CALF REARING
tech guide

170 years of innovation

CALF NUTRITION AND MANAGEMENT FROM BIRTH TO CALVING

Dugdale Nutrition

Introduction

Rearing replacement dairy heifers is the second greatest cost to a dairy unit. However, if the heifers do not have the correct nutrition or are not managed correctly, the price will be paid later in the production cycle.

Contents

Importance of Heifer Rearing

Importance

Heifer rearing in an expensive part of the dairy business. About 20% of the dairy production costs are heifer rearing. Heifers are often not the main focus as they produce no income until the first lactation and no profit until the second lactation. However, the heifer is the future of the herd and can have superior genetics to the cows in the herd. This is why it is important to rear heifers to their potential.

Management

Management of heifers, right from birth is key, to produce productive and long lasting cows. The calf should be born into a clean environment and should be fed quality colostrum immediately. A bad start to life will only escalate into future problems.

Measuring Performance

Performance of heifers can be measured by weight or height. By measuring performance comparisons can be made within a herd and between herds. Heifers which are underperforming cost money either by taking longer to put milk in the tank or requiring treatment for a health problem.

Birth to 2 Days Old

Colostrum

Colostrum is the liquid gold a calf needs to start life correctly. If the quantity or quality of colostrum is not sufficient enough, problems occur later in life. It is important that the 4 Qs are followed...

- Quantity
- Quickly
- Quality
- Quietly

Quantity

A calf should be fed 4 litres (or 10% birthweight) of colostrum at 37°C within the first 2 hours, ideally by suckling a teat, but if need be use a stomach tube to top up. If it is not possible to feed the calf in the first 2 hours then the first feed should be as soon as possible in the first 6 hours.

At least 20% of birth weight should be fed in the first 24 hours.

2 litres, twice a day of colostrum should be continued for at least a further 2 days.

Quickly

A calf should be fed in the first 2 hours of life because at birth the calf's intestines are permeable to antibodies allowing them to be absorbed directly into the bloodstream. The permeability reduces with time after birth and the gut wall is essentially closed after 24 hours.

If the colostrum is offered straight after birth the suckling reflex is usually better and the calf is more likely to take a teat bottle. The calf is then more likely to take a second feed more easily.

Birth to 2 Days Old

Quality

The colostrum antibody level varies between different cows. The calf should be fed 250g of IgG antibodies in the first feed or colostrum >50g/L IgG.

Factors affecting the quality are:

- Dry Cow management
- Dry Cow diet specification
- Stress in the dry period
- Milking cows within 1-2 hours after calving (max. 6 hours)

Colostrum should only be stored if the quality is good enough and from disease free cows.

Quietly

The calf's ability to absorb antibodies is maximised when the calf is not under stress. If a calf is stressed whilst being fed it would require a greater volume of colostrum to absorb sufficient antibodies.

Calf Management

Calves should be removed straight from the cow at birth where possible to reduce the exposure to bacteria and other infections present in the calving areas.

The other benefit of removing the calf and hygienically feeding straight away, ensures maximum absorption of colostrum is possible and a known amount of colostrum has been given to the calf.

2 Days To Weaning

Rearing Heifers

A calf should be fed milk until at least 35 days old either once or twice a day.

Milk replacers have two main benefits over whole milk which is:

- Balance of vitamins and minerals
- Reduced disease risk

The mixing of milk must be done correctly to get the best performance out of the milk. Make sure the powder is weighed accurately, to the correct ratio and mix at 40°C, no hotter!! Then feed the milk at 37°C. From 35 days the milk quantity should be reduced to encourage increased concentrate intakes. The powder should be fed at 125g–150g/litre depending on the ambient temperature and target growth rate, and feed a maximum of 3 litres per feed. The stomach where the milk is digested only has 2 litre capacity at birth so feeding any more than 3 litres in any one feed causes an overflow and this can cause acidosis like symptoms. This can be increased with age.

Offer a very palatable concentrate from day 3. The crude protein should be 16-20%, depending on the breed of calves being fed. The concentrate should be fed fresh daily and the waste feed can be given to the older heifers.

Fresh water must be available adlib, ideally luke-warm but definitely clean.

Use calf jackets in winter for a minimum of 4 weeks after birth. Calf jackets provide extra protection from the cold temperatures. Ensure they are breathable. Straw should still be adequately used for bedding to allow nesting but jackets can allow for a little less straw. Temperature control is key in this early stage.

