HEIFER DEVELOPMENT ON DORMANT NATIVE RANGE WITH FIBER-BASED SUPPLEMENTS OR LIMITED DRYLOT FEEDING

T.T. Marston[1], K.S. Lusby[2], and R.P. Wettemann[3]

Story in Brief

Four different supplement/winter feeding regimens were used to develop 48 spring-born replacement heifers for breeding. Two supplements, containing 20 or 40% crude protein, made from soybean hulls and soybean meal were fed from weaning until the breeding season. Treatments were 4.4 or 5.9 lb/day of a 20% protein supplement or 2 lb/day of a 40% protein supplement fed to heifers on dormant native range from weaning until breeding. A fourth group of heifers was fed 2 lb/day of the 40% protein supplement until mid-February and then limit-fed a complete ration in drylot to gain about 2.25 lb/day until breeding. Heifers fed in drylot or fed 5.9 lb/day of a 20% protein supplement had similar weights at breeding and weighed more at breeding than heifers fed smaller daily levels of 40% protein supplements. More heifers reached puberty before breeding when fed concentrate in drylot compared to heifers wintered on the pasture treatments.

(Key Words: Replacement Heifers, Supplementation, Puberty.)

Introduction

Developing replacement heifers on dormant native range is a challenge to many cow/calf producers. Sufficient gains must be achieved from weaning to 15 months of age so heifers can reach puberty and conceive. Supplements made from feedstuffs high in digestible fiber (such as soybean hulls) are efficiently utilized by cattle grazing low- to medium-quality forage. If sufficient gains can be achieved using a fiber-based supplement while grazing dormant range, producers could minimize production inputs compared to expensive grain-based diets or wheat pasture. Another alternative might be to use minimal input, low-gain programs until late winter and then move heifers to high-concentrate, rapid-gain programs to achieve breeding weight.

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[1]Graduate Assistant [2]Professor [3]Regents Professor

Some studies have indicated that concentrate diets may reduce the age at puberty in heifers.

The objectives of this study were: (1) to determine the potential for using fiber-based supplements to attain acceptable rates of gain with replacement heifers grazing dormant native range, and (2) to evaluate the management technique of combining traditional protein supplementation while heifers graze dormant native range with concentrate feeding regimen prior to the breeding season.

Materials and Methods

The trial was conducted at the Range Cow Research Center 12 miles west of Stillwater. Forty-eight spring-born Hereford and Hereford x Angus heifers were allotted by breed and weight to four groups that were fed different supplements and different feeding regimens from November 1 until the beginning of the breeding season on April 29. These groups were: SBM (a 40% soybean meal based supplement fed at 2.0 lb/day; SBH-LOW (a 20% soybean hull based supplement fed at 4.4 lb/day); SBH-HIGH (the same 20% soybean hull based supplement fed at 5.9 lb/day); and DRYLOT (40% CP soybean meal based supplement fed at 2.0 lb/day until approximately 90 days prior to the breeding season then limit-fed a high energy ration in drylot).

On February 1, 1991 the DRYLOT group was placed in a drylot and fed a complete ration to achieve 2.25 lb/day gain. The daily feeding rate in drylot (13.9 to 16.8 lb/day; as fed basis) was adjusted every two weeks as heifers increased in body weight. It was originally intended that the ration would be based on whole shelled corn and a protein supplement. However, during the first five days of the drylot period, several of the heifers refused to consume whole shelled corn and the ration was changed on February 6 to rolled corn with alfalfa pellets and cottonseed hulls as roughage sources. Heifers readily accepted this ration. While in drylot, heifers were group-fed the complete ration daily in bunks. Composition of supplements and the final drylot ration are shown in Table 1.

Supplement amounts were prorated for 5-day/week feeding and individually fed in covered stalls as all heifers grazed the same pastures. Prairie hay (CP = 4.4%) was used to supplement the dormant native range during inclimate weather in December 1990 and after February 26, 1991 when quality of standing forage was inadequate.

