

Rearing calves is not difficult, but requires exactness and Solmin.

Calf rearing can be easy, or difficult. It is a specialist job requiring knowledge and skills. Correctly reared calves continue growing more quickly after weaning than poorly reared ones, and the eventual size of adult animals can relate to their weaning weight. It is farmer knowledge of this that encourages the high bidding at calf sales for the best well reared calves.

Which calves to buy and rear?

Make sure that all calves and animals come from TB and disease-free areas.

If newly born calves have sheens like these, they are less likely to have health or growth problems. Recently born calves should have clean bottoms, small dry navels and have been well fed on colostrum for about four days. Wet, soft, navels indicate that they are younger than four days.

The choice of calves is between bulls, steers, or heifers. Some may ask, why steers, when bulls have the highest average return per kg of carcass weight. It is because there are times when bulls are a danger, can wreck gates and fences if not electrified, or could get your own or neighbours' animals in calf.



Some might ask why rear beef heifers when bulls grow faster and bigger? One reason is because heifers mature more quickly for selling sooner in October before the schedule drops, or before the second winter, and can be more easily sold for the local beef market. Beef heifers can be mated at 15 months which is standard practise for 99% in New Zealand's seasonal milking, provided they weigh at least 250 kg, and are well fed so gaining about a kilogram a day during the mating period.

Friesian heifers can be mated to a Hereford bull and rear their own calves and more, a lot more easily than feeding them manually, and can then be sold as prime beef. They can be mated at 15 months which is standard practise for 99% in New Zealand's seasonal milking, provided they are at least 250 kg and gaining about a kilogram a day during the mating period.

Another system of rearing when the price of calf milk replacer is high, is buying good identified and recorded dairy heifer calves to rear and then calve them at two years, rear three or four calves on them, or if there are facilities, milk them and feed the fresh warm milk. The calves can be weaned in spring at six to eight weeks of age, after which the dams can be sold to dairy farmers, many of whom are wanting more to milk in late spring to eat the extra spring grass. Buyers pay top prices for well-bred identified dairy cows.

When transporting just one or two calves, each can be put into a large bag, preferably jute, and carried in the boot (trunk) or station wagon. Have the calf's head protruding and tie the bag loosely around its neck. The calf will be easier to lift and will lie down all the time, unless the calf is small and the bag is too big.

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Correctly fed pastures and minerals are essential for growing animals

These same-age yearlings came from the same farmer.

The better one on the right was grazed in a mob of 40 on peat land that I developed and managed with correct CalciumMagPlus and reactive phosphate fertiliser, and fed Solmin through an on-line dispenser.

The worse one on the left was one of 19 on a better mineral soil than peat, but using the government department of agriculture advice of no lime and soil test based superphosphate fertiliser mixes, without Solmin. It is lacking copper (brown colour), zinc (hair on crown and top of neck), sodium (rough hair and lack of sheen), magnesium (sad and tired eyes), iodine (swollen gland on side of jaw that can't be seen) and selenium (low head and low tail because of weak muscles). Its slightly jaundiced brisket



indicates liver damage, most probably from facial eczema damage, which didn't occur on the good farm because it got about 8,000 kg per hectare of agricultural lime, and then 1,000 kg per annum to keep earthworms up to number to eat the thatch on which facial eczema spores breed. Look at the stronger frame and legs of the Solmin fed one, thanks also to correct calcium and its synergisms. Cows fed Solmin from birth can produce 15% more milk, so Solmin costs nothing. Calves seldom need drenching.

Solmin, was developed in the 1980's by me and our dry stock share farmer son-in-law Ian Dobbs, who reared 160 calves each year and farmed dry stock on our second farm on Greenhill Road, Hamilton. Even after 28 years there is no other mineral mix as complete or achieving its results, or that has been surveyed as thoroughly. For more information on this, see the last page.

Because the calf on the right was on correctly limed and fertilised pastures and getting Solmin, it was doing much better, without worm drenching, so the owner moved his others to it. This photo was taken the day after they arrived. They were lighter and less healthy, so will produce less milk all their lives, and be a little harder to get in calf each time.

Sharemilkers and beginners

If planning to go sharemilking or to increase your number of cows, you can buy and rear top quality heifer calves and pay grazing for two years, to lower the cost of buying a herd. If sharemilking and planning to buy a farm, you can rear more calves and graze them off, to increase your assets.

Rearing on first calvers

Calves can be bought and three or four calves reared on each first calving cow, and weaned at seven to eight weeks. After weaning the once-bred heifers can be fattened and sold before the grading system down-grades them and the schedule drops. The eight week old weaned calves then grow better than when run with their dams on slightly less and/or poorer pastures, partly because the dams select the best, competing with their own calves.

Rearing three or four calves on a cow can be difficult getting the cow to feed all, but patient people do it well. Cows usually identify calves by smell more than by sight, so put a little molasses or something on the nose of each and on the cow's nose. Attaching collars to the cow's calf and one other, held together by a rope or chain about 600 mm (2') long helps avoid favouring their calf. When settled, do the same to another.

Rearing on calf loving cows

Some dairy farmers select cows which are used each year to rear the calves, by drafting them into a pen at each milking and letting all the calves in to suck, initially twice a day, then after all calves are three weeks old, once a day and the cow is milked once a day. Check all cows to ensure that they are feeding all calves, and that all calves are getting enough milk in total. The calves do well, the cows milk well when milked after weaning, but can be harder to get in calf if they get thin from over-producing. This is a low-cost, low-labour, very good system.

The cows chosen must be ones which don't fret all day, don't kick the calves (having a pen or yard only just big enough for the cows and calves reduces this), and which will let their milk down to

machines after weaning the calves. With this system there is no bonding or favouring. Check the cows every few days for mastitis. It works well. I've done it, but the farm must be such that the calves can be grazed completely away from the cows, both during feeding and after weaning for several months or up to a year if possible, or sucking from any cow in sight can occur.

The microflora (bacteria) which develop in calves' rumens to digest the pasture are passed down to them from adult cattle which is one reason why calves on cows, or set stocked at two or three in paddocks rotationally grazed by cows or old stock, do better. Paddocks used for young calves must be grazed by mature cattle at some stage for this reason.

Small farm, lifestyle and hobby rearers

For dairy farmers who rear calves annually it is routine, but it can be a difficult for hobby farmers who buy, rear and graze a few calves each year on their few hectares. The profit margin on rearing calves is low, so all avenues should be investigated. Milk powder and calf milk replacers are expensive, so only top quality animals should be reared to sell at higher prices.

To feed calves yourself, you may be able to buy colostrum from dairy farmers, or milk cows by hand or with a small machine, then after weaning sell the cows to dairy farmers who have surplus pasture. Sharemilkers sometimes have to buy cows in spring to keep their numbers correct for their contract. Selling direct saves commissions.

Some buy or hire cows to rear three or four calves each. It is a busy time to start with, then less work, but never none. They regularly need to be checked.

A calf crib can be built so that the calves can get to a muesli feed trough and hay. These encourage more consumption of solids so get the digestion started sooner.

If they don't eat the muesli and hay immediately, sprinkle a little Solmin mineral mix over them. I recommend Solmin a lot for good reason because in New Zealand there are so many mixes that are bad because they don't have salt and contain manganese which can be needed in USA and UK, but never in New Zealand. Here it stresses animals and makes bad quality milk. Read Manganese in Minerals in Soils & Pastures and See Dairying.



There are three or four calves on each cow, depending on her production.

Once calves are trained to come to your call with the cows, count them every time and if any don't come go and look for them. When scouring or unwell they can stay lying down low. Try to get a close look at all every day.

Try for a guaranteed return by trying to buy from farmers to rear their top quality identified and recorded calves to sell back to them at weaning, or as springers, on a fixed date at a fixed weight-related price. The reason for identified and recorded calves, even if planning to sell back to the breeder, is because the farmer may move or change his mind so you may have to sell them elsewhere.

Consider rearing autumn born calves, when the weather is better.

Aim to buy calves so that the number you are rearing are close to the same age.

No calves, just grazing

Consider grazing heifers for dairy farmers on a weight gain basis. The monthly cheques coming in for grazing make life easier. The grazier usually pays the transport, does the weighing, drenching and provides the bulls.

If you are too busy or unsure about rearing, or don't have the facilities, then forget it and buy weaners. Sometimes it is more profitable to buy yearlings. See Beef > Beef Profiting.

Cow management

Successful calf rearing starts with the dams not being too thin or too fat, and on a rising plane of nutrition from drying off to calving. Calves from over-fat or poor condition, mineral-deficient cows get a bad start, especially if the cow goes down at calving, so that the calf doesn't get colostrum. If the cow takes a long time to deliver the calf, it can be handicapped, or even die from suffocation.

For cows to be in optimum condition means rationing cows after drying them off at a condition score (CS) of about 4.8, and feeding them so that they calve at no less than 5 for cows and 5.5 (1 to 10 NZ scale) for first calvers a month before calving. This gives bigger calves, and the first calvers get a better start in the herd.

If cows are too fat and/or fed too much high-clover pasture in the weeks prior to calving, they are more inclined to suffer milk fever, and giving birth can be a slow process. Fat cows and those fed too well in the last six weeks before calving can sometimes have calves that are too big, with the associated calving difficulties.

If on a low magnesium farm see the chapter on Magnesium in Minerals in Soils & Pastures.

Spread Mg on the pasture or in hay or silage for at least three weeks before calving, at the rates recommended for your area, or as published in the Low Cost Dairying booklet from Gallagher retailers, a publication every dairy farmer should have. If cows are low in Mg at drying off, then supplement with magnesium at low levels. Some magnesium oxides are not as good as others, so make sure that you are feeding a top quality one, which is soft, finely ground and without toxic impurities. Insist on an analysis. Some have contained cadmium. See Elements > Magnesium.

If all these things are done, and the soil's major and minor mineral balances are correct, calving should go peacefully, with no more than two per cent of cows going down. If your percentage is higher than this check everything and see Animal Health > Milk Fever.

It is difficult and expensive to increase cow condition by much on pasture during winter, so spring calvers should be dried off before they get too much below 4.8, with the aim of gradually increasing their condition to about 5 by calving.

