

13

Post-weaning management of dairy heifers

This chapter discusses the benefits of well-grown dairy heifers and the growth targets and feeding programs to produce them.

The main points in this chapter

- All too often dairy farmers do a good job with rearing heifer calves up to weaning then virtually neglect them thereafter.
- The rearing of heifers can be divided into two stages: from weaning to first service and from first service to calving.
- Undersized heifers have more calving problems, produce less milk, have greater difficulty getting back into calf and compete poorly with older cows for feed.
- Because they are still growing, heifers will use some of their feed for growth rather than for producing milk and are more likely to be culled for poor milk yield and/or infertility.
- There are many published targets for pre- and post-calving live weights (hence growth rates), body condition, wither heights and first lactation milk yields, but these have all been developed for temperate dairy production systems. There is little information on tropical dairy systems.
- There is little doubt that heifers will not achieve the same growth performance in the tropics as they would in temperate dairying areas, although they may achieve similar mature live weights.
- Realistic in-calf target weights for first calf dairy heifers on tropical dairy farms should be of the order of 350 kg (for Zebu and crossbreds) to 450 kg (for grade Friesians). However, from anecdotal evidence, most tropical dairy farmers are not achieving such targets.

- To accurately quantify weight for age, it is important to be able to assess age from the eruption of incisor teeth.
- Providing weaned heifers with a diet that is both short on daily DM intake, as well as being low in energy content, is a major reason for sub-optimal heifer growth rates. This leads to light-weight heifers and delayed calving, hence reduced potential to produce milk and to get back in calf.
- Heifer farms are a new initiative in many Asian countries in which week-old calves are collected from individual farms and group reared in one location prior to their return to that farm just prior to calving down.

This chapter discusses the post-weaning management of calves reared as replacement heifers for dairy farmers, as summarised in Figure 13.1, as well as a small section on producing beef from the dairy herd.

The rearing of heifers can be divided into two stages: from weaning to first service and from first service to calving. The aim of heifer rearing should be to achieve the maximum growth and development, arriving at the earliest sexual maturity consistent with the least cost. This ensures that maintenance costs are minimised, that there is the earliest possible return on the investment in the original animal and that the heifer can produce well during her first lactation.

13.1 On-farm rearing of replacement dairy heifers

All too often, dairy farmers do a good job of rearing heifer calves up to weaning, but then virtually neglect them thereafter.

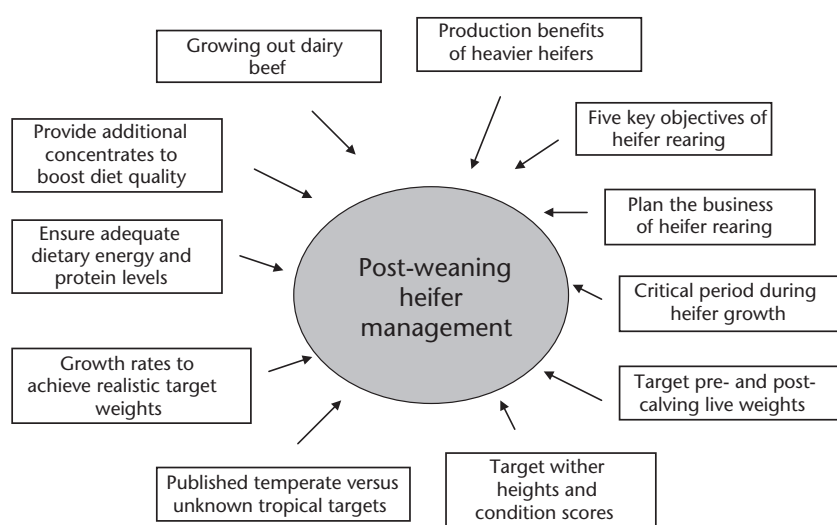


Figure 13.1 The key factors to consider in post-weaning management of dairy heifers



A very poorly reared Jersey heifer in Malaysia.

Weaned growing heifers require less attention than milk-fed calves and milking cows. From weaning until breeding and sometimes even after then, daily contact is not necessary. Because their nutrient requirements are relatively low compared with milking cows, many heifers are located away from the prime grazing areas on many dairy farms, sometimes on agistment on other farms. Unfortunately, the saying ‘out of sight, out of mind’ applies too frequently to replacement heifers. This relative neglect is understandable in view of the long time it takes before any inadequacies in post-weaning practices are reflected in poor milking cow performance.

