Replacement Heifers Aren't Free!

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Take Home Messages

In the work of raising replacement heifers, the goals of the dairy producer, which are discussed in this presentation, should be:

- To produce a healthy replacement heifer, suitably well-developed to consume high quantities of feed and capable of producing high yields of quality milk.
- To grow the heifer cost effectively by achieving a minimum average daily liveweight gain (DLG) of 0.8 kg per day, resulting in an age at first calving of 24 months or earlier.
- To reduce mortality in the early stages of heifer raising with the aim of ensuring that the heifer inventory is sufficient to more than compensate for the higher culling rates.
- To attempt to provide ways to filter surplus heifers to reduce the overall replacement cost.
- To bring the heifer into the milking herd at an earlier age, which will likely result in higher lifetime production with a reduced cost of rearing.

Introduction

To be a successful dairy producer requires 24/7 commitment and a passion for working with cows. To be able to raise a home bred animal that has excellent conformation and high lifetime production to accompany that conformation is the dairy farmer's dream.

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■ What Are The Necessary Components To Successfully Raise Heifers?

Building facilities, disease, nutrition and management are the key components to successfully raising heifers.. Mortality rate can and will be affected by each of these components.

Mortality Rate

Mortality on some farms can be significant in terms of cost to the enterprise. As well as reducing the heifer calf inventory, it increases the raising costs of the calves that do survive. On some farms, where the mortality rate is out of control, the reduced heifer inventory can lead to the need to purchase animals to make up the required number of heifers entering the herd to replace the cull cows exiting the herd. This increases the cost of replacements significantly and reduces the overall profit margin of the business.

Mortality Can Occur At The Neonatal Stage Or The Perinatal Stage.

The neonatal calf or stillbirth: Dystocia is a common cause of calves born dead after a healthy pregnancy. This is often caused by the large size of the fetus relative to the size of the dam. Artificial insemination (AI) companies have data relating to calving ease, so unless that information is ignored, the problem of a large fetus relative to the dam can be largely avoided. Attendance at calving can sometimes save a calf in a situation where the membrane covers the nose or where there is neglect from the dam after the birth to stimulate the calf to breathe on its own.

Stillbirth, defined by Canadian genetic improvement statistics as the death of the calf at birth or within 24 hours after birth, occurs in 12% of calvings from first calf heifers and 6% of calvings in second and later lactations (Murray, 2007). About half of stillbirths are attributed to difficult calvings (dystocia) and the chances of a calf dying within 24 hours are much greater following a difficult calving. The absorption rate of colostrum in such calves is reduced, which can result in potential health problems down the road with the possible loss of the calf.

The perinatal calf: mortality at this stage can be due to a number of factors including building facilities, disease, nutrition and management

Building Facilities

On many farms, the facilities for raising newborn calves through to fresh heifers are less than adequate and contribute to poorly raised weaned calves, which ultimately results in first calving beyond the desired 24 months of age.

The newborn calf must get off to a good start and housing it in a make-shift facility that is poorly ventilated will expose it to a greater risk of disease. Whether the newborn calves are housed in groups, pairs or in individual pens, facility design is an important aspect. Particularly in the case of individual pens, the floor should slope to the front to allow excess moisture to drain away, keeping the bedding dry. Keeping the calf free from drafts is as important as the level and method of ventilation.

Calf hutches are also ideal for the newborn calf. Their construction allows for adequate ventilation and the warmth of the sun in the winter. They might well be a cheaper facility option than a purpose-designed calf barn with a ventilation system and the fact that their location can be changed from winter to summer could also prevent a disease build-up**.** Having a responsible calf feeder who is prepared to spend sufficient time outside in the cold winter conditions could be the limitations of this type of facility.

