

# Effect of calving season on cow/calf production in the Northern Great Plains - reproductive performance -

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## Abstract

There is current interest in the Northern Great Plains in shifting calving season away from the traditional late winter and early spring period. Records from North Dakota cow/calf herds over 6 years (1994-1999) were available to evaluate the effect of calving season on cow/calf production. Records (718 herd-years) were obtained from the central-processed CHAPS database of the ND Beef Cattle Improvement Association. Specific calving seasons were chosen based upon the distribution of mean annual calving dates in the database. Herd-years representing summer (10) and fall (5) calving seasons were excluded due to insufficient data. Remaining calving seasons and associated mean calving dates were late winter (LW; March 7), spring (S; April 2) and late spring (LS; April 20). There were no significant differences among calving seasons ( $P > .1$ ) in overall pregnancy, pregnancy loss, calving, calving loss or weaning percentages. Overall reproductive performance over this time period averaged 93.0, 0.82, 92.3, 4.0 and 89.1%, respectively. Although the percentage of calves born by day 21 ( $P > .1$ ; average 58%) was not affected by calving season, overall calving distribution was improved with later calving seasons. Percentage of all calves born by day 42 ( $P < .05$ ; 86 and 87 vs 79%) and day 63 ( $P < .01$ ; 96 and 95 vs 90%) and of cows ( $P < .05$ ; 86 and 86 vs 77%) and heifers ( $P < .1$ ; 90 and 89 vs 84%) calving by day 42 was increased in S and LS compared to LW. One deviation from this overall trend occurred in 1999 ( $P < .01$ ) when the percentage of all calves born by day 63 was substantially reduced in LS (86.5 vs 96.9%). Overall reproductive performance was very good in cow/calf operations from North Dakota and not affected by calving season. Nonetheless within the range of calving seasons studied, very early calving seasons in the Northern Great Plains have a more disperse calving period with a larger percentage of calves born in the later part of the period. Whether this effect is due to calving season, breeding season or overall herd management is not discernible from these data.

## Objective

Determine the effect of calving season on reproductive parameters of beef cattle operations in North Dakota.

## Materials and Methods

The analysis was conducted on records from North Dakota herds using the CHAPS record keeping system from 1994 to 1999. Seven hundred eighteen (718) herd years were available for use in the analysis. The purpose of the analysis was to evaluate the effect of calving season on standard production variables. Calving seasons chosen were based on the distribution of mean calving dates represented in the database. Herd years representing summer (10) and fall (5) calving seasons were excluded from analysis due to insufficient data for these seasons. Remaining calving seasons were late winter (LW; 115 individual herd years), spring (S; 503 individual herd years), and late spring (LS; 85 individual herd years). Beginning and mean calving dates (tables 5a and 5b) for LW, S, and LS were February 13 and March 7, March 12 and April 2, and March 28 and April 20, respectively.

Data were analyzed using the GLM procedure of SAS (SAS, 2002). Analysis included the effects of calving season, herd year within calving season, calving year and the interaction between calving season and year. Herd year within calving season was used as the error term to test for significant effects of calving season.

## Results

There were no significant differences between calving seasons ( $P > .1$ ) for pregnancy, pregnancy loss, calving, calving loss or weaning percentages (Table 3a). However, there were significant differences between years for all of these reproduction measures except pregnancy loss percentage (Table 3a).

Both year and calving season showed significant differences in calving distribution (Table 2a). Overall calving distribution favored S and LS (Table 2b). Percentage of all calves born by 42 ( $P < .05$ ) and 63 ( $P < .01$ ) days of the calving season, percentage of cows ( $P < .05$ ) and heifers ( $P < .1$ ) calving in 42 days was decreased in LW. One deviation from this overall trend occurred in 1999 ( $P < .01$ ) when percentage of all calves born in 63 days was substantially reduced in LS while other percentage in other calving seasons was unaffected (Figure 4). The apparently tighter calving

season of S and LS may be an advantage to the later calving seasons.