All weights were taken after overnight withdrawal from feed and water. Initial and final weights were averages of weights on two consecutive days. Heifers were exposed to bulls for natural service for 65 days beginning April

Table 1. Composition and nutrient content of supplements and the drylot ration (dry matter basis).

	Supplement/Ration		
	SBM[a]	SBH[b]	Drylot
Ingredients			
Soybean meal	91.20	15.00	11.50
Soybean hulls	3.45	81.00	
Molasses	4.00	4.00	3.10
Dicalium phosphate	1.80	.50	
Vit A	.10	.05	.015
Copper sulfate	.01		
Rolled corn			73.50
Alfalfa pellets			4.90
Cottonseed hulls			5.40
Limestone			1.30
Salt			.30
Nutrient content (calculated)			
Crude protein	45.08	19.34	13.7
Phosphorus	1.09	.40	.33
Calcium	.59	.57	.68
Potassium	2.48	1.50	.85
NE_m, Mcal/cwt	84.72	80.50	93.30
NE_g, Mcal/cwt	56.83	43.10	59.60
Nutrient content, DM (actual)			
Crude protein	42.96	19.83	13.52
Amount fed, lb/day	2.0	LOW/HIGH[c]	V[d]

[a] SBM = Soybean meal.
[b] SBH = Soybean hulls.
[c] SBH-LOW were fed 4.4 lb/day and SBH-HIGH were fed 5.9 lb/day.
[d] Heifers fed SBM supplement until February, then fed from 13.9 to 16.3 lb/day (as fed) of the ration until breeding.

29. During the breeding season and until the pregnancy examination in October, all heifers grazed the same pastures. No supplements were fed after April 29 but a complete mineral mix was provided free choice.

Beginning in January, blood samples were collected weekly for progesterone analysis after a heifer weighed 500 pounds and until the end of the breeding season or the onset of ovarian luteal activity. Puberty was designated as that date when two consecutive weekly plasma samples had greater than 1 ng/ml of progesterone. Pubertal weights and ages were calculated by regression analysis using the intermediate weights before and after puberty.

Results and Discussion

Weight gains prior to the breeding season were similar for the SBM and SMH-LOW groups (Table 2). DRYLOT heifers, which were also fed 2 lbs/day of SBM until February, gained similarly to the SBM group during this period. Heifers fed SBM or SBH-LOW received equal amounts of supplemental crude protein, but the heifers fed SBH-LOW may not have been fed sufficient protein to take advantage of the additional supplemental energy. The SBH-HIGH group was fed supplement at a rate to maintain a daily gain of about 1 lb/day and attained this goal throughout the winter. Gains of SBH-HIGH heifers were greater than either the SBM or SBH-LOW heifers ($P<.01$).

As planned, heifers fed in DRYLOT weighed the same at the beginning of the breeding season as the heifers fed SBH-HIGH. During periods of extreme cold, ADG was reduced substantially. The availability of free-choice prairie hay probably affected the amount of fill and may account for the differences in ADG observed between the months of January and February.

During the breeding season, weight gain for heifers previously fed SBM, SBH-LOW, and SBH-HIGH were about 2 lb/day, while weight gain for heifers previously fed the DRYLOT ration was about 1.3 lb/day ($P<.05$). The abrupt change from high concentrate in DRYLOT to forage may have resulted in reduced forge intake during the beginning of the breeding season. Heifers previously fed SBH-HIGH weighed more ($P<.05$) at the end of the breeding season than either SBM, SBH-LOW, or DRYLOT heifers.

After the breeding season and until the end of the summer grazing, heifers in all groups gained weight similiarly, without supplemental feed. Heifers previously wintered on SBM-HIGH and DRYLOT maintained their weight advantage throughout the summer ($P<.05$) over the SBM and SBH-LOW groups.

Table 2. Effects of treatments on gains and body condition scores of replacement heifers.