The proAction initiative, being developed by Dairy Farmers of Canada as an addition to the Animal Welfare Code of Practice, is aimed at helping producers make on-farm management improvements for the care of their animals and the environment. One section in the proAction initiative states that clean fresh water should always be available to the young calf. Producers using calf hutches will have to be creative to comply with this requirement in the extreme conditions experienced during Canadian winters.

Disease

Disease is the largest contributor to mortality in the early stages of the calf's life. Pre-weaning death loss ranges from 7.8 to 11%, with 53% of the losses due to scours and 21% to respiratory disease. A high proportion of illness and death in the pre-weaning period can be attributed to failure of passive transfer of immunity. The calves simply receive insufficient immunity from colostrum early enough to fight off disease (Murray, 2011). To give the calf the best possible chance of survival, the calf must receive high quality colostrum in sufficient quantities within the first 6 hours of life.

Nutrition

Providing an adequate feeding program is essential not only to the survival of the calf, but also to its health and subsequent growth and well-being. A good nutritional program starts with an adequate quantity of good quality colostrum, followed by a whole milk or a milk replacer program. The choice often involves factors such as cost and calf performance.

The program that is used for benchmarking in the Manitoba Dairy Farm Management Group (MDFMG) values the milk used in calf raising as a cost of production. Although this milk may be unsaleable, the cost of production is the

same as milk shipped from the farm. Providing the preweaned and weaned calf with a high quality well balanced diet will set the animal up to calve at 24 months or less and possibly minimize the overall cost of raising. ~~P~~roviding a well balanced diet in the early stage of raising should avoid the calf developing that pot-bellied appearance that is so undesirable. The correct diet will continue to grow the frame, which will enable the heifer to enter the production herd capable of consuming large amounts of dry matter to match her potential production.

Management

Providing a comfortable facility, reducing the risk of disease and providing a high quality diet are important, but the level of management must be equal to those aspects. Keeping the pen dry and well-bedded, identifying disease at the earliest stage and knowing when to feed extra milk/milk replacer during the coldest weather spells are all very important management strategies. Timing of other various events during the heifer's life cycle is also critical:

- Dehorning when it causes the least stress
- Eliminating the growth check at weaning
- Ensuring vaccines are given at the correct stage
- Noting cycles at pre-breeding and subsequently breeding at the optimum age
- Checking for pregnancy
- Bringing into the close-up pen to learn to co-mingle with older cows

Optimum Age of First Calving

The age at which the heifer calves for the first time makes a big difference to the cost of raising that heifer.

In real terms, it may not necessarily be cheaper to calve a heifer at 24 months as the animal has to be fed a high quality, well-balanced diet (which could be more expensive on a daily basis) to be able to grow and subsequently perform in the barn at that early age. Conversely, after 24-25 months, as her bodyweight increases, the older heifer will consume more feed on a daily basis, meaning that the cost of raising ~~w~~will increase as the heifer remains in the youngstock portion of the herd for a longer period of time.

Figure 1 indicates the impact of age at first calving on annual milk production (Valacta 2003,). Not only do older heifers have less potential to achieve a desired level of production in their first lactation, but their lifetime potential production is likely to be decreased.