### **Implications**

Overall reproductive performance was very good in cow/calf operations from North Dakota and not affected by calving season. Nonetheless within the

range of calving seasons studied, very early calving seasons in the Northern Great Plains have a more disperse calving period with a larger percentage of calves born in the later part of the period. Whether this effect is due to calving season, breeding season or overall herd management is not discernible from these data.

**Table 1a.** Effects of calving season and year on pregnancy, calving and weaning percentages.

Item	Mean <sup>b</sup>	SD <sup>b</sup>	Probability <sup>a</sup>		
			Season	Year	Interaction
Pregnancy percentage	93.0	3.7	-	***	-
Pregnancy loss percentage	.82	1.4	-	-	-
Calving percentage	92.3	4.1	-	***	-
Calving loss percentage (of cows calving)	4.0	2.8	-	***	-
Calving loss percentage (of calves born)	4.3	3.1	-	***	-
Weaning percentage	89.1	5.1	-	***	-

<sup>a</sup> \*\*\*, \*\*, \* and - indicate probability levels of  $P < .01$ ,  $.05$  and  $.10$  and  $P > .1$ , respectively.

<sup>b</sup> Mean and SD refer to the overall average and standard deviation.

**Table 1b.** Least squares means for effects of calving season and year on pregnancy, calving and weaning percentages.

Item	Calving Season			Year of weaning					
	Late Winter	Spring	Late Spring	1994	1995	1996	1997	1998	1999
Pregnancy percentage	93.5	93.4	92.3	95.3 <sup>c</sup>	93.3 <sup>b</sup>	93.3 <sup>b</sup>	91.1 <sup>a</sup>	92.0 <sup>ab</sup>	93.3 <sup>b</sup>
Pregnancy loss percentage	0.89	0.72	1.02	0.89	1.28	0.74	0.92	0.79	0.63
Calving percentage	92.7	92.7	91.4	94.4 <sup>c</sup>	92.1 <sup>b</sup>	92.6 <sup>bc</sup>	90.3 <sup>a</sup>	91.3 <sup>ab</sup>	92.7 <sup>bc</sup>
Calving loss percentage (of cows calving)	4.4	4.0	4.4	4.4 <sup>abc</sup>	4.3 <sup>ab</sup>	4.5 <sup>b</sup>	5.5 <sup>c</sup>	3.2 <sup>a</sup>	3.7 <sup>ab</sup>
Calving loss percentage (of calves born)	4.8	4.3	4.9	4.7 <sup>a</sup>	4.6 <sup>a</sup>	5.0 <sup>b</sup>	6.2 <sup>c</sup>	3.6 <sup>a</sup>	4.1 <sup>ab</sup>
Weaning percentage	89.1	89.5	87.5	90.9 <sup>c</sup>	88.3 <sup>b</sup>	89.2 <sup>bc</sup>	85.4 <sup>a</sup>	88.9 <sup>bc</sup>	89.6 <sup>bc</sup>

<sup>a,b,c,d,e</sup> Means within an effect with differing superscripts differ ( $P < .05$ ).

**Table 2a.** Effects of calving season and year on calving distribution.

Item	Mean <sup>b</sup>	SD <sup>b</sup>	Probability <sup>a</sup>		
			Season	Year	Interaction
Percentage of all calves born					
by day 21	58.0	12.6	-	-	-
by day 42	85.7	8.9	**	-	-
by day 63	95.1	5.2	***	***	***
after day 63	4.9	5.2	***	***	***
Percentage of					
Cows calving in 21 d	55.2	13.1	-	-	-
Cows calving in 42 d	84.9	9.4	**	**	-
Heifers calving before 21 d	29.2	19.2	-	*	-
Heifers calving in 21 d	70.8	18.4	-	-	-
Heifers calving in 42 d	89.2	12.6	*	-	-

