Effect of Preweaning Milk Level and Biological Type on Postweaning Feedlot Performance and Carcass Traits

G. L Crosthwait, R. D. Wyatt,
L. E. Walters and Robert Totusek

Story in Brief

The effect of two levels of preweaning milk intake on postweaning feedlot performance and carcass merit by calves of two growth potentials was determined. This was accomplished by breeding Hereford cows to Angus bulls and Holstein cows to Charolais bulls. This was followed by reciprocal cross-fostering, whereby, calves of each breed combination were exposed to a low (Hereford) or high (Holstein) level of milk. Calves that had been raised to weaning on range were group fed while calves that had been reared in drylot were individually fed during the feedlot finishing period. Calves were fed to an estimated low choice grade.

The high level of milk consumption resulted in an additional 103 and 104 lb of weaned weight among Angus x Hereford and Charolais x Holstein calves, respectively.

Calves which received the higher preweaning milk levels tended to be heavier at slaughter, produced heavier carcasses and generally required fewer days to reach slaughter grade.

Introduction

Previous research has shown that weaning weights can be improved by increasing the milk production of beef cows. In recent years, there has been considerable interest in the infusion of dairy blood into beef herds as a means of rapidly increasing the milk yield of cows and thus increasing weights. However, heavier weaning weights produced increasing preweaning milk consumption will probably influence both the feedlot performance and carcass merit of calves because of either the higher nutrition levels (milk) or influence of dairy breeding. The purpose of this study was to compare the effects of two levels of preweaning milk intake on the postweaning feedlot performance and carcass merit of calves of two growth potentials.

Materials and Methods

Feedlot performance and carcass characteristics of calves to two growth potentials exposed to two levels of milk intake was determined. A system was devised whereby calves of similar breeding could be exposed to a low (Hereford) and high (Holstein) level of milk consumption during the preweaning interval. This was accomplished by breeding Hereford cows to Angus bulls and Holstein cows to Charolais bulls followed by reciprocal cross-fostering of about one-half of the calves at birth. Thus, within each

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calf breed (Angus x Hereford and Charolais x Holstein) one group was the recipient of a low level of milk (10 to 11 lb/day) while another group received a high milk level (21 to 24 lb/day).

Cows and calves were maintained either on tallgrass native range or confined in drylot from birth to weaning. Cows received a post-calving winter supplement level calculated to allow a 20 percent winter weight loss including weight loss at calving. Supplement levels were based on earlier work on cow size and milk production levels at this station. Calves were born in December, January and February and weaned at 240 ± 7 days of age. Drylot calves were creep-fed while range calves received only grazed forage.

Parturition was induced in some cows by administration of 40 mg dexamethazone (Axium) within 10 days of their projected calving date to allow scheduling of the cross-fostering program. Calves were grafted onto foster dams within 12 hr following birth.

At weaning, calves were fasted for six hr, weighed, photographed and vaccinated for blackleg, parainfluenza-3 and IBR. Calves were placed directly into the feedlot at weaning.

Skeletal size was estimated from 2x2 slides taken with each calf behind a grid at weaning and prior to slaughter. Height was defined as the distance from the hip (tuber coxae) to the floor, length defined as the horizontal distance from the point of the shoulder (dorsal anterior humerus) to the hip. The hip and point of shoulder were marked with contrasting chalk prior to photographing to facilitate more accurate measurement.

Calves from drylot cows were individually-fed *ad libitum* in single pens with a covered feeding area. Calves from range cows were group-fed *ad libitum* in a barn with a covered feeding area and an outside loafing area.

Group-fed calves received a 75 percent concentrate ration consisting of the following percentages: gound corn, 60.2, cottonseed hulls, 15.0; ground alfalfa, 10.0; cottonseed meal, 8.0; molasses, 5.0; urea, 1.0; salt, 0.3; minerals and vitamin A.

Individually fed calves were fed a 92 percent concentrate ration consisting of the following percentages: whole corn, 87.0, cottonseed hulls, 5.0; and a pelleted supplement containing cottonseed meal, 3.5; soybean meal, 50.0; urea, 10.0; wheat mids, 3.5; salt; Vitamin A; minerals and chlortetrocycline.

