



# AN ACCELERATED FEEDING STUDY FOR DAIRY BEEF STEERS

*D. R. ZoBell, Allen Young and Bruce Godfrey*  
Utah State University

September 2001

AG 512

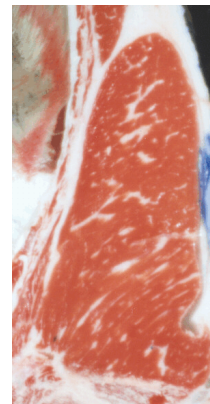
## INTRODUCTION

A large number of Holstein bull (steer) calves are produced by the dairy industry. Producers who purchase these calves should understand that depending on the production strategy employed, the economic outcome could be quite broad. Dairy beef calves that are intensively managed, using aggressive feeding strategies to achieve high levels of efficiency, increase the opportunity for profitability (Zinn, 1986).

Compared to beef breeds, growth performance characteristics of Holstein steers are more consistent and morbidity and mortality are generally lower (Zinn, 1991). Holsteins may be less efficient, however, than conventional beef breeds in converting calories from feedstuffs to tissue (Hooven et al., 1972).

Ruminants fed concentrate versus roughage diets are more efficient for growth (Garrett, 1980). Both Holstein and traditional breeds of beef calves that are fed higher levels of concentrate than roughage achieve higher rates of gain than calves fed feeds that are high in roughages (Bailey, 1989; Sully and Morgan, 1982). As a result, placing calves on high concentrate diets early in their life may be beneficial, particularly if concentrates are relatively low in price compared to roughages.

A study was conducted at Utah State University to evaluate an accelerated concentrate feeding program on Holstein calves from weaning to slaughter and the effects on production and carcass characteristics.



## MATERIALS AND METHODS

Eight Holstein steer calves, initial weight 200 kg, were purchased from a local auction market. They were randomly assigned to treatment which consisted of a Control (C) or on Accelerated (A) feeding program. Control calves (n=4) were fed a growing ration for 56 days (Ration 1, Table 1) that consisted of 28.4% rolled barley to day 56 then increased to 35.2% (Ration 2) and 78.2% (Ration 4) for days 56-140 and 140-308 respectively (DMB). Rations were formulated to meet National Research Council (1996) recommendations for calves of this weight

for an anticipated average daily gain (ADG). Prices for the feedstuffs used were published market averages for the region at trial initiation.

Calves placed on the A (n=3) treatment were fed Ration 4 within three weeks of trial initiation and remained on this ration throughout the trial period (308 d). The feedlot supplement used in this trial contained an ionophore, vitamins and minerals. The primary concentrate in each ration was rolled barley, varying amounts of hay and corn silage. Each ration was fed as a total mixed ration (TMR). All feedstuffs were analyzed initially for dry matter and nutrient levels and analysis was conducted using standard procedures.

The steers were housed in individual feeding stalls where feed intake was measured each day. All steers were fed each morning at approximately 9:00 A.M. The amount of feed given to each animal was determined on the basis of feed consumption during the previous day.

The study was terminated based on live animal ultrasound backfat, longissimus dorsi, and marbling measurements using proprietary image analysis software (Brethour 1991, 1992). Steers were slaughtered at the E.A. Miller Ltd. (Hyrum, UT) facility. Carcasses graded after a 24 hour chill. Carcass data for each animal included hot carcass weight (HCW), backfat (BF), ribeye area (REA), kidney pelvic and heart fat (KPH), quality grade (QG), yield grade (YG), cutability (Cut), and carcass yield (CY).

All data were statistically analyzed to determine differences for any variables that were measured.

## RESULTS AND DISCUSSION

Table 3 is a summary of the production data that were collected from this study. For the 0-56d period, steers on the high concentrate diet (accelerated or A group) responded favorably to high levels of concentrate in the ration, as ADG and feed efficiency (FE) were different from the steers in the control (C) group. This would suggest that the A steers adapted to their ration with little difficulty and concentrate level did not have an adverse effect on DMI, which was similar for A and C at 6.59 and 7.05 respectively. As the feeding period increased, ADG, dry matter intake (DMI) and FE were similar for accelerated and control steers.

