Effect of Calving Period on Heifer Progeny

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Summary

Records from 1997 through 2009 were used to determine the effect of calving date on ADG, reproduction, and first-calf characteristics in spring born heifer calves at University of Nebraska–Lincoln Gudmundsen Sandhills Laboratory. Heifers were classified as born in the first, second, or third 21-day period of the calving season. Heifer calves born during the first 21 days had greater weaning, pre-breeding, and pre-calving BW; greater percent cycling before breeding, and pregnancy rates compared to heifers born in the third period. First-calf progeny had earlier birth date and greater weaning BW. Calving period of heifer progeny impacts development and first-calf characteristics.

Introduction

Research from the 1960s through 1980s indicated puberty occurs at a genetically predetermined size, and only when heifers reach their target weight can high pregnancy rates be obtained. Guidelines were established indicating replacement heifers should achieve 60 to 65% of expected mature BW by breeding. Substantial changes in the economy and cattle genetics have occurred, indicating traditional approaches should be re-evaluated.

More recent research demonstrated feeding replacement heifers to traditional target weights increases costs relative to more extensive development systems developing heifers to 51 to 57% of mature BW (*2010 Nebraska Beef Cattle Report,* pp. 7-10; *2008 Nebraska Beef Cattle Report,* pp. 5-7).

Table 1. Effect of calving period on ADG, reproduction, and first-calf characteristics of heifer progeny.

	Calving period[1]				
Item	1	2	3	SEM	*P*
n	651	304	64		
Birth Date, julian day	77[a]	93[b]	113[c]	2.02	<0.001
Calf birth BW, lb	79[a]	82[b]	84[b]	1.52	<0.001
Calf weaning BW, lb	483[a]	470[b]	434[c]	10.80	0.03
Preweaning ADG, lb/day	1.83	1.83	1.90	0.09	0.10
Pre-breeding ADG, lb/day	0.86	0.90	0.90	0.07	0.07
Pre-breeding BW, lb	653[a]	644[b]	608[c]	9.22	<0.001
Cycling beginning of breeding, %	70[a]	58[b]	39[c]	9.35	<0.001
Breeding ADG, lb/day	1.59[a]	1.63[ab]	1.70[b]	0.09	0.03
Pregnancy diagnosis BW, lb	822[a]	818[a]	789[b]	11.75	<0.001
Pregnancy rate, %	90[a]	86[a]	78[b]	5.62	0.02
Pre-calving BW, lb	946	948	922	14.66	0.06
First-calf birth date, julian day	68[a]	73[b]	75[b]	2.03	<0.001
Calved in first 21 d, %	81[a]	69[b]	65[b]	8.41	<0.01
First-calf birth BW, lb	79[a]	82[b]	84[b]	1.52	<0.001
Assisted births, %	23	29	33	8.37	0.26
Dystocia score[2]	1.29	1.40	1.34	0.11	0.18
Cow weaning BW, lb	924	930	930	17.00	0.68
Calf weaning BW, lb	425	417	410	11.40	0.10
Pregnancy rate after first calf, %	93	90	84	6.61	0.20

[1]1 = calved in the first 21 days, 2 = calved in the second 21 days, 3 = calved in the third 21 days of the spring calving period.
[2]Scoring system 1 to 5: 1 = no assistance; 2 = easy pull; 3 = mechanical pull; 4 = hard mechanical pull; and 5 = Caesarean section.
[abc]Means without a common superscript differ ($P \leq 0.05$).

The majority of heifer development research has focused on the post-weaning phase. Numerous studies suggest the preweaning growth phase exerts a greater influence on puberty in beef heifers than post-weaning growth (Patterson et al., *Journal of Animal Science*, 1992, 70:4018).

Thus, data from 13 production years were summarized to determine the effect of time of calving on subsequent pre- and post-weaning ADG and BW and impact on reproduction and first-calf characteristics in beef heifers.

Procedure

The University of Nebraska–Lincoln Institutional Animal Care and Use Committee approved the procedures and facilities used in this experiment.

Data were collected from the University of Nebraska–Lincoln Gudmundsen Sandhills Laboratory herd between 1997 and 2009. As varying nutritional and breeding treatments were applied to yearling heifers during breeding, 2 year-old cows were removed from this analysis. The breeding season began on approximately June 15. Heifers were classified as born in the first, second, or third 21-day period of the calving season within year.

Continuous data were analyzed using the MIXED procedure of SAS and binomial data with the GLIMMIX procedure. The model included the fixed effect of period the calf was born. The model also included the random effect of year and any treatments imposed on each particular herd within year.

Results

Data demonstrating the effect of calving period on subsequent pre-

and post-weaning ADG and BW and impact on reproduction and first-calf characteristics are presented in Table 1.

Heifer calves born in the first calving period were 16 days older than those in the second, and 36 days older than those in the third period ($P < 0.01$). Calf birth BW was lower ($P < 0.01$) for heifers born in the first period.

As the time of calving became more advanced, calf ADG from birth to weaning tended ($P = 0.10$) to be lowest for heifers born in the first calving period. Regardless of greater birth BW and preweaning ADG, heifer calf weaning BW decreased ($P = 0.03$) with advancing calving period. Calf ADG from weaning to pre-breeding tended ($P = 0.07$) to be least for heifers born in the first period; however, pre-breeding BW was greatest ($P < 0.01$) for calves born in the first period. Heifer ADG from the beginning of the breeding season to pregnancy diagnosis was greater ($P = 0.03$) for heifers born in the third vs. first calving period. The percentage of heifers cycling at the beginning of the breeding season decreased ($P < 0.01$) with advancing calving date (70, 58, and 39%, respectively), and 45 day pregnancy rates were lowest ($P = 0.02$) for heifers born in the third calving period (90, 86, and 78%, respectively).

Heifers born later in the calving season appear to have greater pre- and post-weaning ADG and lower fertility. This is in contrast to data indicating preweaning growth exerts a greater influence on puberty than post-weaning growth (Patterson et al., *Journal of Animal Science*, 1992, 70:4018). In the current data set it appears neither pre- nor post-weaning growth influenced percent cycling before the breeding season or pregnancy rates. Considerable change in beef cattle genetics has likely occurred since these observations were made, and perhaps age rather than rate of gain is more important in determining when an animal reaches puberty and conceives. Research from our group would certainly support the theory that rate of gain prior to breeding has minimal impact on heifer pregnancy rate (*2010 Nebraska Beef Cattle Report,* pp. 7-10; *2008 Nebraska Beef Cattle Report,* pp. 5-7).

Birth date of the heifer's first calf and birth BW decreased ($P < 0.01$) if the heifer was born in the first calving period. Also, more ($P < 0.01$) calves were born in the first 21 days of the calving season if the heifer herself was born in the first calving period. Regardless of greater dam weight at calving and lower birth BW for heifers calving that were born in the first period, calving assistance and dystocia score were similar ($P \geq 0.18$). First-calf progeny had the greatest ($P \leq 0.10$) weaning BW if born to a heifer born in the first calving period. Cow BW at weaning her first calf, and pregnancy rate after the first calf, were similar ($P \geq 0.10$).

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