Dairy heifers need to be well fed between weaning and first calving. Growth rates should be maintained, otherwise heifers will not reach their target live weights for mating and first calving. Undersized heifers:

- have more calving difficulties
- produce less milk
- have greater difficulty getting back into calf during their first lactation
- when lactating, they compete poorly with older cows for feed
- because they are still growing, will use some of their feed for growth rather than for producing milk
- are more likely to be culled for poor milk yield and/or infertility.



A well-reared pregnant Friesian heifer in Vietnam.

The onset of puberty is related to weight rather than age. A delay in puberty means a later conception, which can disrupt future calving patterns and increase rearing costs. All heifers should reach a minimum weight before joining, because lighter heifers have lower conception rates. Target live weights at mating and first calving are discussed below.

To recommend detailed post-weaning management procedures for dairy heifers is not practicable. The system adopted should reflect local and climatic conditions and personal preferences. The extremes of weather and availability of home-grown and purchased feeds are probably the most important variables. Although replacement heifers are essentially non-productive animals, some expenditure is necessary. They represent capital and investment in the dairy herd's future. Heifer rearing should achieve the maximum return on this investment with a minimum of outlay. It should not be regarded as a haphazard undertaking, which hopefully will produce a pregnant heifer, but rather as a business enterprise with clearly defined goals such as:

- the number of animals to be reared
- the desired age at first calving
- the target live weight at calving
- the feeding program
- ways to monitor their performance and total rearing costs
- any specific housing and health requirements.

When rearing dairy replacement heifers, producers should have five major objectives:

1. **The maintenance or expansion of herd size.** Heifer-rearing systems should provide sufficient animals to replace cows culled from the milking herd and allow for increases in herd numbers, if required.
2. **Calving by 24–30 months of age.** Entry into first lactation by 24 months of age minimises the total non-productive days and maximises lifetime productivity.
3. **Sufficient growth for minimal dystocia (that is, calving difficulties) at first calving.** Heifers need to be large enough to calve without difficulty.
4. **Maintenance of health.** The prevention of clinical and sub-clinical disease plays a large role in the ability of replacement heifers to meet live weight and age targets at first calving. Longevity and lifetime productivity is also affected.
5. **Genetic progress.** Replacement heifers generally have higher genetic merit than the current milking herd. This can be expressed as increased productivity (both milk volume and solids), improved efficiency of production and/or enhanced resistance to disease.

When considering these objectives, producers should decide whether to rear their own replacements on farm, to have them contract reared off farm or to purchase in-calf heifers. The last two alternatives will save land for milking cattle, which is important where land is the major constraint to production, but are likely to cost more than on-farm rearing. Contract heifer rearing is discussed in a later section in this chapter. If the farm has a history of poor calf- and heifer-rearing practices leading to high mortalities and poor heifer growth rates, off-farm rearing or purchasing of in-calf heifers should be a serious consideration. However, it must be remembered that when purchasing in-calf heifers, there is no guarantee that their genetic merit is superior to that of older cows in the herd, while their health status is largely unknown.

Heifer rearing is not cheap and the costs to produce a lactating first-calf heifer can account for 15–20% of the total milk production costs. It is not good economics to cut back on heifer rearing costs because lifetime profits will be reduced (Moran and McLean 2001).

The number of first calving heifers each year will depend on the replacement rate within the milking herd. This is the sum of the wastage rate caused by infertility, mastitis, low milk yield, old age, accidents, and so on, together with the particular culling policy for that herd, whether this is to improve milk yield, feed efficiency or reduce calving interval. The number of heifer replacements to be reared also depends on mortality rates during rearing, the conception rates at first mating and the proportion of heifers reaching their target weight for age.

With 20–30 heifers per 100 cows introduced into the milking herd annually, at least 80% of the milking cows should be mated (either using a bull or artificial insemination) to obtain that number of replacements each year. When determining the total number of calves to rear, consideration could be given to rearing additional heifers for sale to other dairy farmers and/or bull calves for dairy beef.

On well-managed farms in temperate dairy regions, achieving a consistent calving program requires heifers to:

- reach puberty at about 12 months of age
- become pregnant at 14 or 15 months of age

- calve at 24 months of age
- return to oestrus and be mated within 70–80 days of calving.

Earlier first-calving ages are easier to achieve with the smaller, more rapidly maturing dairy breeds such as Jerseys, Ayrshires or Zebus.

