Paper ID: 166
Theme 2. Grassland production and utilization
Sub-theme 2.2. Integration of plant protection to optimise production

Bermuda grass hay did not improve performance of stocker calves grazing annual ryegrass at a high stocking rate

Guillermo Scaglia
LSU Ag Center, Iberia Research Station, Jeanerette, United States
Corresponding author e-mail: gscaglia@agcenter.lsu.edu

Keywords: Beef cattle, Bermuda grass, Hay, Ryegrass, Stockers

Introduction

From the nutritional standpoint, annual ryegrass (*Lolium multiflorum*) can provide up to 32% crude protein which is approximately twice what a fall-weaned calf requires at that point in life (250 kg) with observed daily gains of 1 to 1.5 kg (Scaglia *et al.*, 2009). Approximately 15% of the N that similar calves consumed while grazing cool season pastures is retained and 60% is excreted in urine (NRC, 1996). This lack of efficiency might be corrected by limiting access to ryegrass (high N content) while keeping cattle on low quality hay when off the pastures. The objective of the present experiment was to compare performance and grazing behavior of calves continuously stocked on annual ryegrass, grazing it or receiving hay on alternate days, or 72 h on ryegrass and 96 h with *ad libitum* access to hay.

Materials and Methods

The present study was conducted from January to April of three consecutive years (2011 to 2013) at the LSU Agricultural Center Iberia Research Station located in Jeanerette, LA (29° 57' 54" W latitude; 91° 42' 54" N longitude; altitude 5.5 m).

Fifty-four crossbred (*Bos Taurus* x *B. indicus*; from 25 to 50% Brahman influenced) steers (BW=229 ± 2.9 kg; 10.7 ± 0.2 mo of age) born and raised at the IRS were used. The 3 treatments (3 replicates each) evaluated were: 1) steers (CON) were continuously stocked (4.5 steers/ha; 1040 kg/ha) on annual ryegrass (*Lolium multiflorum* Lam. cv. 'Marshall') pastures (1.33 ha); 2) steers grazed 50% of the area assigned to CON treatment (0.67 ha; 9 steers/ha; 2081 kg BW/ha during grazing) every other day (HAY24). Steers were allowed to graze the area for 24 h (starting at 0800) and then brought back to a barn for 24 h (at 0800 of the following day) where they were fed Bermudagrass hay *ad libitum*. In a week (7 d) steers grazed ryegrass for 96 h; 3) steers grazed 50% of the area assigned to CON treatment (0.67 ha; 9 steers/ha; 2079 kg/ha during grazing) for 96 h (Fridays 0800 to Tuesdays 0800), then brought back to the barn for 72 h (Tuesdays 0900 to Fridays 0700) where bermudagrass hay was fed (HAY72).

While in the barn, steers in treatments HAY24 and HAY72 were individually fed medium quality bermudagrass (*Cynodon dactylon*; cv. 'Jiggs') hay using electronic gates (American Calan, Northwood, NH). Hay offered was not further processed so it was fed by manually breaking the square bales, weighing it, and placing it in the Calan gates.

At the start and end of the experiment steers were weighed on 2 consecutive days (no restriction of grazing or water), weights averaged (BW for d 0) and every 15 d thereafter. Mineral mix and water were available *ad libitum*.

All pastures were planted with annual ryegrass (*Lolium multiflorum* Lam. cv. 'Marshall'). Seeding rates used for annual ryegrass were 33 kg/ha and was planted using a 4.5 m no-till planter. All pastures were fertilized twice with 40 and 60 units of N (87 and 130 kg urea/ha) in October and February, respectively.

Forage mass was determined at the beginning of the trial (d 0) and every time the steers were weighed using the double sampling technique with a plate meter and methodology similar to that described by Scaglia *et al.* (2009). Samples of forage for nutritive value analyses were hand-plucked from every paddock every 14 d. Hay samples were taken once a week from each group, composited by pen within 15 d period.

Measurements of forage growth were conducted. A 1-m^2 exclusion cage was constructed using cattle panels. Dry matter intake per paddock was estimated following the method of Meyer *et al.* (2008):

$$DMI_{paddock} = (Yield_{Exclosuret1} - Yield_{Grazedt0}) - (Yield_{Grazedt1} - Yield_{Grazedt0})$$

Where t0 is the previous sampling and t1 is the current sampling. This was then used to calculate average individual DMI (kg/d and as % of BW) for each period.

