Afrivet
Animal health is in our DNA
TRAINING SERVICES

3.1

LIVESTOCK HANDLER TRAINING MANUALS

MODULE 3: SEASONAL PLANNING

Supplementary feed

Managing supplementary feed to optimise production.

English

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Developed by Dr Danie Odendaal

Published by Agri Connect (Pty) Ltd for Afrivet
Tel: +27 (0) 12 817 9060
Fax: +27 (0) 12 809 007
E-mail: enquiries@afrivet.co.za

www.afrivet.co.za

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INTRODUCTION

This manual forms part of Afrivet's series on primary animal health care (PAHC) for small stock and has been developed to help the veterinarian, animal health technician, livestock owner and livestock handler to understand the methodology used when implementing PAHC and production management.

These manuals are ideally suited as practical training aids for training livestock handlers in the principles of planned production management, disease prevention and early disease identification.

The information contained in this manual is a summary of the material used by Afrivet Training Services for the formal training of animal health technicians, extension officers, livestock farmers and livestock handlers.

Developed by Dr Danie Odendaal

Seasonal supplementation to overcome the most important cause of low calving percentages

Natural grazing can only produce enough nutrition to support a 12-month breeding cycle in cattle during a limited time of the year. On any farm, therefore, nutritional shortages must be supplemented by stored feed, concentrated feed supplements and mineral or vitamin supplements.

Protein shortages during the dry season are normally the most important shortage to be supplemented.

Supplementary nutrition is the biggest variable expense on a livestock farm and must therefore be managed very effectively.

The livestock handler needs to understand the need for and application of supplementary feeding in order to proactively maintain good digestion, general health and production.

The three links of the production chain

The cow converts grass to produce milk and a weaner calf that can be sold for an income.

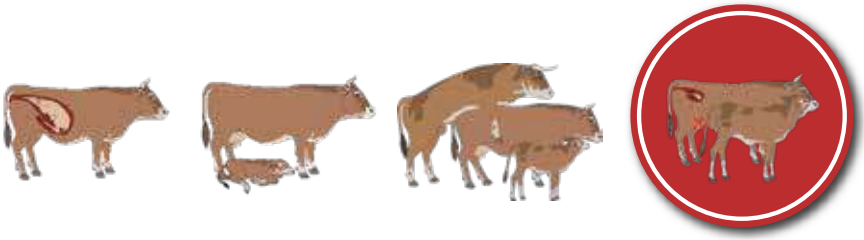
Grass production
Conversion of sunlight, rainwater and the nutrients in the soil into plant material.

Animal production
Conversion of grass to animal products – milk, meat, hides and wool.

Income generation
Selling of live animals and/or animal products into the market, generating cash.

Production goal

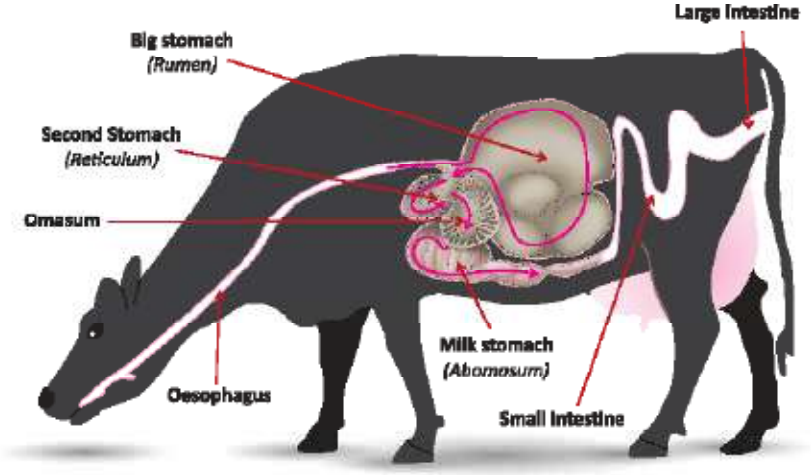
One calf weaned per cow per year



Each link in the production chain is important for the chain to be functional and to achieve sustainable, profitable farming with livestock.

