

Accelerating the Growth of Dairy Heifers

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Introduction

Raising dairy heifers to calve with adequate size at 22 to 24 months of age can optimize profitable milk production. This goal is achievable but requires proper nutrition and management so that heifers are large enough to breed at 13 to 15 months old. For many farms to reach this goal of an average 23-month calving will require what might be termed as accelerated growth. In fact, average age at first calving for Holsteins in the United States is slightly over 25 months of age. This means that the average farm in the United States is currently using restricted growth for heifers and restricting profit potential.

On many dairy farms, heifer management is not the most critical part of day-to-day activities. This results in heifers that calve for the first time later than 22-24 months of age and produce considerably less milk during their lifetime than those that are properly fed and well grown. Heifers that are older at first calving also cost more to get into the milking herd because daily heifer costs add up over a longer period of time.

A study conducted at Penn State University was published in the *Journal of Dairy Science* in 2001. It showed that a small increase in daily feed costs is incurred with more rapidly grown and managed heifers. However, because of this increase in daily feed costs, they spend fewer days in the heifer barn, and the end result is a reduced overall cost to raise each heifer. That same study showed that for every month beyond 22 months of age, it costs about 5% more to raise a heifer to calving. In other words, by increasing the time to first calving by two months (24 vs. 22 months) the overall cost to raise a heifer increases by about 10% and increasing time to calving from 22 to 26 months increases costs by 20% just to get that same heifer in the milking string. In addition, previous research from the USDA has demonstrated that Holsteins and Jerseys that calve at older ages are culled at an equal or slightly younger age than their earlier-calving herd mates. The end results are higher rearing costs for heifers that calve late and decreased productive life and lifetime profitability.

Monitoring heifer growth is an important part of a sound dairy replacement program. It is really the best management tool that we have to assess the past and project the future of heifers. We know that heifers need to be a certain size in order to reach puberty and be bred, and they also need to be a certain size in order to calve and be highly productive animals.

Recommended growth characteristics at breeding and calving for most Holstein and Jersey herds are presented in the following table.

Holstein

Weight at breeding	750-800 lbs.
Height at withers at breeding	48-50 in.
Hip height at breeding	50-52 in.
Weight at calving	1250-1350 lbs.

Height at withers at calving 55-57 in.

Jersey

Weight at breeding	525-575 lbs.
Height at withers at breeding	43-45 in.
Hip height at breeding	45-47 in.
Weight at calving	775-850 lbs.
Height at withers at calving	48-50 in.

If you are concerned that your herd is not average in body size, another way to look at growth targets is that heifers should be 55% of mature weight at breeding and 85 to 90% of mature weight at first calving. Many research studies have shown the positive relationship between body weight at calving and first lactation milk production. Not only are undersized heifers smaller and less productive, but they also are prone to more problems at calving. One of the fundamental challenges facing heifers in the first lactation is being able to consume adequate amounts of feed dry matter to support milk production while they are still growing. Body size and capacity play a very important part in helping heifers successfully compete for feed, support high intakes and milk production while maintaining body condition during this period.

On the other hand, accelerating the growth of heifers in a manner that causes them to become fat also reduces their lifetime milk production and longevity. Overfeeding concentrates or high-quality forages such as corn silage can cause this condition if heifers are not properly monitored, with intake being restricted and other nutrients adjusted accordingly. Published research studies show that excessive energy intake (140 percent of the recommended amount) before breeding can decrease development of the secretory tissue in the cow's mammary gland and thereby reduce first lactation milk yield. It is recommended to grow heifers at 1.8 lbs./day to achieve optimal milk yields. Feeding below or above this rate has been shown to reduce first lactation milk production. Feeding to achieve accelerated growth rates *after* breeding does not appear to hinder mammary development. Therefore, we recommend that growth rates after puberty can be 1.5 to 2.5 lbs./day, based solely on the age and body weight at breeding and the desired body weight at calving. Since there is a great deal of flexibility in ADG postpuberty, heifers should be able to reach recommended body weights most of the time. Optimal growth and development are related to energy intake and also can be aided by ensuring that heifers receive an adequate level of protein.

Feeding the dairy calf and heifer

The gastrointestinal physiology of the calf is poorly developed at birth, and calves are unable to digest a variety of feedstuffs normally fed to ruminant animals. For this reason, the nutritional content of the young calf's diet is very important. The gastrointestinal tract of newborn calves must undergo some maturation during the first three or more weeks of life, and it continues to grow and develop for an extended period of time in the young heifer. Because the calf is technically a monogastric at birth, the nutritional sources in the diet must be easily digestible.

