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RELATIONSHIPS BETWEEN PHYSICAL MEASUREMENTS AND CALVING DIFFICULTY IN TWO-YEAR-OLD SANTA GERTRUDIS HEIFERS

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SUMMARY

Physical measurements were taken at pregnancy testing and near calving in two-year-old, first calf Santa Gertrudis heifers. At calving, calf sex and birth weights were recorded, and calving difficulty scores were assigned. Results indicate that pelvic measurements taken at pregnancy testing or near calving may be used as a culling or sorting tool. Females with a greater body weight to hip height ratio have an increased incidence of calving difficulty and calves with heavier birth weights. Therefore, efforts should be made pre-calving to moderate the body condition of heifers if calving difficulty is a potential problem.

INTRODUCTION

Calving difficulty, dystocia, is an important economic problem in the beef cattle industry and is the end result of many contributing factors. A primary factor is age of the cow; the highest incidence and severity of dystocia has been reported in two-year-old heifers. Other considerations include cow weight at calving, pelvic area of the dam and birth weight of the calf. This experiment evaluated the relationships between physical measurements and calving difficulty in Santa Gertrudis heifers and assessed the potential predictive value of the measurements taken at pregnancy testing or near calving.

PROCEDURES

Seventy-five, two-year-old, first-calf Santa Gertrudis heifers were utilized. To evaluate for a breed of sire effect, 43 heifers were bred to Santa Gertrudis bulls, and 32 heifers were bred to Red Angus bulls. Data were recorded at pregnancy testing (mid-July) and near calving (early December). The physical measurements taken included body weight, hip height, pelvic height and width. From these measurements, body weight to hip height ratios and pelvic areas were calculated. At calving, both sex and birth weight of each calf were recorded. A calving difficulty score also was assigned: 1) normal delivery, 2) easy pull, 3) hard pull, 4) Caesarian section, or 5) abnormal presentation, dead calf. Calving difficulty scores of 2 through 5 were pooled into a difficult delivery group.

RESULTS

Neither breed of sire nor sex of calf had an effect on calf birth weight or calving difficulty score (CDS) in this experiment. The Santa Gertrudis sired calves weighed 73.2 lb with a CDS of 1.9. Similarly, the Red Angus sired calves weighed 72.3 lb with a CDS of 1.6. Calves born through normal delivery weighed less ($P < .01$) at 70.4 lb than those born through difficult delivery (80.4 lb). Among the measurements taken at the time of pregnancy testing (Table 1), the heifers in the normal and difficult delivery groups were similar in age, body weight, hip height, and body weight to hip height ratio. However, the females in the difficult delivery group had shorter ($P < .10$) pelvic heights, narrower ($P < .05$) pelvic widths, and smaller ($P < .05$) pelvic areas. As time of calving approached (Table 2), the heifers in the normal and difficult delivery groups maintained similar age in days and hip heights. The difficult delivery group of heifers weighed more ($P < .05$) and had greater ($P < .05$) body weight to hip height ratios. Near calving time, smaller ($P < .05$) pelvic measurements were still observed in the difficult delivery group.

In consideration of individual CDS (Table 3), pelvic area declined at pregnancy testing ($P < .05$) and near calving ($P < .10$) as CDS increased. Additionally, calf birth weights (Table 3) increased ($P < .01$) from 70.4 lb in the normal delivery group (CDS = 1) to 87.3 lb in CDS = 3 (hard pull and 79.5 in CDS = 5 (abnormal presentation) group with CDS = 2 intermediate at 77.0 lb.

As calving difficulty increased with increasing body weight to hip height ratio, a fatness score based on body weight to hip height ratios and ranging from 1 to 7 was developed and assigned. As the fatness score increased from 1 to 6, the percentage of females experiencing dystocia increased from 0 to 56%. Birth weights of the calves born to females at a fatness score of 1 or 2 averaged 66.4 lb; whereas, calves born to heifers at fatness scores ≥ 3 averaged more than 74 lb.

To evaluate the predictive value of the measurements taken, a correlation analysis was performed. Small, significant correlations (Table 4) of calving difficulty score and physical measurements were realized. The largest numerical and most statistically significant correlation was that of calving difficulty score with calf birth weight ($r = .484$; $P < .01$).

These results indicate that body condition and pelvic area of the dam as well as birth weight of the calf are contributing factors to the incidence of calving difficulty in first-calf, Santa Gertrudis heifers. Pelvic measurements taken either at pregnancy testing or near calving may be used as a culling or sorting tool in an effort to avert economic losses. Body condition of the dam should be moderated

pre-calving, and careful selection of breed of sire and sires within a breed is encouraged.

TABLE 1. MEASUREMENTS TAKEN AT TIME OF PREGNANCY TESTING OF HEIFERS

	Type of Birth	
Measurement	Normal	Difficult
Age, days	520.2	524.1
Body weight, lb	810.0	828.6
Hip height, in	50.9	51.2
Body weight : hip height, lb/in	15.9	16.2
Pelvic height, cm	16.5[c]	16.1[d]
Pelvic width, cm	12.3[a]	11.9[b]
Pelvic area, cm^2	203.2[a]	191.3[b]

Means within a row with different superscripts are different.
[a,b]$P < .05$, [c,d]$P < .10$

TABLE 2. MEASUREMENTS TAKEN NEAR TIME OF CALVING OF HEIFERS

	Type of Birth	
Measurement	Normal	Difficult
Age, days	666.2	670.1
Body weight, lb	1003.0[a]	1040.3[b]
Hip height, in	51.3	51.7
Body weight : hip height, lb/in	19.5[a]	20.1[b]
Pelvic height, cm	14.6[a]	14.2[b]
Pelvic width, cm	13.6[a]	13.2[b]
Pelvic area, cm^2	199.7[a]	187.1[b]

[a,b]Means within a row with different superscripts are different ($P < .05$).

TABLE 3. EFFECT OF PELVIC AREA ON CALVING DIFFICULTY SCORE

	Calving Difficulty Score				
Pelvic area, cm^2	1	2	3	4	5
At pregnancy test	203.2[a]	180.8[b]	185.0[b]	--	195.9[ab]
Near calving	199.7[c]	184.2[cd]	179.8[d]	--	189.7[d]

Means within a row with different superscripts are different.
[a,b]P < .05, [c,d]P < .10

TABLE 4. CORRELATIONS OF CALVING DIFFICULTY CODE

Measurement	At Pregnancy Test	Near Calving
Body weight	.132	.242*
Body weight : hip height	.104	.234*
Pelvic height	-.227†	-.230*
Pelvic width	-.279*	-.244*
Pelvic area	-.312*	-.287*

†P < .10, *P < .05, **P < .01