Housing

Calves should be housed in pairs for the 1st 7-14 days. It is important to maintain hygiene and look at ways of doing this without an increase risk of disease spread.

Ideally have solid panels between each pair of calves and within the pair still have a partial barrier which can be barred rather than solid. Equipment used to house calves should be easily cleaned to reduce the spread of disease between batches of calves.

Caution should still be taken with calves from Johnes positive cows and those showing signs of disease.

2 Days To Weaning

Housing continued...

From 3 weeks to weaning they can be housed in small groups of 5 – 10 calves. Calves should be moved into groups as soon as possible as it encourages intakes.

Once the calves are settled in groups, dehorning and castration can take place at approximately 4 weeks of age.

Feeding Milk Powder Advice

Start at 2 litres twice a day at 125-150g/litre. Ideally still offer some of dam's milk from the 2nd and 3rd milking for 3 days after the first colostrum feeds. This milk should be pasteurised and can be topped up with calf milk replacer if required. This also helps transition to the milk replacer.

Over 7 days increase to 2.5-3 litres twice a day at 125-150g/litre. If on an automatic feeding system we can feed smaller amounts more often and if targeting the accelerated feeding level of 900 grams/day we can achieve this more easily.

At approximately 5 weeks old, decrease from 6 litres daily at 150g/litre in a big step e.g. 900grams to 500grams (4 litres at 125g/litre) as this has been shown to increase hard feed intake more effectively.

From 14 days later the calf can be steadily or suddenly weaned off milk if eating at least 2kg of concentrate average per head in the group.

Speak to your advisor for best regime for your farm!

Feeding Whole Milk Advice

With whole milk feeding, we are still limited to the same quantities of milk fed but we need to be aware of the milk quality as this has an effect on the milk solids the calf receives per day. Whole milk should be collected and stored hygienically and ideally fed as soon as possible after collection.

Pasteurisation should be used with whole milk feeding to reduce the risk of scour bacteria and allow better absorption. Ideally pasteurisation will be at 60°C for 60 minutes. Do not rely on pasteurisation for control of Johnes.

2 Days To Weaning

Automatic Feeders

To run automatic calf feeders successfully, a few points need to be considered:

- Before the calves are placed on the feeders, high standard colostrum management is essential.
- Calves must be trained to the feeder.
- The calf pen should be 40-45^2 feet and well ventilated.
- No more than 12 to 15 calves per pen. Research shows 8 calves per pen perform the best.
- Reach the peak milk as quickly as possible. Calves will easily drink 10 litres per day.
- Meal sizes should be 1.8 to 2.5 litres each, the daily allocation should be consumed within 4 to 6 meals per day.
- Frequently recalibrate the mixing mechanism to ensure the correct concentration of powder is mixed.
- Clean machine regularly.

Weaning

When To Wean

Start to wean calves at 7-8 weeks of age or when they are 12-15% of the mature cow weight. A calf should be eating at least 1.5kg - 2 kg/day concentrate for at least 3 days. Calves should be starting to eat some straw by weaning. The straw will ideally be chopped, clean straw. Wheat straw is preferred over barley but will be dependent on harvest.

Only **ONE** thing should be changed at weaning which is stopping milk. Groups and concentrate should remain stable at weaning.

Weaning Checklist

1. Does the calf have access to fresh and palatable concentrates?
2. Does the calf have access to fresh water?
3. Does the calf eat forage?
4. Is the calf at least 6 weeks old?
5. Is the calf at least twice it's birth weight?
6. Does the calf eat sufficient amount of concentrates?
7. Does the calf look healthy?

Up to 12 Weeks Old

Diet

Calves should continue with the starter concentrate up to 12 weeks maintaining an overall protein level in the diet of 15-16% protein. If you are wanting to change the concentrate around weaning, do not change it at the time of weaning, either change it two weeks before or two weeks after. Ensure that the calves are offered adlib concentrate for 2-4 weeks post weaning then start to reduce the concentrate feeding as advised. Any changes in concentrate should be made slowly with transition from one to the other made over 7-10 days.

Once weaned, hay or chopped straw should be offered adlib. The concentrate should be targeted depending on the forage quality and type. If fed on wheat straw, a concentrate should be 24-26% crude protein. If on a hay based forage then the concentrate should be 16-18% crude protein.