13.2 Benefits of heavier heifers

Provided heifers are at least 18 months old, the younger the heifers calve, the higher their first lactation and mature milk yields, the more calves they produce and the longer their productive life in the herd. An additional benefit is a more rapid generation interval, and hence a faster rate of genetic progress in the milking herd. Lifetime productivity reaches a peak in heifers calving at 25–27 months of age. For example, heifers calving at 24–27 months of age can produce 21 000 L of milk over a 7 yr productive life on established temperate dairy farms, compared with 18 750 L if calving at 30–33 months and only 17 000 L if calving at 36–42 months of age.

Several studies have documented the long-term benefits from heavier calving weights in Friesian heifers. For every additional kilogram at first calving, heavier heifers can produce 7 L of extra milk in each of their first three lactations. Therefore, if heifers calved at 500 kg compared with 450 kg, they would produce an extra 350 L of milk/lactation, or 1050 L extra milk over their first three lactations.

As part of an Australia-wide survey of dairy herd fertility, involving over 33 000 cows, live weights of 2000 Friesian heifers from 69 seasonal calving herds in Victoria and Tasmania were recorded just prior to their first calving (John Morton *pers. comm.*). Heavier heifers calved earlier and conceived more readily during their first lactation (see Table 13.1), indicating a decreased need to induce (or even cull) second calving cows.

Heavier calving live weights also reduce the incidence of calving difficulties and wastage rates, which both adversely affect lifetime performance and herd profits. The percentage of replacement that either die or are culled before their second calving has been recorded at 30–35% in two Victorian studies, which is considerably higher than the target 20% possible with better grown heifers. Similar data for the tropics is not available.

Table 13.1. The effect of live weight at first calving (LWFC) on percentage of Friesian heifers calving in their first 3 weeks of the calving period, subsequent 3 week submission rate, 6 week in-calf rate and the proportion of heifers conceived between 7 and 21 weeks during their first lactation

LWFC (kg)	Calved in first 3 weeks (%)	3 week submission rate* (%)	6 week in-calf rate* (%)	Heifers conceived from 7 to 21 weeks of mating* (%)
<400	36	58	49	30
400–440	49	74	60	27
440–480	55	77	68	21
480–510	65	82	68	19
510–540	53	85	75	13
>540	68	88	77	10

* Data are expressed as percentage of first-calf heifers mated.

There is a critical period for the developing udder during which time excessive growth rates can be detrimental to lifetime productivity due to increasing the deposition of fatty tissue in the udder. Exactly when this critical period occurs and exactly what constitute excessive growth rates have yet to be clearly defined, although there are some general guidelines. Live weight gains should not exceed 0.8 kg/day between 6 and 12 months. Hence heifers should not be fully fed during their second 6 month period. This is unlikely to be a problem in the tropics where post-weaning feeding regimes would rarely lead to such high growth rates.

13.3 Targets for growing heifers

13.3.1 Target pre-calving live weights

Table 13.2 summarises the target live weights for Friesian and Jersey heifers at various ages on well-managed Australian dairy farms (Moran and McLean 2001).

Unless greater attention is given to heifer feeding, most tropically reared heifers are too small, hence too sexually immature, to breed at similar ages as their temperate counterparts. It is better to use target live weights rather than ages to plan heifer mating programs. Adequate breeding weights in the tropics would then be 200–220 kg for small breeds and 290–310 kg for larger breeds.

There is little doubt that heifers will not achieve the same growth performance in the tropics as they would in temperate dairying areas, although they may achieve similar mature live weights. The major constraints to heifer performance in the tropics are heat stress, in both indoor- and outdoor-raised heifers, and forage quality. Chapter 6 provides details on why the tropics is not an ideal place to rear dairy calves and heifers.

13.3.2 Target in-calf live weights

Heifer milk production depends on their live weight at first calving and how well they are fed and managed as milkers in their first lactation. Their optimum live weight at first calving (LWFC) depends on the milk yield farmers wish them to achieve at maturity in the herd. Table 13.3 presents data on target live weights (in-calf) for 2-yr-old Friesian

Table 13.2. Target live weight ranges (kg) at various ages for well-managed Friesian and Jersey heifers on Australian dairy farms

Age (months)	Friesian	Jersey
3 (fully weaned)	90–110	65–85
6	150–175	110–130
9	210–235	155–180
12 (yearling)	270–300	200–230
15 (mating)	330–360	245–275
18	390–420	290–320
21	455–485	335–365
24 (pre-calving)	520–550	380–410

Table 13.3. Target live weights for 2-yr-old Friesian heifers to enable them to produce a specified milk yield as mature cows

Full lactation milk yield as mature cows (litres)	Target live weight for 2-yr-old heifers (kg)
3000	430
6000	540
9000	590

heifers required to produce a subsequent full lactation yield as mature cows (Moran and McLean 2001). On most well-managed temperate farms, 6000 L of milk/lactation would be a realistic target, meaning that Friesian heifers should be grown out to 525–550 kg as 2-yr-olds just prior to calving. The extremes in this table represent typical values for average milk yields on many SHD farms in the tropics (3000 L) and on intensive temperate dairy feedlot farms (9000 L).