Each calf was fed to an estimated quality grade of low choice based on visual estimates of apparent fat thickness. Final weights and photographs were taken after a 12 hr fast.

Group-fed calves were slaughtered in a commercial packing plant and chilled for 72 hr before quality grade, marbling score, maturity, conformation score, and kidney, heart and pelvic (KHP) fat were estimated by a USDA grader. Individually-fed calves were slaughtered at the Oklahoma State University Meat Laboratory and were evaluated in the carcass by a staff member. Rib eye area (REA) and backfat thickness were measured from a tracing at the 12th-13th rib separation on each carcass. Carcass grades were based on the Official U.S. Standards for Grades of Carcass Beef (1973).

Results and Discussion

Feedlot Performance

Feedlot performance of group-fed and individually-fed calves is summarized in Tables 1 and 2, respectively. Initial weight (weaning weight) increased among both group and individually-fed calves as the preweaning milk intake was increased. Charolais x Holstein calves were heavier than Angus x Hereford calves receiving a similar milk level. Heavier initial weights were a reflection of higher preweaning milk

Table 1. Effect of preweaning milk level and breed on feedlot performance of group-fed calves.

	Angus x Hereford		Charolais x Holstein	
	Low	High	Low	High
Initial wt, lb	497	602	551	662
Slaughter wt, lb	848	894	1226	1244
Days fed	152	136	289	250
Daily gain, lb	2.29	2.14	2.39	2.47
Feed conversion, (lb feed/lb gain)	7.93	9.14	8.79	10.70
Skeletal size				
Initial height, in	38.5	38.7	41.3	43.7
Initial length, in	27.0	27.3	28.0	31.5
Slaughter height, in	42.0	43.1	50.2	48.4
Slaughter length, in	32.0	32.5	36.6	38.6

Table 2. Effect of preweaning milk level and breed on feedlot performance of individually-fed calves.

	Angus x Hereford		Charolais x Holstein	
	Low	High	Low	High
Initial wt, lb	477	577	525	632
Slaughter wt, lb	877	907	1262	1323
Days fed	158	139	2.60	2.62
Daily gain, lb	2.58	2.39	2.60	2.62
Feed conversion (lb feed/lb gain)	6.79	7.14	8.61	8.80
Skeletal size.				
Initial height, in	38.3	40.9	42.3	43.3
Initial length, in	24.6	28.3	28.2	31.2
Slaughter height, in	43.1	44.3	50.5	48.2
Slaughter length, in	32.2	34.3	36.4	36.8

intakes and larger birth weights associated with the larger mature size of the Charolais x Holstein calves.

Slaughter weights tended to be heavier among calves receiving high preweaning milk levels. Angus x Hereford calves receiving the high preweaning milk level averaged 38 lb heavier at slaughter than those receiving the low milk level.

Charolais x Holstein calves receiving the high preweaning milk level averaged 39 lb heavier at slaughter than their low milk level counterparts. Charolais x Holstein calves averaged 382 lb heavier at slaughter than Angus x Herefords.

Angus x Hereford calves which received the high preweaning milk level tended to show lower rates of average daily gain than those which received the low milk level. This trend was reversed among Charolais x Holstein calves.

With the exception of individually fed Charolais x Holstein calves, those which received the high preweaning milk level required fewer days to reach slaughter grade.

Feed efficiency was affected among calves of both breed combinations with those on the high milk level having poorer feed efficiencies in both group-fed and individually-fed management systems.

Table 3. Effect of preweaning milk level and breed on carcass traits of group-fed calves.

Breed	Angus x Hereford		Charolais x Holstein	
Milk level	Low	High	Low	High
Item				
Hot carcass wt, lb	537	584	761	807
Ribeye area, in²	10.1	10.2	12.9	13.7
Fat thickness, in	.79	.90	.60	.62
KHP fat[a]	3.29	3.44	2.72	3.58
Cutability, %	47.8	45.7	49.3	48.5
Conformation score[b]	8.25	8.75	7.68	7.67
Marbling score[c]	12.0	10.9	12.9	13.0
Carcass grade[b]	7.1	6.3	7.4	7.6

[a]Kidney, heart and pelvic fat.
[b]6=high good, 7=low choice, 8=overage choice.
[c]10=slight-, 11=slight, 12=slight +, 13=small-.

