PERFORMANCE OF HOLSTEIN CALVES FROM THREE TO TWELVE MONTHS OF AGE

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Summary

Sixty-four Holstein steers were used to study the effect of season and age on performance. Animals beginning the trial in spring were heavier (P<.05) and more efficient than calves started in other seasons. There were no differences (P>.05) among seasons in average daily gain and feed conversion after 6 mo of age. Rate of growth was reduced after 9 mo of age for all seasons.

(Key Words: Calves, Growth, Seasons, Age.)

Introduction

There are approximately 98,000 dairy cows in Kansas, most of which are predominantly Holstein. Assuming a calf crop of 92%, of which 51% are males, there are 46,450 bull calves born in Kansas each year. Because of the intensive use of artificial insemination by the dairy industry, few of these bull calves are needed for breeding purposes. In the past, most have been used to produce meat, mainly as steers. Many times these steers are kept on a deferred program for long periods of time, usually ending in the feedlot, resulting in production of a large carcass with an excess of fat, at a high cost. Part of the reason for this has been the lack of information concerning the effect of different types of growing systems and of season on performance and body composition of Holsteins.

There is evidence to indicate that the Holstein, if fed to produce rapid gains, will efficiently produce lean, tender meat. However, more data are needed concerning body composition at various stages of growth as affected by age and season, especially when the diet is formulated to contain a high energy concentration and rumen escape protein. With this information, it would be possible to develop alternative feeding programs for surplus Holstein bulls to meet more nearly the changing demands of the consumer.

The objective of this research was to study the effect of age and season on growth of Holstein steers. Data concerning body composition were also collected and will be reported elsewhere.

Procedures

Sixty-four Holstein steers were used. During each season (winter, spring, summer, and fall), for 2 yr, two calves were assigned to each of four treatments at 3 mo of age. Animals assigned to treatment A were slaughtered at that time to determine initial body composition; the six remaining calves were randomly allocated to treatment B, C, or D, which consisted of growing the animals until 6, 9, or 12 mo of age, respectively. Animals remained on their treatments until slaughter.

Diets (Table 1) B, C, and D were fed to animals that were 3 to 6 mo, 6 to 9 mo, and 9 to 12 mo of age, respectively. They contained the same energy concentration and were formulated according to NRC recommendations for beef cattle to meet the requirements for each stage of growth. Diet B contained Deccox® during the first 14 days. The main difference between these diets was the protein content, which was 16, 14, and 12% of the dry matter of diets B, C, and D, respectively.

Table 1. Diet Formulation (% as Fed Basis)*

	Diet		
Ingredients	B	C	D
Sorghum grain	0.00	15.20	22.10
Cracked corn	49.20	49.20	49.20
Rolled wheat	13.60	0.00	0.00
Cotton seed hulls	10.00	10.00	10.00
Extruded soybeans	18.80	15.70	7.30
Carmil molasses	6.00	6.90	7.10
Soybean oil	0.00	0.60	1.90
Mineral premix	2.25	2.25	2.25
Vitamin premix	0.15	0.15	0.15

*Each diet contained Tylan® and Rumensin®, each at 10 g/ton.

Animals were individually allocated to pens and fed twice daily to assure ad libitum consumption. Every 14 days the calves were weighed and average daily feed intake was calculated.

The treatments evaluated performance during four seasons and at three different stages of growth with one single feeding system. Data were analyzed as a repeated measures in time experiment, evaluating the effect of seasons and age. The parameters evaluated were feed consumption, average daily gain, feed conversion, and body weight.

Results and Discussion

Feed Consumption

Animals representing a season were born 3 mo before. Animals started on experiment in spring had higher intake ($P<.05$) during the entire trial (Figure 1). This difference was especially obvious in the 9 to 12 mo period. Three parts of the graph show depressed intake. These are the result of observations to determine body composition using the urea dilution technique. There were no differences in intake ($P>.05$) for calves started in the fall, winter, and summer at any of the growth stages.

