

NEONATAL CALF REARING GUIDE



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ScourGuard® 4(K)
GENTLE ON COWS. TOUGH ON SCOURS.

NEONATAL CALF REARING GUIDE ScourGuard® 4(K)



Over 3.8 million dairy calves are born alive every year² with approximately 2 million being reared for heifer replacements or dairy beef. Rearing good replacement heifers is vital on any New Zealand dairy farm. The job of calf rearing is a rewarding one but it can also be very stressful when things go wrong. There are many factors which affect the mortality and morbidity rates of newborn calves including the immunoglobulin status of the calf, the ambient temperature, neonatal diseases and husbandry standards³.

This **Neonatal Calf Rearing Guide** will cover the factors involved in successful neonatal calf rearing systems. The aims are to discuss gold standard husbandry methods and to add value to the person(s) doing the calf rearing, thereby raising

their profile on a New Zealand dairy farm. The **Neonatal Calf Rearing Guide** is structured to work along with the **Neonatal Calf Rearing Checklist** which is designed to facilitate a discussion prior to the calf rearing season and highlight potential risks to calf rearing systems.

THE AIMS OF CALF REARING ARE TO:

- 1 Produce healthy calves, keeping losses to a minimum
- 2 Maximise growth rates
- 3 Maximise calf welfare
- 4 Manage labour requirements
- 5 Maximise profitability

THE CALF GUARDIAN



Calf rearers are responsible for the future generations of cows for the farm and they should have pride in the valuable role they are performing.

Caring quality staff are central to the success of the calf rearing operation. The importance of the calf rearing operation to overall farm profitability must be understood by farm management and all those involved in calf rearing. Reducing the wastage of calves allows for flexibility in the management of replacements;

for example selection of premium calves to rear as replacements or surplus heifers to sell to add to farm income. Calf rearers are responsible for the future generations of cows for the farm and they should have pride in the valuable role they are performing.

Adequate numbers of staff are important to the calf rearing system so that staff are fresh, enjoy their work and are able to take the time required to manage all the calves effectively. Staff should have good clothing so that they are dry and warm. They should also not be required to lift more than 20kg so that injuries are prevented. Patience is a necessary attribute when dealing with young stock.

It is important that communication is clear amongst the staff involved. Therefore it is advisable to have a pre season meeting

to discuss everyone's roles and what the goals are for the season. Planning can greatly reduce stress throughout the rearing period on the staff and the calves. Weekly or regular scheduled meetings are also encouraged if there are a number of people involved in the calf rearing. Discussions around recording of different groups of calves are also important. This includes sick calves, treated calves, feeding systems and any changes to routines.

Consistency is very helpful in the calf rearing sheds. This helps to identify any problems quickly as they show up as different from the routine. The same person should feed the calves at the same time every day. This means that the calves know what to expect and any sick animals can be identified quickly.

COW PREPARATION



Using ScourGuard 4(K) vaccine in the pregnant cows produces hyperimmune colostrum which gives calves the vital antibodies they need against four key causes of infectious scours.

It is advisable to have pregnancy tested the herd at an appropriate time so that accurate calving dates are available for each cow. This allows for feed budgeting for the herd as well as allowing for identification of the early calving cows and therefore the pregnancies conceived by Artificial Insemination. These cows will produce the replacement stock for the herd; therefore it is important that they are at a Body Condition Score of 5 at calving time (BCS 5.5 for heifers). Other factors influencing successful calving periods include transition diet management, metabolic management, sire selection and availability of farm staff to check on springing cows regularly to reduce prolonged dystocias.

Using **ScourGuard 4(K)** vaccine

in the pregnant cows produces hyperimmune colostrum which gives calves the vital antibodies they need against four key causes of infectious scours.

