Comparative Performance of Holstein vs. Beef Breeds in the Feedlot

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Summary

- Holsteins represent a substantial portion of feedlot cattle.
- Large differences exist in preweaning management of Holsteins vs. beef breeds.
- Holsteins may have fewer respiratory problems during the receiving phase.
- Holsteins generally perform well in the feedlot; however, there are slight differences in average daily gain, daily feed intake and feed:gain ration compared with beef breeds.
- Holsteins have a larger death loss; albeit the exact causes were not available.
- Holsteins have a lower dressing percentage, however, other carcass characteristics reported are similar to beef breeds.

Introduction

Without a doubt, Holstein beef has a significant impact on the feedlot industry. In Arizona alone, Holsteins represent approximately 90% of the feedlot capacity. In addition, many dairies are moving into the Texas panhandle and Holstein steers and feedlots are feeding more Holstein steers. Cheatham (2004) reported an estimated 9,141,000 total diary cows in production in the United states with an estimated 90% of dairy cattle being Holstein breeding. In addition, removing the calves lost to retention, the veal market, and death loss, leaves over 3,000,000 Holstein bull calves for feeding.

In the Proceeding of the Managing and Marketing Quality Holstein Steers Conference, Eng (2005) outlined how Holstein steers are different, why Holstein steers are popular, and potential advantage of Holstein steers in the future. Holsteins are different from traditional beef breeds in that 1) they have a gentle temperament and playful, but can be dangerous if inadvertently left as intact bulls, 2) Holsteins are easily bored and thereby may sort feed 3) more bloats, metabolics, and buller problems, 4) more dust production as a result of playfulness, 5) hard to move when animals have a tendency to follow you, 6) Holsteins are more heat tolerant, but cold intolerant, 7) a greater risk for liver abscesses and acidosis, but not founder, 8) pens with Holsteins are wetter as a result of greater water intake and urination,, and 9) suicidal tendencies. In addition, Holsteins steers are popular because of 1) predictable gain and efficiency, 2) Holstein steers are from a relatively small gene pool, 3) Holstein steers produce a high quality carcass; albeit, longissimus muscle area may be smaller than beef breeds, but use of trenbolone acetate combination implants and beta-agonist may combat this issue, 4) as a result of production practices, Holstein calves enter the feedlot weighing approximately 300 lbs and exit the feedlot weighing approximately 1,300 lbs, are in the feedlot for approximately 1 year. This length of time can be advantageous when replacement numbers are short and replacement prices are high, and 5) Holstein steers have fewer respiratory problems, but more metabolic and suicidal deaths (Eng, 2005). Finally, Eng

(2005) suggested that advantages of Holsteins in the future include 1) easily age and source verified, 2) less movement of calves means less fuel costs for transportation, and 3) with properly managed purchasing of feed ingredients selling feed through Holsteins may prove profitable, although Eng goes on to suggest that because Holsteins require approximately 3 ton to finish, high grain prices result in raising Holstein calves becomes less attractive.

This proceedings paper will further address some of the issues that Eng (2005) suggested. In addition, data from VetLife Benchmark Program will be included to support some conclusions.

Preweaning management

Differences between Holstein beef cattle begin early in the life cycle. Besides obvious differences in management as well as nutrition prior to calving, large difference exist in management after calving which may impact overall performance of the animals. While we know that what happens during the critical neonatal period impacts overall performance of Holstein heifers (Van Amburgh, 2003), little is known about nutrition and management during this period on overall performance of Holstein steers.

Traditional management practices with Holstein calves included removal of calves shortly after birth. A majority of dairies removed their heifer calves immediately following birth (52.9%), followed by 22.5% removing heifer calves after nursing but less than 12 h (22.5%), with the remainder of dairies reporting removed their heifers from 12 to 24 h after birth. Passive transfer of antibodies via colostrum is a vital component for calf survival (USDA-APHIS-VS-NAHMS, 2002). Of those calves that were hand-fed colostrum, 16.5% received less than 2 qt, 45.3% received between 2 and 4 qt, and 38.2% received more than 4 qt. Ensuring calves receive adequate colostrum is vital to calf survivability and it appears advantageous to provide the colostum via bottles, vs. allowing the calf to nurse. Franklin et al. (2003) reported that based on 24-hour serum protein concentrations, passive transfer of antibodies was greater when calves received 3 qt of colostrum at birth followed by 2 qt of colostrum 12 hours after birth vs. calves allowed to suckle their dams for 3 days. Likewise, the amount of colostrum impacts the overall production of animals. Faber et al. (2005) reported that the amount of colostrum fed during the first hour after birth influenced subsequent health and lactational performance. These authors evaluated feeding 2 (2.11 qt) vs. 4 L (4.2 qt) of high quality colostrum within the first hour of birth. Besides decreasing veterinary costs by approximately ½, the cows fed 4 L of colostrum resulted in $160.00 per cow in additional milk produced over two lactations. It is generally assumed that Holstein bull calves receive adequate amounts of high-quality colostrum prior to being picked up by commercial calf ranches as well. However, alternative methods including use of colostrum replacement deserve attention in commercial situations. Jones et al. (2004) reported that use of a colostrum replacement containing immunoglobulin concentrates from bovine serum provided adequate IgG for newborn calves. It should be pointed out that we are not advocating use of such products in lieu of colostrum, we are suggesting perhaps such an approach could decrease morbidity and morality of Holstein bull calves raised in calf ranches.