The target weights in Table 13.3 are for purebred Friesians, so would be smaller for crossbred Friesians or Zebu (tropically adapted) dairy heifers. Furthermore, they are for 24-month-old heifers, whereas corresponding LWFC would be older, say 30 months of age. Therefore I believe that corresponding target weights for in-calf heifers on tropical Asian dairy farms should be of the order of 350 kg (for Zebu and crossbreds) to 450 kg (for grade Friesians). From anecdotal evidence, most Asian dairy farmers would not be achieving such targets.

According to US standards (BAMN 2007), the mature weight of a dairy cow is its live weight during its third lactation, generally measured during mid lactation and/or when cows have a good body condition score (six out of eight points). BAMN (2007) then presents target weights expressed as a percentage of mature weights, these being:

- 45–50% at puberty
- 55% at mating, generally during their third oestrus after puberty
- 82% after first calving
- 92% after second calving
- 100% after third calving.

Table 13.4 presents the mating and calving targets for dairy stock of different mature live weights. It should be pointed out that these weights are after calving, whereas those in Table 12.2 includes the weight of the foetus and associated amniotic fluid and associated tissues, say 50–70 kg.

Table 13.4. Target live weights (kg) for dairy heifers and cows of different mature live weights

Stage of development	Percentage of mature weight	Target live weight (kg)				
		400	450	500	550	600
First mating	55	220	247	275	302	330
First calving	82	328	369	410	451	492
Second calving	92	368	414	460	506	552
Third calving	100	400	450	500	550	600

Tables 13.2, 13.3 and 13.4 are recommendations for temperate dairy systems. Until such data has been generated for tropical dairy farms, these are really the only guidelines we have on which to base post-weaning heifer feeding management in Asia. They should be achievable on well-managed tropical dairy systems, but would be overoptimistic estimates on most small holder farms.

13.3.3 Target growth rates

When calculating the desired growth rate to achieve these targets, consideration must be given to the current live weight, the target weight and the time period over which the weight gain must be achieved. Four examples are presented in Table 13.5 to achieve target mating weights, for heifers with different mature live weights and current weights for age.

13.3.4 Target chest girths and wither heights

Chest girths, which measure the linear distance around the heifer's chest, can be used to estimate live weights: relationships are presented in Moran and McLean (2001).

Wither height (or height at the shoulder) is a good measure of bone growth in heifers, and therefore frame size. Frame size can influence the area between the pelvic bones, and hence ease of calving. It can also influence the abdominal capacity, and hence the appetite, of milking cows. Wither height may even be a better measure of heifer development than live weight, because this is influenced by pregnancy and body condition. It is measured as the highest point on the heifer's shoulder, immediately above the front legs and can be routinely recorded by locating a marked stick in the crush or raceway to be read as the heifers move past. Animals should be standing quietly, but not with their head in a head bale, because this alters their natural stance.

Target wither heights in Friesians are 123–125 cm at 15 months and 133–135 cm at 24 months. Corresponding wither heights in Jerseys (and Zebus) would be 110–112 cm at 15 months and 120–122 cm at 24 months.

A heifer's appearance, condition and coat are useful indicators of her health and performance. A heifer with a solid slab-sided appearance and a sleek coat is obviously doing well. Conversely, an animal with a 'guttty' appearance and with more prominent backbone and hips reveals inadequate energy in the diet, such as young animals fed mainly on pasture or low-quality roughages with insufficient concentrate supplements. The coat of poorly grown heifers may appear more coarse and hairy. These symptoms can also indicate a high internal parasite burden.

