PUBLICATIONS

1981

Forage Research in Texas

Departmental Technical Report No. 81-12

Department of Soil and Crop Sciences

AP - 0047

Projects: H-6443
H-1911

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FORAGE SYSTEMS FOR WINTERING REPLACEMENT HEIFERS

OBJECTIVE:

Evaluate methods of utilizing forage-land resources in process of developing replacement heifers.

PROCEDURE:

Fifty-six Simmental x Brahman-Hereford heifers were allotted to two replications of four treatment groups on November 9. Each replicate was made up of seven heifers and one sterile marker bull. Two treatment groups remained in drylot (with different rations) from November 9 until a ryegrass-arrowleaf clover pasture was available for grazing. Grazing of the ryegrass-clover was initiated on March 12. One drylot ration consisted of ad libitum baled hay plus 2.3 kg/hd/da of a 4 milo:1 CSM mixture (HSUP). The other drylot ration consisted of ad libitum baled hay plus 0.23 kg/hd/da of CSM(HCSM). Group 3 had access to full-time grazing of wheat-ryegrass from November 21 until plant maturity (FULL). Stocking rate in this group was 5hd/ha. Group 4 had ad libitum round baled hay plus a part-time grazing sequence of sod-seeded wheat-ryegrass pasture (PART). Heifers started grazing for 2 hours/hd/da until sufficient forage growth allowed for additional grazing time. Stocking rate in this group was 15 hd/ha. All replicates of all groups were separate from November 9 until May 21. On May 21, all groups were combined into a single herd for the purposes of (1) having access to a common forage diet (ryegrass-clover-bermudagrass), and (2) breeding with two Brahman bulls for a 56-day period (5-21 to 7-16).

The following forage data was taken: availability, grazing pressure and stocking rate, percent in vitro dry matter digestibility, percent protein and hay offered. Animal data taken was: average daily gain, condition score, height and length (measured on 11-9, 3-12, 5-21, and 7-16, or at puberty), age at puberty, weight at puberty and pregnancy rate. All heifers were weighed and condition scored at 28-day intervals. Puberty was defined as the first estrus after which a palpable corpus

luteum was present. Pregnancy was determined via rectal palpation 56 days after removal of the fertile bulls (September 8).

RESULTS AND DISCUSSION: Heifers receiving ad libitum baled hay and .23 kg/hd/da CSM consumed more hay than the other two groups. The part-time pasture plus round baled hay group of heifers consumed the least amount of hay. This is due in part to the difference in hay quality. The round baled hay had a protein content of 10.6% and an in vitro dry matter digestibility (IVDMD) of 42%. The conventional, rectangular bales, however, had protein and IVDMD values of 14.5% and 52%, respectively.

Forage was available in sufficient quantity so that animal performance was not detrimetally affected due to restricted intake (Table 2). The heifers assigned to the full-time grazing paddocks had more forage available per unit body weight than did the heifers assigned to the part-time grazing paddocks. This was primarily due to design of the trial for the purpose of efficient forage utilization. Hence, grazing pressure and stocking rate were considerably higher on the part-time paddocks as compared to the full-time paddocks (Table 3).

At initiation of the trial, the heifers averaged 269 days of age and 218 kg (Table 4). Age at puberty was lowest in the HSUP group and highest in the HCSM ($P<.05$). However, two heifers in the PART group did not reach puberty before 7-16. Heifer weight at puberty was greatest in the HCSM group ($P<.05$) and lowest on the PART group. Condition score at puberty ($P<.001$) followed a similar trend among treatments as weight at puberty. Differences in height and length of heifers at puberty were not significant.

Table 5 shows heifer average daily gain (ADG) differences as influenced by treatment group and period. Heifers in the HCSM made compensating gains during 3-12 to 5-21 and again from 5-21 to 7-16. This 205-day ADG showed little difference between HSUP, HCSM, and FULL groups. However, the ADG of heifers on the PART treatment gained less ($P<.001$) than the other treatment groups. This lack of compensatory gain may have been due to (1) the climatic conditions which were generally unfavorable for rapid, forage growth in the spring; and (2) an unusually high incidence and reoccurring incidence of internal parasites.

