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Using Modified Intensive Early Stocking for Grazing Replacement Heifers

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Abstract

Even though Kansas native rangelands often have steep slopes or shallow soils not conducive to many other uses other than livestock grazing, native rangeland and perennial grassland acres in Kansas have been declining. Cropland acreage over this same time frame has increased, and so has rangeland fragmentation into small ranchettes and urbanization. Producers may be looking to increase production efficiency on a shrinking forage land base. The use of intensive early stocking (IES) is one the most efficient stocking strategies to produce beef on rangeland acres. The IES strategy has been widely used in eastern Kansas and is capable of increasing beef production by 30-40% compared to continuous season long stocking (SLS). In western Kansas, IES and continuous SLS have resulted in similar beef production. However, a modified IES (MIES) system, which combines greater early season animal density on high-quality forage of IES, and late season individual animal selectivity for a high-quality diet of SLS, has increased beef production by 26% compared to continuous SLS alone on western Kansas rangelands. Even with this significant increase in production efficiency, stocker production is largely overshadowed by cow/calf production in terms of acres grazed in western Kansas. The question then arises, can the efficiencies of greater beef stocker production from modified IES be utilized with reproductive animals of the cow/calf production system? The purpose of this study was to compare the use of continuous SLS and MIES in a replacement heifer system for western Kansas.

Keywords

body condition score, conception rate, continuous stocking, litter cover, species composition

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Keith Harmoney and John Jaeger

Introduction

Even though Kansas native rangelands often have steep slopes or shallow soils not conducive to many other uses other than livestock grazing, native rangeland and perennial grassland acres in Kansas have been declining. Cropland acreage over this same time frame has increased, and so has rangeland fragmentation into small ranchettes and urbanization. Producers may be looking to increase production efficiency on a shrinking forage land base. The use of intensive early stocking (IES) is one the most efficient stocking strategies to produce beef on rangeland acres. The IES strategy has been widely used in eastern Kansas and is capable of increasing beef production by 30-40% compared to continuous season long stocking (SLS). In western Kansas, IES and continuous SLS have resulted in similar beef production. However, a modified IES (MIES) system, which combines greater early season animal density on high-quality forage of IES, and late season individual animal selectivity for a high-quality diet of SLS, has increased beef production by 26% compared to continuous SLS alone on western Kansas rangelands. Even with this significant increase in production efficiency, stocker production is largely overshadowed by cow/calf production in terms of acres grazed in western Kansas. The question then arises, can the efficiencies of greater beef stocker production from modified IES be utilized with reproductive animals of the cow/calf production system? The purpose of this study was to compare the use of continuous SLS and MIES in a replacement heifer system for western Kansas.

Experimental Procedures

High percentage Angus and Angus crossbred replacement heifers were either stocked at 1.6× the typical stocking density May through July and at 1× for the rest of the season in a modified IES system, or at 1× for the entire season in a continuous SLS system. Pastures averaged 35 acres in size and consisted mostly of limy upland ecological sites. Stocking consisted of 8 heifers or 13 heifers per pasture in the SLS and MIES pastures, respectively. Heifers were checked by transrectal ultrasonography between 30 and 35 days after fixed time artificial insemination (AI) to determine pregnancy and were checked again at the end of the grazing season to determine final pregnancy. One bull was placed in each pasture 10 days after timed AI and remained on pasture for 35 days. Heifers determined not pregnant to artificial insemination in the 1.6× IES system were removed in mid-July while all heifers, regardless of pregnancy status, remained on pasture in the 1× continuous system. In cases when not enough AI pregnant heifers in the 1.6× IES system could be retained to meet the late 1× stocking density, the oldest non-AI pregnant heifers remained on pasture while the youngest were removed. Heifer body weight and body condition score (BCS) were collected in May at the start of the grazing season, in mid-July at mid-season, and again in October at the end of the grazing season. Standing available herbage biomass was also collected from pastures at the grazing season midpoint in July, and again at the end of the grazing season in October by sample estimates from a falling plate meter calibrated to clipped sample plots at each harvest. At midseason, a modified step-point sampling method was also used to estimate ground cover and vegetative species composition.