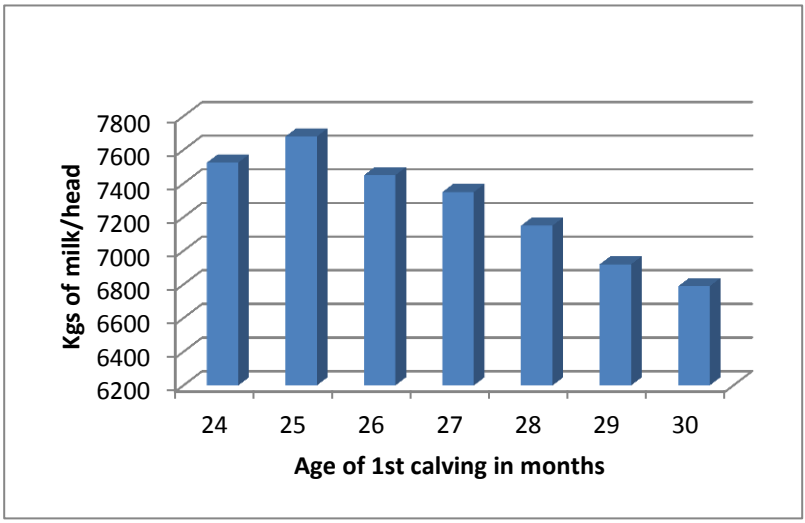

Figure 1. Milk production vs. age at 1st calving in months

Figure 2 shows differences in age at first calving, in months, in the four western Canadian provinces (data from the Canwest DHI 2013 Western Herd Improvement Report). While there has been a trend towards earlier first calving, the table shows that Saskatchewan and Manitoba still lag behind in adopting a younger age at first calving.

The opportunity to bring these animals into the production herd earlier is being overlooked. This is likely to result in reduced lifetime production and a more expensive overall raising cost.

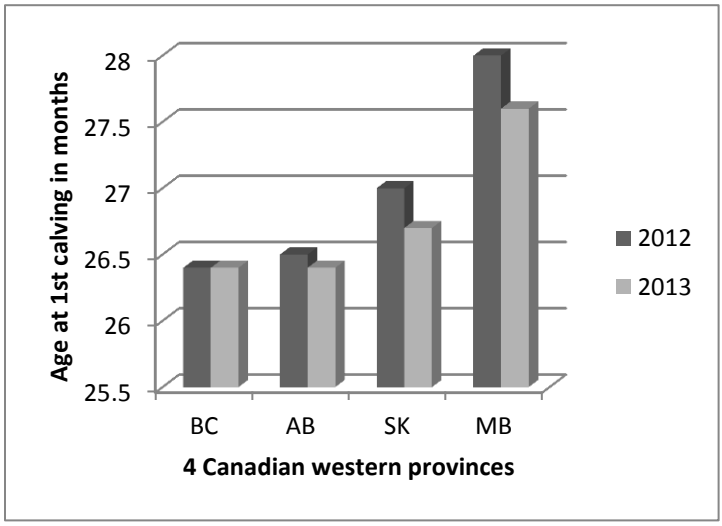

Figure 2. Comparison of the age at first calving statistics (months) for the four western provinces as taken from the 2013 CanWest DHI Western Herd Improvement Report.

Figure 3 shows the results from 32 producers for the age of first calving over a period of 5 years. The trend toward an earlier age at first calving, especially compared with the DHI data in Figure 2, can be attributed mainly to the fact that the topic is addressed frequently with these producers. The importance of bringing the heifers into the production herd earlier to have them contributing to the herd revenue rather than being a prolonged expense is stressed to the producers. These heifers will have the opportunity to be higher lifetime producers than the older calving heifers.

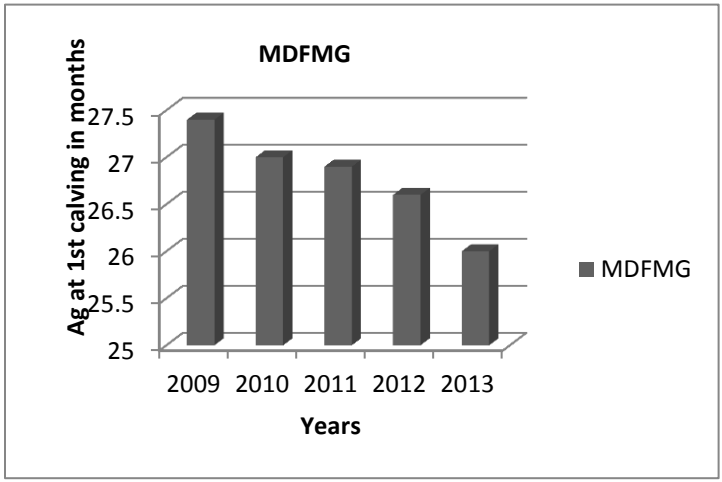

Figure 3. MDFMG data showing the age at 1st calving from an average of 32 producers over the last 5 years.