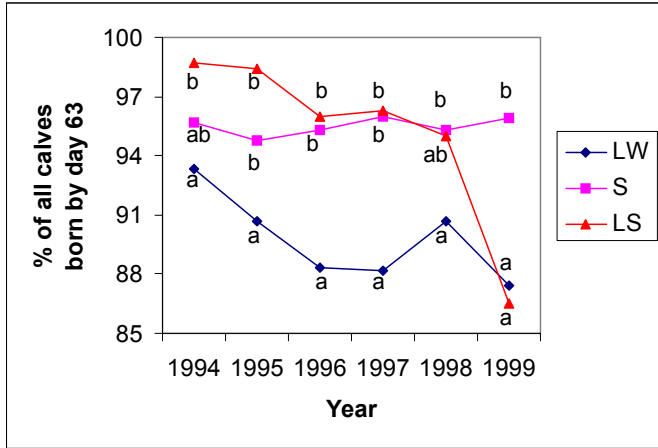
<sup>a</sup>\*\*\*, \*\*, \* and - indicate probability levels of  $P < .01$ ,  $.05$  and  $.10$  and  $P > .1$ , respectively.

<sup>b</sup> Mean and SD refer to the overall average and standard deviation.

**Table 2b.** Least squares means for effects of calving season and year on calving distribution.

Item	Calving Season				Year of weaning				
	Late Winter	Spring	Late Spring	1994	1995	1996	1997	1998	1999
Percentage of all calves born									
by day 21	53.7	57.8	60.3	58.1	59.0	55.7	56.1	56.1	58.6
by day 42	78.5 <sup>a</sup>	86.3 <sup>b</sup>	86.8 <sup>b</sup>	86.4	85.8	83.5	83.1	83.9	80.5
by day 63	89.8 <sup>a</sup>	95.5 <sup>b</sup>	95.2 <sup>b</sup>	95.9 <sup>c</sup>	94.6 <sup>bc</sup>	93.2 <sup>b</sup>	93.5 <sup>b</sup>	93.7 <sup>bc</sup>	89.9 <sup>a</sup>
after day 63	10.2 <sup>b</sup>	4.5 <sup>a</sup>	4.8 <sup>a</sup>	4.1 <sup>a</sup>	5.4 <sup>ab</sup>	6.8 <sup>b</sup>	6.5 <sup>b</sup>	6.3 <sup>ab</sup>	10.1 <sup>c</sup>
Percentage of									
Cows calving in 21 d	52.1	55.1	58.2	55.9	56.9	54.1	53.9	54.1	55.9
Cows calving in 42 d	77.4 <sup>a</sup>	85.6 <sup>b</sup>	85.8 <sup>b</sup>	86.1 <sup>c</sup>	85.4 <sup>bc</sup>	82.9 <sup>abc</sup>	81.6 <sup>ab</sup>	82.4 <sup>abc</sup>	79.1 <sup>a</sup>
Heifers calving before 21 d	20.9	28.3	22.3	19.4 <sup>a</sup>	20.1 <sup>a</sup>	22.2 <sup>a</sup>	24.9 <sup>a</sup>	23.2 <sup>a</sup>	33.1 <sup>b</sup>
Heifers calving in 21 d	62.8	70.3	67.5	65.9	65.4	62.1	71.0	68.0	68.7
Heifers calving in 42 d	84.2 <sup>a</sup>	89.7 <sup>b</sup>	88.6 <sup>ab</sup>	87.2	86.4	86.0	89.7	90.8	84.9

<sup>a,b,c,d,e</sup> Means within an effect with differing superscripts differ (P<.05).



**Figure 1.** Effect of calving season and year on percentage of all calves born by day 63 of the calving period. Average calving dates less than 75 (March 16), between 75 (March 16) and 105 (April 15), and greater than 105 (April 15) were classified into a late winter (LW), spring (S) and late spring (LS) calving season, respectively. Means within year with differing superscripts differ ( $P < .05$ ).