For dairy calves weaning generally occurs at an average age of 8.4 weeks (USDA-APHIS-VS-NAHMS, 2002). Overall, 8.4% of dairy heifers born alive died prior to weaning (USDA-APHIS-VS-NAHMS, 2002). Calf scours, diarrhea and digestive

problems accounted for 62.1% of all unweaned heifer deaths. Data on death losses of dairy bull calves is scarce, however, anecdotal data suggests that it may be in the range of 15%.

As with dairy calves, effective passive transfer of immunoglobulins in colostrum is vital to calf health and immunity both early (Perino, 1997) and later in life (Wittum and Perino, 1995) and should not be overlooked. However, unlike dairy calves, beef calves are more likely to be raised with the dams for longer periods of time. In the 1997 report, death losses of beef calves born alive were 3.4% (USDA-APHIS-VS-NAMS, 1997b). Producers reported weather accounted for the largest losses, followed by unknown cause, respiratory, digestive problems, and predators. Beef producers reported incidence of calf scours of 2.4% for calves 3 weeks of age and 1.7% for calves 3 weeks of age to weaning. Most operations wean between 170 and 259 days (USDA-APHIS-VS-NAHMS, 1997a). However, it may be necessary to early wean cattle in the desert southwestern United States, especially under drought conditions and low forage availability (Whitney et al., 2006). Early weaning has also been used as a tool for improving reproductive efficiency of the cow (Arthington and Minton, 2004), at the start of the breeding season (Arthington et al., 2005) when the calves are around 80 days of age if reproductive efficiency is the goal. In addition, pregnancy rate is increased by early weaning first-calf heifers compared with normal weaning (Arthington and Kalmbacher, 2003). These early weaned calves can either be retained on the farm/ranch or shipped to the feedyard. For early-weaned calves, Whitney et al. (2006) evaluated diet consisting of bermudagrass hay alone, hay with 0.175 or 0.35% of BW of supplemental soybean meal, or a 70% concentrate diet. Not surprisingly, calves fed the concentrate diet had greater dry matter intake and average daily gain than those fed the hay-based diets. Steers were then experimentally challenged with a bovine herpes virus-1 for a simulated receiving period; however, steers were not followed all the way through finishing.

Beef calves and dairy calves raised for beef have drastically different diets as a result of production situations. For beef cattle, for approximately the first 3 weeks of life, the digestive tract could be classified as a non-ruminant and the calf relies solely on milk for nutrients. From 3 to 8 weeks of age, the rumen is in a transitional phase and calves have been observed grazing as early as 2 weeks of age. From 8 weeks on, the digestive tract can be classified as an adult tract (Church, 1998). For most beef calves, the primary feedstuffs are forage with little concentrate supplemented. As mentioned previously, there is no doubt that what happens during the milk-fed period or neonatal period impacts performance throughout life. Besides milk replacer formulation, starter diets formulation may influence overall performance. However, few research studies have evaluated performance throughout finishing with Holstein steers. It is beyond the scope of these proceedings to evaluation all nutritional factors that influence ruminal development, however, we believe it is beneficial to cite a couple studies evaluating cereal grains and fiber sources for Holstein starter diets on ruminal development.

Lesmeister and Heinrichs (2004) suggested that the type of processed corn (whole corn, dry-rolled, roasted-rolled, or steam-flaked) used in calf starter mix influenced intake, growth, and rumen parameters in neonatal calves. In their first experiment, post weaning and overall starter and total DM intake were significantly higher in calves fed starter with dry-rolled corn than rolled corn or steam-flaked corn. Likewise, post weaning and overall starter and total DM intake were significantly higher in calves fed starter with whole corn than steam-flaked corn. Post weaning average daily

gain was significantly greater in calves fed starter with dry-rolled than steam-flaked corn. Papillae length and rumen wall thickness at 4 wk were significantly greater in calves fed starter with steam-flaked than dry rolled or whole corn. In experiment 2, calves fed starter with whole corn had higher rumen pH and lower rumen volatile fatty acid concentrations than calves fed all other starters. Results indicate that the type of processed corn incorporated into calf starter can influence intake, growth, and rumen parameters in neonatal calves. However, animals were not followed all the way through finishing.

