ON Western Australian dairy farms the wastage rate of dairy cows is probably more than 20 per cent. and this, coupled with the tendency towards bigger herds, means that well over half of the heifer calves born should be reared for herd replacements.

There is also a fairly ready market for surplus heifers soon after weaning, as mated heifers, as springers, or with calf at foot. For this reason many dairy farmers retain almost all heifers dropped and indeed, buy and rear additional day old heifers.

Many of the farmers who sell quota milk rear enough heifers for replacements but others consider it better to sell heifer calves at a few days old, and buy back springers or freshly calved cows, and a regular trade has grown up whereby calves move to the more southern districts for rearing, and return to the wholemilk districts at calving time.

Steer calves also, particularly of the heavier breeds, can be profitably reared and, on many farms where there is a shortage of labour, are looked on with more favour than are pigs.

The rearing of calves can be profitable, but losses are frequently high and the death of even a few animals can turn profit into loss. A little extra care and attention to detail can greatly increase the well-being of calves and their final value in the milking herd or the saleyard.

In this article the general principles which should be followed for successful rearing are outlined and feeding standards are set down. They should be used as a guide only and should be modified as required to meet the needs of individuals and the current economic situation on each farm.

Separation of Cow and Calf

As calving time approaches cows should be confined in small paddocks free from hazards and near to the milking shed where they can be observed frequently. Normally, cows require no assistance at calving, but if labour is prolonged beyond a couple of hours, help may be needed.

After birth the calf is licked dry by the dam and will normally start sucking within one to two hours. Opinions and practices differ as to the length of time the calf should be left with the cow after birth. Probably the sooner the calf is removed after it has been licked dry and has had its first drink the better, as the cow settles down much sooner if the calf is removed early.
If the calf is left longer than 24 hours it is important that the cow's udder is checked and any quarter not sucked by the calf is relieved.

**Housing of Young Calves**

When separated from the dam, a calf should be housed in a draught-free shed on clean straw. It should be kept confined for a few days until it has learnt to drink unaided and may then be turned out with older calves into a pasture paddock provided shelter from sun and rain is available.

Before it is separated from the dam, the calf, if a daughter of a bull under Sire Survey, should be given some temporary form of identification so that the identity will be known when the Recorder or Inseminator is available to permanently ear tattoo it. Plastic ear tags or tail tags are available, or a neck chain and disc will give good service.

**Teaching the Calf to Drink**

Patience seems to be the main requirement when teaching a calf to drink. However, the task is easier if the calf is hungry and it is desirable to leave the calf at least 12 hours before attempting to feed it.

Calves will suck more readily if the head is raised and will accept a rubber nipple more readily than a finger. Little trouble is usually experienced where early feeds are given from a nipple. A suitable method is to place the bucket on a raised stand, and have a hose reaching to the bottom of the bucket and attached to a nipple at the other end. The nipple in turn is pushed through a round hole in a piece of 6 in. x 1 in. board at a convenient height for the calf to drink.

**Importance of Colostrum**

It is most important that the calf receive the mother's milk (known as colostrum at this stage) for the first four days of life. Colostrum is quite different in composition to later milk and contains a higher concentration of vitamins together with antibodies which give some protection against various ailments. It also acts as a laxative which starts the calf's digestive system working for the first time.

Young calves should not be bought in a saleyard if their appearance suggests that they have not received a drink from the cow, unless colostrum from other freshly calved cows is available at home.

Colostrum surplus to the requirements of young calves may be beneficially mixed with the liquid milk fed to older calves.

**General Points on Feeding Liquid Milk**

**Fat Content of Milk**

Although whole milk is the best food available for young calves it should not have too high a fat content or scouring can result. Milk with a fat content of 4 per cent. or more should be diluted with water. As a rough guide add 1 pint of water per gallon of milk for every 0.5 per cent. fat in excess of 3.5 per cent.; 1 pint for 4.0 per cent. milk, 2 pints for 4.5 per cent. milk and so on.

**Need to Warm Milk**

At all times milk should be fed at about blood heat. This is important because milk goes direct to the true stomach, by-passing the rumen because of the closure of the oesophageal groove.

**Importance of Cleanliness**

Young calves are very susceptible to bacterial infections causing scouring and perhaps death and for this reason it is most important to thoroughly clean all equipment after each feed.

