Replacement Heifer Development for Spring and Summer Calving Herds

Gene H. Deutscher
University of Nebraska-Lincoln, gdeutscher@inebraska.com

Brent Plugge
University of Nebraska, bplugge1@unl.edu

Andy Applegarth
GSL Unit Manager, Whitman, Neb., andy.applegarth@unl.edu

Rex Davis
University of Nebraska-Lincoln, rdavis1@unl.edu

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Brent Plugge
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Rex Davis[1]

Rate of winter gain before first breeding did not affect reproduction and calf production of spring-born heifers. Summer-born heifers had normal yearling pregnancy rates, but 2-year-old rebreeding rates were low.

Summary

A three-year study on heifer development of spring-born (n=240) and summer-born heifers (n=146) was conducted using sandhills ranch management. Spring-born heifers developed during the winter to reach 53% of mature weight at breeding had similar reproduction and calf production as heifers that reached 57% of mature weight. Feed costs were $22/heifer less for the lighter weight heifers. Summer-born heifers that were developed to reach 60% of mature weight at breeding in early fall had normal yearling pregnancy rates, but rebreeding rates of the 2-year-old cows were low, which caused high culling rates. Two-year-old cows calving in May produced greater calf growth rates to weaning than cows calving in June.

Introduction

Proper development of replacement heifers is critical. Heifers should be managed to reach puberty early, conceive early in the first breeding season, calve unassisted, and breed back early for their second calf. However, this development needs to be accomplished at low costs without sacrificing performance.

Summer calving has gained interest in Nebraska and heifer development programs are needed for these cow herds. How should heifer calves be managed so they will conceive early as yearlings and rebreed for a second calf? Should heifers be bred several weeks before the cow herd?

The objectives of this study were: (1) To compare development of spring-born heifers at two prebreeding target weights (55% or 60% of mature weight) on reproduction and productivity, and (2) To develop summer-born heifers to similar target weights, then compare two dates of breeding (30 days before cows or same date as cows) on reproduction and subsequent productivity.

Table 1. Winter feed rations and costs for spring and summer heifers over three years.

Item	Spring heifers[a]		Summer heifers (Breeding Group)[a]	
	Low	High	August	September
Rations (as fed)				
Meadow hay, lb	13.3	12.3	12.3	11.8
Midd pellets[b], lb	3.6	4.5	3.6	3.3
Corn, lb	0.5	2.4	1.3	0.4
Feeding period, days	155	155	118	118
Avg daily gain, lb	1.1	1.4	1.5	1.2
Costs[c]				
Feed costs per hd per day, $	.55	.69	.56	.47
Feed costs for feeding period, $	85	107	66	55

[a]Feeding periods were mid-December to mid-May for spring and mid-January to mid-May for summer heifers.
[b]Pellet composition: 48% wheat midds, 40% soybean hulls, 5% cottonseed meal, 5% cane molasses plus vitamin-mineral mix, urea and 80g/ton Rumensin.
[c]Average prices were: hay $40/ton; supplements $135/ton; cracked/delivered corn $2.75/bu.

Procedure

A three-year study was initiated using heifer calves selected from the MARC II cow herds at the Gudmundsen Sandhills Laboratory near Whitman, Neb. In 1998, 1999 and 2000, approximately 80 spring-born heifers and 50 summer-born heifers were selected each year as replacements for the spring (March and April calving) and summer (June and July calving) cow herds. The genetic profile of the cows was similar in each herd and the same bulls were used in both herds each year.

The heifers were randomly allotted within age and weight to the treatment groups in mid-December for the spring heifers and in mid-January for the summer heifers. The spring heifers were assigned to one of two treatments, low-gain or high-gain, to reach prebreeding target weights of 660 lb (55% of mature wt) or 720 lb (60% of mature wt), respectively by May 15.

The summer heifers were assigned to either an August or September breeding group. These heifers were developed so both groups would reach a similar target weight of about 720 lb or 60% of mature weight by beginning of breeding season. This weight would be similar to the higher gain Spring heifers. One group of summer heifers was exposed to bulls beginning August 5 (30 days before the cow herd) and a second group of heifers was placed with bulls beginning September 5 (same date as mature cows).

Each year heifers were placed in drylot pens by treatment groups for the winter feeding phase. They were fed meadow hay plus a wheat middlings and soybean hull-based pellet and cracked corn in balanced rations to achieve the desired gains and target weights. Hay (9%-10% CP) was fed ad libitum in bale feeders. Pellets (20% CP) with Rumensin (80g/ton) and a vitamin-mineral mix were fed in bunks with cracked corn as needed. Heifers were weighed monthly and rations were adjusted to obtain desired gains. Table 1 shows the feed rations for each group and the feed costs for the winter feeding phase over three years. For the spring heifers, the cost of feed for the high-gain group was $22/hd higher than for the low-gain group ($107 vs $85). For the summer heifers, the feed cost was $11/hd higher for the August group than the September group ($66 vs $55).