Calves can die within the first month of being born because of mineral deficiencies in the dams before birth. Deficiencies can be caused by not feeding Solmin, insufficient feed for the dam, or poor quality feed lacking the necessary minerals, especially selenium, copper and iodine.

When dry cows are on maintenance diets of about 7 kg of pasture dry matter per cow, per day, they receive only about 0.08 grams of pure copper per day, when they really need about ten times this to build up the levels in their own liver, and that of the calf which is born with high levels of copper and selenium. So get liver tests and if necessary supplement with copper or whatever is required. Copper blood tests are inaccurate. See Elements > Copper. The liver must be measured which is not nice to do on live animals, so culls' livers should be tested at the abattoir in late summer and winter every year when they are slaughtered. Aim for levels of about 900 nmol per kg, with a minimum of 200 nmol and a maximum of 2,000 nmol. Healthy new-born calves are usually born with adequate copper levels and can have 3,000 nmol in the liver. There is very little copper in milk, so new born calves don't get much until they start eating solids. For this reason, calves also benefit when given a good soluble mineral mix from the first week.

Many cows calve at night. To change this and have most calve during the day, feed them at night, or no earlier than 4 pm. Start doing this two weeks before calving and ensure that there is no feed left to eat the next day.

Bull beef

In New Zealand about half a million Friesian bulls are reared each year for export for hamburger meat. Bulls grow faster and have firmer meat which hamburgers need to hold the meat together, so are in demand and in the right conditions are more profitable to rear than steers.

For the information of overseas readers, Friesians are New Zealand black-and-whites which came from England in the late 1800's. They are a bit smaller than Holsteins, but have bigger bodies designed to hold more of the bulky pasture on which they have been developed. They also have stronger legs and wider muzzles for faster grazing. Most of all they mature more quickly so can be

sold sooner. Bull beef farmers aim to buy them.

Bull and heifer calves from high Breeding Worth cows which was Breeding Index until I suggested the improvement to LIC (See Author), grow faster than those from low BW ones, so aim to get your bull calves for beef from good herds, even if it does mean travelling some distance for them, rather than rearing what you have or can get locally.

If the heifers or bulls are to be sold before slaughter age, get (if possible) and keep their records to achieve better sale prices.

Rearing top quality heifer calves from the popular breeds is usually profitable, and if they are your replacements, they determine your future production per cow and per hectare so it is important that only top quality ones are reared. The best calves are those that get a good start in life by being born on clean pasture from healthy, well cared-for cows that are fed the best soluble mineral mix in the drinking water. Some mineral mixes are plain bad as they lack some elements, and others because they contain manganese which is in excess in most of New Zealand and is in Palm Kernel Extract (PKE). More than 2 kg of PKE per cow per day can raise levels in the livers excessively. I would not buy and supplements because it is not profitable to do so in New Zealand. See Feeding. Pastures should be fertilised correctly, including the application of trace elements, based on pasture tissue analyses, to produce calves with a healthy sheen.

In deep snow-covered areas, calving may need to be in barns on peelings, chips, straw or a mix, but it must be coarse, dry and loose, not packed down tightly or soggy.

Buildings and Shelter

Decide how many calves you will rear. Plan the building and manure disposal system. Buildings must be able to be opened on the sunny side. Calves reared in dry, sheltered (not warm) conditions grow 30% faster than those in wet, exposed situations. Calves need protection from cold winds and rain because they have a high surface area (skin) to body weight, and little body insulation (fat). Barns without adequate ventilation can be death traps. Providing adequate shelter for calves until about weaning age in cold areas is profitable during bad weather, but not if in barns with inadequate ventilation, because pneumonia and other problems can exceed the benefits. Check for smells at the back of the calf shed early on still mornings. If you can smell calf or ammonia, increase the ventilation by opening the back near the top, even if means loosening and bending some of the cladding outwards.

Hedges are excellent shelter, and good hay is an excellent supplement to pasture, and helps to develop the rumen, but should be spread along fence lines, not all over the paddock as done here.

This pasture is too short. Grazing it will increase internal parasites because they graze too close to the dung pats.

Young calves and all in really bad weather, need an old hay barn after the hay has been fed, a wool shed or old cow sheds. If no building is available, then get



prices for a low-cost one open to the sun. Aim for at least one square metre of covered shed space per young calf, where they can come and go in temperate climates, then from about two weeks of age encourage them to sleep out in sheltered paddocks. For small numbers, Gavin Poyner of Northland suggested using clear plastic over a frame to keep them dry.

In freezing climates where all the calves will sleep in the building they should have up to four square metres per calf until grazing is available, but possibly calving and calf rearing should be later into spring. Calves should be grouped by age unless there are only a few and there is plenty of space for them.

A building with only an open front will not be ventilated enough unless it is not very deep from the front to back, or has a high roof as in round hay barns. Buildings must face the sun. If rain comes from the same direction, then install a hinged flap that can be let down to stop rain entering, but don't leave it down longer than necessary. Buildings which can have both ends open in degrees are good.

For rearing large numbers of calves several smaller buildings, which calves can come and go from, dotted around the farm are better than one large building. Buildings can be rolled corrugated iron huts or barns well anchored to the ground. To avoid overcapitalising, barns should be used for other purposes such as hay or implement storage after seasonal calf rearing.

To rear dairy replacements with a minimum of labour and capital costs, they must be reared in mobs which also helps start the selection process of keeping and breeding from the best, and they must start being allowed to graze from the first week, unless pastures are snow covered.

The very few New Zealand farmers who tried hutches or stalls decades ago with the aim of preventing diseases from spreading, soon gave them up. Would you bring up your children like that? Treat your animals as you'd like to be treated, and they'll reward you. Even in snow, animals prefer to be out and moving around when the sun shines rather than being cooped up, but they must have access to dry cover. Wind shelter is always necessary.

To avoid mud, build up the area around the building with a layer of sand or free draining soil, which should then be grassed.

Bedding can be wood chips, bark chips, shavings, sawdust, straw, shredded paper, in that order of preference. A thin fresh layer should be added as required, usually daily if large numbers are reared. Don't use mouldy hay for bedding. The mouldy air is bad for calves, as is nibbling at it. They love roughage and will nibble at anything. Make some top quality hay just for your calves. This is described later.

Bedding from CCA treated timber is poisonous, so use untreated bedding materials.

The bedding must be kept dry so a free draining base is essential. Impervious surfaces like concrete are the worst, because the liquid has nowhere to go, so rises up through the bedding and makes a soggy mess. A calf rearer boasted that he had a rubber surface that he washed daily, but it would be damp and cold so unsatisfactory. Bedding on sand is best, or porous soil second best, but they should be changed as required. If bedding is on a firm base, it should have a good fall to a drain which must lead to a distribution pond.

Where calves stand to drink, galvanised grating over concrete is good, but the slope on the concrete to drainage must be at least 1 in 10, with good washing and muck disposal facilities. Where calves are brought to a feeding area concrete is essential, but not where they sleep.

Excellent calves are reared by taking milk in mobile feeders to sheltered paddocks well away from the milking shed, the calving paddocks and polluted calf paddocks. Valleys, trees and/or hedges can provide the essential shelter calves need. Even if in buildings and/or well sheltered paddocks, their hair can stand on end and they can shiver in cold weather through lack of sodium and magnesium in particular, and other minerals. Feeding Solmin in the water has stopped calves shivering within a few days.

Keep things clean. Some get away with little cleaning, but not in warm climates, or after having reared calves for a number of years in the same facilities. Ensure that all calves are outside before cleaning out the bedding, because of the dust, mould and ammonia.

Covers

Calves at birth have thin skins and very little fat insulation, so low cost calf covers can be good value for winter born calves in freezing areas, unless on well sheltered sunny areas. Trials in both islands of NZ gave no benefit, while Massey University trials by Dr Colin Holmes reported less stress, but I don't know the full details of either trial, i.e., type of cover, time of year, how cold it was, amount of shelter, how well fed, whether minerals were fed, etc.

I prefer wool or canvas covers to plastic. If they are not insulating, they are not keeping warmth in and cold out. If covers are used, don't remove them until it is dry and warm, which is normally in very late spring.

Store them in a clean environment and treat them against lice at the time of storing, and again before re-using them. Lice eggs can wait for the warmth of an animal to hatch and multiply on animals under covers without you even knowing.

A client on a high altitude farm near the centre of the North Island wanted to buy covers to stop his one month old Holstein-Friesian bull calves shivering in frosty weather. I suggested he give them mineral mix in their milk at 0.006% of live body weight in the milk or in warm water immediately after their milk. Shivering stopped in three days, making covers unnecessary, and the calves grew

much better.

Grazing layout

To get calves to grow well, they must be provided with, and encouraged to eat, palatable pastures.

In fine weather calves should be out grazing within a week of birth. To achieve this means having good pastures well fenced.

Aim to have mobs (groups) of no more than 50 calves, and electric fence subdivision of say two hectare paddocks into four paddocks or more for each mob, to allow a fresh area at least every three days and a 12 day or longer rotation. These are minimum requirements.

Two electrified white polywires on tread-ins and hand driven fibreglass corner posts are usually sufficient. White spring gates are ideal, because they are easy to erect and remove, and can be stretched and used to guide the calves in various directions.

There is evidence that the high conductive white polywire, white spring gates and white tread-ins give better animal control, because they are much more visible. Cattle can't see orange.

The paddocks can be laid out in a wagon wheel or pie fashion to save having a lane, but when a lane system can be used make it no wider than four metres to water troughs. This will discourage the calves from hanging around in the lanes and making mud.

A water trough should be provided in each paddock, in the race, or, in freezing conditions, in a building to which calves have access. Water should always be spotlessly clean.

Calf feeding systems

Before embarking on calf rearing, look at all methods and speak with users of all systems. Forget bucket and trough feeding. Calves can drink so quickly that way that the rumen bypass doesn't close, so the milk can go into the rumen, causing some to die, while those sucking milk through a recessed small-orifice teat like a cow's, thrive.

Some researchers have claimed that bucket feeding is just as good as using teats; however, they may have compared them with the old style hard large-hole teats. Also, researchers usually have perfect conditions; small numbers of calves, a vet on hand, and quite often set up the trial to last until weaning and then don't know what happens. Bucket-fed calves and ones on large-hole teats usually suck each other more than small-hole teats fed ones. If they suck udders and continue sucking them, the sucked one is highly likely to calve with high somatic cell counts, mastitis and/or blind teats.

