

# Increasing Profitability Through an Accelerated Heifer Replacement Program

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Accelerating heifer growth has been a very controversial subject in recent years. The main controversy revolves around the subject of fat deposition in the udder during periods of rapid weight gain. However, I would like to start by differentiating between accelerated weight gain and accelerated growth rate. In my opinion, these are two completely different topics. Accelerated weight gain occurs when excessive levels of energy are fed to heifers, which results in overconditioning without an increase in frame size. Accelerated growth rate involves formulating a ration that is much higher in metabolizable protein without excessive amounts of energy, which results in an increase in frame size without overconditioning the heifer. This process must start soon after birth in order to obtain the maximum frame size possible at calving.

Dairy owners are well aware of the importance of delivering adequate amounts of high quality colostrum to newborn calves as soon as possible after birth. Recent information has also shown that calves receiving inadequate amounts of colostrum not only are more susceptible to disease, but also grow at approximately 2/3 the rate of other calves. The current recommendation is one gallon of colostrum as soon as possible after birth, followed by another gallon within six hours.

Adjusting the amount of milk replacer fed and/or the percent solids fed according to the environmental conditions and nutritional requirements of the calf is seldom done. Both hot and cold weather increase the nutritional demands of the calf, yet the amount fed the calf usually remains the same. It is often assumed that the average Holstein calf weighs approximately 80 lbs. One of my clients has been weighing all their bull calves and has only found one out of 375 calves that weighed less than 80 lbs. The general recommendation in the past has been to feed a calf at the rate of 10-12% of its body weight. One gallon of milk would weigh approximately 8 lbs. and would be 10% of the body weight of an 80 lb. calf. All the calves

weighing more than 80 lbs. would be receiving an amount less than 10% of their body weight. The mixing instructions on most milk replacers suggest that the product be mixed at the rate of 1 lb. per gallon of water. This equates to a mixture containing approximately 12.5% solids. Calves exposed to severe weather conditions may need to be fed milk replacer at a level of 18-20% solids in order to meet their nutritional requirements. Feeding calves 3 times per day is another option.

Researchers at Cornell University are recommending that milk replacer should be formulated at 28% protein and 15% fat and fed at a rate of 14-20% of body weight. Young calves are more efficient at converting feed to body weight, and this fact should be taken advantage of when the calves are still on milk. Danish research has also shown that calves fed milk free choice gained 0.66 lbs. per day more than those fed 10 lbs. of milk per day. Those that gained weight the fastest gave an additional 1,000 lbs. of milk during their first lactation compared to those receiving the 10 lbs. of milk per day.

The quality of the calf starter grain is also crucial when trying to obtain the maximum growth rate possible. Calf starters are often purchased on price instead of quality. There are still calf starters on the market that are only 16-17% protein, and the most common ones are usually 18% protein. Researchers at Cornell University are now recommending that the calf starter contain a 26.5% crude protein level. The quality of the protein is important and should contain the required amounts of essential amino acids. The immune response is dependent upon good protein nutrition. Properly formulated calf starters will decrease the morbidity and mortality rates due to a more responsive immune system.

The calf should have free access to a high quality calf starter no later than 3 days after birth. Initially, only a handful should be placed in a grain bucket, which should be cleaned out on a daily basis. Fresh grain every day is essential in maximizing the intake of the calf.

The grain should be increased as the calf consumes more. The calf starter that is cleaned out each day from the young calves can be fed to the older calves on the grower ration so it is not wasted. Calves should have free access to fresh clean water at all times. During winter months, water buckets can be moved inside the hutch to decrease the chances of freezing. If this is not possible, warm water should be given to the calves at least once per day between milk feedings. Access to water greatly increases the amount of calf starter consumed on a daily basis. Calves should not be given hay until after weaning.

Calves should be weaned from milk depending on their dry matter intake, not age. As soon as a calf consumes 2 lbs. of a high quality calf starter per day for three days in a row, it is ready to be weaned, regardless of age. Milk can be taken away from the calf all at once or gradually by feeding milk once per day for a week before weaning. The calves should remain in the hutch for observation after weaning. The calf starter intake should increase from 2 lbs. to approximately 5-6 lbs. within 5-7 days after weaning. If calf starter intake drops below 2 lbs. for any reason, the calf should be put back on milk. Care should always be taken not to perform any other management procedures on the calf, such as dehorning or vaccinating, at the same time that weaning takes place. Once the calf starter intake has reached the 5-6 lb. level and intake has stabilized, calves can be mixed into small groups, preferably 5-7 calves per pen. Calves should remain on the calf starter for another week until they have established their social order and become accustomed to the new location. The grower ration can then be introduced to the recently grouped calves. Grower rations usually consist of a high quality grain with approximately 20% of the ration consisting of high quality alfalfa hay. This ration should be formulated for at least 18% crude protein.

