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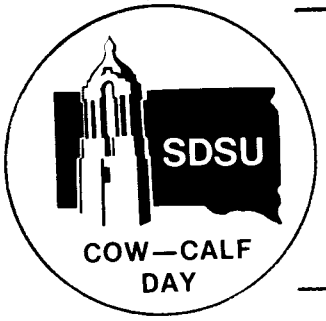

GROWTH HORMONE AS A PREDICTOR OF FUTURE PERFORMANCE IN BEEF FEMALES

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Summary

Circulating levels of growth hormone were measured in 170 head of Angus, Charolais and reciprocal cross females at 8, 14, 20, 32 and 44 months of age. A total of 2,481 samples were collected and analyzed. Year, age, management system (drylot vs pasture) and year x management interactions were important sources of variation in growth hormone level. The 8- and 14-month collections were used to predict future performance, since they represent ages at which beef females are frequently selected. Growth hormone explained 3% or less of the variation observed in any performance trait.

Introduction

Previous work at this station has established a need for predictors of cow efficiency available at weaning or yearling ages. While the weaning weight of a cow's calf has relatively high accuracy in predicting the efficiency of the dam (60 to 70%), the weaning weight of the cow itself has only a 1% accuracy. This study was undertaken to determine if levels of circulating growth hormone measurable at young ages would provide a useful means of predicting cow efficiency and other measures of cow performance.

Methods

Blood samples were collected from 170 females Angus, Charolais and reciprocal cross beef cows once daily on four consecutive days at the ages of 8, 14, 20, 32 and 44 months. Cows were born during the period 1970 to 1972. Cattle were withheld from feed 14 hours prior to sampling to stabilize blood serum metabolites. Growth hormone levels were evaluated by radioimmunoassay in the laboratory of Dr. Alan Trenkle at Iowa State University.

Performance traits studied were most probable producing ability for weaning weight, cow efficiency and milk production, mature weight and mature height. Milk production was a total of four 24-hour milk production measurements taken by the weigh-suckle-weigh method at approximately day 40, 70, 130 and 160 of the animals' lactation. Cow efficiency measured only on individually fed drylot cows was cow and calf TDN intake to weaning divided by calf actual weaning weight. Maturity was defined at ages 5, 6 and 7 years, the oldest ages common to all animals. Mature weight was the average of 39 28-day weights plus a weight taken at calving. Height at the shoulder was measured at calving and weaning of each year. Mature height was the average of six measurements taken at maturity. Most probable producing ability was used to obtain average lifetime production for weaning weight, cow efficiency and milk production. The procedure more accurately weights averages based on different numbers of records.

Results

Growth hormone levels were affected by year differences and by age of the cow at bleeding (table 1). Cattle at 14 and 20 months of age had a higher ($P<.01$) levels of growth hormone than cattle at 8 months of age. Previous research at other institutions indicates that a decrease in circulating levels of growth hormone with increasing age can be expected. In addition to year and age effects, there was a management effect with the pasture group averaging 7.18 ng/ml and the drylot group, 5.74.

Table 1. Growth Hormone Means by Age

Age, months	Growth hormone ng/ml	SE
8	6.23^{b}	.41
14	9.08^{a}	.41
20	7.14^{b}	.43
32	4.77^{c}	.33
44	5.08^{bc}	.48

^{a,b,c} Means without a common superscript differ ($P<.05$).

Results of the study of the predictive value of growth hormone level and cows' own weaning weight for future performance are given in table 2. Also included are the predictions which combine growth hormone plus weaning weight plus weight at bleeding, which in one case would be 8 months and in the second, 14 months. It is clear from these results that accuracy of prediction is low for all five performance traits measured on the cows during their lifetime. Principal interest centered on predicting cow efficiency and even the combination of all three predictors achieves only a 2% level. Predictions of mature weight and mature height carry the highest accuracies in the table followed by weaning weight. The latter are measures of growth of the cow and might be expected to be higher in relationship to these traits. Since weaning weight of the calf is a part of the definition of cow efficiency and since milk production had been shown to be an important part of cow efficiency, it is disappointing to see the low levels of accuracy found for the prediction of cow efficiency. Since the weaning weight of the cow has only 1% accuracy in predicting cow efficiency, whereas the weaning weight of her calf has 60 to 70%, the need for further efforts to develop accurate predictors of cow efficiency available at the ages when heifers are selected seems apparent.

Table 2. Predictive Value of Growth Hormone Level and Cow's Own Weaning Weight for Future Performance

Predictor	Trait predicted: MPPA[a] weaning weight %	MPPA milk production %	MPPA Cow efficiency %	Mature weight %	Mature height %
		8 Months			
Growth hormone	0	1	0	0	1
Weaning weight	3	1	1	13	6
Growth hormone plus weaning weight plus weight at bleeding	11	3	2	25	22
		14 Months			
Growth hormone	0	1	1	3	2
Weaning weight	1	1	0	5	3
Growth hormone plus weaning weight plus weight at bleeding	12	4	1	30	27

[a] Most probable producing ability.