Early Weaning Vs. Normal Weaning Vs. Creep-Feeding Of Replacement Heifer Calves

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Story in Brief

Approximately 200 Angus and Hereford females were subjected to (1) low (2) medium and (3) high planes of nutrition previous to weaning by (1) weaning at 140 days (2) weaning at 240 days, and (3) creep-feeding and weaning at 240 days, resulting in a 110 lb. range in average weight at 240 days of age.

Body weight, condition score and other measurements of growth were affected by preweaning treatment to 1.5 to 2.0 years of age, but differences were small after that time. The creep-fed females tended to wean lighter calves while the early weaned females tended to calve and wean a lower percent calf crop, especially for the first calf crop. The two breeds of females responded to preweaning plane of nutrition in a similar manner. Considering both productivity and cost of raising replacement heifers, the results of this experiment suggest that weaning at a normal age is preferable to either early weaning or creep-feeding.

Introduction

The development of replacement females with maximum productivity (milk production) and reproductive performance at a minimum cost is of utmost importance to the cow-calf industry in Oklahoma. The plane of nutrition during early life has been shown to affect the subsequent growth, reproduction and productivity of many species. The detrimental effects of a low plane of postweaning nutrition on the performance of beef cows has been recognized for many years, and more recently, the detrimental influence of a high plane of postweaning nutrition on beef cows has been clearly shown.

Limited observations at Oklahoma State University showed that heavy milking cows tend to produce heifer calves that develop into poorer producers than their dams while low milking cows tend to produce heifer calves that develop into better producers than their dams. These observations suggested that preweaning plan of nutrition influences sub-

sequent performance of beef females. No controlled research, however, has been previously conducted with beef cattle in which differences in plane of nutrition were limited to the preweaning phase of the life cycle. This experiment was conducted to measure the influence of three preweaning planes of nutrition on the subsequent growth, lactation and reproductive performance of Angus and Hereford females. Both Angus and Hereford females were included in the experiment to determine if a breed difference exists. Previous research with dairy cattle indicate that early maturing breeds are more succeptible to the influence of preweaning plane of nutrition than late maturing breeds.

Procedure

Four groups of Angus and Hereford females (approximately 25 of each breed per group) were produced at the Lake Carl Blackwell Experimental Range near Stillwater. The first group was produced in 1963, the second in 1964, the third in 1965 and the fourth in 1966; the females were born in February, March and April each year.

Within each breed each year, three preweaning planes of nutrition were imposed on the heifer calves: (1) a low plane of nutrition was accomplished by weaning heifers at 140 days of age (early weaning), then maintaining a gain of approximately 0.75 lb. per day to an age of 240 days. During this period between 140 and 240 days of age, the 1963 females were on grass and supplemental concentrates, whereas the heifers produced in 1964, 1965 and 1966 were kept in a drylot and fed alfalfa hay. (2) A medium plane of nutrition was accomplished by weaning at 240 days of age (normal weaning). (3) A high plane of nutrition was accomplished by creep-feeding during the suckling period and weaning at 240 days of age. At 240 days of age the creep-fed heifers weighed 43 and 110 lb. more than the normal weaned and early weaned heifers, respectively; normal weaned heifers weighed 68 lb. more than early weaned heifers.

Differences in appearance of the heifers at 240 days of age were large and obvious as would be expected with an average range of 110 lb. in weight between the two extreme treatments. Early weaned heifers appeared rather frail while creep-fed heifers appeared to be considerably more growthy and were much thicker and deeper bodied; normal weaned heifers were intermediate in appearance.

All heifers in each trial were managed alike after the approximate age of 240 days. During the first winter after weaning they were maintained on a moderate plane of nutrition to gain approximately 0.50 to 0.75 lb. per head daily. Except as previously noted for the low level heifers between 140 and 240 days of age, all females were allowed to

graze native pasture throughout the experiment, supplemented with protein concentrate or alfalfa hay during the winter. In each year all heifers of the same breed and year of birth were kept together and bred to the same bull (of the same breed as the females). Females were bred to calve first at 2 years of age and kept on experiment until 4.5 years of age by which time they had an opportunity to produce three calves. The calving season each year was March, April and May. Calves produced by the experimental females were not creep-fed and were not implanted with stilbestrol. They were weaned at an average age of six months.

Milk production of cows was estimated three to seven times each year by weighing calves before and after nursing.