Ineffective conversion of grass to animal products is very often the weak link in the chain of events that must be managed in order to achieve the clearly stated production goal.

The ability of ruminants to convert grass to animal products



Low-quality plant material such as grass can't be used as food for people. Most of the country is covered by grassland and the only way in which to use this resource is to farm with grass-eating (ruminant) animals.

Ruminant livestock (animals that have a big stomach called the rumen) can use and digest grass through a distinct process.

By using the unique ability of ruminant animals, low-quality plant material can be converted into a saleable product to provide an income.

The market place will determine the price for live animals as well as animal products. The farmer must provide the product that is needed by the market.

In the big stomach (rumen) there are billions of microorganisms (bacteria and yeast). The grass fibres are digested by enzymes produced by these organisms as an animal's own enzymes cannot digest grass.

This releases the individual nutrients in the grass (energy, protein, minerals and vitamins). These nutrients are then used by the organisms as food, and they grow and multiply.

These organisms are then digested in the milk stomach by enzymes produced by the animal, this releases the nutrients and allows them to be absorbed in the small intestine of the animal.

The digestion process – what happ

1. Cattle walk and graze. Coarse grass is mixed with saliva and swallowed into the rumen.

2. When cattle are at rest, they regurgitate small bunches of the coarse grass (the cud) and chew it until it is finely ground. They then swallow the cud and regurgitate more coarse grass until the grass in the rumen is all finely ground. This rechewing of grass is called rumination.

3. There are organisms in the rumen (bacteria and yeast) that now digest the finely ground grass. This releases the nutritional components (energy, protein, minerals and vitamins) in the grass.

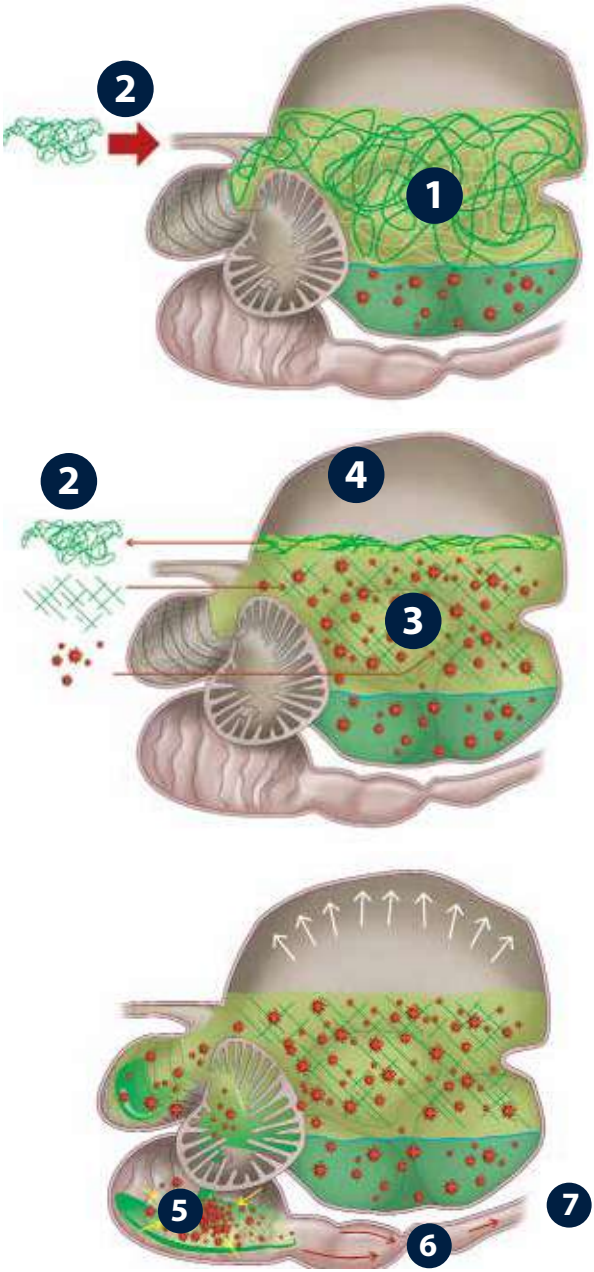
4. Some of the released nutritional substances are absorbed straight into the blood vessels in the wall of the rumen providing the animal with energy.