Table 13.5. Target growth rates (kg/day) for dairy heifers of different mature live weights and various current weights and ages at first calving to achieve target mating weights

Mature live weight (kg)	Age at first calving (months)	Current age (months)	Current weight (kg)	Target mating weight (kg)	Target mating age (months)	Target growth rate (kg/day)
450	24	4	100	247	15	0.44
500	24	4	120	275	15	0.47
500	26	4	120	275	17	0.40
500	28	4	120	275	19	0.34

Body condition should also be taken into account, as well as live weight and frame size, because over-conditioned heifers are harder to inseminate and are at greater risk of calving difficulties. Delayed breeding can lead to over-conditioned heifers, which are harder to breed.

13.3.5 Target first lactation milk yields

The first lactation yield of heifers can be a useful guide as to how well they are grown up to the point of calving. Although their absolute milk yields can vary enormously with feeding management while milking, their milk yields relative to those of their herd mates is a useful criterion of heifer management. This value is determined by comparing the average full lactation milk yield of first lactation heifers with the average of the mature cows in the herd. Over the last 30 yr, this value has increased in Australian herd-tested farms from 65–70% to 80–85%. Friesian heifers have been grown out to produce 90% of the daily milk yields of their mature herd mates (producing 10 000 L/lactation) on Israeli feedlot farms.

If this value is 80% or less, heifer-rearing practices should be reviewed to establish if they are contributing to poor heifer production. Therefore, in a milking herd in which mature cows produce, say, 6000 L/lactation, heifers should be yielding at least 4800 L, while a mature cow average of 4000 L would correspond to heifers producing 3200 L/lactation.

13.3.6 Age of teeth eruption

It is easy to estimate the approximate age of a heifer by inspecting the state of her teeth. A calf may be born without teeth, with the temporary cheek teeth erupting within a few days and the temporary incisor teeth within 2 weeks.

The age at which the pairs of permanent incisor teeth erupt is as follows:

- first incisor teeth: 18–24 months
- second incisor teeth: 24–30 months
- third incisor teeth: 36 months
- fourth incisor teeth: 40–48 months.

The permanent cheek teeth erupt between 6 and 36 months, but are harder to identify than the incisor teeth. The age of eruption of permanent incisor teeth can vary with the feeding regime.

This is a very useful guide when objectively assessing the feeding management of young stock because poorly fed heifers may look healthy and relatively well grown, but if their first (or even second) incisor teeth have erupted they are likely to be much older than at first glance.

13.4 Feeding heifers to achieve target live weights

The formulation of rations to achieve target growth rates depends on available ingredients and their nutritive values. The expected economic benefits from applying the principles of target growth rates include:

- a shorter time before heifers generate farm income through milk production
- a faster rate of expanding the size of the milking herd

- increased farm income through higher heifer milk yields
- a reduced number of replacements required, therefore lower stocking capacity in the shed
- less forages required by growing heifers, hence more available for milking cows.

Once the growth targets have been determined, the rations must be formulated to provide sufficient dietary nutrients. More rapidly growing heifers with larger mature sizes require more protein in their diet, especially at younger ages. Such heifer feeding programs are likely to be more expensive. However, this approach to young stock management invariably leads to greater profits, particularly when well-grown heifers have the potential to produce more milk as mature cows.

Nutrient requirements for heifers depend on:

- expected mature live weight
- desired age at first calving; that is, acceptable age at first insemination
- current heifer live weight
- current age of heifer
- nutritive value of feeds offered.

There is almost always some check to growth at weaning, and this will be minimal if the animals are given gradual access to good-quality forages prior to weaning. During the wet season in the humid tropics, grazed pasture with limited concentrate supplements may be sufficient. However, in the dry or semi-arid tropics and during the dry season in the humid tropics, additional quality forages and concentrates are required to ensure good growth rates.

Before planning feeding strategies for growing heifers, it is important to set realistic target live weights for different ages. For heifers weighing 90 kg at 3 months to reach a target of 550 kg at calving as 2-yr-olds, they need to grow at 0.72 kg/day, compared with 0.57 kg/day if calving at 450 kg or 0.41 kg/day if calving at 350 kg. Average weight for ages and the energy (ME) intakes required to achieve these are presented in Table 13.6.