It has been long established that fiber sources plays a roll in performance of calves. Murdock and Wallenius (1980) conducted a study evaluating complete calf starter rations containing either alfalfa hay, cottonseed hulls, or alfalfa-beet pulp as sources of fiber. These authors reported that although growth and development were normal on all diets, calves fed the cottonseed hull ration consumed more starter and gained more body weight than calves fed the other sources of fiber. The similarity of feed efficiencies, rumen pH, and molar ratios of volatile fatty acids between diets indicated no appreciable differences in rumen development or function. In addition, the incidence of scours was less for calves fed alfalfa hay starter, however, the incidence and severity of bloat were higher for that diet. In finishing beef cattle, roughage source/level alters dry matter intake and performance (Guthrie et al., 1996). Sudangrass hay consistently increased dry matter intake relative to alfalfa hay in high concentrate finishing diets. The long-term impact of starter diet roughage source/level for Holstein steers on overall feedlot performance deserves attention.

Feedlot receiving phase

Most beef calves received at the feedlots would most likely have come off pastures. If these cattle have been subjected to a preconditioning program, health issues could potentially be diminished (Duff and Galyean, 2007). However, most of the time, previous nutritional history of the animals is unknown. Such issues have been addressed in the review by Duff and Galyean (2007). In addition, calves will have to be worked up on concentrate diets and readers are again referred to the review by Duff and Galyean (2007).

Dairy steers, particularly in the southwestern United States, are raised under completely different environments. Day-old calves are received from the dairies (most dairies ensure the calves have 1 or 2 feedings of colostrum before releasing the calves). Calves are then raised in hutches for approximately 60 before weaning. Calves are then weaned and raised to approximately 275 before shipping to feedlots. These calves enter the feedlot accustomed to milled diets, feed bunks, etc. In addition, as Eng (2005) pointed out, dairy calves are perceived to have less respiratory problems than beef breeds. With the production situations in the desert southwest, many of the calves that have succumbed to respiratory disease will not make it to the feedlots. Respiratory disease is probably the largest cause of death in calves after weaning. Predictor factors significantly associated with clinical respiratory tract disease in heifer calves from Swedish dairies included previous diarrhea, previous housing and season (Sveneson et al., 2006). In addition, commingling calves can increase the spread of viruses and in beef cattle, including 1 animal persistently infected with bovine viral diarrhea virus 1b (BVDV1b) caused 68.4% (13 out of 19) of calves exposed to seroconvert to BVDV1b (Fulton et al., 2005). Besides BVDV, other pathogens should be readily transmitted between animals. In addition, these animals should be vaccinated with appropriate

products starting in the hutches. It is imperative that producers raising calves closely consult with their veterinarian.

Feedlot finishing phase

Data the VetLife Benchmark Performance Program show that Holstein steers entered the feedyard weighing an average of 499 lbs, beef steers entered weighing 739 and heifers weighed an average of 683 lbs on arrival (Table 1). This may be deceiving in that the largest percentage of Holstein steers enter the feedlot weighing less than 300 lbs, whereas a majority of traditional beef breeds enter the feedyard weighing between 600 and 800 lbs (Table 2). Part of this discrepancy is related to region of placement. Feedyards reporting into the program from the southwestern United States report Holstein steers weigh 322 lbs compared to 570 lbs for Holstein steers fed in Kansas, Colorado, Kansas, Oklahoma, and Texas (Table 3). This difference is most likely related to availability of wheat pastures and/or other growing programs in the latter regions. Calves in the desert southwest are raised at calf ranches to approximately 275 lbs and sold to feedlots.

Across all years, regions, and weights, Holstein steers weigh slightly more than beef breeds at harvest, are in the feedlot for longer periods of time, consume less feed per day, have a lower average daily gain, a higher feed:gain ratio, higher vet medicine costs, and higher cost of gain than tradition beef steers (Table1). In addition, death losses are higher for Holsteins than either beef steers or heifers (Table 1). It is not reported at what time the death losses occur. Smith (1998) also reported higher death losses in feedyards for Holstein than for beef breeds. The major cause of the higher death loss was 3-fold greater losses due to digestive deaths which may partly be caused by the greater number of days on feed. Table 2 presents feedlot performance by class of animal (Holsteins vs. beef steers). These data reflect the overall values reported earlier, although, Holstein calves weighing less than 300 lbs had superior feed:gain ratio compared to other weight and animal classes whereas beef steers weighing 600-800 lbs had the highest gain. When comparing within each weight class for Holstein and beef breeds, most items are similar in numerical values. Therefore, the major differences in performance are a result of the production systems used (e.g. a majority of Holstein enter the feedlot as calf-feds weighing < 300 lbs whereas the majority of beef steers enter the feedlot as yearlings weighing 600 to 800 lbs).