5. Most of the nutritional substances are used by the organisms for food. They use these nutritional components to grow and multiply. The millions of organisms formed will move with the indigestible food through to the other two stomachs and finally to the last stomach called the milk stomach. Here the organisms are digested by the animal's own **enzymes**.

6. These digested organisms therefore become the "real" food of the animal. The nutritional components in the digested food go through to the small intestine where they are taken up through the intestine wall into the blood.

7. The rest of the undigested food goes out through the large intestine as dung onto the grazing.

ens in the rumen and milk stomach



One of the important nutrients released from the digested grass is protein.

The organisms in the rumen need protein from the grass to grow fast and multiply.

If the protein in the grass is high, digestion will take place at a high rate.

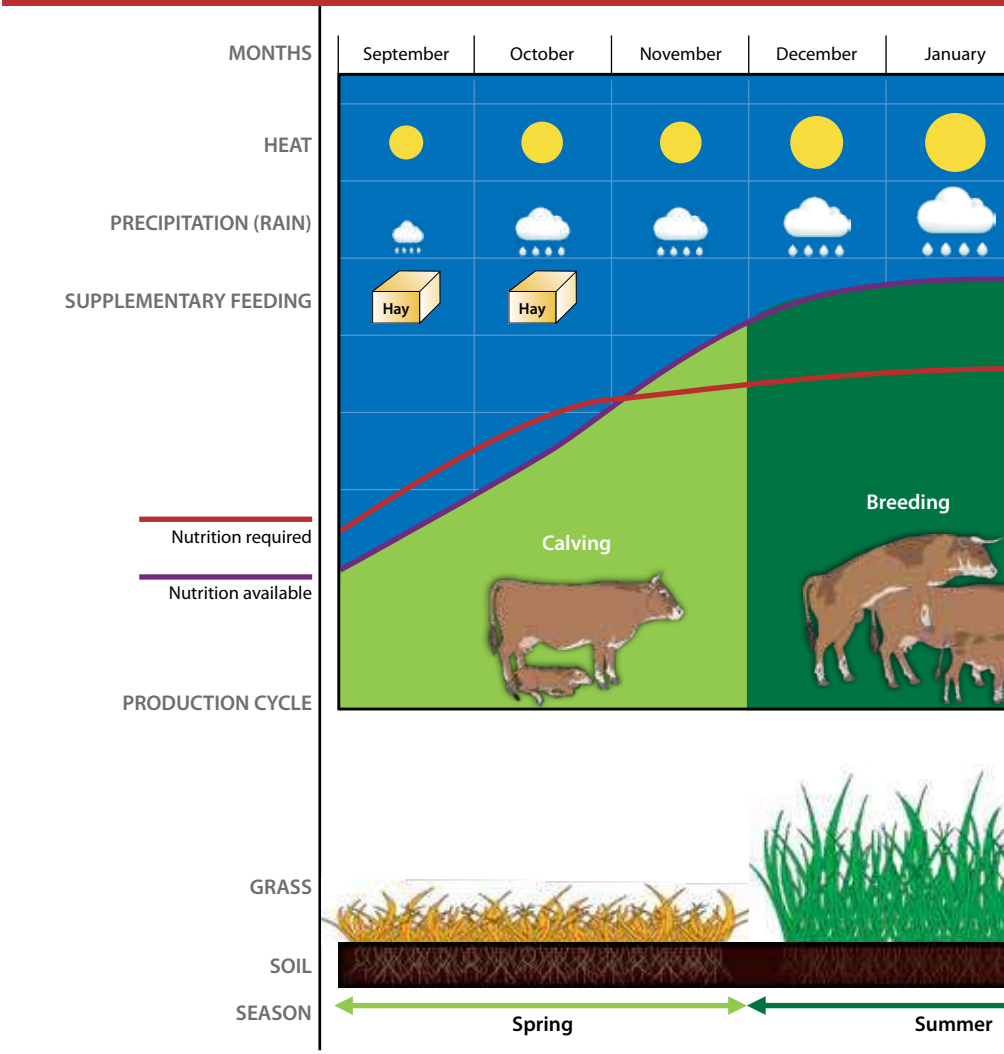
The rumen will empty faster, which results in the cow eating more.