Table 13.6. Average weight for ages and requirements for metabolisable energy (ME) in heifers grown out to 350, 450 or 550 kg at 24 months of age

Age (months)	Live weight at 24 months of age and (average growth rate in kg/day)					
	350 kg (0.41 kg/day)		450 kg (0.57 kg/day)		550 kg (0.72 kg/day)	
	Live weight (kg)	ME intake (MJ/day)	Live weight (kg)	ME intake (MJ/day)	Live weight (kg)	ME intake (MJ/day)
3–6	127	29	141	34	155	39
6–9	165	33	194	41	221	49
9–12	202	38	246	48	287	59
12–15	240	43	298	55	353	68
15–18	277	49	349	64	418	80
18–21	314	51	402	66	484	82
21–24	350	55	450	70	550	85

Table 13.7. Dietary quality for heifers of different ages to grow at 0.7 kg/day

Age	3–6 months	6–12 months	>12 months
Energy (MJ/kg DM)	10.9	10.3	9.5
Crude protein (%)	16	12	12
Calcium (%)	0.52	0.41	0.29
Phosphorus (%)	0.31	0.30	0.23

Using an average ME level of 10 MJ/kg DM in the diet, the total DM intakes required to achieve the three growth rate targets presented in Table 13.6, can easily be calculated, by dividing the energy intakes by 10.

Heifers require a high-quality diet to grow at 0.7 kg/day. Table 13.7 presents the energy, protein, calcium and phosphorus concentrations of their diets to promote this rate of live weight gain. The limited rumen capacity of 3- to 6-month-old heifers means that they should be fed a ration containing as high an energy and protein concentration as that of milking cows.

The nutritive values of various feeds are presented in Chapter 10. A combination of good-quality tropical forages and concentrate supplements are required to produce a diet containing 9.5–10.5 MJ of ME/kg DM and 12% protein. Providing weaned heifers with a diet that is both short on daily DM intake as well as being low in energy content, is the major reason for sub-optimal heifer growth rates, which leads to light-weight heifers and delayed calving, hence reduced potential to produce milk and to get back in calf.

Feeding and grazing management should allow for continuous heifer growth throughout the first 2 yr. Uniform growth is not necessary, and may be impractical with fluctuating forage supplies. However, heifers should never lose weight or grow slowly for long periods during their first year, because they may not achieve their ultimate frame size and/or mating live weight by 15 months of age. Yearling heifers can show some compensatory gain in their second wet season following feed shortages the preceding dry season. Recommendations for grazing and feeding systems will vary with different regions. Rather than depend on ‘recipes’, farmers should use target growth rates to plan optimum feeding strategies. To achieve 550 kg by 2 yr of age, seasonal target growth rates can vary from, say, 0.5 to 1.0 kg/day.

When heifers mix with older cows, they increase their chances of picking up infections from, and hence developing immunities to, any diseases carried by the cows. These immunities can then be transferred to newborn calves via the heifers’ colostrum. Heifers reared in complete isolation from cows are likely to become infected as they calve and come in contact with the milking herd for the first time. This coincides with the time when they should be in peak health to produce milk, get back in calf early and also overcome any stresses associated with their radical change in management. Earlier in their life, heifers were non-lactating animals continually at pasture whereas now they have become lactating animals with regular human contact twice each day.

If the milking herd has a history of Johne’s disease or if there is a high chance that Johne’s carrier cows have been introduced to the herd, then grazing options for young heifers are reduced. This, and other aspects of disease, are discussed in Chapter 11.

Agisting young stock off farm has much to commend it because it allows dairy farmers to use all available feed supplies to produce milk, while still having control over the disease status of the heifers and the genetic progress in the herd. However, farmers must be well aware of the supply and quality of pasture for their agisted stock, the responsibility for stock health while away from the farm and the security of the agistment area against theft and straying heifers, as well as neighbouring bulls. The proximity of the area and its cost are probably the major factors that need to be taken into account. Agistment works well, provided it is cost effective and heifer growth is monitored to ensure target weights are achieved.

Young stock should be handled frequently. When entering the milking herd, they must find their place in the social structure and this may take less time if they are used to human contact. For example, they should be run quietly through the milking shed a few times before calving to start to settle them into the milking routine. Grazing the heifers during their last months of pregnancy with the main herd of dry cows can accustom them to the competitive conditions with which they will have to cope during lactation. Hand feeding heifers for a few weeks before calving will provide extra feed to build up body condition, as well as get them used to being handled.

13.4.1 Grazing versus shedding of growing heifers

Much of Section 13.4 is based on the management of replacement heifers reared under grazing, whereas most SHD farmers in Asia rear their young stock under a continual shed environment. Compared with grazing, confinement creates specific problems such as:

- restricting the opportunity to seek comfort; for example, if only provided with cement floors
- creating problems of high humidity, which can be more detrimental than high temperature
- limiting opportunity for exercise, hence the need for routine hoof trimming
- increasing exposure to infectious diseases
- creating problems of heat detection for artificial insemination
- requiring greater efforts into sanitation
- magnifying problems of social dominance
- increasing capital investment.