**Bulk or Individual Feeding**

For best results calves should be rationed individually and fed according to
It is essential for the calf to receive colostrum in the first four days of its life.

size and strength. Although this statement would meet with general acceptance, many farmers have introduced a system of bulk feeding in groups from a common trough, claiming that the saving in labour more than compensates for the occasional loss through death or failure to thrive. Trough feeding can only be recommended where—

- labour is short and the time saved can be used to rear more calves;
- strict cleanliness is observed;
- the calves suck on nipples and cannot get their heads into the trough;
- calves are segregated into groups on size;
- an observant cowman is available to draft off any calf which is not thriving and give it individual attention.

A Feeding Guide

In the first few weeks of life more calves are killed by overfeeding than underfeeding and the quantity fed should be strictly controlled. At this time the amount fed per day should not exceed 10 per cent. of body weight. Older calves, particularly steers which are to be vealed, can be fed more liberally if surplus skim milk is available.

The milk should be given in two feeds per day, half in the morning and half in the evening.

Where both whole milk and skim milk are available it is best to feed colostrum and then whole milk for the first fortnight and then, over a period of several weeks, gradually replace whole milk by skim milk. By the fifth week all whole milk may be replaced.

Where no skim milk is available suitable substitutes may be prepared from dried buttermilk or dried skim milk powder.

Birth Weight of Various Breeds

Average birth weights of calves of various breeds are Jersey 55 lb., Guernsey 65 lb., Ayrshire 70 lb., A.I.S. 80 lb. and Friesian 90 lb. Of course, within each breed there is a considerable range and, on average, bull calves are heavier than heifers. For this reason the eye and experience of the cowman are important, in the absence of weighing scales.

Quantity of Milk to Feed

In the first week of life an average sized Jersey calf should receive not more than half a gallon per day of diluted milk mixture at an average test of 3.5 per cent. Larger calves would require correspondingly more but even the largest
calf should not at this stage receive more than one gallon per day.

The quantity fed should be gradually increased and the following table can serve as a guide:—

<table>
<thead>
<tr>
<th>Week of Life</th>
<th>Quantity fed per day to</th>
<th>Type of Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small Calf</td>
<td>Large Calf</td>
</tr>
<tr>
<td>1st</td>
<td>lb.</td>
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</tr>
<tr>
<td>2nd</td>
<td>5</td>
<td>9</td>
</tr>
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<td>3rd</td>
<td>6</td>
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<td>4th</td>
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<td>12</td>
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<td>5th</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>6th</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>7th</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>8th</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>9th-16th</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>All skim.</td>
<td>All skim.</td>
</tr>
<tr>
<td></td>
<td>Colostrum/wholemilk.</td>
<td>All wholemilk.</td>
</tr>
<tr>
<td></td>
<td>2/3 whole, 1/3 skim milk.</td>
<td>1/3 whole, 2/3 skim milk.</td>
</tr>
</tbody>
</table>

If there is a shortage of skim milk the maximum quantity per day need not exceed 1 1/2 gallons provided suitable alternative feed is provided.

Where surplus skim milk is available steers can be made to grow more rapidly by increasing the maximum beyond two gallons per day. However, it is doubtful that heifers should be fed greater quantities as they may put on surplus fat to the detriment of production in later life.

Weaning is normally carried out at from four to six months of age but, depending upon milk supplies and other feed provided, may be done at any age beyond about three months with perfect safety.

**Rearing Calves on Milk Substitutes**

Farmers who dispose of all of their product as liquid milk can still profitably rear enough heifers for herd replacements by feeding reconstituted dried buttermilk powder or skim milk powder.

On present prices, these products cost about the same and, this being so, the buttermilk powder, when available, is a better buy as it contains from 2 to 10 per cent. of butterfat and when reconstituted is more nearly comparable to wholemilk.

**BUTTERMILK POWDER** should be reconstituted by adding 1 1/2 lb. to 1 gallon of water.

**SKIM MILK POWDER** should be reconstituted by adding 1 lb. to 1 gallon of water. A better growth rate could be expected with buttermilk powder because of the higher energy value brought about by the additional fat content. However, good growth can also be achieved by the addition to a skim milk diet of a readily available source of carbohydrate such as oat grain, and details for feeding this are given later.

Some difficulty is frequently experienced in getting milk powders to mix uniformly through water. This can be largely overcome by adding an equal quantity of hot water to the powder and mixing thoroughly and then adding the required larger quantity of lukewarm water.

**WHEY**, either fresh or reconstituted, is not a suitable substitute for milk because it is very low in protein and high in lactose and so unbalanced for the needs of a growing calf. When used it must be supplemented by a high protein meal such as one containing 40 per cent. of linseed meal.

Some experimental work has been done which supported the observation that calves can be weaned at 6 weeks and fed the milk substitute as a dry powder.