When good-quality grazing (high protein) is available, the adult cow will eat an amount of grass (on a dry-out basis) equal to or larger than 2% of her body weight.

For a cow weighing 450 kg, it amounts to ≥9 kg of dry grass per day.

The production cycle in the con

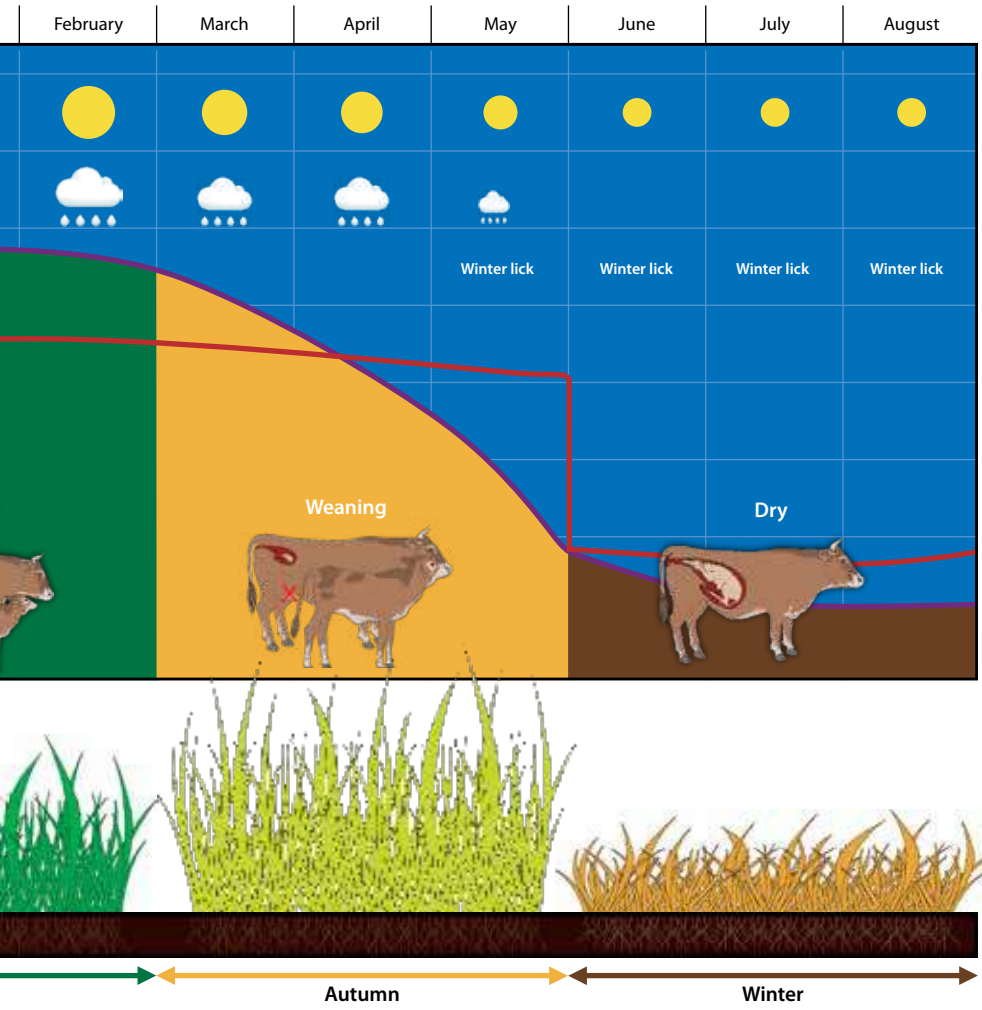
Environmental cycle – nutrition available: The grass growth rate depends amount, digestibility and protein content of available grass during the four



Production cycle – nutrition required: The nutritional needs of a cow proc the 12-month production cycle.

text of the environmental cycle

s on the environmental conditions. There is a significant difference in the seasons.