ScourGuard 4(K) aids in the prevention of calf scours caused by Bovine Rotavirus serotype G6 and Rotavirus serotype G10, Bovine Coronavirus and E.coli. This vaccine should be administered in the muscular area of the neck with an intramuscular (IM) injection. Previously unvaccinated heifers and cows should receive two IM doses at least 3 weeks apart with the second dose given 2–12 weeks prior to calving. For seasonal calving herds the booster injection should be given 2–4 weeks before the planned start of calving so that all calves born in the first 8–10 weeks are protected. Annual revaccination

with a single dose 2–12 weeks prior to each subsequent calving is recommended.

The importance, timing and quantity of colostrum intakes for calves are discussed in the following pages.

CALF COLLECTION, TRANSPORT AND REARING



Twice daily paddock checks and calf removal should occur during the calving season from the springer mob. The reason for this is to reduce mastitis in the heifers/cows and to ensure adequate colostrum intake in the calves in the first few hours of life. Calves left on cows for more than 12 hours have a high rate of failure of passive transfer (hypogammaglobulinaemia) and are therefore at a high risk of neonatal disease, ill thrift and mortality. 50% of calves fail to receive adequate colostrum when left with their dams for 24 hours¹⁰.

Once calves have been delivered to the calf shed their navels should be sprayed with an iodine tincture containing at least 7% iodine.

Trailers should be cleaned after every pick up from the paddock. They should be sprayed daily with a good virucidal spray. The floor

should be sturdy and have bedding or sacking on it. Each calf should have enough area on the trailer to stand or sit comfortably. The aim is to have 5 calves per pen on the trailer, with a maximum of 10 calves per pen. Large trailers should be divided into smaller compartments if necessary. The driver of the vehicle in front of the trailer must be patient and take their time returning to the shed in first gear only.

Much damage can be done in this first point of human contact with the calves. Damages can occur to joints and navels during this time causing navel ill, fractures, wounds and joint infections including septic arthritis.

When purchasing calves for rearing it is important to select good quality calves from the start.

CRITERIA FOR SELECTION:

- 1 No heifer calves born as a twin to a bull calf.
- 2 No calves from cows that have been induced.
- 3 No calves that are under 40kg.
- 4 Calves should be at least 4 days old.
- 5 Must have been fed colostrum since birth.
- 6 Must have a good suck reflex.
- 7 Must not have been given antibiotics.
- 8 The umbilicus must be dry.
- 9 Ideally the calves are born to cows that have been vaccinated pre-calving with a vaccine that prevents calf scours – **ScourGuard 4(K)**.

COLOSTRUM COLLECTION AND STORAGE



Colostrum is a highly valuable nutrient for the neonate calf. Calves are born without antibodies (agammaglobulinaemic) due to separation of the maternal and foetal blood supplies in the placenta of the cow. Colostrum has high levels of immunoglobulins and high energy levels and vitamins. The ingestion of immunoglobulin proteins IgG, IgM and IgA via colostrum intake gives the calf passive immunity to disease and environmental pathogens. The most important of these is IgG as it is the smallest and most abundant antibody in the blood. IgG enters the colostrum during colostrogenesis and confers temporary immunity on the newborn. Trial work has shown that high levels of IgG in the cows' serum pre-calving

transfers to high levels of IgG in the cows' colostrum⁴.

Collection and separate storage of the first milking colostrum is a successful way of ensuring that freshly born calves get high levels of immunoglobulins in their first feed in the calf rearing shed, so called 'passive transfer of immunity'. The concentration of immunoglobulins is highest in the first milking after calving. In the second milking the concentration of immunoglobulins drops to half that of the first milking and decreases in subsequent milkings⁶.

The following are important factors which influence the concentration of Ig in first milking colostrum which subsequently leads to the first Ig intake for calves being lower than optimal⁶:

Milking cows prepartum and cows which are leaking milk prepartum will reduce the Ig levels in the first milking

Induction of parturition usually results in lower levels of Ig's in the first milking

Delaying the time till first milking reduces the Ig level of the first milking, therefore twice a day collection of freshly calved cows and calves from the paddock is recommended

ScourGuard 4(K) studies show that the vaccination of heifers produces excellent quality hyperimmune colostrum so heifers should not be overlooked as part of a calf scours vaccination programme⁴.