When calves are properly weaned at four or more weeks of age, their rumen walls are moderately developed. The diet of these young calves should be formulated to maximize

rumen development. The term “rumen development” describes both rumen wall thickness and an increase in the number and surface area of the rumen papillae. During this period the rumen also becomes more vascularized; an extensive network of blood vessels develops to supply blood to the tissues and to allow for increased absorption of nutrients, including volatile fatty acids, which are major end products of rumen bacterial digestion. It usually takes four to six months before the rumen becomes large enough in relation to the animal’s body to handle high forage, high volume diets. Calves fed high grain diets will have more rapid rumen development than those fed high milk or forage diets. In addition, high quality, more digestible feeds and forages that contain more rapidly degradable energy for the rumen will encourage faster rumen development.

For heifers up to six months of age, free-choice grain is recommended to a maximum rate of 5 to 6 pounds per head per day. Young heifers consume much less forage than grain on a dry matter basis. As animals mature and grow, forages can make up a greater part of their total diet. Forage quality should be carefully monitored for calves at two to six months of age. Fine-stemmed, mold-free hay is the forage of choice. Therefore, a high-quality, cool season grass, legume or legume/grass hay, from a second or third cutting, should be fed. Such forages are recommended because they normally are more palatable and more digestible than other feedstuffs. Fermented feeds such as haylage and corn silage can be fed to calves at four to six months of age, provided the silages are of high quality. Fermented forages are only palatable as long as they are fresh. Therefore, if silage is fed to calves, it must be replaced each day and preferably twice a day during the summer. This does not happen on many farms due to time and labor constraints, and thus the recommendation is often made to avoid feeding fermented forages to young calves. In reality, nutrient content and digestibility are the primary factors that should dictate which forage is fed; feeding management on a farm should also be considered. The quality of forages fed to these young animals will determine how much protein and other nutrients are needed in the grain mix.

By the time a heifer is four to six months old its rumen is fully functional, though not fully grown in size, therefore these heifers are capable of consuming larger amounts of forage. Again, this forage must be quite digestible if the heifers are to maintain adequate intakes that promote good growth rates beyond weaning. Up to one year of age, forage quality can restrict intake for heifers if it is low enough in digestibility to slow down rumen rate of passage. Regardless of the type of forage fed, young heifers need a supplemental feeding of grain concentrates. The amount of grain fed depends partly on the age of the animal, but primarily on the quality of forage being fed. The use of poorer quality forages may dictate the feeding of a higher percentage of grain in the diet.

Pastures also make good forage for heifers, provided there is an adequate amount available. Use of pasture is quite regional in nature, but, where available, it can fit in as part of the heifer feeding program. Often in the hot dry parts of the summer, supplemental forages must be fed to allow adequate intake of dry matter. Forage dry matter intake for heifers should be 2.1 to 2.4 pounds per 100 pounds of body weight. Good pasture management is important for heifers to grow well throughout the plant-growing season.

Growing heifers require some concentrates in order to balance their ration; the amount depends on the quality of forage offered. The amount of concentrate fed and the concentration of nutrients in it are determined by the average forage consumption, nutrient composition of the forage and the average nutrient requirements for the group of heifers.

Concentrates also must be supplemented with vitamins and minerals to achieve maximum utilization of nutrients from the ration.

Bred heifers can be fed and handled in the same manner as other yearling heifers until the last two to three months of pregnancy. During the final three months of gestation the unborn calf makes nearly two-thirds of its growth. Therefore, during this time a bred heifer may need extra nutrients to support growth of the fetus as well as her own body condition and growth.

Body condition scoring is an additional tool that can be used to evaluate the overall nutrition and management of a heifer program. Some limitations in conducting heifer body condition scoring include long, winter-hair coats (in colder climates) and the problem of catching heifers to observe closely fat over the ribs and tail head. In addition, heifers tend to accumulate body fat in different areas than adult cows, particularly over the shoulders and around the brisket. This may force you to adjust your usual adult-cow body condition scoring system. A body condition score of 3.5 to 3.7 is considered ideal for heifers calving at age 22 to 24 months. This score allows a moderate amount of stored body fat to be used in early lactation when dietary energy is insufficient for optimal milk production.

Summary

Healthy, productive herd replacements are the result of good management that starts before the calves are conceived and continues until they enter the milking herd. Keep accurate records to ensure that a sound breeding program is followed. Monitoring growth and adjusting diets accordingly is the single most important part of a sound dairy heifer program. It is likely the only way to have heifers consistently entering the milking string at 22 to 24 months of age. Careful attention to the entire process ensures that genetically superior animals will enter the herd ready to express their maximum potential for milk production.