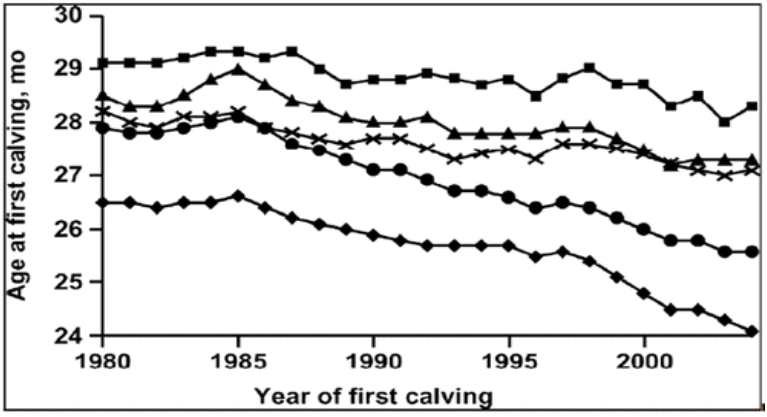

Figure 4: Trend in age at first calving by year of first calving for Ayrshires (■), Brown Swiss (▲), Guernseys (X), Holsteins (•), and Jerseys (♦). (reprinted from Hare et al,, 2006)

Figure 4 indicates that there has been a continual reduction in the age at first calving and that owners of the Jersey breed have led the way in applying the advice provided by researchers and advisers regarding the benefits of calving heifers earlier.

Improved Management Standards

On many farms, the management standards for raising heifers, especially during the birth to weaning period, have improved considerably, resulting in significant reductions in mortality. This has led to a position where some producers have more heifers freshening than they require. Given that average fresh heifer values are often in the range of $2000 - $2500 each and the rearing cost is closer to $3000**,** selling excess heifers is not a profitable option.

■ Sexed Semen

Sexed semen has provided producers with yet another tool in which to advance the genetic potential of the herd.

Can producers benefit by using sexed semen?

- It provides producers with a way to increase the heifer inventory on the farm.
- It potentially provides a positive way to expand the dairy herd from within – maintaining the closed herd status.
- It provides the opportunity for a fresh heifer producing a heifer calf to likely get off to a better start than a heifer producing a male calf.
- Heifer calves from sexed semen generally have a better growth rate than heifers produced from conventional semen.
- The price of sexed semen can be very competitive with conventional semen, so the actual breeding cost doesn't need to be more expensive. However, producers seeking top genetics may argue that sexed semen is not available to their breeding program.

Based on these factors, the breeding cost is actually less per unit value as the producer has a greater number of heifer calves over which to spread the total semen cost. But the producer has to be using sexed semen for a particular reason to be able to justify the practice, otherwise using sexed semen in excess can be very detrimental to the total heifer raising cost and a significant contributor to a glut of heifers. This situation will result in either a higher cull rate in trying to find a place in the milking herd for every heifer or another instance of having to "sell" heifers at less than the cost of production.

■ Using Genomics

The use of genomic bulls has had a very positive effect on the dairy industry in much the same way that the introduction of AI (using frozen semen)

benefited them ~60 years ago. Genotyping of very young calves gives producers another opportunity to identify the animals with the superior and inferior genetic make-up. After receiving the results of the test, producers have the option of culling surplus calves before they start to cost too much to raise. Currently, producers may not be using this tool to their greatest advantage. The cost is still relatively high and together with the logistics of the process may be preventing producers from really taking this management tool on board. The worst aspect would be that, if after the tests are completed, the producers then fail to make use of the information.