Table 4. Effect of preweaning milk level and breed on carcass traits of individually-fed calves.

	Angus x Hereford		Charolais x Holstein	
	Low	High	Low	High
Hot carcass wt, lb	538	559	801	851
Ribeye area, in²	10.3	10.5	12.10	11.3
Fat thickness	.67	.66	.51	.72
KHP fat[a]	2.87	3.03	2.67	3.50
Cutability, %	48.8	48.8	48.9	46.4
Conformation score[b]	8.4	8.3	7.7	7.7
Marbling score[c]	10.1	13.7	11.7	13.5
Carcass grade[b]	6.4	7.5	6.6	6.8

[a]Kidney, heart and pelvic fat.
[b]6=high good, 7=low choice, 8=overage choice.
[c]10=slight-, 11=slight, 12=slight +, 13=small-.

Skeletal measurements indicate that calves receiving the high preweaning milk levels were both longer and taller than their counterparts of the similar breeding that received the low milk level.

Carcass Characteristics

Carcass characteristics of group-fed and individually-fed calves are summarized in Tables 3 and 4, respectively. Carcasses from Charolais x Holstein calves were heavier in all cases than those from Angus x Herefords.

Calves which received the high preweaning milk level produced carcasses which averaged 41 lb heavier than those which received the low milk level.

Preweaning milk level had little affect on rib eye area among calves of either breed combination.

Evidence of external fat thickness was one of the criteria used to estimate carcass grade in the live animal and therefore determine the time of slaughter. Some control was thus exercised over fat thickness in the carcass. Group-fed Charolais x Holstein

calves tended to have less fat thickness over the rib than Angus x Hereford calves. This trend was not evident among individually-fed calves.

Group-fed calves which received the low preweaning milk level tended to produce carcasses with higher (1.5 percent) cutability. This trend was not evident among individually-fed calves.

Individually-fed calves which received the high preweaning milk level had higher marbling scores than those receiving the low milk level. A trend was not evident among group-fed calves.

Quality grade was not consistently influenced by preweaning milk level among calves of either breed combination.

Characteristics of Forage-Fed *vs* Grain-Fed Slaughter Cattle

Jim Williams, D. G. Wagner, L. E. Walters, J. J. Guenther, G. H. Horn and George Waller

Story in Brief

Thirty Brangus X Hereford-Angus crossbred steers (avg. 348.4 kg), approximately 13 months of age, were randomly assigned to three treatments: (1) 90 percent concentrate finishing ration for 161 days, (2) sorghum sudan and wheat pasture for 48 days, followed by the 90 percent concentrate finishing ration for 113 days, and (3) sorghum sudan and wheat pasture (190 days) until slaughter. Performance, carcass traits and chemical composition of the soft tissue were determined. Final slaughter weight and average daily gain (ADG) were lower for group 3 (928 and .83 lb) than for groups 1 (1075 and 1.96 lb) and 2 (1051 and 1.74 lb). Carcass traits, with the exception of percent of kidney, heart and pelvic fat (KHP), were similar for groups 1 and 2 and considerably higher than for group 3, except for rib eye area (REA). Animals in groups 1 and 2 graded 70 percent choice, 30 percent high good *vs* 60 percent standard, 40 percent good for those in group 3. Soft tissue in the carcass was significantly higher ($P<.05$) in crude protein, moisture and ash for group 3 *vs* group 1. Cattle in group 1 had approximately twice the fat content in the soft tissue compared to group 3.

Introduction

Present world grain shortages, likely increased future demands for grain for human consumption and potential change in the level of fat consumption in the human diet ultimately suggest a need for an alteration in beef production systems in the future. Recent trends in cattle feeding revealed that total grain use declined 50 percent between 1971 and 1974 with a concomitant 50 percent increase in the percentage of forages utilized in rations (Ward *et al.*, 1977). More recently, however, there has been some reversal in this sharp decline. Utilization of more forages in finishing rations for cattle will require additional tillable land for the production of high quality forages, since only high quality roughages will support adequate gains. Cool season annuals, such as wheat pasture, may offer great potential for producing forage-finished beef. Approximately 11.9 million acres of wheat pasture were available for grazing in Oklahoma and Texas in 1974.