Proceedings, Western Section, American Society of Animal Science

Vol 44, 1993

EFFECTS OF REDUCING DYSTOCIA ON HEIFER PRODUCTIVITY[1]

H.A. Turner[2] and G.L. Farnsworth[2]

Oregon State University
Corvallis, Oregon 97331-6702

ABSTRACT

Objectives of these trials were to: 1) measure the effects of reducing or eliminating dystocia through breeding on the productive and reproductive performance of heifers and: 2) study the effects of winter nutrition on heifer performance. Over a 3 yr period, 203 Hereford x Simmental heifers were stratified by age and weight with groups randomly assigned to treatment. Treatments were in a 2x2 factorial design with 2 levels of winter feed and 2 sire groups. All heifers were wintered on alfalfa-hay ad lib with half receiving .9 Kg of barley. Breeding was to Angus or Longhorn sires. Feeding of barley increased heifer weights ($P<.05$) through the winter but did not effect heifer productivity. Longhorn sires reduced dystocia from 36% to 1% ± .02 ($P<.05$), increased weaning rate from 80% to 89% ± .01 ($P<.05$), reduced calf mortality from 19% to 6%, increased production per heifer at weaning from 190 to 221 Kg and tended to shorten calving intervals ($P<.10$). Angus sired calves were heavier at birth 38 vs 33 Kg ± .47 ($P<.05$), born 4 days earlier ($P<.05$) with no difference in weaning weight ($P>.05$). Comparing heifer performance of heifers experiencing dystocia as opposed to those calving unassisted, pelvic area and heifer weight at breeding was not different ($P>.05$), birth weights were 5 Kg higher ($P<.05$), weaning rates lower by 19% ($P<.05$), and production per heifer reduced by 47 Kg. Reducing dystocia through breeding improved calf survival, weaning rate, production per heifer and subsequent conception rates
without effecting weaning weights. Energy level had no effect on reproductive performance of the heifers or calf weights.

Key Words: Beef Heifers, Dystocia, Longhorn.

Introduction

Breeding heifers to calve at 2 yr of age can increase lifetime beef production; however, heifers at first calving are prone to dystocia. In the absence of dystocia, heifers calving first at 2-yr-olds have a tendency to calve earlier in subsequent years, wean heavier calves, and produce a higher percent calf crop than heifers calving first as 3-yr-olds (Lesmeister et al., 1973). However, heifers at first calving are three to four times more likely to suffer dystocia than a second and later calving (Meijering, 1984). Dornbos et al., 1984 reported 2-yr-old heifers experienced prolonged labor and required 1.5 times more assistance during parturition than mature cows. Consequences of dystocia include increased calf mortality (Anderson and Bellows, 1967), reduced conception at subsequent matings (Laster et al., 1973) and increased calving intervals (Brinks et al., 1973).

Turner et al. (1992) concluded that birth weight of calves and age of heifer were the only factors that significantly impacted dystocia out of a multiple of measures taken. Since most producers like to breed their heifers to calve as 2 yr olds and early in the breeding season to help insure they are early calvers during their productive years, this leaves control of birth weight as the only factor involved in dystocia that can be manipulated.

The objectives of this research were to: 1) measure the effects of reducing or eliminating dystocia through breeding on the productive and reproductive performance of heifers and: 2) study the effects of winter nutrition on heifer productivity.

Materials and Methods

Over a 3 yr period, 203 Hereford x Simmental heifers were stratified by age and weight into four equal groups with the groups then randomly assigned to treatment. Treatments were in a 2x2 factorial design with 2 levels of winter feed and 2 sire groups. All heifers were wintered on a full feed of an alfalfa-hay mix with one treatment group receiving .9 Kg of barley per head per day. Half of the heifers were bred to Angus sires with the others bred to Longhorn sires. Subsequent breedings were to Simmental or Hereford sires.

Heifers were weaned the last week of September or the first week of October each year at a mean weight of 223 Kg. Mature weight of this herd at a condition score of 5 is about 523 Kg. Nutritional treatments were initiated in early December, with breeding commencing in early April. Nutritional regimes were terminated in early May. Prior to breeding, condition scores, utilizing a 1 to 9 system with 1 being emaciated and 9 extremely fat, were estimated by palpating subcutaneous fat over the backbone, ribs, and tailhead. Pelvic area (pelvic height x pelvic width) were also determined at this time. All pelvic measurements were taken by one technician using a Rice Pelvimeter. Height represented the linear distance between the dorsal surface of the cranial end of the symphysis pubis and the ventral surface of the midsacrum, and width the maximum distance between the shafts of the ilia.