Growth Rate

Aim for growth rate of 0.8- 1.0kg/day.

Housing

At least 10 days post weaning, calves can be moved into larger groups but they should not be housed in the same area as adult cattle until at least 6 months of age. This will help reduce the risk of diseases, especially pneumonia affecting younger cattle. They should have access to 18” feed space per heifer. In an ideal situation there would be a maximum of 30 cattle in one airspace.

12 Weeks to Pregnancy

Rearing Heifers

Heifers should continue on a straw and concentrate diet ideally, although diets can be developed around hay as well. A concentrate of around 24% protein should be fed with straw to maintain an overall diet protein level of 14-15%.

Silage or pasture access should not be given until at least 6 months of age as they will not be digested fully and will affect rumen development. The concentrate used alongside should be balanced to the silage quality for energy and protein. If young heifers are turned out to pasture they should be supplemented to ensure rumen development continues and they meet growth targets.

Serving Heifers

Heifers should show oestrus by 10 months with service by 13 months to aim for calving at 24 months.

For service they should be at least 55% of adult size. Growth rates should be monitored with target being 0.8-1.0kg/day.

If heifers are turned out before the service period we need to ensure we manage them to minimise stress and optimise fertility. This can often mean housing 6 weeks before service until PD + to ensure control of energy and diet. If kept outside a supplement may be required to support conception rate. Review performance on an individual farm basis and manage these heifers through this crucial period as carefully as possible.

Ideally heifers should only be served twice and certainly not more than 3 times. This helps ensure only fertile replacements are being brought into the herd.

PD+ to 6 Weeks Pre Calving

Rearing Heifers

Heifers can be fed a straw and silage diet with concentrate. Again other forages may be used depending on the farm.

Overall diet protein level should be around 13-14%.

Feed space should be maintained at least 24" per heifer.

Ensure growth is maintained at approximately 0.8kg/day depending on weights at time of PD+ and target weight for 1st calving.

Once reach 6 weeks pre calving they should move onto the dairy herd dry cow ration and management.

Transition

If heifers have been reared on pasture or bedding with no experience of cubicles or concrete there could be an increased incidence of lameness once entering the milking herd. When heifers are coming up to calving, the nutritional and environmental changes should be kept to a minimum.

- Ensure the heifers have had contact with concrete during the rearing stage.
- Move heifers into a close up group at least a month before calving. The area where they are housed should have cubicles similar to the ones that will be used after calving or should be on soft bedding.
- Overgrown claws should be trimmed at the time of moving into the close up group and feet should be checked for lesions.
- A well formulated close up ration should be fed at least one month before calving but do not allow heifers to become over conditioned.
- 21 days before and after calving, the heifers should have 30" of trough space.
- Start foot bathing the close up heifers.

Calving Pen

Ideal Calving Pen

- Have a stress free system
- Have a calving gate in the pen so that a cow can be held by one person
- Ensure there is enough space in the calving pen so that a calving aid will fit
- Consider a cuddle box for the calf
- A cow or heifer needs plenty of space to exercise

Cuddle Box

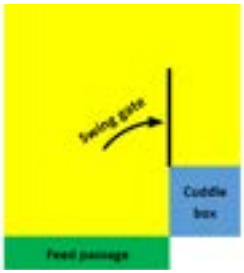
The cuddle box is a box in the feed passage area where the cow can lick the calf and the calf is safe. A border around the box protects it from cold winds. The calf should be fed 2 litres of colostrum as soon as the calf will take it. By putting the calf in the cuddle box and feeding with colostrum, the quantity and quality of the colostrum is known. By placing the calf on hay or silage, it encourages the cow to eat.

Looking After the Heifer

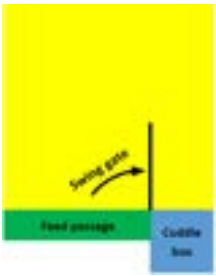
After calving the heifer should be given 20 litres of luke warm water to rehydrate her and stimulate feed intake. A reviving drink can also be given to the new calved heifer, these contain electrolytes, glucose, vitamins and minerals to replenish her.

A gate in the calving pen allows the heifer to be milked in the pen whilst she is licking the calf.

When the calf is taken away from the heifer, she will start to look for it. If the calf has been laid on hay or silage it will smell of the calf and should stimulate forage intakes.