Feed Conversion

Feed conversion is shown in Table 2. Feed conversion was found to be erratic and was greatly affected by stress. Differences were observed for feed conversion at 3 and 6 mo ($P<.05$). However, no difference ($P>.05$) was found between 9 and 12 mo. Animals gained weight slower as they got older. Overall feed conversion in the last period of growth was poorer ($P<.05$) than that at the other ages; feed conversion mean values for the last period were higher than those for the other stages of growth, except for those steers of 9 to 12 mo of age during summer.

Body Weight and Average Daily Gain

There were no differences ($P>.05$) among seasons at 9 and 12 mo (Table 2). Nevertheless, animals at 3 to 6 mo of age differed ($P<.05$), with spring and winter calves being heavier than fall and summer calves. The rate of growth was

affected by age mostly in the last period. Higher means were obtained between 6 and 9 mo.

Initial weight at 3 mo of age averaged 208.3 lb. Average weight at 1 yr of age was 1056.3 lb (Figure 2). Animals assigned to spring were heavier (P<.05) than animals at other seasons. This advantage continued through the trial until animals reached 9 mo of age. Rate of growth was significantly reduced during the last 3 mo of the experiment. At that stage, animals suffered joint damage, particularly under cold temperatures, because of the concrete floor. That problem may be the cause of the decreased rate of growth. Growth followed a linear pattern (R^2 =.95).

Table 2. Feed Conversion (FC) and Average Daily Gain (ADG) at Different Stages of Growth

	Seasons							
Age,	Fall		Summer		Spring		Winter	
mo	ADG	FC	ADG	FC	ADG	FC	ADG	FC
3	1.98[d]	3.54[b]	2.24[cd]	3.48[b]	2.29[cd]	3.28[ab]	2.56[c]	2.78[a]
6	3.96[c]	3.48[a]	3.48[c]	4.32[b]	3.88[c]	4.66[ab]	3.95[c]	4.00[a]
9	3.80[c]	5.66[a]	2.90[c]	6.84[a]	3.39[c]	6.00[a]	3.06[c]	6.94[a]
12	3.30[c]	6.78[a]	3.66[c]	5.56[a]	2.57[c]	7.84[a]	2.46[c]	9.45[a]

[ab]FC within row with uncommon superscript letters differ (P<.05).
[cd]ADG within row with uncommon superscript letters differ (P<.05).

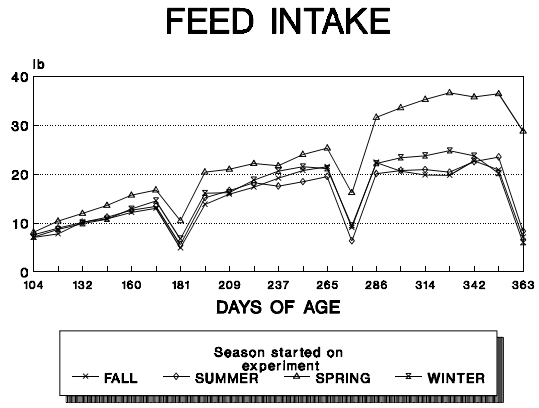

Figure 1. Daily Feed Intake of Holstein Calves from 3 to 12 Months of Age.

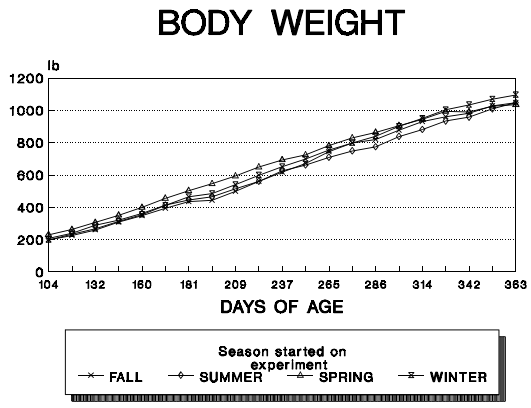

Figure 2. Body Weight of Holstein Calves from 3 to 12 Months of Age.