Initial and prebreeding weights were taken after an overnight restriction from feed and water. Birth weights were taken within 24 hr of parturition. Conception data were recorded utilizing rectal palpation during the fall. Open heifers were culled. Calves were dropped during late January to late March with a mean calving date of February 1. Subsequent parturitions were about a week later. Severity of dystocia was scored as follows: 1) no difficulty, birth unassisted; 2) slight difficulty, nonmechanical assistance required; 3) considerable difficulty, hard pull by hand or mechanical assistance required; 4) extreme difficulty requiring caesarean section. For statistical analyses all calves were lumped into assisted and unassisted groups.

Data were analyzed as a 2x2 factorial with differences evaluated using preplanned contrasts. Means were separated by the Least Squares method protected by a prior F-test $P<.05$ (Steel and Torrie, 1980). All data were analyzed using General Linear Model procedures of SAS (1988).

Results and Discussion

Productive and reproduction performance of heifers by treatment is presented in Table 1. High energy produced higher winter gains ($P<.05$) and resulted in an increased condition score ($P<.10$). Pelvic areas were similar. Subsequent gains were reversed with heifers from the low level compensating and outgaining those from the high level ($P<.05$). Heifers from the low energy groups were 7 Kg heavier at weaning time. Energy level did not have an effect on any of the productive or reproductive measures on the first calf or subsequent calves. Heifers from the low energy level were 65% of their eventual mature size at breeding so additional energy would not be expected to provide positive results and could have

[1]Oregon Ag. Exp. Sta. Tech Paper No. 10159
[2]Department of Animal Science

possibly created negative effects. Economically the results from high energy were negative due to the cost of supplemental feeding.

Direct comparisons between the use of Longhorn or Angus sires are presented in Table 2. Dystocia was reduced from 36% with Angus breeding to virtually 0 with Longhorn breeding. Only one calf was assisted out of 94 calving with the Longhorn breeding. That calf was assisted at 1 am in the morning and likely would not have needed help, but the herdsman wanted to go to bed, so went ahead and provided assistance. Birth weight was reduced by 5 Kg with Longhorn breeding and calving date delayed by 4 d. This could be due to a longer gestation period for the Longhorns, or delayed breeding. Weaning weights were 5 Kg heavier for the Angus calves, which is the same weight advantage they held at birth. So with the 4 d difference in age the Longhorn sired calves slightly outgained the Angus sired calves up to weaning. In addition to requiring no assistance at birth, none of the Longhorn calves required assistance in nursing or medication due to calfhood maladies. Nearly 50% of the Angus bred heifers or their calves required attention of some kind.

Weaning rates favored the Longhorn bred heifers by 9%. Initial conception rates were 5% less in the Longhorn group, so calf survival was actually 14% higher at weaning than in the Angus sired group. Production per heifer up to weaning favored the Longhorn group by 31 Kg. Calving interval was 5 d less in the Longhorn bred group ($P<.10$), with no differences in second calf conception rate or weaning weight. Second calf dystocia was 7% higher in the group previously bred to Longhorns with 2% of the previously bred Angus groups being repeats. So it appears the Longhorn breeding may have delayed dystocia problems in 5-10% of the heifers. Conception rates for the 3rd calf favored those from the Longhorn groups by 8%. Weaning rate of the second calf was only 4% in favor of the Longhorn group, however heifers losing calves were retained and rebred. This number represents the percentage of heifers that weaned a 2nd calf in relation to the number that started the trial.

A comparison between heifers that experienced dystocia and those that didn't are presented in Table 2. There was no difference in pelvic measurement, condition score, nor size of heifer between the groups with pelvic measurement being 183 cm^2 for each and heifer weight 371 and 372 Kg respectively, for those requiring assistance and those calving on their own. Birth weight was 13 Kg heavier in the dystocia group. This data agrees with results reported by Turner et al. (1992). Heifers experiencing dystocia had 62% bull calves as opposed to 47% in the other group. This fits the birth weight data in that bull calves are heavier than heifer calves and experience more severe dystocia problems. Heifers calving on their own had a 19% higher weaning rates, with weaning weights being similar. Production per heifer at weaning favored the unassisted heifers by 47 Kg. Calving interval, conception rate and weaning rate of the second calf was not different ($P>.05$). However, heifers that lost calves were retained and rebred.