Cuddle box in the calving pen



Cuddle box outside the calving pen

Economics & Targets

Heifer rearing is an expensive part of the business. To rear a heifer, on average it costs approximately £1800 if the heifer calves at 24 months. By calving at 24 months old the heifer is cheaper to rear but also she is earning her keep and putting milk into the tank sooner.

Factor

Many factors impact the overall cost of rearing calves, these include:

- The value of the calf
- Feed
- Labour
- Housing (bedding)
- Veterinary
- Waste removal and storage
- Reproduction

Calving at 24 Months

Calving at 24 months is more economic than calving at 26 months or later. Statistics show that calving at 24 months, a cow will average 25,000 litres throughout their 5 years, where as a heifer calving 2 months later will only average 20,400 litres. Also a heifer calving at 24 months old has 62% chance of still being in the herd at 5 years old where as calving at 26 months old only had 41% chance of being in the herd.

Growth

Measuring growth of youngstock provides performance information and can help identify poor performing cattle or underlying health problems. It is also a method to determine efficiency of feed conversion and ensures maximum returns on investment.

Growth Targets

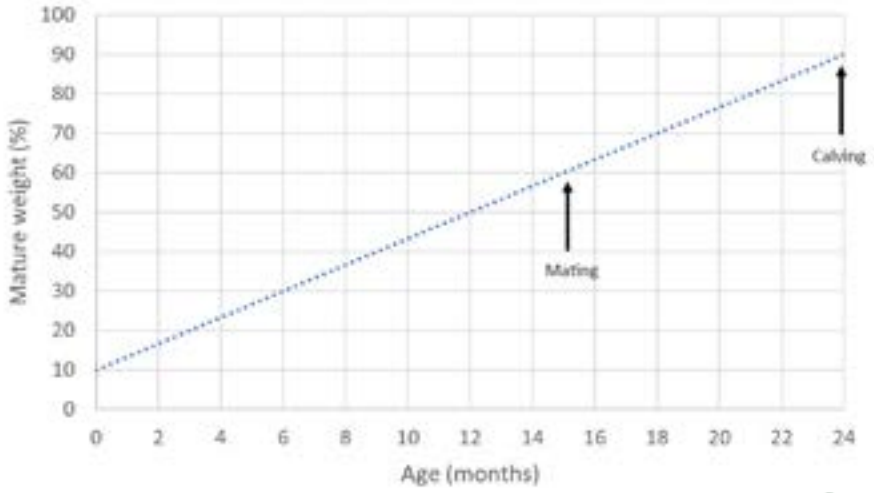
To successfully rear heifers to calve down at 24 months, the key is to maximise weight gain without creating overfat heifers.

Heifer growth rate is best measured as a percentage of mature weight or size due to different breeds having a different mature weight and size i.e. Jersey vs Holstein.

It does not matter which method of measurement is used as long as the measurement are taken regularly and it is accurate, using the same method each time.

It is important that the target for the percentage of mature size is based on cows which are in 3rd and 4th lactation and 100 to 120 days in milk.

	Weaning Weight	6 Months	9 Months	Mating	Calving
% Mature Weight	Double Birth Weight	30	40	55-60	85



Measuring Growth

Methods

There are various methods to measure calves, such as:

- Weight– electric weigh scales are the most accurate method of determine weight. Also by setting up a weigh scale in a race it gets cattle used being handled
- Withers height– make sure the calf is standing on a flat surface
- Hip height- make sure the calf is standing on a flat surface
- Hip width
- Girth around the chest– used to determine weight

Benefits of Measuring

- Achieve target growth rates for breeding
- Identify underperforming and sick calves
- Identify bottlenecks within the system
- Maximise growth efficiency cost effectively

When

Birth weight should be recorded to create a baseline figure, then measurements should be taken as frequent as possible, but at least at:

- Weaning
- 2 weeks post weaning
- Six months of age
- Mating

Daily Liveweight Gain

- Average Daily Liveweight Gain (DLWG) can be calculated once two measurements have been taken
- Example: a calf weighs 38kg at birth. A month later it weighs 62.5kg. DLWG= 0.7kg/ day

$$\frac{62.5 - 38}{31} = 0.7$$

Housing

Calves

Calves should not be housed with older cattle as calves are at a greater risk of disease.