Results and Discussion

Growth and Development.

Figure 1 illustrates the weight of females to 4.5 years of age as influenced by preweaning plane of nutrition. Differences were largest at 240 days of age, at which time the experimental treatments were terminated. The early weaned females tended to remain lighter than the other groups to 4.5 years of age, although the differences after 2 years of age was small (approximately 30 lb.). The weight advantage of creep-fed females dis-

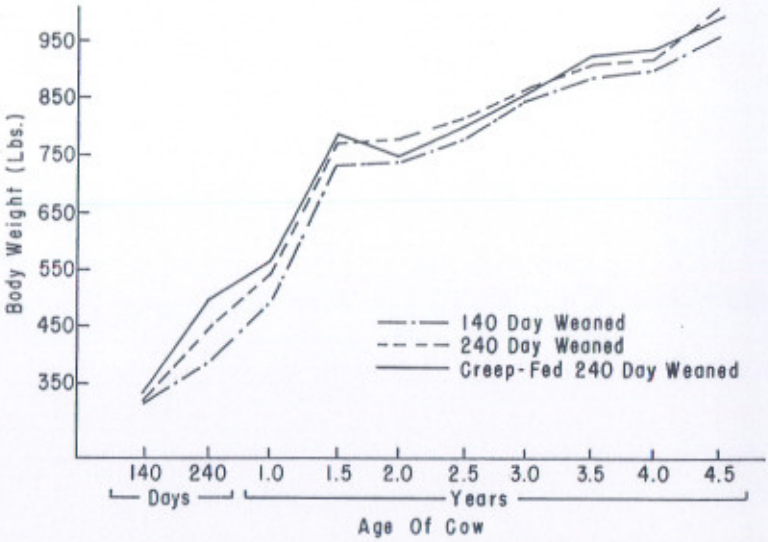

Figure 1. Average body weight of females fed different levels of nutrition before weaning.

appeared after 1.5 years.

Figure 2 illustrates changes in skeletal size as indicated by height at withers. At 240 days, creep-fed heifers were considerably taller (1.8 inches) than early weaned heifers, but only slightly taller (0.4 inch) than normal weaned heifers; the normal weaned heifers apparently made near-maximum growth and creep-feeding did little to increase skeletal size. On the other hand, the growth of heifers was noticeably slowed by early weaning. Appreciable differences in skeletal size existed through 1.5 years, but by the time of first calving (2 years) differences were small.

Other measurements of growth and fatness included circumference of heart girth, width at hooks, length of rump, length of body, distance from chest to ground, height at hooks and condition score. All indicators of growth followed a pattern similar to that outlined for body weight and height at withers, in that differences were largest at 240 days and gradually decreased to 1.5 years after which they were small.

The growth results of this experiment indicates that differences in size of heifers at normal weaning age created by plane of nutrition are temporary in nature, since differences after 1.5 to 2.0 years were either non-existent or small. There was definitely no permanent advantage in size of female due to creep-feeding, particularly compared to the normal weaned females. Early weaning did delay maturity as indicated by most body measurements, and appeared to cause a slight reduction in mature size; differences in size after 2.0 years were small but consistent.

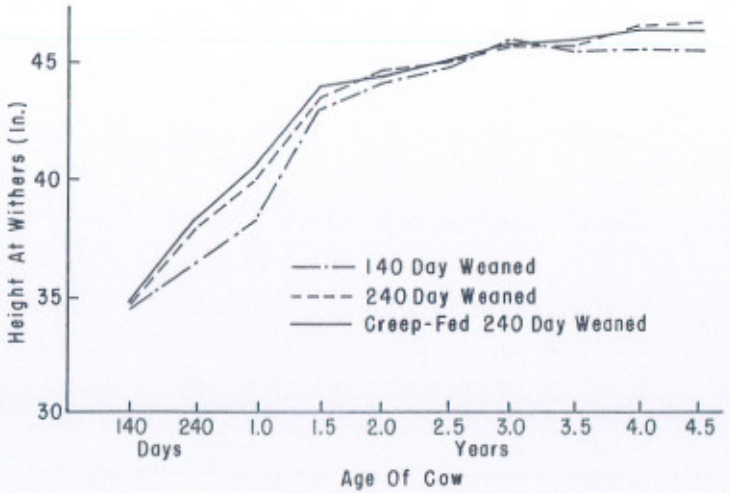

Figure 2. Average height at withers of females fed different levels of nutrition before weaning.