Saliva is essential for digestion and plenty is made when sucking from a correct teat at the correct height, whereas almost none is made when drinking from a bucket, and very little is made from large orifice teats.

Use systems which have teats set at two-thirds the calf's back height. Small-holes as in Milkbar black teats, mean that calves have to suck harder and for longer, giving more saliva for better digestion and less sucking each other afterwards. Trials in NZ and Japan gave better grown calves on Milkbar Teats.

There are calf feeders mounted on tractors or all terrain vehicle's (ATV) which poke through the fence for calves to drink without one having to open and close gates and be mobbed. Some on front-end-loaders can go over fences.

Feeders on wheels for about twenty calves are good. Several can be towed around the farm in tandem by a farm bike or ATV to the calves in different paddocks.

After about two to three weeks, when the calves have settled down and are drinking well on twice a day feeding, change to once a day.

If you don't have a soluble mineral dispenser, in the morning give them as much warm water as they will drink, with Solmin dissolved in it at about 2 grams per calf, increasing to 4 grams (0.006% of live weight). Otherwise add the minerals to the milk, because calves do much better when supplemented with minerals from the first week.

Feed them their milk in the late afternoon, so that they sleep full, to continue growing over night. Calves on once a day afternoon feeding do better than those on twice a day. They seem to get out and graze more in the morning. See Sucking below.

Calves playing around with the teats instead of sucking, or changing from teat to teat, can do so because of having mouth ulcers from hard teats with hard points on the end, or be suffering digestion problems. Change to Milkbar teats with recessed ends, not pointed ends.

Sucking

Even naturally reared calves on cows will sometimes suck each other, especially if the cows stop them sucking their teats if sore or when the milk is finished. When artificially rearing, pointed teats with large holes which allow fast drinking without sufficient sucking and saliva absorption, will encourage sucking.

Feeding calves with buckets or troughs (without teats) encourages calves to suck each other, however, even when using teats some will still suck ears and udders. The sucking of udders by calves, and later by heifers, can start hair balls, lengthen and distort heifers' teats, and encourage the development of milk and then udder infection, which can cause them to calve with mastitis and/or high somatic cell counts.

In freezing areas the moist ears of those sucked can get frost bitten.

Giving calves their ration of Solmin in warm water after their milk to suck through teats (which also washes the tubes and teats), and/or feeding them top quality hay or silage to discourage sucking, are ways to get their minds off sucking each other.

Moving them to new pasture, also encourage them to eat rather than suck each other.

After weaning, if some persist in sucking, use a commercial weaner plate, but some can suck with their head on an angle and some plates fall off. The best ones are large. Some farmers have success with 300 mm (12") of sharpened 4 mm (8 gauge) soft wire. Don't use 2.5 mm (16 gauge) high tensile because it can't be shaped as easily and catches in things more easily.

Push the wire through the bone gap in the nose, which can be felt with your fingers. Gently twist the wire around the front of the nose, cross it over a few times and leave the two spikes protruding upwards and forwards. Remove them at about one year of age. It is advisable to use a veterinarian (perhaps a local anaesthetic) and to disinfect the spike and appropriate area of the nose.

Animals with any form of anti-sucking device must be checked to ensure that they don't get caught up by the nose in a conventional fence (electric fencing is safer), tree branch or other obstacle. Ensure "weaners" don't restrict feeding in any way. Observe animals regularly to ensure this and don't use them if grazing scrub or brush areas.

Farmers who have prevented sucking completely have heifers calving without mastitis and with very low somatic cell counts. First-calvers calving with mastitis produce less all their life.

Prevention is best, so use the best, small-bore teats, the best minerals, and top quality pasture, hay and vacuum silage. See Silage & Hay in www.grazinginfo.com

Colostrum - preserving and storing

Colostrum is the first very rich milk from the first eight milkings, not days, (ten milkings from first calvers and once a day milking. It must not be put in the milk vat, milk silo or tank. It has twice as much good elements as whole milk and is a good food for even older calves. The colostrum of Jerseys and Guernseys is even richer, especially in calcium. Older cows produce better colostrum than first calvers, and colostrum on the first day of calving is the highest in quality. High producers' colostrum is not as good (as concentrated) as lower producers. Colostrum from induced cows is not as good as from full term cows. Try to avoid inducing by feeding cows adequately all their lives on minerally balanced pastures, supplemented with Solmin.

Ensure that calves get at least two litres of new colostrum soon after birth, and certainly within six hours. Calves are born with no immunities, but get them from the colostrum; however, the immune transfer can occur only if the calf gets new colostrum within six hours of being born, but the sooner the better because the ability to absorb the immunity decreases from birth on.

Colostrum is an excellent feed for all age calves, so can be stored for feeding later.

- It can corrode metal, so store it in clean stainless steel, or clean plastic vats or drums.
- Natural yoghurt can be added to start the preserving process at one litre per 20 litres of warm colostrum and stir thoroughly. Leave over night. The next day this treated colostrum can be used to treat larger amounts in vats or larger drums. Natural yoghurt powder can also be used.
- The preserving process can fail, so have more than one container to reduce the possibility of having it all go bad.
- Some acids and bacteria can be used, and commercial colostrum preservers are also available.
- Stir the containers thoroughly **twice every day**.

- Never mix separate batches of different ages together. One can interact with the other and separate out.
- If it separates with the fat floating and the whey going to the bottom, it must be discarded. This can happen for no apparent reason, but avoid it by being more thorough next time.
- I repeat, use more than one container in case something goes wrong with some and so you can feed the oldest first.
- Limited amounts of ordinary milk can be added to the treated colostrum and will be preserved with the colostrum. Stir it in and don't add too much, which can over-dilute the natural preserving qualities of colostrum.
- The surface should remain smooth and not bubble.
- Never save colostrum containing antibiotic treatment, detergents, sanitisers or blood. Never feed milk containing blood to calves. It can contain E. Coli and cause calves to scour.
- Handle it in a sanitary manner to prevent contamination.
- Keep it loosely covered to keep out dust, flies, rats, mice and birds.

Colostrum can be fed ad-lib and cold, to month-old calves (not younger ones) from 200 litre (44 gallon or 54 US gallon) drums with teats and tubes fitted, or diluted at two parts to one of hot water and fed once a day.

Milk and colostrum that are over-diluted with water are less inclined to curd in the stomach, resulting in digestive scours, so don't over-dilute and watch for scours.

Pure fresh colostrum can be frozen and warmed more than six months later, and fed to newly born calves unable to get colostrum and achieve disease immunity. Freezing colostrum doesn't lose much feed value, but is not as good as fresh. Always have some in your freezer. Colostrum can also be bought from some suppliers.

Change from colostrum to milk and/or milk powder (milk replacement) gradually.

Fresh colostrum not sold at the dairy company premium price, can be stored and preserved and fed for months. Cold, ad-lib colostrum is fed by some from after two weeks, but some calves don't do well on it, so have to be removed and fed warmed milk. Watch for them and act quickly.

If drums run out of milk and the calves suck air, they can become bloated.

Something we don't always realise is that whole milk (not just colostrum), fresh from the cow, contains antibodies as well as leukocytes (white blood cells) which may aid in preventing infections.

Milk quality

As with water, if you would not drink it, then don't expect your animals to do so. This means don't feed them milk containing a treatment such as animal antibiotics. It may cause scours, antibiotic resistance, or be inadvertently fed to bobby calves before slaughter for meat, so suffer a penalty and possibly international sales losses, but even without a penalty, it should not be fed.

Teaching to drink

Young animals make attachments very quickly, so if they are left with their mothers for too long they can become almost impossible to train to artificial rearing. Remove the calf from the cow within 24 hours of birth (12 hours is better) and place it in a warm building. It should have been well fed, so leave it for 12 hours without anything to drink and then train it to suck from a warmed teat. If it has not drunk, give it colostrum immediately.

Navel ill

Check navels and disinfect them with iodine or similar if necessary. A high percentage of newly born calf problems are caused by navel infection. Avoid calving and transporting calves in dirty conditions. Clean the calf trailer or tractor tray regularly. When handling calves, avoid damaging the navel.

Navel ill describes conditions affecting the umbilicus (navel cord). The navel cord supplies blood, oxygen and nutrients until birth. After it breaks the navel should dry up, but is open to infection, which can cause bacteria to spread through the calf's joints (they swell) and body, causing severe illness and sometimes death. A vet with antibiotics should be called.

Feeding

After transporting, allow them to get over the stress by resting for a few hours before trying to feed them. If they are hungry, feed only a litre or two until they have rested and settled down.

When teaching a calf to drink, use a warm, moist teat and ensure that the milk is warm (42°C or 108°F). Be gentle. Use your CLEAN, warm-milk-dipped fingers to lead it to the teat; never fight with it or try and win by strength. They will usually start drinking within seconds. If they don't after a few tries, then leave them for a few hours and try again. Don't persist for too long at any one time because this can upset the calf and make it fear you and resist even more.

Leaving them without milk for a little longer is not cruel. Quite often cows, after giving their calves an initial drink, will leave them lying down while they go away and graze.

At one week of age don't feed them more than 10% of their live weight, e.g., 4 litres a day to a 40 kg calf and by five weeks only 7% of their live weight. Increases should be gradual and no more than half a litre each three days.

Calves do much better when supplemented with the best correct minerals because pastures can't take up enough minerals, so after the first week add the best dissolved mineral mix to the milk at 2 grams (0.07 oz) per calf or 0.006% of their live weight per calf. I've not seen or heard of cow or calf bought feed (BF) that has sufficient minerals, so soluble minerals make up the difference and give better calves for no extra cost, because good ones save parasite drenching and make calves grow faster so are worth more.

Some steam flaked or pre-digested concentrates are good, however be careful of soya beans in BF. In Canada calves died when fed soy from the corner of a container because the corner had not been heated well enough. The soy must be properly heated before mixing into rations and there is no guarantee that this will always be done correctly.

See the Rearing Costs spreadsheet in www.grazinginfo.com

Aim to have calves eating 1 kg of muesli BF per calf, before four weeks of age. It is cheaper than milk or milk replacers and it helps with early weaning because it can be fed after weaning. By about five weeks of age they can be eating 1.5 kg. After weaning reduce it gradually to encourage pasture consumption.