■ Culling

Higher Culling Rate

Over the last few years milk quality standards have rightly been raised to provide consumers with a safer and more nutritious product in the store. On the farm, this has caused cows with ongoing mastitis problems and cows with high cell count to be rigorously culled to enable the farm to comply with the quality standards imposed. Although some culling is the result of mastitis and high SCC, DHI data show that reproduction is still the number one reason for culling dairy cattle in Canada.

Together with the improved management standards in raising young calves, reports show that culling rates have increased about 5 percentage points over the last 5 years. There may well be an opportunity on farm, by applying higher levels of stockmanship, to reduce cull rates and therefore the number of required replacement heifers..

The tendency is for producers as a whole to want to keep and raise every heifer born on the property. Can that mindset be changed? There are options to reduce the number of poorer quality heifers early to save $$, options particularly appreciated given that the first 90 days is the most expensive period. These options include:

- Natural selection
- Selection by parent average
- Selection by genomic testing
- Use of a beef bull on the lower yielding cows and those with undesirable conformation, representing the bottom 20-25% of the herd.

Filtering heifers out at Breeding Age

An additional way to deal with surplus animals is to look at their reproduction status at breeding age. Heifers that do not conceive after the second, and, certainly the third, breedings should likely be considered as potential culls. Poor conception at this age could likely mean reproduction problems with subsequent calvings.

Cost of Increased Culling Rates

As mentioned earlier in this culling section, the average culling rate appears to have increased approximately 5% over the last 5 years (Table 2, Agritel Databank) In that same period the direct heifer raising costs have increased by 1% per year (Table 2, Quebec data from Agritel Databank). In 2014, the high prices that producers have obtained from the cull market have lessened the impact of this statistic, but this is unlikely to remain the norm. The buoyant cull market is due to the current size and status of the North American beef herd, which is unlikely to suddenly alter.

In 2013, 40% of the MDFMG participants reported a cull rate that exceeded 40%. This is the highest culling rate that the MDFMG has ever experienced, and it comes at a price! There would likely be economic gain for producers to improve their levels of management and extend the life of the dairy cow to achieve a greater number of lactations. It seems that with current high cull cow values, producers are moving the offending cows out of the herd; perhaps they should be paying more attention to establishing the root cause for culling, especially in the case of mastitic and high SCC cows.

Cost of Culling 30% vs 40%

There is concern that a culling rate of 40% is becoming the new norm. Table 1 shows that a producer with a 100-cow herd (assumes 24 months of age at 1st calving) would require a heifer inventory of 89 animals at 40% cull rate as opposed to 67 animals at 30% cull rate. That's a lot of extra heifers to raise as replacements!

Given that it takes $3000+ to raise a heifer and that culls are currently bringing in up to $1500, that extra 10% cull could easily be costing that producer $30,000+. It's not easy to maintain a 30% cull rate year on year, but it's still important to attempt to exercise some control over the cull rate to as great a degree as possible. The higher cull rates are costing producers a lot of money and reducing profitability at year end.

Table 1. A guide to the number of replacements needed to manage a 100-cow herd

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

Going hand in hand with the higher cull rates is the age of cows in the herd. It takes one and a half lactations for the heifer to pay for her cost of raising. Canwest DHI 2013 data from the four western provinces show that only ~35% of cows in the herds are in their 3rd lactation (or greater).

It is important that a producer maintains herd size. If the cull rate exceeds 36%, a producer will likely have to:

- Purchase animals
- Lower the age of first calving
- Maintain a calving interval of 13 months or less (> 395 days)

A cow should be replaced only by an animal that will be more profitable.