There are two major reasons why SHD farmers do not have areas on their farm set aside for grazing: namely high land costs and cheap labour. There are other reasons and these include:

- the lack of farm forage areas
- inefficiencies of allowing stock to graze the forages rather than ‘cut and carry’ them to the stock
- better opportunities for climate control in a shed compared with the open air
- the better security of stock inside a shed compared with out in a paddock
- the difficulty of managing tropical forages to maintain quality while being grazed compared to a regular hand harvesting cycle.

Of all the classes of stock on a dairy farm, growing heifers would be the easiest to manage as grazing animals, because they do not require close attention at least twice daily, such as with milk-fed calves or milking cows. Because this is rare in tropical Asia, farmers can more easily plan feeding programs for growing heifers by providing adequate forages of acceptable quality rather than depend on their unknown ability to harvest sufficient nutrients themselves in a less-controlled grazing environment.

13.5 Contract heifer rearing

Well-reared heifer replacements represent the future for any dairy farm and regional dairy industry. As mentioned above, rearing heifers requires careful planning and adequate feed resources. As the cost of dairy land rises and the emphasis on milk production continues to drive profits, farmers with limited time and resources could consider contracting out the care of their replacement heifers. Such contracts could be with individual farmers, dairy cooperatives or even government support agencies. A good heifer rearer should, at the end of the contract, deliver animals in good condition, at an agreed weight for age and, if stipulated, pregnant. Specifications should be approved by both parties and documented in the contract.

Understanding the real cost of rearing heifers is the first step in developing an agreement with an independent rearing contractor. By assessing and placing a monetary value on the time and resources required to raise heifers on farm, the farmer can then determine the amount the service is worth to the dairy business when externally contracted.

The contract needs to document not only the agreed target weights but also the farmer's expectations on heifer management and conception. This written document should be agreed upon and signed by both dairy farmer and contractor. It should consider the following key points:

- target weights for age; these should be realistic for the breed type and the feed resources
- daily management: how often will the heifers be checked if grazing?
- routine animal health protocols, such as parasite protection, vaccination and drenching in accordance with district requirements
- veterinary attention: who pays the veterinary expenses?
- mating and pregnancy testing: whose responsibility is this?
- collection and delivery: who pays for transportation costs?
- the date for collection and delivery
- weighing procedure and frequency: specify intervals between weighing reports
- the payment schedule: what is the timing of payments? These should be staggered in line with animals reaching agreed interim target weights
- penalties for not achieving target weights: if the stock are not growing, the ability to remove them should be specified in the contract
- disease assurance program: an assurance that the rearing property is relatively disease free

- other stock: what other stock are on the rearing farm and will they be kept separate from the farmer's heifers?
- penalties for deaths and losses: it is recommended that a 3% allowance be given for stock deaths
- dispute resolution procedures; who arbitrates any disagreements?

When selecting a suitable contractor, dairy farmers could use the following checklist:

- stock skills and cattle handling facilities for weighing and providing for veterinary attention
- ability and facilities to manage an effective AI program, if desired
- resources to handle bulls such as fencing, yards and a separate bull paddock
- good external fencing with no neighbouring properties holding bulls
- knowledge of dairy heifers, their health and growth requirements, such as supplementary feed, mineral licks and good rotation through paddocks, for both grazing and cut and carry
- property in or near a common dairy area, so it is convenient, minimises transport costs and improves stocking rate flexibility during difficult seasons (that is, the stock can be easily returned home during feed shortages).

There may be local dairy farmers who wish to reduce their daily work load by changing from milking cows to rearing heifer replacements. Contract heifer rearing on owned or leased land can provide a solid cash flow business. To develop a successful heifer rearing business, the following points should be considered:

- Understand the costs and time required to rear dairy heifers.
- Talk to dairy farmers to understand the long-term risks and opportunities for contract heifer rearing in the district.
- Be in close proximity to dairy farmers.
- To decide on the size of the rearing operation, firstly assess the cost and availability of pastures and other forages and concentrate feeds, and then, secondly, take into account labour requirements and administration costs, such as any public liability insurance.
- Assess the risks in the paddocks where the heifers will be reared, if they are to be outdoors. Check fences, pasture, potential hazards and the location of neighbouring bulls to ensure heifers remain safe during their visit.
- Assess the potential pasture supplies and quality for the proposed stocking rate and the likely need for supplementary feeds.
- Once profitability is established, select the maximum number of heifers from a minimum number of farms.
- Encourage farmers to batch calve together, so the calves, being close in age, will be easier to handle, rear and mate, ensuring that record keeping and other management tasks can be kept to a minimum.
- Visit dairy farms from which calves originate and check the stock before transit to ensure they are in good condition and meet the contractual requirements.
- If taking young newly weaned heifer calves, ensure that all stock are fully weaned and unlikely to suffer any health or nutritional setbacks on arrival at their new farm.