Reproductive Performance.

Average birth weight for all three calf crops of early weaned, normal weaned and creep-fed dams was 60.8, 62.5 and 63.4 lb., respectively (Table 1). The average birth weights suggest a slight trend for increased birth weight with increasing plane of preweaning nutrition. However, differences were small, and creep-fed females produced the heaviest calves the first and third calf crops but the lightest calves the second calf crop.

As shown in Figure 3 there was a general trend for a lower percentage of early weaned females to conceive, especially for the calf crop, as indicated by calving percent. For the first calf crop, the calving percent was 15.8 and 15.6 percent lower for the early weaned heifers than the normal weaned and creep-fed heifers, respectively. This indicates that more of the early weaned heifers had not reached sexual maturity during the first breeding season when the heifers were yearlings. The average calving percent for all three calf crops was 69.9, 76.9 and 79.8 percent for early weaned, normal weaned and creep-fed females, respectively (Table 1).

Percent calf crop weaned followed the same general pattern as calving percent; the average percent calf crop weaned for all three calf crops was 67.3, 72.8 and 76.8 percent (Table 1). As illustrated in Figure 4, the disadvantage of early weaned heifers in average percent calf crop weaned was due primarily to their low percent calf crop weaned for the first

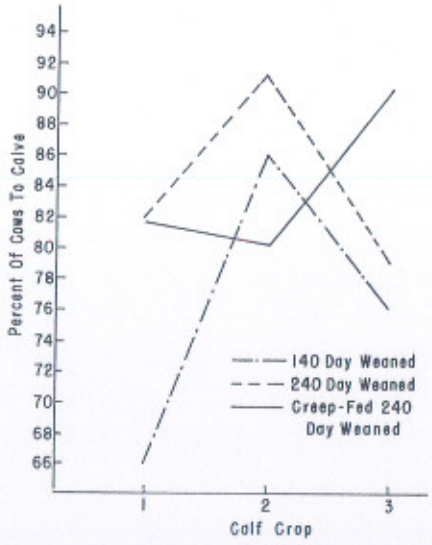

Figure 3. Average percent of cows which calved for three calf crops.

calf crop, which in turn was due entirely to their low calving percent. It can be concluded then that the major problem with early weaned heifers in this experiment was a failure of some heifers to reach sexual maturity before or during the first breeding season.

Calving percent and percent calf crop weaned were below normal for all groups. A contributing factor was the necessity to use one-bull breeding herds throughout the experiment; yearling bulls were used and in several instances it appeared bulls were of low fertility.

Calf Weight. As shown in Figure 5, the creep-fed females tended to wean lighter calves. Although rather consistent for all three calf crops, the differences were small, varying from 7 to 10 pounds. The average weaning weight for all three calf crops was 345, 341 and 335 lb. for early weaned, normal weaned and creep-fed females, respectively (Table 1).

Normal weaned females produced the most milk, and creep-fed females produced the least (Table 1). Although differences were small, some definite trends were evident. Twenty-four separate comparisons

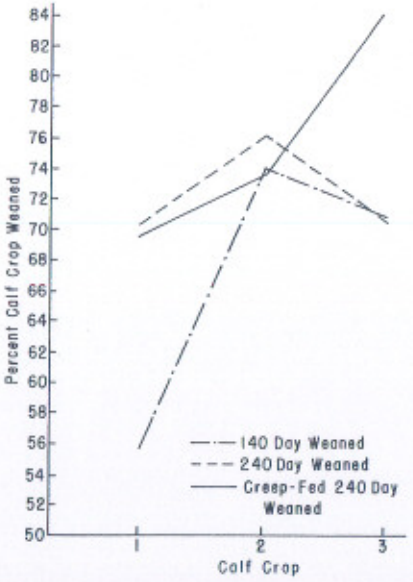

Figure 4. Average percent calf crop weaned for three calf crops.