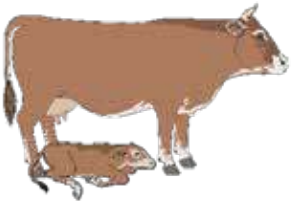


ducing one calf a year differs depending on her stage of production during

The 12-month production cycle

Practical explanation of the nutritional needs during the four different stage

Period 1: Calving and preparation for breeding

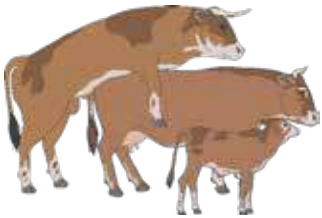


The reproductive tracts must return to normal and the cows must come on heat again to rebreed after three months. Cows must also reach peak milk production to support calf growth. **This is the most important nutritional period for the beef cow.**

Cows must be supplemented with stored feed (such as hay) after calving, if enough grazing is not available.

Provide trace minerals before the start of breeding (see back page).

Period 2: Breeding and pre-wean growth of calves



The bull will mate with cows showing standing heat. Therefore, cows should be gaining weight during the breeding period. **The best grazing possible must be available at the start of breeding.** Cows will be in the early stages of the next pregnancy while giving milk for the calves.

Phosphate can be supplemented during the breeding season for optimal weight gain during breeding.

4 Stages of the

The nutritional needs of a cow during peak milk production, especially the daily amount of protein needed, is double the amount needed by a dry cow.

1 to 1.5kg of protein per day.

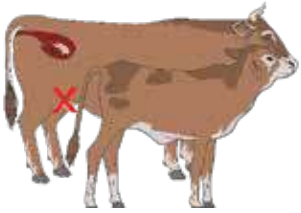
Most cows (> 90%) in the herd should be in a body condition score (BCS) of 2.5 at the beginning of mating (breeding) season and increase in condition during this period.

BCS 2.5 – the eye muscle is half full and the bone ends feel well rounded.

e is driven by nutritional needs

es of production.

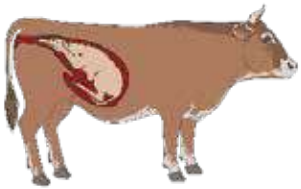
Period 3: Weaning of the calves and pregnancy diagnosis



Up to weaning, the cow will start to lose weight owing to the falling nutritional value of the grass. Low levels of protein supplementation can be started as soon as the cows start to loose condition. If a cow's condition score falls below 2.5, calves must be weaned.

High levels of protein supplementation must be provided from the beginning of the dry season to maintain high intake of dry grass.

Period 4: Dry cow management and preparation for calving



The dry cow must now build up fat reserves before calving. In addition 70 to 80% of the total foetal growth occurs during this period. **This is the second-most important nutritional period during the beef cow year.**

Continue with high level of protein supplementation.

Provide cows in low condition (<3) with an additional energy supplement.

Provide trace minerals and vitamin A 30 - 60 days before the start of calving.

production process

The nutritional needs of the dry cow are much lower after weaning but the digestibility of the grass also decrease drastically at the start of the dry season.

0.5 to 0.6kg of protein needed per day.

Most cows (> 90%) in the herd should be in a condition score of 3 or more, 30 days before the first calves are born.

BCS 3 – the eye muscle is full and the bone ends can only be felt with pressure.

The development of dry gallsic

The amount of protein (protein percentage) in the grass is the first limiting fac
longer during the year, a disease condition called dry gallsickness can develop

Starts as a result of low-quality grazing

At the start of the dry season, the crude protein percentage in the grass will start to fall below 10%.

BCS – 2.5

The eye muscle is half full and the bone ends feel well rounded. 2 to 5mm of fat can be felt under the skin over the pin bone.