Jersey calves, being smaller, need less. Jersey milk is richer so less should be fed. Don't dilute it with water because doing so adversely affects curding in the stomach and so digestion. Just feed a little less.

Calves grow much better on milk than on most milk replacers. Milk replacer powders vary in quality. There have been disasters with both milk and animal fat based (tallow) milk replacers. Poor calf growth and problems can occur when the base products are old or rancid (smell them) or levels of any item are too high or too low. Ca levels should always be higher than P levels - preferably nearly double.

Make a note of the levels of all ingredients and percentages in powders that give you good results, then, when a discounted milk powder is offered to you, you'll know what to look for. When calf rearing on a large scale it pays to buy new batches well in advance, and try some on few calves for a week before giving it to them all. If general digestive problems occur, change the brand of powder and BF immediately in case it is the cause.

Remember to encourage the development of calves into ruminants right from the beginning. If after weaning they develop pot bellies, it can be from the rumen not having developed well enough through feeding too much milk and BF for too long, and/or a lack of cobalt. The calves reared in pens in North America can be long legged and without large rumens, but some is genetic from being selected from concentrate-fed high producers, rather than from all pasture-fed high producers.

Good pasture, good hay, good silage, yeast and the necessary minerals all aid digestion.

Once the calves are out grazing well, it is best to take the milk to them, rather than bring them to the barn - unless the barn is centrally situated with plenty of paddocks around it, but remember to give them a fresh paddock every day or two.

Calf rearing is best done by women, because calves respond to thoughtfulness and tender loving care, and women are usually more gentle and thorough. However, some of these attributes can result in overfeeding with milk and BF, and calves then doing very poorly when weaned on to pasture, because they had not been eating enough pasture when overfed on milk and BF. Some of the worst weaned calves I've seen were over-fed with milk and BF until weaning, without hay, and with little

incentive to graze. After weaning they crashed, developed pot bellies and deteriorated rapidly. Putting them back on BF, minerals and top quality hay and pasture, if available, can save them.

Feeding too much milk and BF for too long also increases the possibility of well-grown weaned calves suddenly getting pulpy kidney.

I've seen clients' well reared heifers thriving without having had a single worm drench, but they got all of the correct feeding and care. At a field day in late November on Gary Wilson's farm at Matamata, a farmer asked how often the four month old calves had been drenched. "Not at all" Gary replied. "How is that possible?" was then asked. "Doing what Vaughan recommends," Gary replied.

Sahiwals and their crosses prefer warm milk so adapt well to automatic feeders. They move as a group so may need more than one teat per 20.

Spend at least 10 minutes a day to keep things clean. Some get away with little or no cleaning, but not in warm climates, or after having reared calves for a number of years in the same facilities where germs increase.

Some rear their calves on as little as one and a quarter bags of good, free flowing milk powder (auto feeders must have free flowing milk powder) through an auto feeder, by adjusting the powder ratio down to 70 grams per litre and weaning at 110 to 130 lb live weight (depending on breed), but it is much better to feed 80 grams per l and rear to 130 to 170 lb live weight (depending on breed), which will take closer to two bags. Don't guess the powder to water ratio, measure it to ensure that it is correct. A weak mix tastes insipid, and can cause scouring because it doesn't coagulate in the stomach. Decreasing the water temperature reduces intake and is not recommended because it also slows calf growth.

In a prolonged power failure, mix milk powder by hand in large buckets and put the end of the tubes into them. Lag the buckets with bags to keep them warm. If the feeder fails, use a power drill and paint stirrer (half inch diameter rod and cross piece) and place the mixed milk and tubes in a large drum.

A large stirrer on a motor run through a transformer can also be used to mix large volumes in a tub from which the mob of 20 drink. With this system, have more teats than calves to prevent a calf missing out because it is between two on teats, and its teat is 180° away.

Bulk feeding

Most farmers now rear calves like this. Once old enough and with weather warm enough, they can be outside all the time, provided natural shelter and/or a mobile shed is provided, and the calves get Solmin in their milk to prevent shivering and summer heat stress.

After feeding, calves can be moved to the next paddock by calling them like you do when arriving, and following the tractor and feeder.



Rumen bacteria

Young animals are born with no rumen bacteria, so must get it from older animals, preferably by grazing in a rotation with them. One reason calves on cows usually do so much better than hand reared ones is the fertilising of their rumen with the dam's rumen bacteria and microflora which aid digestion. A reason that two or three calves per paddock after weaning do well, is the same, so if grazing calves in mobs, rotate them with older animals.

However, when calf rearers do everything right, hand reared ones can on average do better than dam-fed ones because they don't get overfed, are observed more frequently and treated for problems more quickly, and get minerals. This only applies if one is observant and takes quick action.

The way to get rumen bacteria into hand reared calves is to graze them on pastures previously grazed by older stock and to use older stock to clean up calf pastures which, if the calves are being adequately fed, can be unevenly grazed and clumpy. Before using older stock to graze out calf areas, if necessary, drench them for worms and treat them for lice, and wait a day for them to pass them out to avoid polluting the calf area.

In Australia it was found that goat rumen bacteria have improved the digestion of cattle, but

obtaining and implanting the bacteria is not easy for large numbers. A practical way could be grazing cattle with or after goats. It is known that the worst enemy of any animal is another of the same species.

In a British trial, calves fed rumen-building feeds such as good hay, silage and pasture from the first week, developed larger rumens more quickly. They found that rumens then grow comparatively larger than those fed more milk and rolled grain or muesli during their first few months, without hay or pasture. They showed that the size of a calf's rumen at weaning (in Britain they wean at three to four months, in NZ at about seven weeks) remained relative for their lifetime. If calves are not eating the hay, then sprinkle very little Solmin over it. Most will then take to it immediately. They know what is good for them, i.e., minerals and hay. Some mineral mixes are no good for this because some don't contain salt, which is what attracts them, and do contain oxides which are fertilisers. If you can't get Solmin, and what you can get doesn't include salt, then add it at 0.003% of the animals liveweight.

Good, short, green-coloured hay with a high clover content like this will encourage consumption, rumen development and calf growth. Bad hay or straw won't. Calves benefit from good hay (lucerne, clover or grass hay that has not seeded, in that order) until three months old.

Hay from correctly fertilised pasture is best, but after 2 to 3 months of age if there is enough pasture don't feed even home grown hay, because of the cost of 30 NZ cents per kg DM, against pasture at 20 cents, including NZ land value at NZ\$30,000 per hectare of bare land.

Some (possibly the vendors in USA where there are millions of tonnes to be got rid of each year) claim that barley straw is better than hay at developing rumens, but I know of no trials comparing barley with good ryegrass and clover New Zealand style hay. Most USA hay has no clover and is cut when too long, so is often not much better than barley straw, and if it has mould it is worse. Top quality hay is rare because it needs to be cut after a few hours of sunshine on it with a lacerator and pipe to bruise it for fast drying, but not cut short. It should be turned frequently and baled the next afternoon. Note the length of this hay, and the crimping and greenness indicating it contains vitamin D. See Silage and Hay.

If you haven't seen hay made this way, you have not seen the best hay. Much of the hay I've seen in many countries contains mould which is an enemy of calves and all animals. Barley straw is usually free of mould and is cheaper, but has no feed value so doesn't speed calf growth. Many NZ farmers like vacuum packed lucerne haylage which is a good product.

In New Zealand on pasture diets, we need cows with large rumens to get top production from pasture, so almost all farmers give calves access to pasture from the first week. In bad weather this will mean allowing them to come and go from shelter.

Be careful with silage for young calves, because it starts to grow mould within a few hours and some young stomachs can't take mould. Vacuum silage is the best. Provide the amount that will be eaten within half a day or remove what is left over. Calves, like babies, are fussy eaters and know good from bad, so make and keep top quality hay for them to encourage consumption and to avoid toxicities.

Dry stock farmers

Farmers not in dairying, but rearing calves, should calculate the costs of having heifers or cows calve and milking them in an old barn, just for feeding calves. There can be good money in rearing calves on milk for six to eight weeks with good hay and BF. After the calves are weaned the cows can be sold to dairy farmers, some of whom have surplus pasture then and are seeking more cows.

Bull beef

In New Zealand about half a million Friesian bulls are reared each year for export for hamburger meat. Bulls grow faster and have firmer meat which hamburgers need to hold the meat together, so are in demand and more profitable to rear than steers.

For the information of overseas readers, Friesians are New Zealand black-and-whites, that came



from England more than a hundred years ago.

Bull and heifer calves from high Breeding Worth (was Breeding Index) cows grow faster than from low BW ones. Therefore aim to get your bull calves for beef from good herds, even if it does mean travelling some distance for them, rather than rearing what you have, or can get locally.

If the heifers or bulls are to be sold before slaughter age, get (if possible) and keep their records to achieve better sale prices. Rearing top quality heifer calves from the popular breeds is usually profitable, and if they are your replacements, they determine your future production per cow and per hectare, so it is important that only top quality ones are reared.

The best calves are those that get a good start in life by being born on clean pasture from healthy, well cared-for cows that are fed the best soluble mineral mix in the drinking water. Pastures should be fertilised correctly, including trace elements, based on pasture tissue analyses, to produce healthy calves.

Pasture

One frequently sees calves on long, lodging, stemmy, trampled pasture which they don't like, so don't eat. If special calf paddocks are used, use cattle to chew the calf paddocks down monthly, to remove the soiled trampled grass and worm eggs that all pastures have, and to freshen the pasture, making it more palatable and to spread rumen microflora. Top quality hay from the first week is also important.

A Massey University, NZ, trial showed that calves first preference is short 15 cm leafy pasture, and mixed grasses rather than ryegrass, assuming the grasses are all the same length. Most NZ perennial ryegrasses are old high-endophyte ones, and so unpalatable. If possible sow endophyte-safe ones like Bealey NEA2 on all the farm, but especially in calf paddocks. Currently my research shows that in Victoria, Australia and New Zealand, Auckland Province, Bealey with NEA2, which is a safe palatable excellent endophyte, is the best by far in yield, handling droughts, animal preference and production, but it must be fed and handled correctly. Check it in your area, and try a paddock under your management, especially calf paddocks.