STORAGE OF COLOSTRUM

The concentration of immunoglobulins is highest in the first milking after calving.

NATURAL FERMENTATION AT AMBIENT TEMPERATURES

This process involves fermentation due to natural bacterial inoculation of colostrum. Colostrum must be stored in a cool place (5°–15°C) in a plastic container with a loose fitting lid to keep bird droppings and other contaminants out. Metal containers or parts can corrode due to the acid production from fermentation. The colostrum should have the top crust broken and be stirred twice a day to keep the fermentation process alive. The stirrer should be rinsed with water only (no detergents) and hung up close to the storage area so that it doesn't touch the ground and contaminate the stored colostrum. The container can be washed after being emptied but only with water, no detergents. This allows the beneficial bacteria to seed the next batch of stored colostrum. Do not add to these containers extremely bloody colostrum, mastitis milk or colostrum/milk from cows that have been treated with antibiotics—this includes any cows that are still within their milk withholding period from an antibiotic treatment and cows within their dry cow therapy treatment to calving interval withholding period. Colostrum can be stored for up to 3 months if stored in this way. However, it is recommended to feed this colostrum within a couple of weeks as the nutrient and Ig content of colostrum

declines during storage¹ and the palatability decreases over time.

BACTERIAL INOCULATION OF COLOSTRUM

Bacterial cultures are used to stimulate the production of desirable microbial populations to ferment colostrum. These include: *Streptococcus lactis*, *Streptococcus thermophilus*, *Lactobacillus bulgaricus* and *Lactobacillus acidophilus*¹. Colostrum can be preserved with yogurt (*Lactobacillus* sp). A practical example of this is the addition of a dried packet of yogurt, like EasiYo®, to the first batch of colostrum.

Further containers of colostrum can be seeded with part of the initial batch, which keeps the development of beneficial microbial populations going.

CHEMICAL TREATMENT OF COLOSTRUM

The addition of formaldehyde (formalin) has been shown to maintain levels of immunoglobulins in colostrum for at least 4 weeks⁷. The benefits of this system are that it controls undesirable fermentation, it helps to control protein (and therefore immunoglobulin) breakdown and allows storage in high ambient temperatures¹. Careful calculation of the rate of addition of formaldehyde must be done and a complete batch/container should be made up rather than adding to

part containers.

Another product which can be used for storing colostrum is Colostrum keeper.

FROZEN COLOSTRUM

Colostrum can be frozen and stored with very little nutrient or Ig loss for greater than 6 months¹. Care must be taken when warming the colostrum for use so that proteins aren't denatured. It is recommended to warm the colostrum slowly or allow to come to room temperature once removed from the freezer.

Fonterra has a Colostrum Code of Practice managing the supply of colostrum and the issues around dry cow therapy. It states that if the farm is to supply colostrum to Fonterra the withholding period of the dry cow therapy product should be extended by 20 days. However, the code states that the welfare of the cow and the calf must come first. Therefore adequate supply of colostrum to the calf in the first few days of life is stipulated by Fonterra in these situations. The farmer should inform their consulting veterinarian at the dry off milk quality consultation if they are supplying colostrum to Fonterra.

FIRST COLOSTRUM FEEDING

After the first 24 hours of life the ability to absorb colostrum immunoglobulins ceases.



Calves are born almost completely without immunoglobulins. Calves must therefore receive immunoglobulins from colostrum in the first 24 hours of life. Gut closure is the term used for the cessation of macromolecule absorption (including immunoglobulins) across the enterocytes of the small intestine. After the first 24 hours of life the ability to absorb colostrum immunoglobulins ceases¹. The first 6 hours of life is the most efficient time to absorb immunoglobulins and absorption efficiency is decreased when colostrum intake is delayed¹. Therefore the early ingestion of colostrum immunoglobulins ensures significantly higher levels of serum immunoglobulin concentrations⁶.