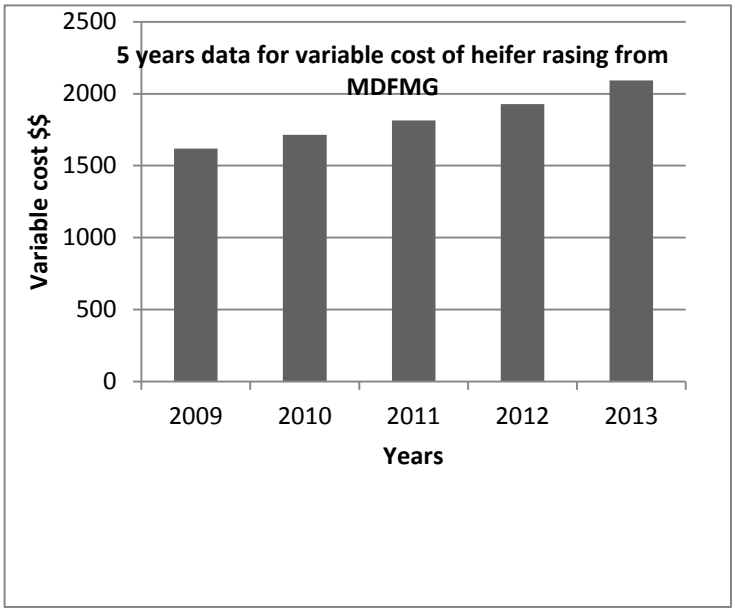

Figure 5. Cost of heifer raising (MDFMG dataset)

Figure 5 depicts 5 years of data showing the variable costs from MDFMG benchmarking information. The variable cost refers to the operating (direct) cost only; the fixed costs are not included. The fixed costs vary from one farm to the next much more so than the variable costs. If a producer has expanded, i.e., built a new barn, purchased quota or purchased additional equipment, (i.e., parlor, robots or automated feeding system), it is likely that the interest charges and depreciation on building and equipment will be higher than for the producer who has basic facilities and a lower debt servicing level. Personal withdrawals and labour are also costs that vary from farm to farm.

Table 2 shows data supplied by Groupes Conseils Agricoles du Quebec (GCAQ) from the Agritel Databank. This organization offers producers the opportunity to improve their financial management skills by benchmarking their annual results. The MDFMG subscribes to the same software program, enabling its producers to compare themselves with their own previous years' data, other individuals' data, 1 of the 3 MDFMG group averages, or even the Quebec group average.

Table 2. Data from 498 Quebec farms from Agritel Databank supplied by GCAQ

Year		2013	2012	2011	2010	2009
Number of farms		**498**	**498**	**498**	**498**	**498**
STRUCTURE						
No. heifers produced	Head	26.2	25.9	25.7	25.0	23.7
No. of cows	Head	76.3	76.6	74.4	74.3	74.1
TECHNICAL CRITERIA						
Forage alloc. heifer	DMT/h.	6.2	6.2	6.2	6.1	6.1
Qty concent./heif prod.	Kg	842	874	890	958	1,048
Calving weight	Kg	597	597	597	588	590
Calving age	Months	25	26	26	26	26
Avg. cow age	Yr:Mth	3:11	3:11	3:11	3:12	3:11
Rate of heifers raised	%	34%	34%	35%	34%	32%
Cull rate	%	35%	32%	31%	32%	28%
Avg.price of sold cows	$/cow	953	935	831	691	681
Calving interval	Days	407	418	422	416	415
Cost forage production	$/TDM	207	206	200	186	203
VARIABLE EXPENSES		$/heif	$/heif	$/heif	$/heif	$/heif
Value of calves		113	113	97	86	96
Milk drunk by heifers *		124	126	132	168	126
Cost hay STD. value		1,095	1,044	1,026	1,003	995
Cost concentrate STD **		570	564	497	461	520
Veterinarian		81	81	79	75	70
Breeding (ins.+emb.)		42	42	40	40	38
Bedding & straw		107	95	86	76	69
Livestock boarding		36	36	34	31	36
Misc. (reg.class.fairs)		18	18	16	17	15
Variable expenses		**2,187**	**2,118**	**2,007**	**1,958**	**1,964**

*Milk drunk is valued at the cost of production.
**Milk replacer expense is included in the concentrate cost

Using only the variable costs and 25-month age at first calving from the 2013 Quebec data, the average direct daily cost of raising heifers is $2.88

■ Custom Raising Heifers

Custom raising heifers is not that common in Canada, unlike the U.S. where custom raising is big business, with professional custom raisers managing thousands of replacement heifers.