Trojan NEA2 best diploid perennial ryegrass.

Bealey NEA2 is the best tetraploid lasting, provided in limed fertile soil and not over-grazed.

At a Gordonton comparative trial, AR37 endophyte in Alto and Commando was hardly eaten so 30 cm high while other grasses next to them were grazed shorter. In this and my trials, Bealey NEA2 was grazed the shortest because of its palatability.

Avoid effluent paddocks

Try to avoid calves grazing paddocks that have recently had effluent spread on them, because they can have higher parasite numbers and will taste foul to calves that are fussy eaters, so they will eat less.

Pastures can be palatable or not. Correct CalciumMagPlus, reactive phosphate and other elements determine this. If ryegrass is hard to break off (cattle break it off with their tongues, they don't bite it off) it can be from the excess of potassium which is common when superphosphate fertilising is based on soil tests.

Concentrates, grain or muesli (Bought feed - BF)

All animals have their own maximum volume that they can consume in a day. This amount should contain all the components and elements required for growth and health.

A high quality, palatable milk powder based milk-replacement can be fed after colostrum has been fed for at least the first four days, but preferably feed colostrum as long as possible.

Milk replacers should have about 25% protein and about 20% fat.

BF with too much molasses can be too laxative. The BF should be coarse kibbled or rolled, not finely ground. Calves will then chew it and regurgitate it, especially if fed with pasture, hay and/or silage. Chewing these makes saliva, the first digestive juice. If any don't eat the BF, silage or hay, sprinkle a little Solmin mineral mix over them.

Calf muscle tissue development needs protein and limited fat. When the typical 25% protein grass and clover pasture is not being grazed or fed, research showed that high fat diets deposited too much fat in the body and udder. Apparently, this cannot be corrected in later life and accounts for

differences in fat levels of animals, which can be a problem in beef animals and in cows that lay on fat rather than produce milk.

After they have had their milk, give them ad-lib BF, starting with the best 20% protein one, as well as Rumensin, sodium bentonite, minerals and vitamins, for at least four weeks. After 4 weeks change gradually to one kg per day (2.2 lb) (depending on calf size) of a cheaper BF until two to four weeks after weaning, unless pasture is poor, in which case continue the BF for as long as necessary.

Eating BF after milk is fed tends to discourage calves from sucking each other. If calves are slow to take BF, sprinkle a small amount of soluble mineral mix, or fine salt, over it, because most animals are attracted to salt. If they still don't eat enough BF, feed less milk.

Most commercial companies will not add sufficient minerals, sodium bentonite, etc., because BF is a price competitive business. Some add Rumensin, which helps growth and coccidiosis control.

Avoid horses getting any product containing Rumensin, because too much can kill them.

BF encourages birds, which can land in calf scours and then fly to the trough and so cross contaminate the water. Therefore feed BF in the late afternoon when birds have stopped feeding, and turn the troughs over or cover them after the calves have finished, stopping birds infecting the troughs the next morning. Birds can spread scours, coccidiosis, salmonella, yersiniosis, leptospirosis, etc., by landing in dung and then in BF, hay or silage.

Dogs should not be allowed around calves other than to work them, because if they lick calf dung (as they do), and then a calf's nose or the BF, as they do, they can spread disease.

Feeding BF helps reduce the cost of rearing by allowing less milk to be fed, and it trains calves to eat BF in case it ever has to be fed in later life during pasture shortages. It is also an easy way of feeding a coccidiostat and/or a yeast product. However, avoid overfeeding BF because doing so and/or feeding too much milk, especially in the morning, discourages pasture consumption, which can result in small rumen calves which don't wean well, because they have inadequate rumen capacity. Pasture and good hay expand the rumen most; grains don't, despite what the adverts say. BF without hay and pasture, especially if finely ground, can't develop (increase the size of) a rumen.

Water

Potable water must always be available to calves, especially when hay or BF is fed. Clean the water troughs regularly, and clean the troughs in paddocks each time before calves go in until they are at least six months old. All water troughs on farms should be cleaned at least twice a year to avoid infection and to encourage animals to drink more.

The Sweetman Trough Guard, an aluminium framed fabric cover, covers the trough completely to keep dirt and irrigated effluent out. It is removed and folded up when animals are in the paddock. Email troughguard@sweetmans.com for information.

A good soluble mineral mix helps keep water troughs clean, but won't eliminate the need for cleaning them. If you won't drink the water, don't expect your animals to.

All except local body supplied water should be analysed initially and every five years to ensure it is not toxic.

Cryptosporidium water borne parasite can cause scours.

Scours

A cause of scours in calves can be from the parasitic micro-organism Cryptosporidium, which is a water borne parasite. Some say that they have no problem with scours when feeding lucerne haylage, but it won't cure micro-organism scours, however, healthy calves can avoid scours from other sources.

Scours are the nightmare of calf rearers. There are nutritional and infectious scours, and it is important to identify which. There can be many causes. The first thing is to identify the cause, so if necessary use your vet to help.

It is useful to know that infectious scours are usually more severe, but seldom break out instantly in a large number, as can happen with nutritional scours.

As in everything, prevention should be the aim, so use preventive practices and avoid **excessive** use of antibiotics and/or sulpha drugs as a form of control. Doing so is against world human food health requirements and can lead to antibiotic resistance in the animals and consumers of their meat.

Most calf rearers find it cheaper and more profitable to spend ten minutes a day on cleanliness and

spraying with a good fungicide-disinfectant, than to have to treat scouring calves.

However, spraying with a germicide is not a licence to ignore cleanliness and other causes of scours, because, as with most farming operations, perfection in everything is the way to complete success. Germs can become resistant to fungicides, so be prepared to change sprays if necessary. Sprays over dirt and organic matter will not last for long. Clean it up. Some rearers get away with little cleaning, but not so easily in warm climates, or where calves have been reared for a number of years in the same facilities.

If there are more than half a dozen flies, then spray for them, but not anywhere where calves or people, especially children, can be affected by the spray.

Children love hanging around calves, so warn them of what to avoid and to wash their hands with soap afterwards.

Scours can be caused by -

- A calf not getting enough colostrum within six hours of birth.
- Feeding the useless colostrum from induced cows to newly born calves.
- Infection from the dam. Preventive injections are available for pre-calving use.
- Milk from some cows producing toxins from what they ate, or from udder infections.
- Overfeeding.
- Milk too diluted with water so the milk doesn't coagulate or curd.
- Sudden change from electrolytes back to milk. Many veterinarians now recommend continued nursing or feeding of milk or milk replacer to satisfy the feed requirements, at the same time as feeding 2 to 3 fluid per electrolyte formulations daily. Dehydration occurs with scours, so keep up the supply of liquids and electrolytes and add a good soluble mineral to the drinking water. Don't mix electrolytes with milk, as some will curdle the milk. Solmin mineral mix will not.
 - Faulty milk replacer. If in doubt, change what you are feeding. Many have been a cause of scours and poor calf growth.
 - Overcrowding, especially if ventilation is inadequate.
 - Sudden changes in anything, such as type of milk, from hunger to gorging, warm to cold milk, and warm to cold air (chilling) as with sudden cold wet weather.
 - Deficiencies of minerals.
 - Born in a dirty or infected paddock or pen. Just changing the calving paddock has stopped calf scours. Where possible, changing the calving and rearing paddocks each year is beneficial.
 - High nitrate and/or algae or other toxin infected water.
 - Dirt infected milk or dirty utensils.
 - Cross infection from staff handling scouring calves then going to healthy ones.
 - Birds and/or dogs fouling food after eating scoured droppings.
 - Very cold milk preventing clotting, which is necessary for digestion. Use a thermometer to ensure body temperature milk for young calves. Older ones can drink cold milk without problems, but removing the chill by adding a little hot water is sometimes advisable. If you have to buy a thermometer, get a soil thermometer so it has a double use. They are also stronger. See www.shoof.co.nz who also sell milk warmers.
 - Dirty water. Clean all water troughs every few months, and paddocks where calves are going before moving them in.
 - Drinking very cold water.
 - Drinking water from a dirty source.
 - Excess iron in water. Zinc has reduced calf scours when they were on milk powder mixed in high-iron water.

There are usually reasons for scours, but if they occur for no obvious reason ask your vet about Rotavirus and vaccinating your cows against it 3 to 12 weeks before calving to increase antibodies in the colostrum.

Preventing scours

When calf rearing goes well the following are most probably being done -

Feeding a little less milk rather than too much. Maximum growth rates should be aimed for

without excess milk scours.

Scours are more likely to occur during changes in the weather, such as to sudden cold and wet conditions. If the maximum milk is being fed, feeding a little less during short bursts of cold, wet weather, and a little more in fine weather, helps reduce the chance of scours. Generally calves need slightly more milk and feed in cold weather than in warm, but the slightest amount too much can make some scour.

Avoiding nutritional scours by increasing the amount of milk fed gradually, and observing the above.

Using a calf teat with a small hole so that calves drink slowly and make plenty saliva.

Spreading agricultural lime at one kg per square metre over dirty, boggy areas.

Encouraging calves to be on pasture, rather than in barns.

When scours occur, use the above, and the following -

Feed Bentonite which is an extremely fine clay which aids digestion, and is an excellent product which reduces the likelihood of scours. It allows more milk to be fed in the early stages of life for faster growth with less likelihood of over-feeding scours.

3,000 mg of Vit C a day helps.

Feed rennet products, which aid digestion.

Change paddocks. With beef this is easier than with dairying where calves are usually close to the farm dairy, but a change may have to happen for a year to stop infections.

Graze calf paddocks short, with older animals to remove parasite havens, to remove polluted pasture, and so that the sun can get to the base.

Keep surroundings clean and use a sanitising spray or powder. A dairy farmer client who sprays his calf shed and the entrance area after weaning and cleaning it out, and again before calving gets no scours. Obviously he does everything else right, including giving calves a little warm water with a little soluble mineral mix through the milk feeder after they finished their milk and then some fresh, short-cut green (not brown leached) hay, with a little soluble mineral mix sprinkled over it to encourage them to eat it. Don't feed more Soluble Mineral Mix than 0.006% of their live weight per day. This is three grams per 50 kg calf or 0.1 ounces for a 110 lb calf.