The aim is for 2 Litres within

6 hours of birth and a total of 4 Litres (or approximately 10% of bodyweight) within 12 hours of birth. It is important to use the very first milking from cows for this first feed. The use of hyperimmune **ScourGuard 4(K)** colostrum ensures high intakes of antibodies against Rotavirus G6 & G10, Coronavirus and *E.coli*.

One can never be sure that the calf has stood and suckled from the cow in the paddock after birth. Therefore it is important to make sure that the calf gets this colostrum intake in the calf rearing shed once collected. Individual calf drinking bottles or compartmentalised calf feeders are good for this, however if necessary stomach tubing a calf with 2 Litres of colostrum may be necessary.

Some reasons for the failure of passive transfer are¹:

Colostrum with poor levels of immunoglobulins (discussed above)

Delayed ingestion of colostrum by the calf

Cows with large conical shaped teats or udder conformation where teats hang very low to the ground, blocked teats, blind teats, mastitis, muddy teats and sore teats

Poor mothering or recumbent cow (metabolic disease or other illness)

Birth injured, weak or cold calves (e.g. swollen head or swollen tongue, or weak calves rolling into electric fence or drain)

Congenitally affected calves may not suckle

CONTINUED COLOSTRUM FEEDING

Colostrum should be fed ad lib to the calves for the first four days as a minimum.

Continued daily feeding of fresh or stored hyperimmune **ScourGuard 4(K)** colostrum is recommended for the first 4 days post partum and beyond. This action after gut closure will not increase serum immunoglobulin levels but will give local immunity in the gut lumen, which gives continued protection to the calf. Colostrum should be fed ad lib to the calves for the first 4 days as a minimum. Monitoring of the calves is important during this time to ensure that all calves in each pen are drinking successfully without assistance

by the calf rearer.

Colostrum is also a good source of energy and nutrients for the calf (see Table 1 below). Colostrum has almost twice the amount of solids, 4 times more protein and 60 times more immunoglobulins than cow's milk. High energy intakes are important for growth and development, plus the energy from colostrum stimulates the activity and growth of the intestinal tract.

TABLE 1: THE COMPOSITION OF COLOSTRUM ^{5,12}

	COLOSTRUM	COW'S MILK
Fat %	6.7	4.7
Protein %	14	3.5
Lactose %	2.7	4.6
IgG %	6	0.09
Total solids %	23.9	13.6
Total energy (MJ/Kg DM)	25	23.9

HOUSING



Calves must be kept dry and draught free at all times.

Calves should be kept as far away as possible from the older animals on the farm. Calves should be allocated a pen when they first arrive in the shed and they should stay in this pen the entire indoor rearing time. They should be grouped with calves of the same age. The minimum space allowance aim per calf is 1.5 m². Pens should group a minimum of 10 calves together, 20 at the most. Each shed should house a maximum of 100 calves. There should be enough barn space to house at least 50% of the calves born on the farm. Ideally the shed should be twice as long as it is wide. This prevents draughts at the back of the shed. Calves must be kept dry and draught free at all times however ventilation is important. There should be no ammonia smells from the pooling of urine. Open sheds should be north facing to allow for sunlight to enter the open calf rearing area and reduce draughts. In very cold or windy areas of New Zealand wind breakers or roll down screens may be helpful to keep the calves sheltered.

There should be no free lying water, mud, drains, swamp

or cowshed effluent near the calf rearing sheds. The bedding should be untanned sawdust, shavings, post parrings or wood chip with a depth of 200–300 mm. Bedding should be topped up regularly as needed. The flooring should drain properly. Ideally it should drain from the back to the front. This removes effluent and water and prevents pooling. A suggestion is a coil drain placed in sand or metal under the bedding to remove excess urine and therefore reducing the ammonia concentration. Grated flooring can be covered with wind or shade cloths and covered with bedding materials.

Do not use high pressure hoses in the shed as this causes aerosol bacteria and viruses to become air borne and contaminate other pens. Use a broom if necessary to remove excess materials from lane ways.

Ensure that the truck collection site for bobby calves is well away from the replacement calves.