Conception rates for the 3rd calf were 16% less in the heifer group that experience dystocia problems on their first calf. This data agrees with other unpublished data from this research station. The delayed effect on conception rates of initial dystocia has been consistent over 3 yr at two different locations.

In summary, reducing dystocia through breeding improved calf survival, weaning rate and subsequent conception rates without reducing weaning weights. Production per heifer on the first calf was improved by 31 Kg using Longhorn sires on heifers as opposed to Angus sires. Energy level had no effect on reproductive performance of the heifer or calf weights.

Implications

Dystocia can be virtually eliminated in first calf beef heifers through breeding. By utilizing Longhorn sires the resulting increase in calf survival, calf health, shortened calving intervals and increase in subsequent conception rates in conjunction with unaffected weaning weights, dramatically improved heifer productivity. Deleterious effects of dystocia were still evident in the form of reduced conception rates and delayed calving dates on he 3rd breeding. Expenses were also reduced dramatically in Longhorn sired heifers and their calves. Labor required for assistance during parturition was virtually eliminated as well as assistance in getting up, nursing, warming up and handling to provide medication for various calf maladies.

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TABLE 1. PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF HEIFERS BY TREATMENT.

	Treatment				
	High energy		Low energy		
Item	Longhorn	Angus	Longhorn	Angus	SE[a]
Number	50	51	50	52	
Initial wt (Kg)[b]	246	247	249	245	
Prebreeding gain (Kg)[c]	100[h]	101[h]	93[i]	94[i]	1.9
Condition score (1-9)	6.1	6.0	5.9	5.9	.03
Pelvic area (cm^2)	181	185	183	180	
Final wt (Kg)[d]	376	375	370	366	
Conception rate (%)	92	100	96	98	
Calving date (Julian)	34[h]	29[i]	32[h]	29[i]	.96
Birth wt (Kg)	33[i]	39[h]	33[i]	37[h]	.68
Dystocia (%)	0[i]	39[h]	2[i]	33[h]	.02
Weaning wt (Kg)[e]	235	247	245	243	4.2
Final wt to weaning gain (Kg)	88[h]	87[h]	104[i]	99[i]	4.0
Heifer wt at weaning (Kg)	464	462	474	465	
Weaning rate (%)	88[h]	80[i]	90[h]	79[i]	.02
Production per heifer (Kg)[f]	219	190	223	190	
Calving interval (d)	384	390	387	392	1.4
Conception rate #2 (%)	84	86	80	82	.03
Birth wt #2 (Kg)	37	39	38	38	.72
Weaning wt #2 (Kg)	226	230	227	235	5.5
Weaning rate #2 (%)[g]	70	65	66	63	
Dystocia #2 (%)	8	6	11	0	.02
Conception rate #3 (%)	80	66	86	83	.03

[a]Pooled standard error of least square means.
[b]Initiation of energy levels in early December.
[c]Gain from initial wt to breeding in early April.
[d]Weight at termination of energy levels in early May.
[e]Sex adjusted weaning wt.
[f]Based on actual weaning wt and calf survival and assuming equal initial conception rates.
[g]Represents calves weaned in year 2 compared to total number of heifers at the start of the trial.
[hi]Row means without common superscript differ, $P<.05$.

TABLE 2. REPRODUCTIVE AND CALF PERFORMANCE DATA COMPARING SIRE TYPE AND HEIFERS EXPERIENCING DYSTOCIA VS THE OTHERS.

Item	Longhorn		Angus	SE[a]	Dystocia		Unassisted
Number	100		103		38		161
Conception rate (%)	94		99		97		96
Calving date (Julian)	33	**	29	.67	31		31
Birth wt (Kg)	33	**	38	.47	40	**	35
Dystocia (%)	1	**	36	.02	100	**	0
Weaning wt (Kg)[b]	240		245	2.9	241		243
Weaning rate (%)	89	**	80	.01	68	**	87
Production per heifer (Kg)[c]	221		190		164		211
Calving interval (d)	386	*	391	.97	390		388
Conception rate #2(%)	82		84	.02	84		83
Weaning wt #2 (Kg)	227		233	3.8	221		231
Weaning rate #2(%)[d]	68		64		66		66
Dystocia #2(%)	10		3	.01	2		11
Conception rate #3(%)	83		75	.02	72	*	88

[a]Pooled standard error of least square means.
[b]Sex adjusted weaning wt.
[c]Based on actual weaning wt and calf survival and assuming equal initial conception rates.
[d]Represents calves weaned in year 2 compared to total number of heifers at the start of the trial.
*Significant at $P<.10$.
**Significant at $P<.05$.