As pointed out by Eng (2005) there is a perception that Holstein cattle have higher buller incidence than beef breeds. In addition, personal observations of Holstein steers in our feedlot have a propensity to ride more than beef breeds. Because Holstein steers are in the feedlot longer than traditional beef breeds, Holsteins may either be implanted more often or more aggressive implant programs may be used. It has been suggested that anabolic implants may be among the causative factors for buller steer syndrome (Voyles et al., 2004). However, these authors found that administering trenbolone acetate – estradiol implants on day 50 did not influence overall buller incidence, but did influence when bullers developed. Another potential explanation for increased riding and buller behavior may be related to housing systems used with Holstein calves. Dairy heifers that are group-fed from teats in groups of 6 spent less time cross-suckling than calves fed from buckets (Jensen and Budde, 2006). Perhaps we are altering social behavior of dairy calves by individually feeding which then leads to riding behavior later in the feeding cycle. Controlled experiments will need to be conducted to test this hypothesis. In addition, there is evidence that group housing dairy calves prior to

weaning leads to increased transfer of pathogens and increased morbidity (Losinger and Heinrichs, (1996).

Carcass characteristics

Averaged across all regions, weights, and years, The only real difference in carcass characteristics is the lower dressing percentage with Holsteins vs. beef steers or heifers. Likewise, data separated out by animal class (Holsteins vs. beef steers) and weight class reflects these differences (Table 2). Evaluating carcass data by region suggests that the largest difference is dressing percentage and percent of Holstein steers grading Choice (Table 3).

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Table 1. Comparison of class of animal (heifers, steers, or Holsteins) for all regions, weights and years on performance and carcass characteristics using recent data from the VetLife Benchark Performance Program

Item	Animal Class		
	Heifers	Steers	Holsteins
Lots	175,256	212,011	11,588
Head	26,133,403	33,306,335	2,313,794
In wt, lb	683	739	499
Out wt, lb	1,148	1,262	1,296
Days on feed	163	164	289
ADFI, lb	18.9	20.2	18.2
ADG, lb	2.85	3.18	2.76
Feed:gain ratio	6.68	6.42	6.65
Cost of gain	0.56	0.53	0.58
Veterinary Medicine, $/hd	13.92	12.84	14.82
Death loss, %	1.45	1.33	2.75
HCW, lb	734	803	803
Dressing, %	64.0	64.0	61.2
Prime	1.7	0.8	3.2
CAB	6.5	4.4	0.2
Choice	53.4	43.9	54.1
Penalty QG	4.9	6.3	5.2
Yield grade 1	14.6	17.7	10.2
Yield grade 2	40.4	45.1	59.4
Yield grade 3	37.7	33.4	29.0
Yield grade 4	6.6	4.1	1.3
Yield grade 5	0.8	0.4	0.0
Heavy carcass	0.8	4.7	3.9
Light carcass	1.6	0.6	1.1
Dark cutters, %	0.7	0.6	0.9

Table 2. Comparison of class of animal (steers vs. Holsteins) and weight class for all regions and years on performance using data from the VetLife Benchmark Performance Program

	Animal class/weight, lbs							
	Steers				Holsteins			
Item	<300	400-500	600-800	>900	<300	400-500	600-800	>900
% of total head	1.0	12.7	77.8	9.3	63.6	13.2	16.3	6.8
In wt, lb	320	509	750	1,037	269	498	751	1,089
Out wt, lb	1,108	1,161	1,266	1,382	1,245	1,296	1,318	1,424
Days on feed	316	234	159	104	370	284	192	125
ADFI, lb	14.5	16.6	20.4	23.6	15.0	18.3	21.4	23.5
ADG	2.46	2.75	3.22	3.22	2.62	2.78	2.94	2.64
Feed:gain ratio	5.92	6.10	6.39	7.67	5.75	6.66	7.42	9.43
Cost of gain	0.53	0.53	0.53	0.59	0.54	0.57	0.61	0.75
Vet Medicine	21.29	20.40	12.20	8.69	18.90	15.10	11.40	6.34
Death loss, %	4.81	2.82	1.17	0.75	4.08	2.98	1.65	0.92

Table 3. Comparison of performance of Holsteins steers by region using data from the VetLife Benchmark Performance Program

	Region	
Item	Desert Southwest	CO, KS, OK, NE, TX
In wt, lb	322	570
Out wt, lb	1,242	1,318
Days on feed	342	262
ADFI, lb	15.2	19.4
ADG, lb	2.67	2.86
Feed:gain ratio	5.73	6.86
Cost of gain	0.55	0.58
Veterinary Medicine	15.99	15.09
Death loss, %	2.74	2.94

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Veterinary Medicine	15.99	15.09
Death loss, %	2.74	2.94