The housing should be draft free but well ventilated.

The bedding should be clean and dry at all times.

The equipment used for the pens should be easy to sterilise so plastic or metal rather than wood. All the pens should be cleaned between use, and the best sort of system for sanitation is an all in all out system.

Hutches vs Pens

Pens are the most common system of housing calves, however, hutches have been shown to be more healthier than pens. Below are some advantages and disadvantages of hutches.

Advantages	**Disadvantages**
Lower infection rate if cleaned properly	Need to be shaded in summer
Kept separate normally outside away from older calves and dairy cattle that can carry disease	Food becomes wet (Can put buckets inside)
Can stand inside and outside	Large straw usages
Healthy microclimate (Constant Air flow, no drafts)	Moisture from ground can seep through
Easy to clean and move	Initial cost
Keep on a gradual slope to drain away water	

Groups

Many small groups are better than one big group:

- Reduces competition for feed and water
- Reduces the spread of disease
- Calves can be monitored better

Housing

Feed Space

The feed space is an important part of housing to get right. Too little space then the smaller heifers will get bullied out resulting in poor growth rates. There will also be a greater variation in the size of the heifers. At the point of service some heifers will be ready to serve whereas other heifers won't have achieved the target weight.

Weight (kg)	Width feed space
Less than 100	0.3m
100-199	0.35m
200-299	0.4m
300	0.5m

Straw Yards

If the heifers are in straw yards, there should be a bedded area and a hard standing feed passage area. The concrete area promotes hoof wear, prevents the hooves becoming over grown and prepares the hoof wall for later years.

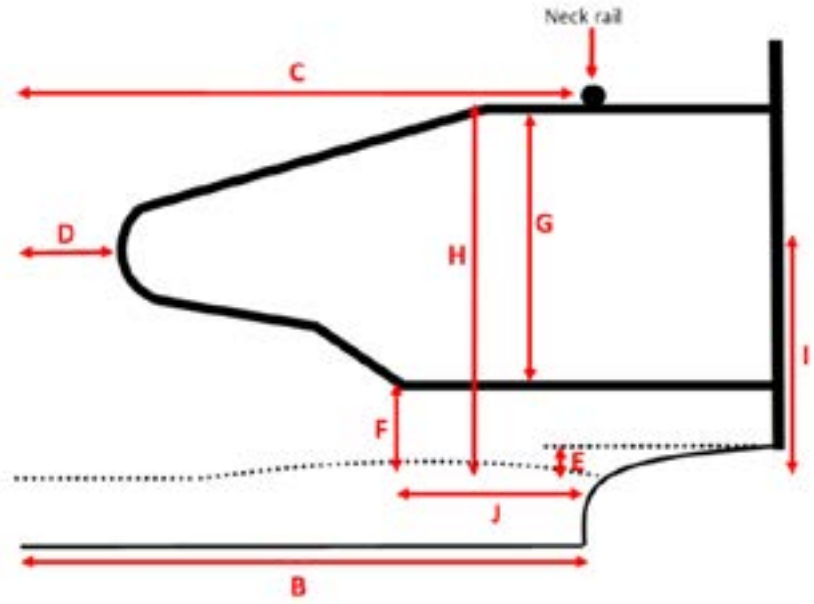
For heifers younger than a year of age the hard standing feed passage should be 2m wide so that when a heifer is feeding, other heifers can get around the back of her. The feed passage should be scraped out every day. Older heifers will need up to 3.5m wide feed passage.

Cubicles

Housing young heifers in cubicles trains them to lie in them before entering the milking herd. The cubicles should be clean and comfortable to encourage the heifers to lie in them. There should also be 5% more cubicles than the amount of animals. If they are dirty, uncomfortable or not enough of them then the heifers will not lie in them and this behaviour will be carried through to when they are in the milking herd.

Cubicles continued...

	Age (months)				
Dimensions (inch)	6-11	11-15	16-18	19-22	23-24
Width	32	39	43	46	46
C	45	55	60	60	60
F	12	12	12	12	12
G	24	32	35	36	36
H	36	44	47	48	48
Head to Head	5' 5"	6'	7'	7' 6"	7' 6"
Single Row	7'				



Disease

Calf Diseases

Average pre weaning mortality= 7.8-11%

Average post weaning mortality= 1.9%

Impacts of disease short term

- Labour
- Drugs
- Replacement cost

Impacts of disease long term

- Depressed gain by 6 months of age
- Increased risk of death before calving
- Increased risk of culling before calving
- Increased age at first calving
- Reduced lifetime production

Newborn Calf

Disinfect navel- Iodine dries and seals the navel quickly but check regularly and treat more than once if needed.

