 0.05) \), cow gain/ha, and
stocking rate/ha. Improved cow and calf performance
has been reported with other warm-season perennial
forages. Wyatt et al. (1997) reported an increase in BW
of cows grazing Bermudagrass-dallisgrass compared
with cows grazing Alicia Bermudagrass. In the same
study, calves suckling cows grazing Bermudagrass-dal-
lisgrass pastures weighed more at weaning than calves
on Alicia Bermudagrass pastures. Cow and calf perfor-
ance were consistently greater for Bermudagrass-dal-
isgrass than for Alicia Bermudagrass pastures (Wyatt
et al., 1997). Hill et al. (1985) reported improvements
in cow gains, calf gains, and calf weaning weights on
Coastal Bermudagrass pastures compared with Pensacola
bahiagrass pastures. Calf ADG during summer

Figure 3. Forage mass (kg/ha) in Coastal and Tifton 85 Bermudagrass pastures during the grazing interval; (a)
2004; forages within dates, SE = 722 kg/ha, LSD = 2,122, 21 df; dates within forages, SE = 792 kg/ha, LSD = 2,381,
15 df; (b) 2005, SE = 717, LSD = 2080, 27 df.
approached 1.0 kg on T85 pastures in the current study (Table 1), similar to results reported by Rouquette et al. (1998), when Coastal Bermudagrass biomass did not limit ad libitum consumption of the forage.

Calf creep-grazing treatments increased \( P < 0.03 \) cow ADG and cow gain/ha compared with no creep grazing, but cow stocking rate did not differ between treatments (Table 1). The 2-yr mean forage mass was similar for all pastures \( P > 0.70; 6,939 \) vs. \( 6,628 \) kg/ha, Coastal vs. T85; \( 6,664 \) vs. \( 6,896 \) kg/ha, no creep grazing vs. creep grazing), well above the targeted average of \( 2,800 \) kg/ha. The forage mass availability in pastures should allow a high degree of selectivity by cows and calves. A forage \( \times \) creep grazing \( \times \) sample date interaction \( P < 0.01 \) occurred for forage mass in 2004; however, all tests of effects involving treatments indicated no differences \( P > 0.10 \), therefore only the means for forage \( \times \) sample date interaction are presented (Figure 3a). In 2004, forage mass was similar for Coastal and T85 pastures throughout most of the grazing interval, but T85 had greater \( P < 0.05 \) forage mass than Coastal pastures on July 27, but forage mass was reduced to comparable levels with Coastal by increasing stocking rates. The increased forage mass reflected recent fertilizer application and heavy rainfall. In 2005, only forage mass was affected by forage and date main effects \( P < 0.01 \), but for ease of presentation, forage \( \times \) date interaction data are presented (Figure 3b) to illustrate the point that, as the season progressed, relative differences in forage mass were maintained, with T85 pastures stocked at somewhat greater rates than Coastal pastures. In this experiment, cows and calves were assigned to pastures in early June of each year after the spring breeding season. Earlier research has documented greater quality of Coastal Bermudagrass and other cultivars in the spring (Utley and McCormick, 1978; Hill et al., 1985), which often allows calves to begin rapid growth before summer grazing begins. The current study was designed to have cattle grazing during the summer months, which often presents challenges to cow and calf production at our location related to potential for drought, high temperatures, and low forage quality and mass. Although all classes of beef cattle have grazed Coastal Bermudagrass over the years, cow-calf performance on T85 pastures in the United States has not been reported. This experiment applied pressure to the forages to support calf gains during the last 90 d before weaning, a time when calf BW, nutrient requirements, and forage DMI are increasing, but cow milk production is declining. Cow ADG during summer was above maintenance while cows nursed calves, and ADG was greater for cows grazing T85 (Table 1), indicating that cows had recovered most of their BW following calving before assignment to pasture treatments in this study. Summer temperatures, rainfall amounts, and rainfall distribution often affect summer grazing performance of calves. Inclusion of a high-quality legume as a creep-grazed forage was predicted to supply additional nutrients for the calves as they approached weaning time in later summer, and aeschynomene allowed increased calf performance in this study.