**Supplements to a Milk Diet**

**Cereal Grains**

Skim milk is very rich in protein as compared to wholemilk and is best balanced by feeding an easily digested starchy food. The best supplements consist of whole or crushed cereal grains, oats being very suitable for this purpose. Wheat bran adds to the palatability of a ration and is much used for this reason. Pollard is not recommended for calves.

Oat grain may be fed whole or coarsely crushed and alternatively equal parts of crushed oats and wheaten bran may be used.

Particularly where skim milk, fresh or reconstituted, is fed, the feeding of either of these two grain mixtures should be commenced at about two weeks of age by giving a pinch after each feed in the feed bucket or a separate container. The quantity fed should be gradually increased to a maximum of 2 lb. per day at about 10
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weeks of age and continued at that level to 6 months of age.

Feeding of a small quantity of grain immediately after feeding is also desirable because it stops calves from developing the ear-sucking habit.

Hay

Young calves will not eat great quantities of hay and indeed have little rumen development in the first few weeks of life. Nevertheless a small quantity of good quality hay should be available from a few weeks of age onward. Hay should be fed according to appetite and is best made available in covered feeding racks which are accessible at all times.

Silage

Silage should not be fed to calves under two months of age but can then be made available in small quantities if no green feed is available.

Pasture

From about two weeks of age calves should have access to short, dense pasture. In the absence of hay, young pasture may accentuate scouring and the use of portable covered hay racks is therefore desirable.

Pasture paddocks for calves should be rotated as a measure of worm control and to increase palatability. Depending upon the number of calves reared and facilities available, this may be done by tethering calves on a fresh section each day, by the use of an electric fence and strip grazing, by using four large paddocks for calves on a weekly basis, or even by running calves ahead of the herd around the whole farm.

Vitamin A

Adequate supplies of vitamin A are provided by wholemilk but this is a fat soluble vitamin and so is almost entirely absent from skim milk. Green pasture also contains adequate amounts of vitamin A, and it is only in the absence of both wholemilk and green feed that vitamin A supplementation is necessary. When required it can be added to the milk ration.

Minerals

Cobalt is the only mineral supplement likely to be required by calves in our dairying districts. It is now frequently used as a fertiliser in deficient areas so overcoming any deficiency once calves start to graze freely.

Milk is a poor source of cobalt even where the cow has an adequate supply and therefore the addition of cobalt to the milk is frequently desirable. A suitable mixture can be made by dissolving 1 oz. of commercial cobalt chloride in a gallon of water and feeding one teaspoonful of the solution for each 10 calves every day.

When the calves are weaned cobalt is still essential and, where pastures have not been topdressed, it should be mixed with the dry meal at the rate of 1 oz. cobalt chloride per 100 lb. of meal or Denmark lick at 4 oz. per 100 lb. of meal.

Water

A supply of fresh, clean water should be available at all times to calves of all ages.

Points on Management

Calfood Scours

Much scouring can be prevented by careful attention to hygiene and feeding. All utensils should be cleaned immediately after use firstly with cold water and then with detergent and water as near boiling as possible. They should be immediately inverted to allow complete drainage. Milk should be fed at the correct temperature and dilution, and the quantity should be adjusted to the age and individuality of the calf. Use of nipples prevents gulping and reduces the chance of milk splashing over into the rumen which is not functional in the first week or two and where fermentation is likely to cause scouring.

Cold, damp and dirty conditions encourage the spread of white scours. At the first sign of white scours a calf should be isolated and all milk withheld for 24 hours. After this time boiled water containing glucose may be given, and the calf gradually returned to its normal diet with diluted milk over a period of three or four days.

More severe cases should be treated in addition with modern drugs.
Worm Control

The worm problem can be minimised by using a rotation of pasture paddocks and by keeping calves in a healthy condition. Effective drugs are now available should treatment be necessary.

Dehorning

All heifer calves being reared for the dairy herd should be dehorned at an early age. The caustic stick or dehorning paste are best used in the first week of life or the hot iron method at about two weeks of age.

Castration

Bull calves to be retained for meat production beyond 3 months of age should be castrated at about two weeks.

Care after Weaning

All too frequently calves are well-reared in the first four to six months of life and are then weaned at a time when pastures are drying off, and are left to fend for themselves on poor pasture. It is most desirable that calves be kept growing at a reasonable rate at this time although they should not be permitted to become coarse.

Under our conditions heifers should be mated to calve down at about 24 months of age, and leaving them empty for a longer period results in economic loss. For calving at 24 months old to be successful heifers should be kept growing after weaning. Even the heavier breeds should then come into oestrus regularly by the age of 15 months.
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