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Introduction to Feeding Holstein Beef

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In January, 2016 according to the USDA, there were 30.3 million beef cows and 9.3 million dairy cows. This has resulted in dairy animals being an increasing proportion of the beef supply compared with past decades, with fed dairy steers accounting for approximately 14% of beef and cull dairy cows accounting for 6%. In the Midwest, an increasing number of operations are feeding dairy steers due to their consistent supply and performance compared with beef breeds, due to the more homogeneous genetic base.

One of the biggest differences between feeding Holstein and beef breeds is the time on feed due to the age and weight that animals are placed in the feedlot, the differences in feed conversion and expected average daily gain, and the final weight achieved. With beef breeds, many steers go into the feedlot at 500 to 850 lb and reach their finished weight at 1200 to 1400 lb. This results in feeding periods from 140 to 200 days, with an average daily gain of 3.4 to 3.9 lb/day with a feed to gain conversion of 5.6 to 6.4 on a dry matter (DM) basis. For updated information on current feedlot performance, a good site to visit is Kansas State University's Focus on Feedlots: https://www.asi.k-state.edu/about/newsletters/focus-on-feedlots/monthly-reports.html.

In contrast, Holstein cattle require anywhere from 8 to 12% more energy to meet maintenance energy requirements than beef breeds, due to a variety of factors, including their greater frame size, thinner hide and hair coat, and less subcutaneous fat, which make them more susceptible to environmental stresses, such as excessive mud, rain, snow, or wind. They also consume approximately 7% more feed than beef steers, as reported in an excellent online publication from the University of Minnesota (http://www.extension.umn.edu/agriculture/beef/components/docs/holstein_feeding_programs.pdf) that outlines the nutritional requirements of Holstein cattle at various stage of growth. Their average daily gain rarely exceeds 3.4 lb/day, with a realistic range being 2.8 to 3.4 lb/day gain, under a variety of feedlot conditions. Relatively recent research with Holstein cattle started as calves reported similar performance. In a study with Holstein steers fed a corn silage based growing diet and a corn based finishing diet, and fed for an average of 265 days, the average daily gain was 3.58 lb/day with a conversion of 5.7 lb of feed per pound of gain on a DM basis. The steers were started on feed at 390 lb and taken to a final weight of 1330 lb. They had an average carcass weight of 774 lb and a 58.2% dressing percentage (Lehmkuhler and Ramos, 2008). In a similar study using Holstein steers fed a corn-based diet and started on feed at 483 lb and taken to 1288 lb with 243 days on feed, the steers averaged 3.4 lb/day gain with a conversion of 5.5 lb of feed per pound of gain on a DM basis. These steers had an average carcass weight of 750 lb and a 58.3% dressing percentage (Gorocica-Buenfil et al., 2007). These two different studies show the type of consistency that can occur with Holstein steers that are fed a corn-based diet for long periods of time, without a long growing period using long-stemmed forage.

From a carcass standpoint, Holstein cattle have carcasses with a higher numerical yield grade than carcasses from beef breeds due to heavier carcass weights, smaller longissimus muscle areas, and higher kidney, pelvic, and heart fat (KPH) percentages (McKenna et al., 2002). Dairy steers have a lower dressing percentage, which is calculated by dividing the hot carcass weight by the live weight at harvest, compared with beef steers. In general, dairy steers have a dressing percentage between 55 to 62%, with an average of 58 to 60%, compared with beef steers that normally range between 58 to 65%, with an average of 62 to 64%. The factors that tend to lower dressing percentage are cattle being lighter muscled, having less fat, having a greater gut fill and larger visceral organs, having mud on the hide, and having a greater proportion of live weight in head, feet, and leg bones.

