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Effects of year-round stocking methods and stocking rates on seasonal forage response and cow-calf weight gain in the gulf coast region of the United States[1]

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ABSTRACT

The present research is the second phase (2 yr) of a multiyear cow-calf study employing fixed stocking rates and examining the effect of stocking method, i.e., continuous and rotational, and stocking rate on beef cattle production. Two sets of 4 adjacent pastures, each containing a mixed warm-season, perennial grass sod [common bermudagrass, Cynodon dactylon (L.) Pers.; dallisgrass, Paspalum dilatatum Poir.], were overseeded to 'Marshall' annual ryegrass (Lolium multiflorum) in the autumn of 2 consecutive years. Within each set of 4 pastures, one of the following grazing treatments was randomly assigned each pasture: rotationally stocked (8 paddocks) at a low, medium, or high stocking rate and continuously stocked at a moderate stocking rate. Low, medium, and high stocking rates were 1.25, 2, and 2.75 cows/ha. Brangus cows and their suckling calves were stocked on treatment pastures in March 2004. Stocking treatment affected prebreeding cow BW ($P < 0.01$) and tended to affect precalving ($P = 0.13$), postbreeding ($P = 0.07$), weaning ($P = 0.11$), and subsequent precalving cow BW ($P = 0.08$). Stocking-method treatments were similar in forage allowance in the early- and late-spring periods ($P = 0.67$ and $P = 0.65$, respectively), but in the summer period, rotationally stocking at a medium stocking rate was greater ($P < 0.01$) than continuously stocking at a moderate stocking rate. There was a consistent trend across seasons for the percent CP in the simulated bite sample DM to be greater ($P < 0.1$) for the continuously stocking at a moderate stocking rate compared with the rotationally stocking at a medium stocking rate stocking methods. Based upon cow BW outcomes in this research, stocking rate is the most important consideration in design of a grazing program.

Key words: beef cattle, cow-calf, stocking rate, stocking method

INTRODUCTION

Greater than 50% of the beef farms in the United States have fewer than 20 cows, and almost 25% of farms having cattle and calves have fewer than 50 acres of pastureland (USDA, 2007). Many, if not most, beef producers operate on a fixed area of pasture resources and lack the inclination or ability to employ a variable stocking rate in the management of pasture and cattle resources. A stocking system that increases production

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efficiency and maximizes economic efficiency without making unreasonable time, labor, and resource demands and that is sustainable on a year-round basis would be desirable. The goal is to identify a system that finds the proper balance between individual calf weight and total calf weights per unit of land area.

Few studies have examined the effect of fixed or set stocking rates (Hamilton et al., 1996; Arthington et al., 2007; Scaglia et al., 2008) and stocking method (Chestnut et al., 1992; Lomas et al., 2000) on cow-calf production. Fewer still are those that have examined stocking methods across an array of fixed stocking rates on a year-round basis for multiple years on cow-calf production (Wyatt et al., 2012). Comparisons of stocking methods for growing animal production have typically focused on forage species predominating in a particular season of the year (Hafley, 1996; Gunter et al., 2005; Bungenstab et al., 2011). Stocking methods and stocking rates in a seasonal growing animal scenario do not translate well to year-round–based cow-calf production system (Aiken and Bransby, 1992). Presumably, stocking management in one season may indeed affect forage production and animal performance in a subsequent season.

The current research represents the second phase of multiyear project and has the objectives to 1) determine the effect of 3 fixed stocking rates in rotational stocked pastures on seasonal cow and cow-calf weight change, forage allowance, and forage nutritive value and 2) compare continuous to rotational stocking at identical moderate stocking rates on seasonal cow and cow-calf weight change, forage allowance, and forage nutritive value.

MATERIALS AND METHODS

General Design

The study was a randomized complete block design with 2 replications of 4 treatments. Treatments consisted of 4 livestock grazing strategies: rotationally stocked at a low, medium, or high stocking rate (**RL**, **RM**, and **RH**) and continuously stocked at a medium stocking rate (**CM**). Low, medium, and high stocking rates were 1.25, 2, and 2.75 cows/ha, respectively. Although stocking rates were based upon the number of cows in a treatment, suckling calves accompanied the cows from early spring through weaning. Treatments were randomly assigned to 4-ha pastures (replication 1) and 6.5-ha pastures (replication 2). Difference in pasture area between replications was due to availability of pastures for the study. Individual pastures served as the experimental units. Pastures assigned to the rotational treatments were subdivided into 8 equal-size paddocks to allow for rotational stocking. Paddocks were 0.5 ha for replication 1 and approximately 0.8 ha for replication 2. The resultant number of cow-calf pairs for the low, medium, and high stocking rates were 5, 8, and 11 pairs for replication 1 and 8, 13, and 18 pairs for replication 2. Cows remained on treatment pastures for the duration of the study unless they were removed for injury or reproductive failure. The study was initiated in March of 2004 and continued for 2 consecutive years.

Weather Information

Thirty-year and 2-year (coinciding with the present study beginning in February 2004) means of average maximum and minimum temperatures, precipitation amount, and percent days of measurable precipitation (exceeding 0.03 cm) are presented by season in Table 1. The study was characterized by less accumulation in the winter (i.e., November through January) of both years compared with the 30-yr precipitation means for those seasons. However, remaining seasons in both years were relatively wetter than the seasonal average precipitation accumulation for the 30-yr mean. The early (February through April; **ESP**) and late spring (May through June; **LSP**) of 2004 received considerably more accumulated precipitation compared with the 30-yr average. Days of precipitation (%) were less in the winter season for both years and were greater for both years in the ESP and LSP. Although precipitation accumulation for the summer (July through October; **SUM**) in both years was greater than the 30-yr mean, the days of precipitation were surprisingly less for the SUM seasons compared with the 30-yr average and indicate that more precipitation was accumulated with fewer rainy days than the 30-yr mean.

Pasture and Grazing Management

All pastures were located on Baldwin (fine, montmorillonitic, thermic, Vertic Ochraqualfs) and Iberia silty clay loam (fine, montmorillonitic, thermic, Vertic Haplaquolls) soils at the Louisiana State University Agricultural Center Iberia Research Station located in Jeanerette, Louisiana (29°57′54″W latitude; 91°42′54″N longitude; altitude of 5.5 m). Pastures had previously been shaped to improve drainage. Pastures were maintained in a warm-season, mixed perennial sod composed of primarily common bermudagrass, *Cynodon dactylon* [L.] Pers., and dallisgrass, *Paspalum dilatatum* Poir. Warm-season annuals were represented by crabgrass, *Digitaria* spp., and broadleaf signalgrass, *Urochloa platyphylla*. All pastures were broadcast overseeded in October of 2003 and 2004 with annual ryegrass (*Lolium multiflorum* L.; Marshall, The Wax Company, Amory, MS) at 45 kg/ha. Pastures annually received 173 kg/ha of nitrogen in 3 split applications of 67, 67, and 39 kg of N/ha in February, June, and December, respectively. Potassium and phosphorus soil amendments were applied (each 67 kg/ha) in June of each year. Pastures were treated with picloram + 2,4-D (Grazon P+D, 2.33 L/ha, Dow AgroSciences, Indianapolis, IN) annually in the spring for horsenettle (*Solanum carolinense*) weed control.

Rotationally Stocked Pastures. Cows rotationally grazed 8 paddocks throughout the year. Rotations were based upon the subjective assess-