Also -

If buying calves and the source looks suspect, isolate them from yours for a week. Isolation needs to be as far apart as possible, not just in an adjacent pen.

On our farms we always had a paddock for new animals for up to a week.

If for any reason you can't carry a baby calf so have to drag it to a form of transport, do so gently by the back legs so it doesn't scoop up anything into its mouth. Always check and clean any dirt from in or around its mouth, then give it some colostrum.

Calve down in clean dry conditions, preferably on fresh pasture to avoid E. Coli entering the calf in any way, especially through the dam's muddy teat. Know how to identify and treat Escherichia coli (E. Coli) scours.

Having young (<one month old) calves drink very cold water can cause them to scour blood within a day, so always take the chill off their water, or in freezing conditions keep it warmed.

Isolate calves with infectious scours immediately, keeping them sheltered from the cold, but with plenty of ventilation.

If any odour can be smelt in calf buildings, then more ventilation is essential. Sun, if possible, does more good than most things, so plan the calf shed to open to the morning and midday sun.

Scouring calves are best given a little milk every six hours, followed by treatment about an hour later. Never mix electrolytes with the milk, because, like water, they prevent the milk from curding, so hasten the flow of milk through the calf's system. Administer the electrolytes an hour or two before or after feeding a little milk. In occasional cases milk should be withheld for a day and only an electrolyte with glucose or dextrose for energy should be fed.

Diluting the milk with more than 15% water can prevent the formation of curd in the calf's stomach and cause digestive scours, so should not be done.

Anti-scour products with nicotinic acid frequently do a good job, but it depends on the cause. Improved scour control products will continue to become available, so watch for them and follow

their instructions.

If a calf is too weak to drink, a stomach tube can be used to administer two litres of warmed electrolyte/nicotinic type product into the stomach. Read the instructions before using a stomach tube. Electrolytes are safe, and warm up the calf, which helps it instantly. It is easy to overheat calf feed in winter. Check it with a thermometer or your elbow. A cold hand in winter is not accurate.

Ensure that sick calves get enough fluid.

If you get scours every year and you are practising all the recommendations, including feeding the best minerals, consider vaccinating all cows with one of the immune aids which have worked extremely well, especially for beef farmers who may not be able to monitor and treat calves easily. Colostrum from treated cows has more antibodies for calves.

Organics

The organic farmers who are against all forms of treatment of animals, believing that nature will take care of everything, can come horribly unstuck with calves, especially under high stocking rates. I believe that all farmers should have an intelligent and balanced attitude by helping nature and avoiding animal suffering.

I've seen terribly stunted young stock on organic farms, caused by mineral deficiencies and then aggravated by lice. I've also seen perfect calves and heifers as shown in the photos below.

Nature didn't do a good job of balancing soils or climates. We must help her. If not prepared to, then farm the animals suited to your climate, pastures, soils and conditions (management), and keep animal numbers down, so that competition doesn't increase parasite and disease infection.

I'm all in favour of farming naturally and have always (since 1955) farmed that way, never having used Superphosphate, but I believe in aiding nature through soils, pastures and animal health, and making a profit. This means correct fertilising by applying all the deficient minerals, correct supplementing including minerals that pastures can't provide, and the type of shelter appropriate for the climate.

Even with perfect feeding of soils, there are no plants that can provide enough sodium to grazing animals, especially in warm areas, where tropical grasses have levels half those of temperate ones. Even temperate grasses don't supply enough (See Pasture Analysis > Kikuyu, Maize and Paspalum). Also, if your area is low in some elements, your pastures, crops and animals will be low, unless corrected, which is easy today using the knowledge and products available.

Organic farmers can suffer imposed limitations on supplementing minerals, so those required in small amounts are not allowed to be supplemented, because they can't be measured or seen to be lacking. The very nature of trace elements is the requirement for them in 'trace' amounts.

As I see it, some of the rules applied in New Zealand on milk for export are designed to reduce New Zealand milk exports to their country so that they can keep their own market at higher prices. An overseas organic inspection group told a Waikato organic farmer that a 20 metre radius area around a 40 metre deep bore had to be fenced to keep animals off it, while the country concerned has and applies very lax organic rules. Read 'The Omnivores Dilemma', 'Organic Inc.' and other documented research on organics. See Further Reading for more.

In some countries, not only are organic rules weakened, but the word 'Natural' is used to encourage some foods to be bought. Natural is not 'organic', but is aimed at being an alternative. Food from a tethered animal can sold as 'Natural.' The term 'Free Range' is also used. Food from animals in USA barns, can be sold as 'Free Range', provided a door in the barn is left open!

What has this got to do with rearing calves?

Calves are the future herd, so must be well reared to grow into full size animals. To have healthy organically grown animals, the more expensive ways such as

Feeding seaweed, cider vinegar, etc., in water troughs makes them oily and dirty. Also, the oceans are now the sewers of the world, so sea products are high in mercury, cadmium and other toxic pollutants, there are none that can be organic. All the sea products I've had tested for



pollutants and toxins have been high in them, so toxic. We now avoid them all. Their cost is about \$3,000/tonne of dry matter, which shows how expensive they are. Her organic heifer's good head height and clean tail shows it is not selenium deficient, and good condition shows what can be done without drenching for internal parasites that many farmers overdo, creating resistance to drenches. Organic farmers are not allowed to drench for parasites. Organic farmer Margaret Porteous near Hamilton does all the right things and rears well grown, healthy heifers like this. It has never been drenched or fed minerals, so is a bit smaller than those fed the nine soluble minerals in Solmin. It's rough hair shows it needs more salt. Margaret uses my Fertiliser Nutrient Planner based on my Pasture Minerals Analysis.

Its clean tail and good condition shows what can be done without drenching for internal parasites that many farmers overdo, creating resistance to drenches.

Solmin is not organic approved because the iodine used is not approved and because the organic body wants \$2,000 to approve it, which is not worth it for the 100 organic dairy farmers in NZ. The organic dairy farmers should get their own mineral mix made.

Medicines

The high sulpha and antibiotic drug penalties in meat are justified. If farmers don't buy the toxic drugs they won't make a mistake and suffer a penalty, so make sure that you know the rules and use only safe products. Read the labels and ask your vet. Some contain no antibiotics and no sulpha drugs, but work on a binding action and supply the necessary electrolytes with vitamins and an energy source such as dextrose.

Check all the scour and feed supplement products you have in stock. You could be surprised at how many have antibiotics or sulpha drugs. Most have a 28 day withholding period to slaughter, some have longer.

A register of all drugs must be kept, even by lifestyle rearers. It should show the product, when bought, when used, why and how, the animal number and the results. Where there is more than one person on a farm, only one should be in charge of the drugs and their administration, to avoid costly mistakes.

Meat importing countries are always on the lookout for a reason to ban our produce, so don't you be the cause.

Dehorning

The horn buds of beef type calves can usually be felt at birth, so can be dehorned with a pocket gas debudder in the field soon after birth while still easy to catch (sometimes), while your well-controlled dog quietly strong-eyes the mother from a distance. If cows are wild, then bringing them all into a yard and separating them is best.

Sometimes scissors are needed to cut the hair around the bud first. Place the calf on the ground, put your knee on its neck and burn a full circle. Do it in fine weather, not in rainy weather and watch for calves showing stress and treat them or get a vet. Having a helper is best.

Dairy type calves usually need a week or two for the buds to be big enough, and hand reared calves are easier to handle, so can be done when older than cow reared calves.

A hot iron electric (or propane) dehorner is the kindest in my opinion. It is amazing how quickly calves get on with feeding after dehorning.

Pastes are the worst. Evidence is of calves still rubbing at it after a week. Also pastes can run and cause facial damage.

A pain killer or local anaesthetic can be injected around the horn bud to numb the area. In some countries the dehorning requires a vet and local anaesthetic. Your vet will know the rules.

If not done as calves, then horns can have castrating rings or a larger one put around the horn at the very base. Try to do it in cool weather.

Work with your vet to ensure minimum suffering and to stay within the law.

Weaning

Wean off milk by weight, grazing activity and pasture availability, not solely by age. Calves should be able to be weaned by seven weeks of age on good pasture. If good pasture is not available, but they are eating at least 1 kg of good calf muesli (coarse BF) per day, then wean them to the best

pasture and keep feeding BF.

New Zealand calves have always been weaned off milk before two months of age, whereas in most other countries it has been closer to four months. Trials by Minnesota University in 1996 showed that weaning off milk at four weeks of age instead of eight weeks saved 33% in feed costs and had no problems. I presume the mob was small and conditions perfect.

To achieve this, or even six week weaning, calves must not be fed so much milk that they don't eat BF or hay, or don't graze much. They would have to get their rumen going and be fed BF for quite a while after weaning, especially if on pasture that is not lush grass and clover. Pasture cover should be about 2,200 kg DM per ha.

Many well reared calves suffer a check at weaning, sometimes through dehydration rather than the lack of milk, so continue feeding the off-chill water with Solmin at least 0.006% of live weight per day, reducing the water quantity and temperature gradually to end after another three or four weeks.

If an inline dispenser can not be used, try a Peta trough dispenser from Hamilton, 07-855-2323 or (Google for Peta dispenser) or put 10 grams (0.7 oz) of Solmin per calf in the water trough. This will encourage them to drink water from it.

Well-reared calves fed a good soluble mineral mix from one week of age may never need deworming, but if necessary deworm only the ones that need it **immediately** it is needed. Do faecal counts to be ahead of the worms. Use products that suit your farm. These could include lice control even before weaning. If unsure, use the best pour-on just before weaning and a white drench a few weeks later.

After weaning, calves should be encouraged to eat plenty. This means graded-for-size mobs no bigger than 50 and moving them daily (into harvested silage or hay paddocks if available, to allow the calves to eat as much parasite free pasture as possible), or set stocking them at one, two or three per paddock, to allow them to graze selectively, at which calves are extremely good. If set stocking the calves, put in a kilo of Minerals per trough when the cows come out. The calves won't drink it all; cows will get what is left over. These figures assume average size dairy farm troughs of 500 litres or more. Just weaned set stocked calves must be checked daily, in case they go back in condition from not eating or drinking enough, suffer parasites or just fret.