Results and Discussion

Heifer body weight and body condition score were not different between the two stocking treatments at any time during the grazing season (Table 1). However, early individual average daily gain (ADG) from May to July was slightly greater (1.84 vs 1.72 lb/day) for the continuous SLS group compared to the MIES group (Table 2). This difference disappeared during the last half of the grazing season, and animals had similar ADG for the last half of the grazing season and for the combined whole grazing season. Because animals were stocked at a greater density in the MIES pastures early in the season, the MIES treatment had greater total beef production during the first half of the growing season, and subsequently had 38% greater beef production per acre for the whole grazing season (Table 2). First service conception rate (FSCR) was not different between stocking treatments. Because heifers not pregnant to AI were removed from MIES pastures at mid-season, the MIES pastures had a higher percentage of AI-bred heifers remaining on pasture at the end of grazing, forming a more uniform and synchronized group.

Available herbage dry matter at mid-season in July was greater for the MIES pastures by 145 lb/acre, but available herbage dry matter was not different between stocking systems in October at the end of the growing season (Table 3). Both stocking systems averaged just over 1900 lb/acre of residual available herbage at the end of three growing seasons. Litter cover (Table 4) and species composition of most dominant and subdominant grasses and forbs were not different between stocking systems before or after initiation of the experiment. Two species did have significant composition changes after stocking treatments were imposed. Composition of sand dropseed (*Sporobolus cryptandrus*) and sedges (*Carex* sp.) significantly declined in the continuous SLS pastures but did not change in the MIES pastures (Table 4). Both of these species comprise only a small percentage of total vegetative composition, so these differences may have only small or minimal biological impact on the pasture system.

Implications

The MIES system appears to be ideally suited for the production of replacement heifers. The use of a synchronization protocol and early pregnancy detection with ultrasonography enables the removal of non-AI pregnant heifers at the grazing season mid-point. This creates a uniform group of heifers remaining on pasture at the end of the grazing season. Individual weight gain-trends and gains per acre of the MIES system with replacement heifers closely resembles the improved production efficiency of MIES observed in long-term stocker steer grazing research.

Table 1. Heifer body weights and condition scores in early May at the start of the grazing season, at mid-July at mid-grazing season, and at the end of the grazing season in early October, averaged over 2015-2017

Heifer stocking treatment	May weight	May BCS	July weight	July BCS	October weight	October BCS	Heifer FSCR	Pasture AI Remain
	lb		lb		lb		%	%
Continuous SLS	772	5.5	909	5.7	986	5.5	52	51
Modified IES	770	5.5	900	5.7	989	5.5	44	69

Heifer FSCR to timed AI and percent of heifers pregnant to AI left on pasture at the end of season is also included.

Table 2. Early grazing season, late grazing season, and total season individual ADG and total beef produced per acre for replacement heifers stocked with a continuous SLS system or a 1.6×+1 modified IES system averaged over three years, 2015-2017

Heifer stocking treatment	May-July ADG	July-October ADG	Total ADG	May-July beef	July-October beef	Total beef
	lb/hd	lb/hd	lb/hd	lb/acre	lb/acre	lb/acre
Continuous SLS	1.84*	1.03	1.42	34*	19	52*
Modified IES	1.72*	1.09	1.40	52*	20	72*

*Indicates statistically different values at the $P \leq 0.05$ level.

Table 3. Pasture available herbage dry matter (DM) yield determined by falling plate meter readings correlated with clipped frame samples in July and October of 2014 prior to grazing treatments and in 2015-2017 at mid-season and after grazing

	Heifer stocking treatment			
	July		October	
	Continuous SLS	Modified IES	Continuous SLS	Modified IES
	Available DM (lb/acre)			
2014 pretrial	1310	1428	1568	1754
2015	1866	1909	1558	1590
2016	2482	2195	2413	2359
2017	2112	1919	1857	1754
Average 2015-2017	2153*	2008*	1943	1901

*Indicates statistically different values at the $P \leq 0.05$ level.

Table 4. Pasture ground cover and species composition in 2017, and significant change in composition of sand dropseed (SPCR) and sedges *(Carex)* from 2014, prior to grazing treatments, to 2017

	Litter cover 2017	SPCR 2017	2014-2017 Change	*Carex* 2017	2014-2017 Change
			%		
Continuous SLS	88	3.0	-1.4*	5.1	-4.4*
Modified IES	84	2.3	0.0*	5.3	-0.1*

*Indicates statistically different values at the $P \leq 0.05$ level.