perhaps to a greater extent than farmers of any other dairying country. Under our conditions pasture can be entirely substituted for milk for well grown calves between six and 10 weeks of age. By this time the calf's intake from grazing is adequate and it is digesting the pasture as well as a mature animal, provided the pasture is leafy and clean. Rotational grazing seems the best means of ensuring this. Incidentally, new devices which have come on the market in the last year or so which provide a means by which calves can suck their milk from a large can have been found by some farmers to facilitate the adoption of rotational grazing at an early stage.

If we try to substitute an all-pasture diet for milk too early, say at two, three, or four weeks of age, we get an ill-thrifty, pot-bellied calf, if it lives at all. The digestive system has been stretched to accommodate the bulky feed, but not enough of it can be digested and utilised to provide the nutrients necessary for good growth.

Starchy Grains and Meals

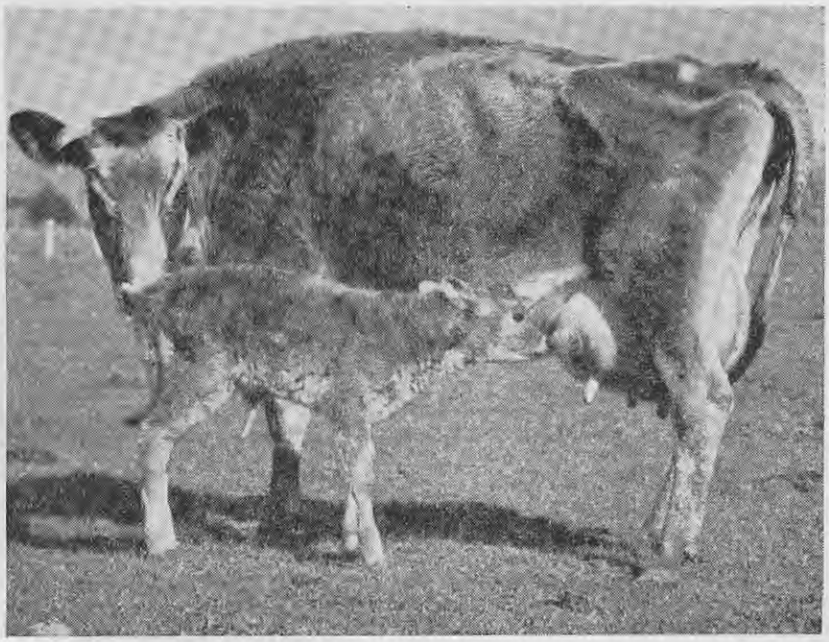
From birth some time elapses before a calf can make good use of starchy foodstuffs. But by about the third or fourth week this capacity is developed in most calves sufficiently to make it worth while adding this type of foodstuff to the ration as a milk replacer should nothing better be available. Meals made up largely of cereal grains and their by-products, with oil seed residues such as linseed cake and small quantities of meat or fish meals, have been widely used with good hay in many countries to save milk in calf feeding. The inclusion of an appreciable amount of dried milk solids improves mixtures of this type.

The system usually advocated is to introduce the calf to very small amounts of these feeds in the third or fourth week and gradually to substitute them for whole milk, but to feed some whole milk for eight to 10 weeks.

Such a system can work quite well under good management. Growth rates are often rather slow. Care has to be taken not to rush the substitution and cut off the milk too soon or results can be disastrous. Calves vary from one individual to another in the speed with which they take to new feeds and in development of the ability to digest and utilise them. So it is particularly necessary in this type of feeding to be prepared to treat calves as individuals and to keep some on more whole milk for longer if they are not thriving.

The Use of Milk By-products

The butterfat in milk supplies energy to the calf and also acts as a carrier of the fat-soluble vitamins A and D. Apart from this a small amount of fat seems to be necessary in the diet of a very young calf for reasons not well understood yet. However, as the calf ages the need for butterfat declines; and as most butter factory suppliers on home separation know very well good healthy calves can be reared on skim milk plus good pasture after adequate whole milk feeding for three to four weeks and some whole milk to five to six weeks of age.



A newly born calf's rumen is not developed to handle bulky fibrous feeds. The answer is milk, providing lactose, which the calf is already equipped to use.

Under this system of feeding the calf normally receives adequate vitamin A as carotene from pasture. Being out in the sunlight, the calves do not need extra vitamin D in the feed.

If we try to substitute separated milk for whole milk too early in the life of the calf, for instance, in the first week, trouble occurs. The calf suffers from the lack of a small amount of fat, may run short of vitamin A, and the food may be too dilute for the very young calf to get its nutrients within the limits of its appetite for the bulky feed.

As a by-product from buttermaking we are now producing in New Zealand quite large quantities of buttermilk powder. A typical sample of this product gave the following analysis:

	Per cent
Moisture	4
Fat	10
Protein	35
Lactose	42
Ash	8

Essentially, the composition is similar to that of skim milk powder, except that the buttermilk powder has an appreciable amount of fat, an amount which may vary from sample to sample. The buttermilk powder can normally be bought more cheaply than skim milk powder.

Buttermilk powder has been shown to be a very useful milk replacer for calf feeding, and an increasing number of farmers are finding a place for it. While the feeding value varies a little with the fat content, useful approximations are:

1 lb of buttermilk powder provides the same available energy as 1 gallon of skim milk.

2 lb of buttermilk powder provides the same available energy as 1 gallon of whole milk.

Thus if 1 lb of buttermilk powder is mixed with 1 gallon of warm water the product can be used in the same way as liquid skim milk. This suggests the following feeding procedure which has proved reliable:

Weeks	Foodstuffs	
0-3/4	Whole milk	Pasture
3/4-5/6	Whole milk, buttermilk-powder-water mix	Pasture
5/6-8/10	Buttermilk powder	Pasture
8/10 on		Pasture

Within limits of convenience, the dilution is not important, provided we can think in terms of using 1 lb of the buttermilk powder where we might have used 1 gallon of skim milk. Under good management and where ample supplies of pasture are available, once a day feeding from one month onward seems to give satisfac-