HYGIENE



Spray the barn with a complete anti-viral product twice a week.

In dirt floor sheds the floor should be scraped out and the top level of soil removed at the beginning of the season. Should drainage be required then this should be added at the beginning of the season. The entire barn is to be sprayed out with a virucidal spray. Adequate bedding needs to be organised and stored close by for topping up the bedding.

Spray the barn with a complete anti-viral product twice a week.

Foot baths are useful for people to clean their boots coming into the shed. People can be a large source of contamination for a calf

rearing shed. Therefore, people who aren't involved in calf rearing should not need to come into the shed during the season.

A rodent control system is often necessary especially around areas where milk powder and meal is stored. Birds should be removed from the shed if possible, to reduce the occurrence of bird droppings in the shed. Do not allow dogs to roam from pen to pen as they can spread disease.

Milk should be brought to the calves rather than moving calves to a milk feeding area. This reduces the chance of infectious spread between groups of calves and weak calves will not walk to the milk feeding area and are often missed. It is also advisable to keep the milk lines as short as possible, again to reduce the chance of contamination as well

as to reduce the chance of the teats or milk line blocking.

The sick calf pen should be positioned so that they are seen often by staff. This ensures that calves are constantly monitored and action can be taken quickly if a calf deteriorates. It is important to be conscious of spread of disease from this pen so a calf rearer should not go straight from this pen to other pens in the shed where healthy calves are. Although the calves in the sick calf pen often need special attention, it is advisable to feed them last or attend to their treatments after the other pens have been fed or checked therefore minimising the spread of disease. Gloves are recommended for use in the shed at all times, however all clothing worn by staff can be a source of viral or bacterial spread.

FEEDING



Be observant during feeding. Look for blocked teats, slow feeders and bullying by other calves.

In a neonate calf the colostrum is channelled through the oesophageal groove into the abomasum. The rumen is bypassed via this groove to avoid rumenal indigestion or bloat and to allow abomasal peptic digestion of milk. The closure of the oesophageal groove is stimulated by suckling, stimulation of the glossopharyngeal nerve, salt and water. The oesophageal groove is functionally absent by 12 weeks of age¹. Suckling is therefore important for healthy milk digestion; so the calf should be fed standing with its head up. Drinking from buckets at ground level is not advised.

When feeding calf milk replacer (CMR) it is very important to follow the instructions

carefully. Use one brand of CMR throughout the milk feeding programme. If changes/increases are being made, make them slowly i.e. gradually over three or more days. Monitoring the calves for nutritional 'white' scours is advised to assess if changes or issues are arising.

It is advisable to use a CMR from a company who is a member of the New Zealand Feed Manufacturers Association (NZFMA). This is a voluntary organisation which asks its members to adhere to its code of practice and promotes high standards of quality products.

When using CMRs there are a number of important management practices:

Mix up the milk powder just prior to feeding. If it is mixed up the day before the powder can settle out and the milk can go off causing harmful bacterial growth.

Store bags of powder in a cool, dry area that is free from rodents and birds.

Mix powder thoroughly with warm water. Add milk powder to half the final volume, mix well and then top up to the required volume with warm or cold water as required. Feeding warm milk is advised as it reduces the need for energy expenditure to get the milk up to blood temperature in the calf. The temperature of the milk should be between 18–20°C when fed to the calf.

Use a thermometer if you are unsure of the correct temperature.

Always use clean fresh water.

Rinse all equipment thoroughly after use. Ensure that teats do not become blocked. Ensure that milk feeders are stored in such a way so as not to collect bird droppings.

Be observant during feeding. Look for blocked teats, slow feeders and bullying by other calves.

Use a compartmentalised feeder for the first 3 weeks at least, so that each calf gets the same volume.

The aim of neonatal calf feeding is to give 10% of bodyweight in milk to calves. (i.e. a 40kg calf should get at least 4 litres of cow's milk or 4 times 125g/L of CMR i.e 500 g of powder equivalent).