Don't treat weaned calves the same way as you may treat dried off cows, which may be to put them in the back paddock and forget them.

Some may not be able to eat enough simply because their rumen is too small. If so, and grazing with a big mob, they will gradually lag further behind the best calves. Graze the poor doers on the best pasture on their own in small bunches and feed good hay (calves love it for good reason), BF mixed with a good yeast product to help the rumen digestion, and adequate soluble mineral mix in the drinking water. Doing this can make the worst calves catch up to the average ones, which is important to give even and manageable mobs. Not taking corrective action immediately can create a future cull through being stunted for too long.

If the pastures are subtropical or tropical grasses like Kikuyu, Paspalum (Dallis), Bermuda, etc., or are longer than 150 mm (6"), or have very little clover, calves will have to be kept on BF for longer. Feed it under the fence line, not in expensive to buy, move, clean and maintain troughs that can get polluted by birds.

If necessary and possible, grow some temperate grasses and legumes just for the spring weaned calves. Have it about 10 cm long at birth. Calves don't like 20 cm long grass. Temperate grasses obviously won't grow in hot regions in summer or in snow covered areas in winter, so if you're not on seasonal milk, plan two calvings a year, and if possible time them to allow for weaning calves on to good pastures.

In winter, when sunshine hours are short, vitamin D deficiency can adversely affect calves and restrict their uptake of calcium, which is essential for their bone growth. Hay made in sunny conditions can provide vitamin D.

If after correct feeding and weaning they develop pot bellies, low cobalt can be a reason. Mineral deficiencies are a major cause of poor young stock, so keep supplying minerals.

Symptoms of mineral deficiencies are dry noses, runny eyes, not holding their head above their back line, lack of sheen and bloom, loose droppings, ill thrift, and being unsettled. They also bawl a lot and hang around gateways and water troughs more than they should, instead of being out in the paddock grazing.

Calf weaning & growth targets

Minimum weights to aim for in kilograms if weaning on to good grass and clover pasture.

Minimum (not average) kg weights should be -

		6	15	24
	Weaning	Months	Months	Months
Holstein-Friesian	80	140	290	520
Friesian x Jersey	75	130	270	480
Jersey	70	115	235	430

Calves from North American Holsteins will need higher weights. Calves which are not adequately fed, and don't grow fast enough, will be a handicap to your herd production for the whole of their milking lifetime. If they are not up to weight, but have been adequately fed with appropriate parasite control, then they may be short of minerals.

Parasites

Keeping all stock free from parasites reduces the infection of young ones. If possible, rear and graze calves well away from the milking shed and other polluted areas.

You should have a worm egg count check before you drench because drenching is expensive if not needed. Measure drench for the heaviest calf, not the average.

The incidence of coccidiosis is increasing, and can affect young calves and even yearlings, so keep a watch for it from the beginning. Symptoms are black (blood stained) dung spread over the pin bones by the tail. The tail is frequently rubbed from side to side as if the anus is itching.

Treatment is with a coccidiostat available from vets. Sometimes vets have insisted on a faecal check first and found no coccidia, but after treatment the tell tail spreading of dark (or black from blood) dung over the pin bones has stopped. Coccidiosis damage to intestines, when severe, can cause scouring for many years. It occurs mostly in humid weather as opposed to dry weather. Contact us for Animal Health > Internal Parasites > Coccidiosis.

Dung stuck to tails is usually from digestive problems, worms, coccidiosis, low selenium levels and/or high nitrate pasture. For more accuracy on this see Animal Health > Symptoms and Causes. Many things in farming have more than one cause because one problem can bring on another.

Work out a worm drenching programme and record it on your calendar. If the above don't stop the scouring, then ask your vet if the problem could be Yersiniosis which can spread from rodents, deer, etc., to calves. See Animal Health in www.grazinginfo.com

Keeping all animals on the farm parasites free reduces the infection of young stock.

In April 1993 the US Department of Agriculture researchers found that calves infected with the protozoan parasite *Sarcocystis* run a fever, lose appetite and become emaciated. However, even after recovery, some simply fail to grow normally, because the parasite causes the calves' immune system to release a cytokine type hormone that blocks the action of the growth hormones. Research is continuing to prevent or correct this action.

After weaning, keep an eye on them and remember the vaccination programme.

Lice can occur from the first week, so have a schedule of checking for them every Monday. They can first appear as specks between the back legs.

General tips -

- Look directly at every calf every day to catch any off colour (sick) ones immediately. A stitch in time applies with calves. Identification of the problem to treat it correctly is most important, so if in doubt use your vet.
- With a sick calf never 'wait and see', as they can go downhill very quickly. Give it the treatment most likely needed. If necessary get your vet sooner rather than later.
- Avoid even the slightest amount of bloat control material, or facial eczema levels of zinc, getting into young calves feed or water. The amount put through dispensers for bloat control in adult stock can adversely affect calves on milk, and it takes very little more to kill a calf.
- Having a radio going in the calf building will accustom calves to noises and reduce the chances of them panicking if, for example, a bucket is dropped, or talking people suddenly arrive. It also

discourages birds which eat the muesli and pollute it with bugs.

- If hair comes off in patches check for ringworm, and if free of them check that the soluble mineral mix you are feeding has zinc. Use your vet for problems you are not sure of.
- When buying calves it is easy to bring ringworm and other diseases on to the farm. Avoid calves with dull eyes, dry noses, drooping ears (unless a tropical breed), with any discharge, jaundice, etc.
- Visitors from other calf rearing operations should not be allowed into yours unless footwear is disinfected, or new shoe covers are worn.
- Rolled grain has a limited shelf life of only a week before it deteriorates. Old animals can cope with a little mould and fungi, but calves can't, so buy a reputable brand of freshly crushed or rolled BF and store it in a dry cool place.
- Calves don't like finely ground, dusty grain products. They find textured feeds more palatable, and these require chewing, which is good for them and increases saliva production.
- Calves know that they need roughage so look for things to chew, and love licking, sniffing at, tasting and drinking from puddles, however small, so never have any puddles they can get at - even tractor wheel mark indentations that can gather dirty water. Provide clean water that is not too cold and contains the best soluble mineral mix which attracts calves to it, and, most importantly, always have good quality roughage available.

Rearing Costs of Animals

Like other farming operations, calf rearing should be budgeted. Use a Rearing Costs spreadsheet from www.grazinginfo.com which calculates rearing options. Like all GrazingInfo spreadsheets, it can be added to and adjusted. You can make your own spreadsheet by copying and pasting the following into a spreadsheet and putting in the Total formulae, or buy all with 50 other useful spreadsheets. Compare your cost of rearing with the cost of buying weaned ones. See the Spreadsheet, Rearing Costs of Animals.

Using colostrum can reduce costs, unless colostrum can be sold for a higher price, but only that from the first few days fills the dairy company requirements, so the remainder can be fed to calves.

Rearing profitably

Some calves in many countries are born weak, cold and shivering soon after birth*. Help the calf drink at least 2 litres of fresh colostrum from the cow or what you milk from the cow there and then, preferably within half an hour of being born and again after 2 hours.

*If you have this problem and have difficulty in rearing calves, consider the following -

Mineral deficiency in cows could be a main cause. Sodium, magnesium and some other elements help animals control their body temperature, and dams must get them to provide new-born calves with them. Feed the best soluble mineral mix of nine elements all year to cows, and to calves from one week of age. Soluble minerals are like a low cost electrolyte. Calves will be much stronger. Holsteins will be blacker and whiter. Jerseys will have more sheen. Most will grow faster with fewer parasites. See the photos on page one. Feeds grown from the top 15 cm (6") of soil that has been growing crops or pasture will be low in most elements that have been mined out of the soil, except the N, P and K which have been applied. Tens of thousands of tons are applied in NZ every year. The minor elements are in serpentine, quarry dusts at about \$80 a tonne, and in most subsoils which can be brought up with a chisel plough when cultivating.

Serpentine has many of these deficient minerals

Give calves the best ten minerals after one week.

If calves don't eat good hay after a week, sprinkle Solmin over it.

Dilute Jersey milk (not colostrum) by 10% because its fat is too high, having been bred for high fat percentages for a hundred years and only recently for protein.

Calving

If cows take hours to calve, they could be low in zinc (as well as other minerals). In New Zealand many farmers fertilise with balanced fertilisers after using the Pasture Mineral Analysis spreadsheet, but some pastures analysed here and from other countries are still desperately low in some elements and too high in potassium and phosphorus.

Doing this, and feeding Minerals improve animal health unbelievably and halves vet bills, as

revealed by dairy farmers Tony & Gwen Ashford of Ngatea in the Hauraki Plains.

“We met Vaughan Jones in 1989 when our farming had gone a little off the rails. Our peat was dead, and the cows were very touchy, with red udders (eczema from high nitrates), and on that first farm walk Vaughan pointed out quite a number of things we could do to improve our lot. Liming with deficient elements, pasture sampling, ceasing helicopter spraying for weeds and again for facial eczema, cleaning the water troughs and suppling complete minerals through an on-line dispenser, and using reactive phosphate fertiliser were a few of his suggestions.

“Our animal health improved so much in one year that in October when we phoned our vet to come and vaccinate our calves, he thought that we had left the district.

“We have never looked back. Thank you, Vaughan.”

To help Tony and Gwen Ashford and hundreds of others, I used software I had written to get the best information from pasture tissue analyses, and to work out optimum lime and fertiliser mixes and the most profitable number of cows to milk. There are 50 more spreadsheets to help with farming.

These suggestions are a guide to help you rear better young stock, but must be adapted to your farm and conditions, which can be done to all our spreadsheets. I can help where needed.

After weaning

BF should be fed after milk and after weaning to allow earlier weaning.

BF can be fed in paddocks on an old rubber belt from a stone quarry, which can be dragged from paddock to paddock with a quad that can carry the BF. Calves soon learn to follow to get the new feed and fresh grazing.

As previously mentioned, weaned young stock must be looked after very carefully. They must be checked daily by looking at every one.

Those not growing well should be grazed on their own at two or three per paddock to remove competition at least until they catch up, and should be fed BF to help them. Keep a note of their numbers so you don't breed from them - and don't make excuses. Check their dams and sires. Remember that the problem could come from one or both, that is if they both have the same weakness. The poorer ones can be the later born ones, in which case you should allow for that and help them catch up. Check why they not growing as well. Faecal worm and blood tests may be necessary, but are not always 100% reliable.