1 to 3 months later

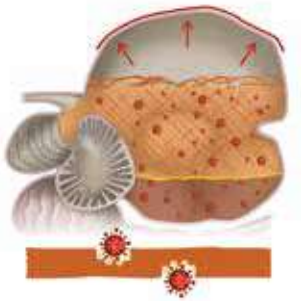
The crude protein percentage in the grass is now 7% and below.

BCS - 2

Eye muscle is very indented but the bone ends just feel rounded. 1mm of fat can be felt under the skin over the pin bone.

Development of dry gallsickness caused

Protein is the first limiting nutrient in natural grazing. The protein needs of the organisms are not provided by the grazing. The organisms in the rumen become less because they do not have enough protein to multiply at a fast rate. This directly reduces the food supply of the cow because there are less organisms to digest. Owing to the fact that cattle are pregnant but still producing milk for the calf, they will start to lose weight.



When the protein in the grass falls to 7% and below the number of organisms that must digest the grass becomes even less. These organisms need enough protein otherwise they can't multiply. Now the grass will be digested even slower, and the cattle will eat much less (1.5% of body weight) because undigested grass remains for a longer time in the rumen. Even if the calves are weaned the cows will still lose condition because of the very slow rate of digestion.

ckness due to protein shortage

ctor in dry grass. Because there is only dry grass available for six months or p if the nutritional shortage is not supplemented by providing a protein lick.

4 to 5 months later

The crude protein percentage in the grass is now 4% and below.

BCS - 1

No eye muscle can be felt and the bone ends are very sharp. No fat can be felt under the skin and the skin is stuck to the pin bone.

by a protein shortage

When it is completely dry and very cold, the grass becomes very hard and the protein can fall to 4% and even lower. By now, the organisms in the rumen stop multiplying and die. The grass in the rumen can't be digested any more.

Cattle will rapidly lose weight when this starts to happen. They will get to the point that they are too weak to walk and will lie down. Once cattle lie down they will die in a few days and in most cases they can't be rescued, even if they are provided with good feed at this stage.

Examination of dead cattle

When a veterinarian cuts open the dead animal, they will find that the different stomachs of the cow contains very dry grass and the gallbladder is enlarged. In cattle that haven't eaten for a few days the gallbladder will be bigger so it is not a sign of a specific disease.

The animal will also not have any fat reserves specifically around the kidney which is a sign of starvation.

Diagnosis of protein shortage in the live animals.

There is no specific test to make a diagnosis of a long-term protein shortage. The veterinarian will base their findings on the time of year, available grazing, pregnancy status and condition of the cattle.

This condition will occur in most areas of South Africa where a protein supplement is not provided during the dry season.

The digestibility of dry grass becomes too low to maintain good production and the goal of producing one calf every 12 months cannot be obtained without a protein supplement.

Prevention of production losses and dry gallsickness

Prevent production loss and dry gallsickness by providing supplementary protein at the beginning of the dry period.

The aim with protein supplementation is not to feed the animal but to feed the organisms in the rumen in order for them to keep digesting the dry grass at a high rate. The grass available can provide enough energy for the animal's need if the animal eats enough.

The digestive process of cattle (as described) has a further distinct advantage in that the organisms in the rumen can use the basic nutrient (nitrogen) that forms the building blocks of protein. This is normally obtained from the digested grass, but if the protein in the grass is too low, this specific nutrient can be supplied in its chemical form, for example urea. This is totally unique to ruminants and the research that led to its use, was one of the most significant developments in cattle farming.

Providing a protein lick

A protein supplement is provided in the form of a loose or hard lick block. It normally contains between 40 to 50% protein and the intake varies between 350 – 600g per day.

The lick contains four basic components:

1. Protein derived from urea, other nitrogen sources and natural protein in the form of oil cake meal.
2. Energy in the form of milled grain seeds (such as maize meal) or the by-products of the milling or sugar industry like hominy chop or molasses.
3. Minerals, mainly phosphorus and calcium.
4. Salt as a supplement and regulator of intake.

Licks can be bought as ready-mixed preparations or can be mixed on farm from the different components.