The CMR intake should provide the same amount of powder (energy) intake but volumes are often reduced when the concentration is increased to say 150 or 200 g/L¹¹.

CMR FEEDING INSTRUCTIONS

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TWICE A DAY FEEDING

Suggested feeding rate and volume—mixing rate 150 grams/litre

AGE	VOLUME PER FEED	GRAMS PER FEED	GRAMS PER DAY
0–4 days	Colostrum fed ad lib		
5–10 days	2 litres	300 grams	600 grams
11–21 days	2.5 litres	375 grams	750 grams

ONCE A DAY FEEDING

Suggested feeding rate and volume—mixing rate 300 grams/litre

AGE	VOLUME PER FEED	GRAMS PER FEED	GRAMS PER DAY
0–4 days	Colostrum fed ad lib		
5–10 days	1 litre twice a day	300 grams	600 grams
11–21 days	2 litres once a day	600 grams	600 grams

FEEDING CONTINUED



A suggestion to manage slow drinking calves is to make a pen specifically for slow drinkers.

Once a day feeding works by restricting the feeding volume and increasing the concentration of the milk. This encourages earlier consumption of concentrates, whilst the full nutritional requirements are met.

It is important to use a compartmentalised feeder in this case to ensure that there are even and accurate intakes.

Feeding of mastitis or antibiotic milk to calves is not advised^{8,9}. Some studies suggest that there

is a higher incidence of heifer mastitis after feeding milk from cows with mastitis to calves. Best practice dictates that the feeding of mastitis or antibiotic milk is to be avoided.

A suggestion to manage slow drinking calves is to make a pen specifically for slow drinkers. This way they can all be monitored together and not be bullied and miss out on their complete feed.

Meal or concentrates are valuable to stimulate rumen function. This prepares the gut for an all grass diet. Concentrates should be highly palatable and highly digestible. It should contain high protein levels of between 18–20% whilst the calves are indoors. It should contain a ruminal buffer to prevent acidosis and a coccidiostat. Trough space is

important to consider so that every calf can get to the meal at the same time. 300mm per head should be allowed for space even when ad lib feeding as calves usually come to the trough all at the same time. Meal should be available to calves from week 1 post partum.

Fibre (hay or straw) contributes to the development of the rumen but has less energy than concentrates so should only be fed at a maximum of 10% of the diet. This fibre source helps to “stretch” the rumen. It should be sweet smelling and dry, with no moulds or dust. Hay or straw should be available to calves from day 1 post partum. Clean, fresh water must be made available to the calves from day 1 post partum. Troughs must be checked daily and cleaned as necessary.

RECOGNITION AND MANAGEMENT OF SICK CALVES



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Carefully observe every calf daily to identify sick calves. Healthy, happy calves will move around the pen, play, feed eagerly and stretch after getting up.

They will have shiny coats, bright eyes, wet noses, dry navels, and dry hind legs. Use all your senses when looking at sick calves and the environment in which they live:

LOOK

Recumbent, dull sunken eyes, droopy ears, swollen wet umbilicus, lame on one or more legs, disorientated, separate from the others, not playing, slow to the feeder, discharge (blood, mucus, pus) from the nose or mouth, hair loss.

LISTEN

Grinding teeth, bellowing, coughing.

SMELL

Ammonia, milk, meal, hay, water.

Isolate and treat sick calves as soon as possible. Spray the pens of sick calves daily with a complete anti-viral spray. The rectal temperature of the calf is influenced by the ambient temperature. Take the temperature of a healthy pen mate before you take the temperature of the sick ones for comparison. Generally over 39.5°C is considered pyrexia.

Veterinary intervention early in a disease process is advisable. Failure of passive transfer of immunoglobulins from the colostrum into the calf in the early stages of life can be measured by taking a blood sample from the calf. Post mortems can be very beneficial to rule in or rule out certain diseases. They can be done quickly and give the veterinarian good information.

Faecal sampling, dehydration levels and temperature results are also important to a diagnostician. However, it is important to take a holistic approach to diagnosing calf diseases including looking, listening and smelling.

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