After the feeding phase each year, all heifers were weighed and body condition scored on May 15 and moved to native range for summer grazing. Before the breeding season began for each group, heifers were blood sampled twice (10 days apart) to determine puberty (cycling) status and were pelvic measured. Four Angus bulls were placed with the spring heifers on May 20 for a 45-day breeding season. The same bulls were used on the summer heifers for 45 days; but half of the heifers began the breeding season on August 5 and the other half on September 5. About 60 days after the end of each breeding season, heifers were examined for pregnancy, and were weighed and condition scored.

The bred heifers grazed subirrigated meadow after-growth during the fall and in the winter were fed meadow hay and supplement (1.5 lb/day, 40% CP) on range. Calving began about March 1 for the spring heifers, May 15 for the August-bred heifers, and June 15 for the September-bred heifers. Calving records were recorded on all heifers and calving assistance given as needed. After calving, spring heifers were fed good quality meadow hay plus supplement (1.5 lb, 40% CP). Summer heifers received the same ration until May 15, when all heifers were moved to summer range. Summer heifers calved on summer range.

The spring 2-year-old cows were exposed to MARC II bulls on June 5 each year for rebreeding, while all summer 2-year-old cows were placed with these same bulls on September 5. The summer cows were fed 1.0 lb/day of 48% CP cubes during the breeding season in 1999, and in 2000 the cows were fed these cubes 45 days before and during the breeding season. Calves from spring 2-year-old cows were weaned in early September, and calves from summer cows were weaned in late November. All bred 3-year-old cows were placed

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with the mature cow herds and fed and managed with them thereafter. Data were analyzed using least squares analyses of SAS and chi-square analyses.

Results

Spring Heifers

The feed ration for the high-gain spring heifers (Table 1) included 7 lb of corn and pellets, while the low-gain heifers received a total of only 4 lb. This supplement for the high-gain group caused a 0.3 lb/day increase in ADG (1.4 vs 1.1) and cost $22/hd more during the 155-day wintering period.

Table 2 shows the heifer weights and breeding results on the spring heifers over three years. In mid-December the heifers weighed 469 lb. At prebreeding in mid-May, the high-gain heifers weighed 51 lb more ($P<0.05$) than the low-gain group and had 0.4 unit higher ($P<0.05$) condition score. The high group heifers at prebreeding were at 57% of mature wt and the low group heifers were at 53% of mature weight. In both groups, heifers did not reach projected target weights. The percentage of heifers cycling before breeding was 11% higher ($P<0.05$) for the high-gain over the low-gain heifers (85 vs 74%). The 45-day pregnancy rate was 4% higher ($P>0.20$) for the low-gain heifers (92 vs 88%) than the high-gain heifers. This was unexpected and may have been due to the low-gain heifers gaining more rapidly on lush spring grass during the breeding season. At pregnancy check, the high-gain heifers averaged 25 lb more ($P<0.05$) than the low-gain heifers.

Table 3 shows the calving, weaning and reproduction results of the spring 2-year-old cows over two years. The third year data are unavailable at this writing. The high group cows were heavier ($P<0.05$) at calving and at weaning times. Average calf birth date, calf birth weight, calving difficulty, and calf losses were similar for both groups. Calf ADG to weaning also was similar for both groups of cows indicating milk production was similar. The 205-day adjusted calf weaning weights were nearly identical for both groups.

Table 2. Heifer development and breeding results for spring and summer heifers over three years.

	Spring		Summer (breeding)	
Trait	Low	High	August	Sept.
No. of heifers	120	120	73	73
Beginning wt.[a], lb	469	469	402	403
May 15 wt., lb	638[b]	689[c]	580[b]	549[c]
May body condition	5.6[b]	6.0[c]	5.5[b]	5.3[c]
May target wt., lb	660	720	590	560
Winter ADG, lb/day	1.1[b]	1.4[c]	1.5[b]	1.2[c]
Prebreeding wt., lb	638[b]	689[c]	703[b]	727[c]
Prebreeding body condition	5.6[b]	6.0[c]	5.5	5.4
Pelvic Area, cm^2	174	171	175[b]	181[c]
Cycling before breeding, %	74[b]	85[c]	89	92
Began breeding season	May 20	May 20	Aug 5	Sept 5
Pregnant in 45 days, %	92	88	88	93
Pregnant check wt, lb	827[b]	852[c]	785	778
Pregnant body condition	5.6[b]	5.8[c]	5.4[b]	5.3[c]

[a]Heifer development began in mid-December for spring and in mid-January for summer heifers each year.
[bc]Treatment means in row within season differ ($P<0.05$).

Table 3. Calf production and rebreeding of 2-year-old cows over two years.