In the Midwest, JBS Packerland has a high-energy Holstein contract that outlines discounts and premiums for fed Holstein cattle. The contract sets a minimum of 70% USDA Choice and Prime carcasses and 30% USDA Select carcasses. In order to achieve 70% USDA Choice and Prime carcasses, cattle must be fed a high-energy, grain based diet for the majority of their time in the feedlot, rather

than having a long growing period and a short finishing period. Premiums are given for more than 70% Choice and Prime, and discounts occur when fewer than 70% Choice and Prime carcasses are in a load of cattle, with a load being defined as 47,000 lb +/- 1,400 lb live weight. The base prices for carcasses are set by the market at the time of harvest, with no discounts occurring for carcass weight if the carcasses are between 750 to 950 lb. However, a $2.50/cwt discount occurs with carcasses over 950 lb, and a $10/cwt discount occurs with carcasses over 1000 lb. The contract assumes a 61% yield, based on dressing percentage. Thus, a 950 lb carcass is expected to come from an animal that weighed 1557 lb live, and a 1000 lb carcass is expected to occur with a live weight of 1639 lb.

With Holstein cattle, it is critical to feed as little long-stemmed forage in the feedlot as possible, in order to reduce maintenance energy requirements, increase the energy density of the diet, and to increase the dressing percentage of carcasses. In ruminants, maintaining the digestive organs (rumen, reticulum, omasum, abomasum, small intestine, and large intestine) plus the liver and kidneys can take as much as 40 to 50% of the energy and 30 to 40% of the protein consumed in a day. Forage diets that are very bulky and only 40 to 60% digestible increase the weight of the digestive tract. In contrast, grain-based diets result in decreased organ weights compared with forages because grains are 80 to 100% digestible and have a much smaller particle size, which allows them to have a faster rate of digestion and passage through the digestive tract. The result is that grain is more digestible than forage, plus it decreases an animal's maintenance requirement by resulting in less digestive organ mass, leaving more nutrients for muscle growth and fattening. Sainz et al. (1995) reported steers fed a high-forage growing diet had 21% ($P < 0.01$) greater maintenance requirements during the finishing phase compared to those grown on a high-concentrate diet and slaughtered at the same carcass weight. Thus, long-stemmed forage is detrimental to feed efficiency and dressing percentage, and with Holstein cattle, the negative impacts on carcass traits can have a significant economic impact if steers grow in size but do not deposit fat.

Production systems and feedlot nutritional programs vary widely in the feedlot industry. Developing feeding strategies to produce economically viable and consumer acceptable beef is critical to the advancement of the added-value meat industry. In all feedlot systems, one of the most critical management areas is animal health. Management for optimal health starts with nutritional programs that boost the immunity of the calf from the neonatal period through high-quality colostrum. This can have impacts on animal health, growth rate, feed efficiency, and marbling as an animal's passive immune transfer at birth may be an important factor in an animal's susceptibility of bovine respiratory disease (Galyean et al., 1999). Since respiratory disease impacts growth, meat characteristics, and marbling, management and nutritional practices that keep cattle from becoming sick is very important because diagnosis of cattle with respiratory diseases is very difficult, and diagnosis at the feedlot level does not have a close correlation with lung lesions associated with respiratory illness. Research at the USDA Meat Animal Research Center (Wittum et al., 1996) found that 35% of 469 steers in one study were treated for a respiratory disease episode between birth and harvest. In their study, 78% of treated cattle had lung lesions at harvest, and 68% of untreated cattle had lung lesions at harvest. While both groups had high percentages of lung lesions, the authors concluded that if an animal was sick enough to be identified as having a respiratory illness and treated, performance reduction had already occurred. If a calf gets a respiratory disease, tissue damage occurs, and nutrients are diverted from lean growth and marbling toward repair of the damaged tissue. Therefore, to insure that an animal's health and management history does not limit its ability to deposit marbling or to grow to its potential, individual animal identification, management, and marketing should be practiced.

Bottom Line: In conclusion, feedlot nutrition and management are constantly evolving. With Holstein cattle, reducing maintenance energy costs through feeding a highly-digestible, grain based diet will improve the efficiency of gain, carcass characteristics, and allow animals to achieve a USDA Choice carcass, while reducing the chance of discounts for carcasses that are too heavy. The important thing to remember is that there are ways to improve efficiency, alter the composition of gain, improve carcass characteristics, and increase profit potential with appropriate feeding and management strategies.

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