Increased cow and calf performance on T85 pastures was consistent with previously reported increased steer performance on T85 pastures compared with Tifton 78 and Coastal pastures (Hill et al., 1993, 1997a,b, 2001a). Creep-grazing aeschynomene paddocks (DM, CP, ADF, NDF, nonstructural carbohydrates, and TDN was 91, 20, 36, 46, 27, and 59% of DM, respectively) resulted in additional calf gains on both Coastal and T85 pastures, which is consistent with previous research (Ocumpaugh and Dusi, 1981) in which aeschynomene provided the greatest calf gains of several legumes and grasses compared as creep-grazing forages in addition to perennial grass pastures. Because T85 forage has better quality
Table 2. Two-year forage quality of pastures determined using forage masticate of esophageally cannulated steers in June, August, and September\(^1,2\)

<table>
<thead>
<tr>
<th>Chemical composition</th>
<th>Forage</th>
<th>Creep grazing</th>
<th>Sampling month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coastal</td>
<td>T85</td>
<td>NCG</td>
</tr>
<tr>
<td>DM</td>
<td>92.4</td>
<td>92.2</td>
<td>92.2</td>
</tr>
<tr>
<td>Ash</td>
<td>9.2</td>
<td>9.5</td>
<td>9.6</td>
</tr>
<tr>
<td>CP</td>
<td>16.5</td>
<td>16.9</td>
<td>17.0</td>
</tr>
<tr>
<td>ADF</td>
<td>46.3</td>
<td>46.9</td>
<td>46.3</td>
</tr>
<tr>
<td>NDF</td>
<td>70.1</td>
<td>71.9</td>
<td>70.9</td>
</tr>
<tr>
<td>ADL</td>
<td>25.5</td>
<td>25.1</td>
<td>25.2</td>
</tr>
<tr>
<td>IVDMD(^3)</td>
<td>54.7</td>
<td>59.5</td>
<td>58.2</td>
</tr>
</tbody>
</table>

\(^{a,2}\)Least squares means for forage masticate at different sampling dates differ, \(P < 0.01.\)

\(^{d,2}\)Least squares means for a pasture forage masticate at different sampling dates differ, \(P < 0.05.\)

\(^{b}\)Least squares means for a pasture forage masticate at different sampling dates differ, \(P < 0.10.\)

\(^{1}\)C = Coastal and T85 = Tifton 85; CG = access to aeschynomene paddock, and NCG = no creep grazing.

\(^{2}\)Data presented as main effect means for forages and creep grazing; there were no effects of year (\(P > 0.20\)) or interactions with year (\(P > 0.20\)) for the chemical data.

\(^{3}\)A forage \(\times\) creep grazing interaction (\(P < 0.05\)) occurred for IVDMD (C, NCG = 57.4%; C, CG = 52.1%; T85, NCG = 59.1%; and T85, CG = 60.0%).

Two-year forage quality of pastures determined using forage masticate of esophageally cannulated steers in June, August, and September. The CP concentrations and fiber in masticate samples were unaffected (\(P > 0.10\)) by treatments. Sampling dates affected ADF (\(P < 0.01\)), NDF (\(P < 0.01\)), CP (\(P < 0.05\)), and ADL (\(P < 0.10\)) for forage masticate. Greater inherent NDF in T85 masticate (Hill et al., 1993), and in T85 hay samples (Mandebvu et al., 1999; Hill et al., 2001b) has been reported. In the current study, increased NDF on Coastal with creep grazing apparently occurred from increased grazing of aeschynomone on the Coastal creep-grazing treatment, resulting in greater forage mass and fiber. Masticate IVDMD (Table 2) had a forage \(\times\) creep grazing interaction (\(P < 0.05\); Coastal no creep grazing = 57.4%; Coastal creep grazing = 52.1%; T85 no creep grazing = 59.1%; T85 creep grazing = 60.0%). The IVDMD was lower for Coastal creep grazing than Coastal no creep grazing (\(P < 0.05\)), but IVDMD was similar (\(P > 0.10\)) for T85 no creep grazing and T85 creep grazing. Additionally, IVDMD was greater (\(P < 0.05\)) for T85 than for Coastal pasture, which corresponds to greater esophageal forage masticate IVDMD in May and September in a previous steer grazing study (Hill et al., 1993). Sampling date affected forage quality, with greater (\(P < 0.01\)) IVDMD in June than in August or September. The increased forage mass of all pastures (Figure 3a,b) throughout the study suggested that forage selectivity by cows and calves was high, but it may also indicate greater maturity of pasture forages, resulting in somewhat lower IVDMD as indicated in the esophageal masticate samples.

**Pasture Quality**

Chemical analyses of masticate samples from pastures in both years (Table 2) revealed no year interactions (\(P > 0.10\)). The CP concentrations were lower (\(P < 0.05\)) for September masticate samples compared with June and August samples (\(P < 0.05\)), but CP in masticate from all treatment pastures exceeded CP requirements (NRC, 1996) for cows and calves throughout the study interval. The CP concentrations and fiber in masticate samples were unaffected (\(P > 0.10\)) by treatments. Pasture selectivity of cows and calves was high, but it may also indicate greater maturity of pasture forages, resulting in somewhat lower IVDMD as indicated in the esophageal masticate samples.