	Spring		Summer (breeding)	
Trait	Low	High	August	Sept.
Calving season began	Mar. 1	Mar. 1	May 15	June 15
No. of heifers calving	71	67	43	47
Precalving wt., lb.	914[d]	945[e]	898	898
Precalving body condition	5.3	5.3	5.3	5.3
Calf birth date, day	Mar. 13	Mar. 12	May 23[d]	June 20[e]
Calf birth weight,[a] lb.	72	74	72	73
Calving difficulty, %	13	21	14[d]	2[e]
Calf losses-calving to weaning (No.)	2	2	1	1
Weaning date, day	---------Sept. 6---------		---------Nov. 27---------	
Calf age at weaning, days	177	178	187[d]	159[e]
Actual calf weaning wt.[a], lb.	402	403	388[d]	324[e]
Calf ADG[a], lb/day	1.87	1.85	1.69[d]	1.59[e]
205d adjusted calf weaning wt.[a], lb	455	453	418[d]	398[e]
Cow wt. at weaning, lb	900[d]	928[e]	916	911
Cow body condition	5.1[d]	5.3[e]	5.0	5.0
Cows pregnant with 2nd calf, %	90	91	79	75
Cow productivity[b], lb	387	368	357	350
Cows in herd at 3-years of age[c], %	77	73	63	67

[a]Calf weights adjusted for sex
[b]Productivity = number of calves weaned x adjusted weaning wt. divided by number of heifers developed.
[c]Number of cows remaining in herd to have second calf as 3-year-olds divided by number of heifers developed.
[de]Treatment means in row within season differ ($P<0.05$).

Percentage of cows rebreeding for their second calf was similar for both groups (91% vs 90%). Cow total productivity was slightly higher for the low-gain group. At second calving, calving date, calf birth weight and calving difficulty were similar for the two groups. If these results continue for the third year, they would indicate developing heifer calves to be 60% of mature weight at first breeding is not necessary, under similar management, and may be too costly. An economic analysis will be completed in the future.

Summer Heifers

Feed rations for the August heifers (Table 1) included 5 lb of supplement while the September heifers received only 4 lb because they had 30 days longer to gain the target weight before breeding began. August heifers gained 0.3 lb/day faster than the September heifers, but feed cost was $11/hd more.

Heifers averaged 403 lb in mid-January (Table 2). By mid-May, the August heifers weighed 580 lb while September heifers weighed 549 lb. At breeding, the August heifers weighed

703 lb while the September heifers weighed 727 lb (P<0.05). These weights were about 60% of mature weight. The percentage of heifers cycling before breeding was similar for both groups.

The 45-day yearling pregnancy rate was 5% higher (P>0.20) for the September heifers (93% vs 88%) over the August heifers. September heifers were 30 days older at breeding than the August heifers. At pregnancy check time, heifer weights were similar.

In Table 3, the 2-year-old cows in both groups had similar weights at calving and at weaning times. Calf birth weights were similar for the two groups, but calving difficulty percentage was higher for the cows calving in May (14%) than those calving in June (2%). The prebreeding pelvic area (Table 2) was slightly larger (6cm^2) for the June calving cows, which may have had some influence on calving difficulty. However, when comparing calving difficulty between the various groups (March vs May vs June calving), cows calving late in the spring or summer had fewer problems. This difference was not due to smaller calf birth weights. The factors influencing less calving difficulty may have included warmer temperatures, less heifer stresses, more pelvic relaxation, better nutrition on green grass and more heifer exercise.

Calf ADG to weaning was greater for the calves on the May calving cows. Actual calf weaning weights were 64 lb heavier (P<0.05) from the May calving cows, but the 205-day adjusted weights were 20 lb different (P<0.05) between groups.

Cow pregnancy rates for the second calf were low for both groups (May = 79%, June = 75%). This was probably due to the mature grass and lower nutrition during the September and October breeding season for these 2-year-old cows on range. However, cows were supplemented with 1.0 lb/day of 48% CP cake during the breeding season. Also, the summer cows were smaller (about 900 lb) at calving which may have influenced rebreeding rates.

Another year of data on calf production of the spring and summer 2-yr-old cows is being collected. However, the results at this writing indicate the following. Spring heifers developed during the winter at a low gain (1.1 ADG) to reach 53% of mature weight prebreeding, had similar reproduction and calf production as higher gain heifers (1.4 ADG) that reached 57% of mature weight.

Summer heifers bred to calve 30 days before the mature cows had slightly lower yearling pregnancy rates, but slightly higher 2-year-old pregnancy rates than heifers bred to calve at the same time as the cows. May calving heifers had heavier 205-day calf weaning weights compared to June calving heifers. Summer-born calves had similar birth weights to spring-born calves, but less calving difficulty was experienced with June calving.

Pregnancy rates of summer heifers were satisfactory at yearling breeding, but unsatisfactory at 2-year-old rebreeding. Only 54% of the summer heifers were still in the herd at 4 years of age. Growth rates of summer-born calves appear to be lower than spring-born calves.

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[1]Gene Deutscher, professor emeritus, Animal Science; Rex Davis, beef unit manager, Animal Science, West Central Research and Extension Center, North Platte; Brent Plugge, extension educator, Thedford; Andy Applegarth, GSL Unit Manager, Whitman, Neb.