In winter get the calf under a heat lamp or in a warming box.

Use calf jackets

Get colostrum in the calf as soon as possible

Health Considerations

- Worming
- Lungworm Prevention
- Pneumonia and Scour Vaccinations
- Johnes Control Strategy
- BVD & IBR Testing
- Leptospirosis Vaccination / Testing
- **Speak to your Vet**

Disease

Scour

Scour is caused by viruses (rotavirus & coronavirus), bacteria (E.coli & salmonella) and parasites (cryptosporidia & coccidiosis). As soon as you see a calf with scour, remove the calf and pen away from other calves. You should have a pen designated for sick calves. Ensure to disinfect the area where the poorly calf has been to reduce the spread to other calves.

Take a faecal sample and send this to your vets to determine what is causing the scour. When calves scour they loose a lot of water and easily become dehydrated. Give the calf electrolytes to replace the fluids and salts that have been lost.

Pneumonia

Common signs of pneumonia are nasal discharge, coughing, heavy breathing, increased breathing rate and reduced appetite. Pneumonia tends to spread rapidly in a group of calves, remove a calf that is showing signs of pneumonia and keep a close eye on the rest of the group for symptoms.

To reduce the risk of Pneumonia:

- Ensure the calf receives the correct quantity and quality of colostrum
- House in a well ventilated building but ensure there are no draughts
- Calves should not be stressed
- House different age groups separate
- Cattle at pasture may have lung worm (husk)

Clostridial Disease

Clostridia are soil bacteria which are known to cause a number of conditions in cattle, the most common being blackleg. Clostridia diseases occur because the cattle have grazed infected pastures.

Once the cattle consume the spores produced by the bacteria, the spores are found in the muscle, liver and spleen. If the muscle which contains the spores gets damaged, by injury to the animal, then the spores germinate and produce a fatal toxin. In most cases the animal is found dead.

Calf Choice Total 100

Only natural colostrum replacers provide newborn calves with the colostral protein, colostral fat and other critical ingredients required within hours after birth.

- Calf's Choice Total 100 is natural, not a manufactured formula
- Sourced in Scotland and therefore EBL & TB free
- High in colostral fat, an important energy source
- Safe & effective, free of disease causing organisms and convenient
- Easily mixes in under 15 seconds
- Available in 500g Sachets
- 3 Year Shelf Life

Pro Skim

Pro Skim is a high quality milk powder which is formulated with the fatty acid technology of NeoTec4 and Amneo technology.

Benefits of NeoTec4:

- Improve Feed Efficiency & Utilisation
- Improve ADG (Average Daily Gain
- Improve Frame & Muscle Growth
- Reduce Scours & Optimise Immune System

Amneo balances the animo acids to meet the calf's requirements

Progressive Rumistart Pellets

Rumistart pellets can be fed from 3 days old.

- Contain quality protein sources to support growth and frame development.
- Contains 18% Protein
- Contain balanced starch and sugar content which drives the development of the rumen
- Includes Nustart to support rumen development and animal health
- Contains Safmannan yeast cell wall to support intestinal health and development of the immune system.

Progressive Calf Nuts

A high energy 6mm nut designed to meet the energy and protein requirments of young calves.

- Contains 18% Protein
- Contains quality protein sources are included to support frame growth
- Contains quality protein sources to support frame growth.
- Starch and sugar levels and sources to drive rumen development.
- Contains NuStart and Safmannan yeast cell wall for digestion tract and immune system development.

iStart Pellets

A 3mm, 17% crude protein pellet designed to feed to calves from 3 days old.

iStart pellets contain NuStart, which supports rumen development and feed intakes, and Safmannan yeast cell wall to help support intestinal health and develop the immune system.

DN Products - Heifer

Progressive Heifer Nuts

Progressive Heifer Nuts are a high energy 6mm fully mineralised heifer rearing nut designed to meet the energy demands of calves and heifers fed on a hay or silage based diet.