The results for ADG, DMI and FE are similar to what has been reported by others for Holstein steers (Bond et al., 1972; Zinn, 1983). Research has shown, however, that Holsteins are less efficient than conventional beef breeds for feed efficiency (Hooven et al., 1972).

The 140-308d FE values were different overall using combined A and C values compared to the 0-140d period. This suggests lower feed efficiency as the days on feed increased.

Table 4 is a summary of carcass characteristics. There were no differences between treatments for all of the variables measured, with the exception of marbling score (MS). The A and C treatment steers had MS values of 6.60 and 5.85 respectively. The steers included in this trial all had relatively high MS scores. This is reflected in the quality grade (all but one control group steer graded USDA Choice). This was achieved with little outside fat cover as backfat (BF) (2.5 and 3.3 mm for A and C steers). The yield grade average for A and C steers was similar. The carcass data are consistent with other studies with the exception of marbling score which was higher than that reported by Zinn, (1991) and Bertrand et al. (1983). This is noteworthy given the age (approx. 14 months) at the time the animals were slaughtered.

Marbling score was high across treatments, particularly in relation to their age (approx. 14 months at slaughter). Bertrand et. al (1983) found little difference in the MS for Angus, Hereford and Holstein steers (14 months). However, industry graders commonly indicate Holstein steers generally have higher marbling scores than beef breeds. Part of the reason for these higher scores may be the age of the animals because at time of slaughter Holsteins tend to be older than beef breed animals.

The effect of treatment on Holstein net returns above feed costs is presented in Table 5. None of the variables measured were different between treatments, although there was a numerical trend for increased returns for the A steers. These data show that the returns above feed costs were greater for steers on the accelerated ration than those on the control (forage) ration. These results would likely be true even when the price of feedstuffs increased, unless there was a significant change in the relative price of forages versus concentrates. It should be noted that the net returns in Table 5 do not represent the net returns of feeding Holstein steers. Other costs would need to be included (e.g. Interest expense, processing costs, transportation, marketing etc.) to determine the net returns of feeding Holstein steers. However, feed is the major cost in any feeding operation and the inclusion of these other costs would probably not affect the comparison of accelerated feeding alternatives.

## CONCLUSIONS

Holstein calves can be placed on rations high in energy as levels of efficiency are significantly higher than forage-based diets. This study showed that high levels of efficiency can be achieved early in a feeding period where the ration consists of high concentrate levels. Accelerated feeding yielded greater returns than a ration that used higher portions of roughages.

## REFERENCES

- Bailey, 1989. Rate and efficiency of gain, body composition, nitrogen metabolism, and blood composition of growing Holstein steers given diets of roughage or concentrate. *Can. J. Anim. Sci.* 69:707.
- Bertrand, J.K., R.L. Willham, and P.J. Berger. 1983. Beef, dairy and beef X dairy carcass characteristics. *J. Anim. Sci.* 57:1440.
- Bond, J., N.W. Hooven, Jr., E.J. Warick, R.L. Hiner, and G.V. Richardson. 1972. Influence of breed and plane of nutrition on performance of dairy, dual-purpose and beef steers. II. From 180 days of age to slaughter. *J. Anim. Sci.* 34:1046
- Brethour, J.R. 1991. Relationship of ultrasound-measured backfat to feedlot performance of beef steers. *Kansas State Ag. Exp. St. Reports of Progress.*, 627, P1.
- Brethour, J.R. 1992. The repeatability and accuracy of ultrasound in measuring backfat in cattle. *J. Anim. Sci.* 70:1039.
- Garrett, W.N. 1980. Factors influencing energetic efficiency of beef production. *J. Anim. Sci.* 51:1434.
- Hooven, N.W., J.B. Bond, and E. J. Warwick. 1972. Influence of breed and plane of nutrition on the performance of dairy, dual-purpose and beef steers. I. Birth to 180 days of age. *J. Anim. Sci.* 34:1037.
- SAS. 1996. SAS User's Guide: Statistics (Version 6.12). SAS Inst. Inc., Cary, NC.
- Sully, R.J., and J.G.L. Morgan. 1982. The influence of feeding level and type of feed on the carcasses of steers. *Aust. J. Agric. Res.* 33:721-729.
- Zinn, R.A., and D.E. Axe. 1983. Ration conditioners and potassium supplementation for finishing steers. *California Feeders Day Report*, P 64.
- Zinn, R. 1986. Holstein steers in the feedlot. *Southwest Nutrition Conference Proceedings. Univ. of Arizona Pub.* P 98.
- Zinn, R. 1991. Comparative feedlot performance, carcass merit and economics of production of Holsteins versus beef breeds. *Southwest Nutrition Conference Proceedings. University of Arizona Pub.* P 50.