- Only accept animals in good health after transit. Sick animals should be sent back to the dairy farmer.
- Prepare a detailed formal contract based on the key points above.

While the onus is on the dairy farmer to set the targets, flexibility and common sense should prevail with concessions made for unusual and unexpected circumstances. Long-term contracts are more likely to develop if the farmer's expectations are realistic and clearly communicated to the rearing contractor.

Contract heifer rearing can be undertaken by a commercial operator or, as is becoming increasingly common in tropical Asia, constitute one of the services provided by dairy cooperatives or even government livestock agencies. It is highly unlikely that any Asian country will be able to achieve realistic target national herd sizes without importing dairy heifers. This is mainly because of the very high pre- and post-weaning mortality rates referred to in Chapter 6, which can only be overcome through developing the skills discussed in this book.

A commercial contract calf rearer will have to become competent quickly to remain in business. The development of 'heifer farms' is a new initiative of governments and cooperative agencies, removing the calf and heifer rearing responsibilities from individual SHD farmers; the pregnant heifer is then returned to that farm just prior to calving down. Such heifer-rearing services provides the opportunity for bulk purchase (and routine nutritive testing) of feeds, specialist skills in animal health and production, and good rearing facilities. It can also allow for the importation and bulk rearing of young (say 6-month-old) dairy heifers, which would reduce their purchase and transport costs and give them more time to adjust to the tropical environment before mating and eventual pregnancy.

13.6 Using dairy stock for beef production

Although dairy cows need to produce a calf each year to continue milking, dairy farmers only require 20–30% of these calves to replace those cows that die or are culled from the milking herd, because the average productive life span for milking cows is four to five lactations.

Artificial rearing of replacement heifer calves is a specialist job that dairy farmers generally have to undertake. Because it is the most expensive period in an animal's life, calves reared for dairy beef would need to be grown out for slaughter at much older ages to dilute these high initial feeding costs. Unless these finished animals realise reasonable returns, dairy beef is unlikely to be profitable.

No matter what the system of beef production, the maintenance of breeding stock and the production of their offspring to replace those slaughtered for human consumption is a major part of the total feed inputs. With beef producers, these must be included in their total production costs. However, with dairy beef producers, these are 'paid for' by dairy farmers. Because dairy calves are by-products of the milk industry, dairy beef farmers should then have lower production costs than beef farmers. Their ultimate lower carcass returns can allow for this, but they have rarely been sufficient for dairy beef to have a long-term viable future.

Growing out bull calves for slaughter at 18 months or more is frequently a major generator of income for dairy farmers. These stock can be kept entire and grown out as bulls, or they can be castrated at an early age and grown out as steers. Bulls grow faster than steers, but, when they reach puberty, they can become a nuisance with milking cows on heat. The same principles of feeding management for dairy heifer replacements should also be used for growing out dairy beef bulls or steers. Target growth rates should be at least 0.5 kg/day. There may be additional recommendations with regards to vaccinations and other health management issues, and such information should be sought from local animal health specialists.

Purebred or crossbred Friesians are preferred over Jerseys or local breeds and generally return more money per kg live weight when sold for dairy beef, so the breed type of the bull calf should be considered when deciding on its future fate on the farm. On the whole, milk generates more income per kg fresh grass grown on the farm than beef does, so it is important to 'do the sums' on dairy beef production when farm stocking rates are high. Acceptable growth rates are unlikely if the major part of the ration is very low-quality forages, such as rice straw. As with milking cows, green grass is the best forage to feed dairy beef animals.

It is important to plan the finishing (or fattening) strategy for dairy beef. Target live weights should be used in any feeding program, so using a chest girth tape to estimate live weight is worth considering. Friesians are later maturing than other dairy beef animals, meaning that a higher level of concentrate feeding will be required to produce a suitable sale animal: namely one with a good degree of finish (or some cutaneous fat cover over the ribs).

This page intentionally left blank