**Milk Production and Quality**

Differences in forage quality of the small plots (Figure 1d), grazed pastures (Table 2), and previous research with T85 (West et al., 1997; Mandebvu et al., 1999; Hill et al., 2001a) created interest in determining potential for beef-cow milk production differences, and for milk effects on calf performance. This experiment was designed to begin in early June; consequently, milking
Figure 4. Mean estimates of milk yield (kg/12 h) on August 10, 2004 (176 d postpartum), determined by using a machine milking in Coastal and Tifton 85 Bermudagrass pastures with or without aeschynomene creep grazing. C = Coastal; T85-Tifton 85; NCG = without creep grazing; and CG = with creep grazing; SE = 0.33, LSD = 0.95, 36 df.

occurred during the mid to later stages of milk production for cows calving in January and February. In 2004, a forage × creep grazing interaction (P < 0.06; Figure 4) was observed for milk weights, with the greatest 12-h milk yield on Coastal no creep grazing, and the lowest on Coastal creep grazing (P < 0.05). Milk weight was adjusted for age of dam as the only significant covariate. In June 2005, milk yield was similar (P > 0.10, Figure 5) for treatments, with no forage × creep grazing interaction (P > 0.80), and milk weights were adjusted for covariate effects of age of dam, calf BW, age, and calf sex. In August 2005, milk yield data were affected by a forage × creep grazing interaction (P < 0.06; Figure 5). The milk yield was greater (P < 0.05) for cows on creep-grazing treatments than on no creep grazing, with greater (P < 0.05) milk yield on T85 creep grazing than Coastal creep grazing, and milk yield was greater (P < 0.05) for T85 creep grazing than T85 no creep grazing. The August yield data were adjusted for age of dam as a covariate. August milk yield patterns were inconsistent for the 2 yr with lower milk yield on Coastal creep grazing than T85 creep grazing in both years, but with greatest yields on Coastal no creep grazing in yr 1, and on T85 creep grazing in yr 2. Milk yields were greater in June than in August in 2005 (Figure 5), reflecting the reduced postpartum interval of cows at the June milking date. Research has indicated greater 12-h milk production for cows grazing T85 compared with cows grazing Coastal with volunteer rye-grass (Hill et al., 1998). In experiments over longer intervals, West et al. (1998) reported similar DMI and milk yields for lactating Holstein cows offered diets with increasing proportions of NDF from T85 Bermudagrass hay. In an earlier experiment (West et al., 1997), Holstein cows had similar DMI per 100 kg of BW when fed diets containing either T85 Bermudagrass or alfalfa hay. In a beef cow and calf grazing experiment (Bagley et al., 1997), cows in creep-grazing systems did not produce as much milk as cows in non-creep-grazing systems. Calves may compensate for reduced milk production of cows with greater BW gains later during the year because of increased DMI of greater quality creep-grazing forage. In the current study, milk fat was somewhat greater for cows on T85, and in yr 1 more milk protein (P < 0.05; Figure 6) was detected for cows graz-
Figure 7. Mean fat and protein percentages of milk collected by using a milking machine on June 28 (139 d postpartum) and August 9 (181 d postpartum), 2005. C = Coastal; T85 = Tifton 85; NCG = without creep grazing; and CG = with creep grazing; a) June, fat, SE = 0.13, LSD = 0.38, 44 df; protein, SE = 0.22, LSD = 0.62, 44 df; b) August, fat, SE = 0.04, LSD = 0.11, 44 df; protein, SE = 0.11, LSD = 0.31, 44 df.

Hill et al. (1998) reported increased milk fat and milk protein for cows grazing T85 pastures with and without alfalfa creep grazing than for cows grazing Coastal pastures with ryegrass. The trends for increased (P > 0.10) milk protein in August 2004 (Figure 6) and June 2005 (Figure 7a), and greater (P < 0.05) milk protein in August 2005 (Figure 7b) for cows grazing T85 pastures indicate that the increased milk protein produced on these pastures contributed to greater calf gains recorded for T85 treatments (Table 1).

Tifton 85 has produced substantially greater DM yields, digestibility, and ADG in steers, beef calves, and
cows compared with Coastal Bermudagrass. Throughout our study, forage mass was abundant and tended to be greater for Tifton 85 than for Coastal pastures. Cow and calf performance were considerably increased for Tifton 85 pastures in both years of the study. Under continuous stocking, Tifton 85 pastures had greater nutritive value and were stocked with more cattle than Coastal pastures. Both ADG and weaning weights were increased for calves with access to aeschynomene creep grazing Tifton 85 Bermudagrass during the summer before weaning. Milk protein tended to increase for calves with access to aeschynomene creep grazing Tifton 85 pastures in both years of the study. Under our study, forage mass was abundant and tended to be greater for Tifton 85 than for Coastal pastures. Protein supplementation of stocker calves grazing Tifton 85 and Coastal bermudagrass. Pages 69–70 in Texas Agric. Exp. Stn. Rep. No. 2004-1. Overton, TX.


LITERATURE CITED