Table 1. Rations used in Holstein Study (DMB)<sup>1</sup>.

Treatment	Ration		
	1	2	4
Control	%	%	%
Alfalfa Hay	18.3	17.5	7.0
Grass Hay	18.7	17.9	
Corn Silage	31.5	26.3	10.0
Barley Grain	28.4	35.2	78.2
Supplement	3.1	3.2	4.8

<sup>1</sup>Feedstuff cost (DMB/Ton): Alfalfa hay - \$67.00; Corn silage - \$71.00; Grass hay - \$56.00; Barley grain - \$60.00; Supplement - \$132.00.

Table 2. Nutrient specifications for Holstein rations.

Variable	Ration		
	1	2	4
Dry Matter (%)	59.8	61.5	75.8
Crude Protein (%)	10.7	11.3	12.1
Total Digestible Nutrients (%)	68.6	70.0	78.9
Cost/Ton (DMB)	\$69.10	\$70.20	\$72.37

Table 3. The effect of an accelerated finishing program on Holstein steer production variables.

Treatment/Period	ADG (kg)	DMI (kg)	FE
0 - 56 d			
Control	1.02	7.05	7.02
Accelerated	1.44	6.59	4.78
56 - 140 d			
Control	1.17	7.00	6.01
Accelerated	1.09	7.18	6.69
0 - 140 d			
Control	1.12	7.05	6.27
Accelerated	1.23	6.95	5.73
140 - 308 d			
Control	1.13	9.82	8.80
Accelerated	1.25	9.82	7.88
0 - 308 d			
Control	1.13	8.55	7.61
Accelerated	1.24	8.5	6.88

Table 4. The effect of an accelerated finishing program on Holstein steer carcass characteristics.

Variable <sup>1</sup>	Control	Accelerated
Finishing Wt. (kg) <sup>2</sup>	518.2	559.5
Hot carcass Wt. (kg)	300.9	324.1
Carcass Yield (%)	57.8	57.9
KPH (%)	2.88	2.67
Backfat (mm)	3.3	2.5
REA (sq cm)	68.4	71.6
Cutability (%)	50.9	51.1
Yield Grade (%)	2.56	2.43
Marbling Score	5.85	6.60
Quality Grade (% Choice)	75	100

<sup>1</sup>KPH = Kidney, pelvic, and heart fat; REA = Ribeye area;

<sup>2</sup>Includes a 4 % pencil shrink

Table 5. The effect of an accelerated feeding program on Holstein steer net returns above feed costs.

Variable	Control	Accelerated
<b>0 - 140 d</b>		
In Weight (kg)	195.5	200.9
In Cost (\$)¹	301.00	309.40
Final Weight (kg)	352.0	373.3
Final Returns (\$)²	480.04	509.23
Feed Cost (\$)³	75.38	77.44
Net Returns above feed cost (\$)	103.66	122.39
<b>140-308 d</b>		
In Weight (kg)	352.0	373.3
In Cost (\$)²	480.04	509.23
Final Weight (kg)	519.9	559.4
Final Returns (\$)⁴	666.39	727.26
Feed Cost (\$)⁵	131.51	131.43
Net Returns (\$)	54.85	86.60
<b>0-308 d</b>		
Net Returns (\$)	158.51	208.99

¹In weight x \$1.54/kg (actual).

²Final weight x \$1.36/kg (based on published market returns at the time for similar type and weight holstein steers.

³Feed cost: 0-140 d (DMB), Control - \$69.64/T, Accelerated - \$72.37/T.

⁴Final returns: Choice quality grade @ \$2.24/kg, Select @ \$2.11/kg.

⁵Feed cost: 14-308 d (DMB), Control and Accelerated - \$72.37/T.

Utah State University Extension does not discriminate on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, or marital or family status in employment or program delivery.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jack M. Payne, Vice-President and Director, Cooperative Extension Service, Utah State University, Logan, Utah. (EP/DF/09-01)