Every year, as described by Scaglia *et al.* (2009), grazing behavior recordings were conducted through the entire grazing season on one steer per treatment replicate, each wearing an animal activity monitor (IceTag^{TM}, version 2.004, IceRobotics, Midlothian, Scotland, UK) attached to a Velcro® strap on the left rear leg just above the metatarsophalangeal joint. Bite rate was determined in 2 consecutive-1 min intervals (in each hour) in each of the days and averaged by animal.

The experiment was a completely randomized design with 3 replicates. Data were analyzed with the MIXED procedure (SAS Institute Inc., Cary, NC).Forage mass and nutritive value of ryegrass were analyzed for treatment, sampling date, and their interaction. For ADG, the effects of treatment, period, and their interaction were determined. Sampling date (for forage variables) and period (for ADG) were the repeated measures. Productivity (BW gain/ha and beef produced/ha) was analyzed for the treatment effect. In all cases, paddock was the experimental unit. For grazing behavior variables year was considered the random effect, steer within treatment by year was the experimental unit, with day analyzed as a repeated measure.

Results and Discussion

Pastures grazed by steers in treatments HAY24 and HAY72 had more forage mass ($P< 0.05$) from d 28 until the end of the grazing season when compared to CON (1699 and 1800 vs. 1088 kg DM/ha, respectively). Concentrations of ADF and NDF were greater (27 and 41%) and the IVDMD was lower (74%) for HAY75 pastures compared to CON pastures (23, 38, and 78%, respectively).

When expressed as %BW, the average DMI for the entire grazing period was greater ($P = 0.03$) for CON (2.31% BW) than for HAY24 (1.69% BW) and HAY78 (1.79% BW).

Treatment differences in ADG during the first 2 weeks of the trial were explained by the steers' eating behavior in HAY72. Both times that steers returned to the barn after 4 d on ryegrass, they reduced hay intake which in turn affected fill and ADG. After the first 14 d even though ADG was lower for HAY72, it was similar ($P> 0.05$) to those steers on HAY24; however, the small ADG during the first 14 d, explained most of the difference in total ADG (0.56 kg) and gain per ha (362 kg) for HAY72. Steers in HAY24 gained 0.81 kg/d and 418 kg/ha. Steers in CON gained more per day and per unit of land (1.18 kg and 498 kg, respectively) when compared to those steers under hay-feeding treatments.

Throughout most of the experiment, steers in HAY72 consumed less hay ($P< 0.05$) than those on HAY24 (3.8 vs. 4.9 kg DM/d, respectively); however, the largest differences were observed during the first (2.7 vs. 3.4 kg DM, respectively) and last period (4.4 vs. 6.2 kg DM, respectively). This negatively impacted the performance of steers in HAY72. Hay (12% CP, 54% TDN, 70% NDF and 39% ADF) intake differed when expressed as % BW (on average HAY24 consumed 13% more hay on a %BW than HAY72). Forage mass, height, and nutritive value were not limiting, thus the 72 consecutive hours on hay is the explanation for their lowest ADG.

No difference ($P> 0.05$) in grazing behavior variables was observed between steers in the different treatments. Bite rate was greater ($P = 0.01$) in HAY24 and HAY72 (68 and 70 bites/min, respectively) than in CON (63 bites/min). Bite rates per hour for HAY24 and HAY72 were greater in the first 2 h of the day (76 and 77 bites/min, respectively), and gradually decreased throughout the day. In the evening hours, bite rate was similar across treatments (64 bites/min).

Conclusion

In our environment, hay feeding did not improve performance of steers grazing at twice the appropriate stocking rate for annual ryegrass. Chemical and physical characteristics of the bermudagrass hay may have negatively influenced its intake and digestibility. Grazing behavior of steers in the first hours on ryegrass was affected by previous diet (hay). Further studies are warranted.

References

Meyer, A. M., M. S. Kerley and R. L. Kallenbach. 2008. The effect of residual feed intake classification on forage intake by grazing beef cows. *J. Anim. Sci.* 86:2670-2679.

NRC. 1996. *Nutrient Requirements of Beef Cattle*. 7th rev. ed. Natl. Acad. Press, Washington, DC.

Scaglia, G., H. T. Boland and W. E. Wyatt. 2009. Effects of time of supplementation on beef stocker calves grazing ryegrass. II Grazing behavior and dry matter intake. *Prof. Anim. Sci.* 25:749-756.