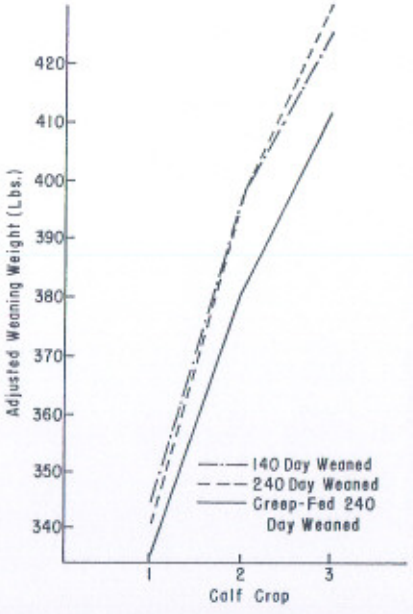

Figure 5. Average adjusted weaning weight of calves from cows fed different levels of nutrition before weaning (Adjusted to a 205-Day Steer Basis)

Table 1. Effects of Preweaning Plane of Nutrition on Cow Productivity Average for Three Calf Crops

	Preweaning Treatment of Cows[1]		
	Weaned at 140 days	Weaned at 240 days	Creep-fed, Weaned at 240 days
Birth wt.,[2] lb.	60.8	62.5	63.4
Calving percent	69.9	76.9	79.8
Percent calf crop weaned	67.3	72.8	76.8
Weaning wt.,[3] lb.	345	341	335
Pounds calf weaned per cow[4]	261	282	288
Estimated daily milk yield, lb.	9.6	10.1	9.2

[1] The preweaning treatment refers to the treatments imposed on the *cows* when they were heifers
[2] Adjusted to a bull calf equivalent.
[3] Adjusted to a 205-day, steer basis. Sex-adjustment was made by multiplying the age-adjusted weight of heifers by 1.05.
[4] Calculated by multiplying % calf crop × average weaning weight for each calf crop.

among preweaning treatments were possible within year-of-birth of experimental female, breed of experimental female and calf crop; in 16 comparisons normal weaned females produced more milk than early weaned females and in 18 comparisons creep-fed females produced less milk than normal weaned females. Furthermore, trends in milk production were similar to those observed for weaning weight, lending additional support to the concept that creep-feeding of replacement heifers is slightly detrimental to their future lactation ability.

The below-normal weaning weights observed in this experiment were caused in part by poor range conditions due to local drought, and by frequent handling of the calves during very hot weather which was necessitated by the procedures used for estimating milk production of the dams.

The average pounds of calf weaned per cow per year (sum of weaning weight x average percent calf crop weaned each calf crop) was 261, 282 and 288 for early weaned, normal weaned and creep-fed females, respectively (Table 1). The relatively poor performance of the early weaned females in pounds of calf weaned is primarily a reflection of their poor calving percentage for the first calf crop; they were at no disadvantage in terms of weaning weight of the calves which they produced.

Conclusions

The economic implications of this research are apparent. Although early weaning would normally involve essentially no additional expense (simply separate heifers from their dams and allow them to graze separate pastures), the decreased pounds of calf weaned due to the lower reproductive performance of early weaned heifers for the first calf crop suggest

early weaning is a questionable practice. On the other hand, if pasture conditions and management were adequate to result in sufficient size of heifers to insure sexual maturity during the first breeding season, early weaning could probably be successfully practiced. Furthermore, if three-year-old calving is practiced, early weaning should be very satisfactory; three-year-old calving would eliminate the pressure of sexual maturity created by breeding heifers as yearlings.

An economic analysis of the results of this experiment does not favor the creep-feeding of replacement heifers. Creep-feeding of heifers did not produce a permanent advantage in size of the resulting cows and little distinct advantage in pounds of calf weaned. The creep-fed females in this experiment consumed an average of 430 lb. of creep-feed per heifer. At a cost of $65.00 per ton, the value of the creep-feed was $13.98. Assuming an average value of $0.40 per pound for calves, 35 lb. of additional calf per cow would be necessary to break-even. This is not likely to occur, especially considering the lighter calves produced by the creep-fed females. Further, the cost of creep-feed assumed above did not include a charge for labor and a creep-feeder. Economic implications may change slightly as prices change, but the fact remains that the creep-fed female has little if any advantage.

No relationship was noted between preweaning plane of nutrition and breed of female in this experiment. Even though the Angus females were slightly earlier maturing than the Herefords, they were not affected differently than the Herefords by preweaning treatment.

The results of this experiment suggest a general recommendation that for producing replacement females which will calve first at two years of age, weaning at a normal age is preferable to early weaning or creep-feeding.