So why would you have your heifers raised off the farm?

- Poor facilities
- High mortality caused by less than optimal management (facilities, disease and nutrition)
- Inferior quality forage
- Insufficient forage – maybe a small land base

All these factors would reduce growth rates, resulting in older heifers at calving and, as discussed previously, less potential lifetime production.

Disadvantages of custom raising:

- Timeliness of management decisions could be out of your control
- Additional expense associated with moving cattle around constantly
- The risk of disease from groups of heifers mingling with heifers from other herds

The cost would not likely be less than the on-farm raising cost because the operator requires a realistic management fee to allow his business to cash flow positively. The feed cost would be very similar in both instances.

It is essential that a solid agreement is in place to ensure that the growth targets are being met, which will allow the targeted age at first calving to be achieved.

■ Purchasing Replacements

Purchasing replacements might be adopted as an alternative to having the heifers custom raised. More often than not, fresh heifers can be purchased well below the cost of raising.

So what puts producers off purchasing replacements?

- Most producers favour a closed herd.
- Producers don't want the risk of introducing new diseases on to their farm.
- Often, animals don't do as well as expected on another farm in a different environment and with a different feeding system. The opportunity for those heifers achieving high lifetime production is reduced.

From a purely economic standpoint, purchasing replacements would be a smart decision. But producers tend to look at long-term trends, which suggest that replacing every cull with a purchased animal creates severe pressure on the cash flow. What is not considered is the cash that is saved from feeding a heifer for 2 years or more, which is itemized in the cost of production reports that appear earlier in this paper. Feed alone represents almost 80% of the direct cost of raising a heifer. Maintaining a closed herd policy to prevent bringing disease on to the farm is a solid reason for not purchasing replacements.

■ Accelerated Feeding Program

The aim of an accelerated feeding program over a more traditional feeding program is to give the calf a better start in the first 90 days of its life. The increase of nutrient intake in the preweaning period is expected to produce an improved daily liveweight gain. This growth advantage must then be maintained into the subsequent stages of the heifer's development in order for the animal to enter the milking herd sooner.

Advantages of the system:

- To improve the daily liveweight gain in the preweaning period
- To reach the target weight for breeding earlier
- To subsequently calve the heifer sooner, which should have the effect of reducing the overall raising cost
- To optimize the lifetime production of the earlier calving heifer

Disadvantages:

- The higher protein milk replacer and calf starter add cost to the preweaning period.
- An aggressive postweaning nutrient intake must be maintained to benefit from the early stage advantage.

- Very careful monitoring of the calf's health status is required in the preweaning period.
- This system is not recommended for twins or weak calves from a difficult birth.

The increased intake of the higher protein milk replacer can have the effect of increased fecal looseness and discoloration of fecal material because of the lower fibre content from the reduced intake of calf starter. The calf's general appearance may not always be as desirable as the sleek-coated calf raised on a more traditional feeding program. The management and calf raising skills need to be top-notch for the system to be truly successful.

Summary

To capture the efficiencies of raising heifers as replacements on farm:

- The producer will find it more beneficial to calve heifers at 22-24 months, as long as the optimum bodyweight of those heifers has been achieved for their age (and breed).
- The producer should attempt to achieve a culling rate of less than 35% wherever possible.
- The producer needs to maintain a calving interval of 13 months or less, especially where there is a higher cull rate, in order to maintain herd size.
- The producer would be better off financially to only raise the number of heifers that are needed to maintain herd size. It is not usually profitable to raise and market excess heifers.
- The producer should only replace an animal if it is really necessary!

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