- 19% Protein
- Contains a range of energy sources to support rumen health and growth rates
- Contains quality protein sources to develop and support frame growth
- Includes bypass protein sources
- Contains Actisaf yeast to support rumen development

Progressive Heifer Straw Nuts

Progressive Heifer Straw Nuts are a 6mm fully mineralised heifer rearing nut, ideal for feeding with straw due to the high protein content.

- 26% Protein
- Contains a range of energy sources to support rumen health and growth rates
- Contains quality protein sources to develop frame growth
- Contains Actisaf yeast to support rumen development
- Contains upto 1% Urea to support straw based digestion

iGrow Range

This range of fully mineralised 6mm nuts are available in 16%, 18% and 20% protein.

- Contains good quality protein sources to support structural growth
- The starch and sugar levels are balanced to drive rumen development
- This range will work well for more cross bred / beef type growing animals

Alka Rearer Nuts

Alka Rearer Nuts are a fully mineralised 6mm nut.

- Contains a range of quality protein sources to support frame growth
- Energy sources support rumen health
- Includes Alka Barley which supports rumen health

Replenisher 321 Nuts

Replenisher 321 nuts are a 24% protein nut which contains Lift, Actisaf yeast, Magnesium Chloride and Availa minerals. Good levels of quality protein with high bypass levels for preparation for colostrum and milk production. iPrepare rolls have a high magnesium level using Magnesium of different sources to help reduce issues with milk fever at calving by supporting partial DCAD.

iPrepare Rolls

iPrepare Rolls are a 18% protein 12mm roll with good levels of quality protein and high bypass levels for preparation for colostrum and milk production.

iPrepare rolls have a high magnesium level to help reduce issues with milk fever at calving by supporting partial DCAD and also contain Lift.

DC Xzel Nuts

DC Xzel Nuts come as a complete version with a high specification of minerals or as a version designed to be fed alongside on farm dry cow minerals. They contain good quality protein and energy sources to support transition and milk production. The Xzelit calcium binder included works well in grass based, and high potassium silage diets to support the cow's hormonal system and reduce the risk of milk fever.

Lift = natural product to boost liver function

Actisaf yeast = live yeast to support rumen function through transition

Magnesium Chloride = makes the product partially DCAD to help balance calcium excess

Availa Minerals = these are minerals which are more bioavailable to the cow

X-zelit = reduces the risk of milk fever by stimulating the cow to mobilise her calcium reserves by binding calcium from the diet.

Progressive Heifer

Progressive Heifer minerals include Availa minerals which are proven to be more readily absorbed and utilised by the cow to ensure optimal results. The benefits of Availa minerals include lameness reduction, improved immunity and lower SCC, improved fertility, increased milk production, better feed efficiency and digital dermatitis control.

Essential Dry Cow

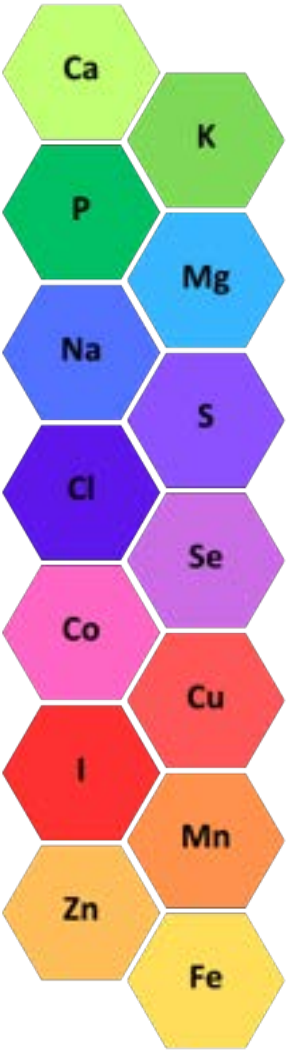
This farm pack mineral is designed to support non-lactating animals with a standard mineral inclusion that will provide basic needs for the dry cow.

Progressive Dry Cow

This farmpack mineral is Availa mineral based and is designed to support transition cows through the dry period to support animal health and prepare them for the next lactation.

Xzelit

A calcium binder and can be fed as a raw material in a TMR based dry cow system for the last 2 weeks pre-calving to support the cow's hormonal system and reduce the risk of milk fever.



ZINPRO

Dugdale Nutrition

Scan to find your local Sales Specialist

Please call your local DN Sales Specialist for further information about any DN product or service.

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