As the heifers mature, their rations have to be adjusted according to their requirements. The problem comes with grouping of the heifers. Smaller dairies often have to group heifers together over a wider range of age. This makes it extremely difficult to formulate a ration that is adequate for the younger animals without overfeeding the older heifers. In order to maximize the growth of the younger animals, the ration should be formulated for them, carefully

observing the older animals in the group to ensure that they do not become overconditioned. Smaller dairies may wish to utilize the lactating ration for one group of heifers and the pushout from the lactating cows for another group. Each dairy that is interested in an accelerated heifer growth program needs to consult their respective nutritionist in formulating the appropriate rations based on the ages of heifers within the respective groups. Basically, these rations will be somewhat lower than what is usually formulated for energy and higher for protein. Concerns about overfeeding protein can be satisfied by checking the blood urea nitrogen levels to see if they are elevated. If the rations are properly formulated, the heifers will increase rapidly in frame size without becoming overconditioned.

Heifers need to be bred when they reach the appropriate frame size, not according to body weight. I like to use 51 inches at the withers for the height at which to begin breeding. I have found that on a good accelerated heifer growth program, approximately 10% of the heifers will reach this height at 10 months of age, about 25% will be ready at 11 months, and the rest by 12 months of age. There will always be a few that are delayed in reaching their breeding height. These heifers must be critically evaluated and possibly culled. Instead of waiting until breeding age to evaluate heifers for possible culling, I like to do the evaluation at approximately 400 lbs. It is very easy to pick out heifers that are obviously stunted and/or in poor health when compared to their herdmates of similar age. Unless these heifers are obviously sick, they can be sold for close to one dollar per pound. If kept in the herd, they often calve, produce poorly, and are then culled at beef price. The cull price is close to what would have been received if sold at 400 lbs., only without all the feed costs that were incurred in feeding the heifer to adulthood.

The single most common problem with breeding heifers on an accelerated heifer program is waiting too long to initiate breeding once the heifers have reached the appropriate breeding size. As heifers get older, the rate at which their frame size increases tends to slow down. If heifers are still several months away from calving when this process occurs, they tend to gain body condition. Heifers that were bred late or took longer to conceive could become overconditioned, when compared to heifers that conceived closer to the time they reached the

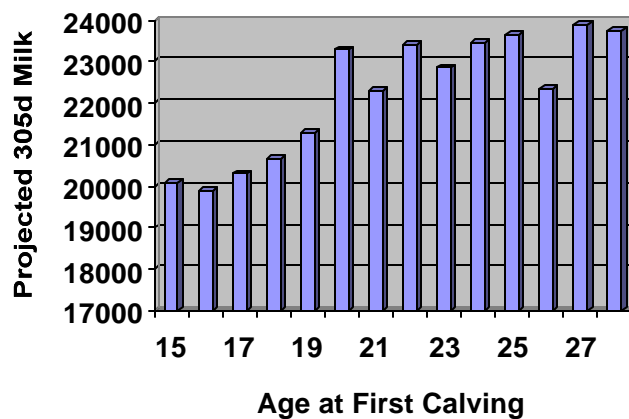
appropriate breeding size. If this occurs, the late bred heifers would have to be put on a lower quality ration to prevent overconditioning. It has also been my experience that heifers calving in for the first time at 30 months of age or older do not milk well and do not return the money invested in them up to calving. These heifers are obviously problem breeders and often are extremely difficult to get bred back after calving.

If at all possible, it is advantageous to keep the springer heifers separated from the second lactation and older cows in the close-up dry cow pen. Heifers do not compete well with older cows and often will not consume adequate amounts of dry matter for optimum health. Care should also be taken to provide adequate bunk space for heifers and to adjust the ration on a daily basis according to the number of heifers in the close-up pen. The area in which the heifers give birth, whether it is the close-up pen or a specific maternity area, needs to provide the heifer with adequate space so she can lie down and give birth without being disturbed. I have seen situations where the percent of calves born dead was cut in half simply by increasing the size of the close-up pen where the heifers were giving birth.

The number one concern pertaining to accelerated heifer growth programs is deposition of fat in the mammary gland, resulting in decreased first lactation milk yield. However,

these results were received by accelerating the weight gain on prepubertal heifers, without much attention paid to the protein requirements needed to increase frame size. There have also been several studies examining the mammary gland, which have proven that there is no decrease in milk producing tissue in heifers that have been on accelerated growth programs with increased protein levels in the ration. Some studies did show a decrease in first lactation milk yield, but it was not due to fat deposition in udder; rather it was due to the fact that the animals weighed less. Dry matter intake is directly proportional to body weight; therefore, a lighter animal will eat less which will result in lower milk production.