What is achieved with a small protein supplement?
A pregnant cow that has just weaned its calf weighs 450kg, and requires 500g of protein per day to maintain its weight.
If that cow grazes on grass with a protein content of 4% the following occurs:

Supplemented protein intake		**Unsupplemented protein intake**	
Supplemented by 450g of lick X 45% protein content.	200g protein	Unsupplemented, no additional protein intake.	0g protein
Grass intake increases to 2.2% of body weight @ 9.9kg, resulting in protein intake of:	396g protein	Grass intake falls by 40% to 1.5% of body weight @ 6.75kg, resulting in protein intake of:	270g protein
Protein required:	500g protein	Protein required:	500g protein
Outcome	**+96g extra**	**Outcome**	**- 230g shortfall**

The increase in grass intake plus the lick supplement will provide the cows with more than 100% of their daily protein and energy needs in order to use the extra nutrients for gaining weight in preparation for the next calving. **A small amount of protein supplement per day (450g) is the most cost-effective input that a farmer can make to overcome the most limiting factor in producing one calf per cow per year.**

It is essential for the farm worker to know that loose protein licks containing urea are formulated for cattle to only eat a small amount of the lick otherwise they will be poisoned by the urea. Therefore, cattle must be adapted to the lick (see instruction on the label). They must get the lick daily and the lick must be very well mixed and not get wet. If there is water in the lick container, the urea will dissolve in the water and the cows drinking this will become poisoned.

Warning

Licks containing urea can cause urea poisoning.

DAIRY-MIN

VITAMINS / MINERALS
ORAL

RSA Reg. No. V24723 (Act 36/1947)

Contents per 100 ml: Vitamin A 50 000 IU / Vitamin E 400 IU / Copper 150 mg / Manganese 300 mg / Zinc 500 mg / Magnesium 500 mg / Cobalt 5 mg / Selenium 20 mg

Vitamin, mineral and amino acid supplement for dairy cattle. DAIRY-MIN provides essential organic trace minerals, magnesium, amino acid and fat-soluble vitamins to assist in fertility, immunity and growth in dairy cattle.

Withdrawal period:
Meat: None
Milk: None

Packaging available
5 L, 25 L

20 ml / 50 kg (Calves), 60 ml / 250 kg (Weaners), 100 ml / 500 kg (Cows/bulls)

Registration Holder: Camelus Grondstowwe CC, Co Reg 1996/41164/23

OVI-MIN

VITAMINS / MINERALS
ORAL

RSA Reg. No. V24722 (Act36/1947)

Contents per 100 ml: Vitamin A 50 000 IU / Vitamin D3 2 500 IU / Vitamin E 500 IU / Manganese 200 mg / Zinc 600 mg / Selenium 20 mg / Magnesium 1 000 mg / Cobalt 15 mg / Lysine 2 000 mg

Vitamin and mineral supplement for sheep and goats. Ovi-Min provides essential trace minerals and fat-soluble vitamins to assist in fertility, immunity and growth in sheep and goats.

Withdrawal period:
Meat: None
Milk: None

Packaging available
1L, 5 L, 25 L

8 - 10 ml (kids/lambs over 25 kg),
20 - 25 ml (Adult)

Registration Holder: Camelus Grondstowwe CC, Co Reg 1996/41164/23

OVI-MIN + CU

VITAMINS / MINERALS
ORAL

RSA Reg. No. V26349 (Act 36/1947)

Contents per 100 ml: Vitamin A 50 000 IU, Vitamin D3 2500 IU, Vitamin E 500 IU, Manganese 200 mg Zinc 600 mg, Selenium 20 mg, Magnesium 1 000 mg, Cobalt 15 mg, Lycine 2 000 mg, Copper 100 mg

Vitamin, mineral and amino acid supplement for sheep and goats. Ovi-Min + CU Gel provides essential organic trace minerals, magnesium, amino acid and fat-soluble vitamins to assist in fertility, immunity and growth in sheep and goats.

Withdrawal period:
Meat: None
Milk: None

Packaging available
1L, 5 L, 25 L

8 - 10 ml (kids/lambs over 25 kg),
20 - 25 ml (Adult)

Registration Holder: Camelus Grondstowwe CC, Co Reg 1996/41164/23