After weaning, all calves should be weighed monthly or at least two-monthly, and weights checked against expected ones and action taken. It is not so useful to improve feeding, etc., after six months of under-feeding.

If calves are to be sent to grazing after weaning, stop feeding BF for at least ten days before they leave, so that they become accustomed to living on pasture alone. Ensure that they will get Solmin minerals. See Mineral Feeding for information on dispensers.

SM's (Soluble Minerals)

You might think that I have recommended Solmin too often, but I've been on hundreds of farms and the animals not getting Solmin NEVER do as well as those getting other mixes.

These calves were not getting Solmin when we were developing and comparing it, so some hung around the water troughs, had runny eyes (low magesium), black hair was brown (low copper), long hair with no sheen (low sodium), low heads and dung on tails (both low selenium).

Internal parasites becoming resistant to drenches is frequently written about, as scientists and drench companies try to overcome



what they see as an increasing problem. If farmers fertilised correctly with all the deficient elements, based on ryegrass leaf analyses, not soil pH for calcium and minerals, and fed Solmin through the drinking water, worm drenching would decrease or be eliminated and resistance to worms would not occur.

In the 1980's our daughter and son-in-law, Sue and Ian Dobbs, share-farmed for us on Greenhill Road, just east of Hamilton. They reared 160 calves each year, and helped me develop Solmin. At weaning, Ian divided the 160 into two mobs. These 80 didn't get it. They soon suffered typical deficiency symptoms of runny eyes, scald between front toes from low zinc, low cobalt (long hair on top of neck), dry noses, less saliva (from low sodium), dry brown hair (low copper), and in some cases pot bellies.

Ian noticed that, not only did the soluble minerals mob look better, they were also more contented, spread more over the paddock, were bigger, didn't need drenching for worms and ate less pasture, seen by their leaving 20% higher DM residuals measured with an electronic PastureGauge©

At about five months of age they were joined up as one mob and all animals on the farm then got the nine minerals in Solmin through a tank dispenser.

The front heifer in this photo got Solmin minerals from weaning at about seven weeks. They should all get it from one week of age, but we were developing it. The one behind it got no Solmin for the first few months. They were all on good pastures correctly fertilised with LimePlus and reactive phosphate with deficient trace elements - better than organics with its ridiculous limitations.



More examples

Des Holmes of Rukuhia had enjoyed rearing calves on his hobby farm for 20 years, and worked in town. After a few years the calves started doing poorly. His vet advised him to "give up rearing calves because the farm was parasite infested", so, disappointed, he put his farm on the market.

At the same time, Bernie Leuthard, a neighbour suggested that he ask my advice, after which Des agreed to stop using 30% potassic superphosphate and to start using LimePlus and 'correct' fertilisers of reactive phosphate and trace elements, based on ryegrass analyses. He also started feeding Solmin in the water. This all happened in the autumn of 1989. Six months later he said, "The calves reared by hand were nearly as good as those reared on cows, and without any repeated worm drenching." The saved worm drenching costs paid for the Solmin, and on top of this the yearlings ended 50% bigger than those from previous years. Des took his farm off the market.

Animals grazing correctly limed and fertilised pastures and fed the best minerals in their water become amazingly tame. Before this photo, his heifers had never seen this farmer from Tauranga.

Des accepted that minerals were necessary on peat so fed them to his calves there, but not to those on his Hamilton clay loam block a few km away. In midsummer he phoned me and asked what he could do about his calves on the clay soil bunching up tightly, milling round and being worried by flies. I said to put Solmin in the water troughs. Three weeks later he phoned and said they had settled down and weren't now bunching. Calves bunch up when flies worry them, and flies worry animals more when they lick each other a lot (flies seek moisture). If deficient, cattle lick each other for salt from the perspiration. Flies also worry animals more when they have dirty tails and dirty bodies from scouring, low selenium and from bunching up to avoid flies, so they muck on each other and attract more flies.



Another farmer, Bryce Wilson of Te Kawa, Waikato, had very poor calves, with two looking as if they'd never be any good. Three months after fertilising with salt to lower the extremely high

potassium levels (4% in pasture tissue) and reactive phosphate with other low elements, all analyses improved dramatically. He fed the minerals and the worst two calves improved to be hard to find. The poor doers always benefit from minerals more than the best ones do, showing that they were not suffering from drench resistance, but from mineral deficiency.

Mature animals also benefit from correct fertilising and the nine minerals in Solmin. The pasture and cows on the left were of a new client, and on the right two years later. Soils, earthworm numbers, pastures, animals and production improved.

This photo at a field day I organised, shows the size of a well fed 23 month old, due to calve, that was well reared and then grazed with Solmin fed. They belonged to Gary Seath of Orini, Waikato, winner of the 1990, NZ Fieldays Dairy Farmer of the Year Award.



Main points that helped him win

- Well-grown first calvers that produced about 20% more milk every season than typical ones.
- Good pastures thanks to 3 tonnes of finely ground LimePlus per hectare every three years.
- Over-sowing the whole farm with Concord (top winter ryegrass then) each autumn. Bealey NEA2 is the recommended one now.
- Reducing cow numbers from 250 to 200, as a previous Fieldays Farmer of the Year winner had done, saving \$65,000 pa (It cost \$1,300 to own and keep a cow.) annually, and still produce the same total milk solids, at 600 kg of milk solids per cow because they were never hungry, increased his profit, and the young stock were better fed, so grew bigger.
- No more animal or human stress from having hungry cows, made him a more successful and happier farmer.

Testimonial

A first year user of Solmin minerals wrote, “Our calf rearer forgot to add Solmin minerals for a month and some of the calves got a bit of scours. Also, a few got Spring Eczema which I strongly suspect they wouldn't have if they had been getting Solmin minerals. Thank goodness we figured out what was happening, as the calves just didn't look as well as they did a month before. It's amazing what a difference Solmin makes. Now we have certainly seen with our own eyes, not that we had any doubt. Our cows get Solmin through a Cook and Galloway (Ph 07-847-7583 Hamilton), low cost on-line dispenser and none now get Spring Eczema.”

Solmin soluble minerals mix in 1987 were the world's first, and have not been changed. To my knowledge no other mineral mix is as complete (9 elements) or has been surveyed as shown below.

A few farmers have been talked into changing to the more expensive per kg of minerals and less complete, chelated minerals and then suffered calf problems. Some chelated marketers criticise sulphur which Solmin has, but it reduces metabolic problems and milk fever and is a natural sulphate element.

If any minerals are promoted to you, ask for their survey results like below and don't believe the old story that some fertiliser sales people have used for decades, i.e., that their current product has been improved. If so, ask for an old survey.

In everything you buy, remember that sales people want your money, so most will say anything to get it. One big NZ company rubbished Solmin minerals and got Peter and Helen Butler of Ngahinapouri to change to theirs which had only a few elements, one of them, 'manganese' which was in excess on their farm (and most of NZ).

While on Solmin they got a blood mineral test which was excellent. Within a month of changing to the bad mix containing manganese and not enough salt, their cows deteriorated and another blood test showed excess manganese and other toxic minerals. The vet who did it could not believe the difference, but like other vets, still didn't recommend Solmin to other farmers, because doing so loses

them business.

DeLaval Feedtech Soluble Minerals User Survey - November 1990														
21 reports by users with 4,110 cows.					Feedtech used in drench or dispenser at 25 grams/cow/day									
		# Months	Cow	Heifer	Animal		Cow	Retained			Milk	Milk	Young	
Name	Location	Used	Temperament	Appearance	Dung	Cycling	Placenta	Mastitis	Milk	Fat	Protein	Stock		
1 Bindon Robert	Matamata	2	O	O	B	O	B	O	O	U	U	U	O	
2 Black Robert	Matamata	3	B	O	B	O	B	O	D	U	U	U	O	
3 Carswell Terry	Te Aroha	2	O	B	B	B	B	B	D	O	O	U	B	
4 Chynoweth Bill	Pukeroro	4	O	B	B	B	B	O	O	U	U	U	B	
5 Clark Malcom	Patetonga	3	O	O	B	B	O	B	D	O	U	U	O	
6 Clausen Craig*	Whitikahu	12	O	O	B	O	B	B	O	U	O	O	B	
7 Cropp Kevin	Tatuanui	4	O	O	O	O	B	O	O	U	O	O	O	
8 Davis Gary	Tirau	3	O	B	B	O	B	O	D	U	U	U	O	
9 Dawson Rod	Waharoa	2	B	B	B	B	B	B	O	U	U	U	B	
10 Hawe Keith	Walton	4	B	O	B	O	O	O	O	U	U	U	O	
11 Henderson Wally	Matamata	2	B	O	B	O	B	O	O	U	U	U	O	
12 Marson Gary	Waiuku	2	O	O	O	O	B	O	O	O	O	O	O	
13 Orr Richard	Kereone	3	B	B	B	O	O	O	D	U	U	U	O	
14 Saforson Sterling	Rotorua	2	B	O	O	O	O	B	D	O	U	U	O	
15 Simpson Kerry	Matamata	2	B	O	B	O	B	B	O	U	U	U	O	
16 Singh Jesse	Tauhei	2	B	B	B	B	B	B	D	U	U	U	O	
17 Stent Mike	Putaruru	2	O	O	B	B	B	O	O	U	U	U	O	
18 Webb David	Waharoa	2	B	B	B	B	B	O	D	U	U	U	O	
19 Whittaker K*	Matamata	14	B	B	B	B	B	B	D	U	U	U	B	
20 Wilson Lloyd	Matamata	3	B	B	B	B	S	B	D	O	O	O	B	
21 Wright John	Waharoa	6	B	O	B	O	B	B	D	O	O	O	O	
B = Better, U = Up, D = Down, W = Worse, 0 = No change sometimes because already feeding minerals.														
* Original trial farms Solminix contains seven elements at optimum levels,														
Trials with young stock showed those on Solminix, now called DeLaval FeedTech soluble minerals, ate less, grew faster and needed no, or very little worm drenching.														
										See http://www.grazinginfo.com > Minerals				