Even if lighter weights at calving were still a problem, and I do not think it is if the rations are properly formulated and heifers are bred according to size, studies show that it would still be profitable to accelerate the heifer growth program. One study done by VanAmburgh at Cornell University showed a marginal income of \$5.18 per hundred wt. on the dairy. The heifers on the accelerated growth program calved 98 days earlier and gave 992 lbs. less milk during their first lactation. The decreased milk production resulted in a loss of \$51.00 of marginal income. However, the increased rearing costs (\$1.50 per day for 98 days) were \$147.00 for heifers calving later. Therefore, the marginal income was increased by \$96.00 per heifer for those calving earlier.



**Figure 1.** The projected 305 day milk of heifers raised on an accelerated heifer growth program by age at first calving.

Now that more is known about how to properly formulate rations to accelerate the growth in replacement heifers, it is possible to have heifers calving in at 20 months of age and still obtain the same frame size as 24-month-old heifers raised on a conventional ration. These heifers do not show a decrease in first lactation milk yield and do not show any increase in calving difficulties.

Figure 1 compares the projected 305 day milk relative to the age at first calving for a 1,200 cow dairy on an accelerated heifer growth program.

The heifers calving at less than 19 months of age were accidentally introduced to the bull before reaching the appropriate size. Those calving at 19 months on up had reached the appropriate size before breeding. It is fairly evident that once the heifers reached 20 months of age, age at first calving had little to no effect on the projected 305 day milk.

A review of the calving difficulty showed no difference between the early and late calving age heifers.

If we assume that an average culling rate in today's large dairies is around 36% and that the current age at first calving is 26 months, the dairy would have to have 94 heifers per 100 cows on the farm from birth to calving in order to maintain herd size. If this is a 1,000 cow dairy, then 940 heifers would be needed. If the age at first calving was reduced to 22 months, then only 670 heifers would be needed to maintain herd size. That is a difference of 270 heifers needed on the farm. Approximately half of these heifers needed on the farm to maintain herd size would calve in one year. Half of 270 would be 135. If these heifers had to be purchased at \$1,800 per head, this would equal \$243,000 per year on increased costs.

Table 1 illustrates the total number of heifer replacements needed per 100 cows in order to maintain herd size, taking into consideration the age at first calving and the herd's cull rate.

**Table 1.** Influence of age at first calving and cull rate on the number of replacement heifers required.

Cull Rate	22 Mo	23 Mo	24 Mo	25 Mo	26 Mo	27 Mo	28 Mo	29 Mo	30 Mo
20%	38	42	46	48	52	56	61	63	67
22%	42	46	50	54	58	63	67	69	73
24%	46	50	54	58	63	67	71	75	81
26%	48	54	58	63	69	73	77	81	87
28%	52	58	63	69	73	79	83	87	94
30%	56	63	67	73	79	83	89	94	100
32%	61	67	71	77	83	89	96	100	106
34%	63	69	75	81	87	94	100	106	112
36%	67	73	81	87	94	100	106	112	121
38%	71	77	85	92	98	106	112	118	127
40%	75	81	89	96	104	110	118	125	133

\*Based on 12% heifer losses: deaths 0-12 months=5%; pre-breeding culls=3%; deaths 13 months to calving=1%; and post-calving losses 3%.

It is evident that extending the age to first calving is extremely costly to the dairy producer. It has been estimated that 15-20% of the total costs on the dairy farm are associated with heifer rearing (Karzes, 1994). It has also been stated that the single most important variable influencing costs associated with heifer replacements is the age at first calving (Cady, 1996). After summarizing much of the available literature on accelerated heifer growth, VanAmburgh from Cornell stated, "The economics are very strong that early calving, even at lighter post-calving body weight, improves farm profitability."

The increasing costs of heifer replacements, coupled with the fact that cull rates on large dairies are often exceeding 35%, emphasizes the importance of establishing a good heifer replacement program that will result in decreased death losses as well as decreasing the age at first calving.

In summary, some of the nutritional considerations for establishing an accelerated heifer growth program are as follows:

1. Formulate rations that increase growth rate by increasing frame size without excessive body condition. In the past, most heifer nutritional requirements published have tended to overestimate the energy and underestimate the protein needed to accomplish accelerated growth without causing excess fat deposition.
2. Formulate rations to maximize rumen microbial growth, which improves feed efficiency as well as optimizes amino acid balance.

3. Maximize dry matter intake through better management procedures such as: ensuring adequate feed bunk space, providing fresh feed and water at all times, utilizing good quality forages in heifer rations, and maintaining a clean dry and comfortable environment.
4. Monitor body condition scores as heifers mature to ensure that the rations are properly formulated to maximize frame size without the heifers becoming overconditioned.
5. Utilize a nutritionist that supports the principle of accelerated heifer growth to help you establish your own program that works in correlation with your existing facilities and your management protocols.

Accelerated heifer growth programs can be a valuable asset in increasing the overall profitability of your dairy operation if the time is taken to design the program to fit into your management scheme and the rations are formulated properly to maximize frame size without overconditioning the heifers.

## References

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