The percent of heifers reaching puberty and becoming pregnant during the test period are shown in Table 6. Groups HSUP, HCSM, and FULL had 100% of the heifers to reach puberty; whereas, only 69% of the heifers in the PART group reached puberty during the study period. Pregnancy rate was high and nearly identical for heifers in the HSUP and HCSM groups. The percent heifers becoming pregnant in the FULL group was considerably lower than anticipated. A close examination of the ADG of heifers in the FULL group revealed that the open heifers gained 31% less than the pregnant heifers (.39 vs .27). Thus, the lack of adequate ADG was probably responsible for the low pregnancy rate. It was concluded that compensatory gains via programmed forage utilization schedules may be used to a biological and economical advantage in the development of replacement heifers. And, further, that gains immediately preceding and during breeding may be more important than winter gains in terms of pregnancy rates.

Table 1. Hay offered to heifers receiving hay-supplement (HSUP), hay-cottonseed meal (HCSM), and hay-pasture (PART).

GROUP	Hay Offered			
	11-9 to 3-12 (kg)	3-12 to 4-11 (kg)	Treatment Totals (kg)	Per heifer per day (kg)
HSUP	9918	-	9918	5.7
HCSM	11154	-	11154	6.9
PART	5952	1839	7791	3.6

Table 2. Available forage in paddocks grazed by full-time (FULL) and part-time (PART) heifers.

Date	Forage Availability			
	FULL		PART	
	kg DM/ha[1/]	kg DM[2/] / kg BW	kg DM/ha	kg DM / kg BW
11-9	5040	3.48	-	-
11-29	4410	1.60	2862	-
12-19	5202	2.84	3617	1.12
1-16	2664	1.36	2375	0.71
2-13	1384	1.00	2357	0.69
3-12	1728	0.97	1392	0.58
4-11	1980	0.81	1836	0.46
5-2	2086	0.64	1062	0.22
5-21	1654	0.63	882	0.15

[1/] Kilograms of forage dry matter per hectare

[2/] Kilograms of forage dry matter per kilogram of animal body weight

Table 3. Resultant grazing pressures of full-time (FULL) and part-time (PART) grazing treatments.

Date	Grazing Pressure and Stocking Rate			
	FULL		PART	
	kg BW/ha[1/]	Animals/ha[2/] (250 kg/an)	kg BW/ha	Animals/ha (250 kg/an)
11-9	1450	5.8	-	-
11-29	2760	11.0	-	-
12-19	1829	7.3	3219	12.9
1-6	1956	7.8	3358	13.4
2-13	1389	5.6	3414	13.7
4-11	2446	9.8	3948	15.8
5-2	2630	10.5	4068	16.3
5-21	2572	10.3	5893	23.6

[1/] Kilograms of live body weight per hectare

[2/] Number of animals per hectare based on a constant 250 kg body weight per animal

Table 4. Physical traits of heifers at initiation of the trial and at puberty.

Group	Initial Heifer Status		Heifer Status at Puberty				
	Age (days)	Weight (kg)	Age (days)	Weight (kg)	Condition Score	Height (cm)	Length (cm)
HSUP	272	218	376 ± 72	292 ± 48	6.7 ± 0.8	119.1 ± 5.6	114.0 ± 7.1
HCSM	265	216	454 ± 67	319 ± 43	7.0 ± 0.9	123.5 ± 4.7	119.1 ± 6.4
FULL	269	220	389 ± 63	279 ± 43	6.2 ± 0.6	120.4 ± 7.4	115.2 ± 5.7
PART	271	216	409 ± 88†	272 ± 33	5.5 ± 0.9	121.6 ± 3.5	114.0 ± 6.9

†Two heifers did not reach puberty during trial and data from them were not included in this table.

Table 5. Average daily gain of heifers by periods as influenced by treatments.

Group	Average Daily Gain (kg)					
	11-9 to 3-12	3-12 to 5-21	5-21 to 7-16	11-9 to 7-16 (250 days)	7-16 to 9-8	11-9 to 9-8 (304 days)
HSUP	0.64	0.68	0.46	0.61	0.14	0.53
HCSM	0.38	0.83	0.73	0.57	0.19	0.50
FULL	0.58	0.91	0.35	0.57	0.13	0.50
PART	0.24	0.39	0.50	0.40	0.17	0.36

Table 6. Percent heifers reaching puberty and becoming pregnant from each treatment group.

Group	Total No. Heifers	Puberty		Pregnant	
		No.	%	No.	%
HSUP	14	14	100	13	93
HCSM	13[1/]	13	100	12	92
FULL	14	14	100	9	64
PART	13[2/]	9	69	7	54

[1/] Heifer broke leg and was removed from study.

[2/] Heifer injured back and was removed from study.