	Group			
	SBM	SBH LOW	SBH HIGH	DRYLOT
No. of heifers	12	12	12	12
Weight, lb				
10/31/90[a]	464	465	445	445
4/26/91[a]	604[c]	613[c]	683[d]	684[d]
6/26/91[a]	728[c]	742[c]	793[d]	759[c]
10/31/91[a]	871[c]	889[c]	943[d]	914[cd]
Daily gains, intermediate, lb/d				
11/02-12/06, 34 days	.95[c]	.70[cd]	1.20[ce]	.80[c]
12/06- 1/04, 29 days	.02[c]	.31[c]	.67[d]	.07[c]
1/04- 1/29, 25 days	.83[c]	1.28[d]	2.04[e]	1.09[c]
1/29- 2/26, 28 days	-.43[c]	-.11[c]	.50[d]	.51[d]
2/26- 3/26, 28 days	1.50[c]	1.34[cd]	1.52[cd]	2.30[e]
3/26- 4/28, 33 days	2.02[c]	1.82[c]	1.83[c]	2.85[d]
Weaning to beginning of breeding season, lb/d				
11/02- 4/28, 177 days	.85[c]	.90[c]	1.29[d]	1.30[d]
Daily gains, without supplement, lb/d				
4/28- 6/26, 58 days	2.12[c]	2.23[c]	1.90[c]	1.29[d]
6/26- 10-31, 127 days	1.12	1.14	1.18	1.23
Body condition score[b]				
Date, 4/26	5.27[c]	5.45[c]	5.77[d]	5.89[d]
Date, 6/26	5.38	5.47	5.56	5.42
Date, 10/31	5.88	5.91	5.83	5.78

[a] Heifers were weighed two consecutive days after 16 hours of fasting and weights were averaged.

[b] Heifers were assigned body condition scores (1 = emaciated, 9 = obese).

[c,d,e] Least square means in a row with different superscripts differ ($P < .05$).

Body condition scores at the beginning of the breeding season for the SBM and SBH-LOW were less ($P<.05$) than body condition scores of heifers fed SBH-HIGH and DRYLOT . By the end of the breeding season, body condition scores were similar for all groups.

Age at puberty was similar for SBM, SBH-LOW, and SBH-HIGH groups, but DRYLOT heifers reached puberty at younger ages than either SBM or SBH-LOW ($P<.01$). The SBM and SBH-LOW heifers reached puberty at similar weights but were lighter than heifers fed SBH-HIGH or DRYLOT ($P<.05$). The weight at puberty for SBH-LOW heifers was less ($P=.06$) than for DRYLOT heifers. Pregnancy rates were equal to or greater than 84% for all groups. Comparisons between age and weight at puberty along with pregnancy rates are shown in Table 3. The greater number of DRYLOT heifers reaching puberty before the breeding season would likely result in more calves born early in the calving season. This would permit more days for heifers to return to estrus after calving and also would increase weaning weights of calves that would be older at weaning.

This study indicates that replacement heifers grazing dormant native range and fed enough 20% supplement, made from digestible fiber sources such as soybean hulls, can develop satisfactorily for breeding by 15 months of age. An alternative method of heifer development could be the use of small daily amounts of high protein supplement (40%) during winter grazing followed by a limit-feeding program approximately 2 to 3 months prior to the spring breeding season. This is the first replication of a three year study and additional animals will be used to evaluate reproductive performance.

Table 3. Least square means of puberty weight and age in heifers by treatment.

Group	SBM	SBH LOW	SBH HIGH	DRYLOT
No. of heifers	12	12	12	12
Avg. birthdate	2/28	2/27	3/03	2/28
Puberty				
Age, days	440.3^{a}	438.1^{a}	426.9^{ab}	419.0^{b}
Weight, lb	634.4^{a}	636.9^{ab}	689.5^{c}	669.8^{bc}
Puberty prior to Apr 29, %0	0^{a}	17^{a}	17^{a}	75^{b}
Pregnancy rate,%	84	92	92	84

[a,b,c] Least square means in a row with different superscripts differ ($P<.05$).

Literature Cited

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