LIVESTOCK HANDLER TRAINING MANUALS

MODULE 2: PRODUCTION MANAGEMENT

Production management in cattle

Concentrating the breeding season to allow for easier management of all stages of production.

English

AFRIVET TRAINING SERVICES

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Production management – Cattle

Concentrating the breeding season to allow for easier management of all stages of production.

CONTENTS

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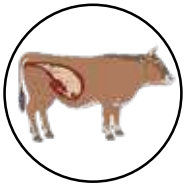
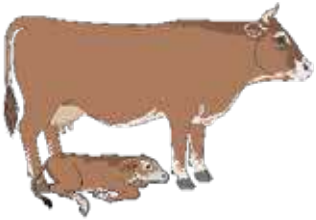


Production management in cattle

The two major events in the 12-month production cycle that must be managed well in order to produce one calf per cow per year.



Normal calving

The livestock handlers who work with and observe the animals daily have a very important role to play during the period before, during, and after calving to ensure that problems are addressed as soon as they arise in order to limit calve losses and get the cows ready for the next breeding session.

During calving, very close observation and assistance is required as each calf born has the same value as a weaned calf. Survival and growth up to weaning depends on normal calving and the intake of enough colostrum after birth.

Controlled breeding

Controlled breeding is used to ensure that the cows calve within a short period of time in order to utilise the natural grazing most effectively.

- **This is the most important management goal for profitable cattle farming.**

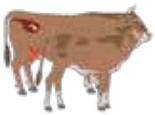
Controlled breeding leads to the implementation of planned herd health and production management actions.

- **These can then be provided to uniform groups of animals during predetermined months of the year.**

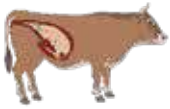
- The 12-month production cycle is divided into four distinct production periods, which makes it possible to better plan for and manage production during each of the periods. During each production period, specific management actions must be implemented at critical control points to obtain a successful outcome.

Period 1: Calving and preparation for breeding

Period 2: Breeding and pre-weaning growth of calves

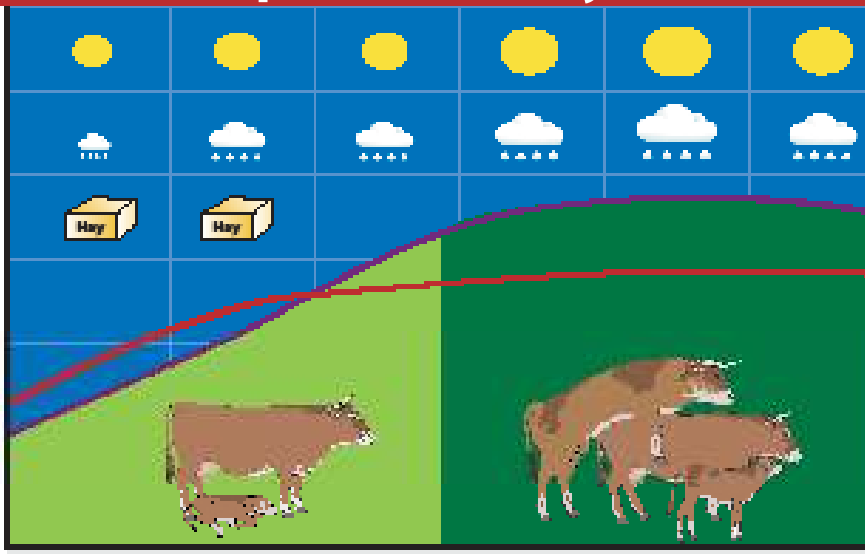


Period 3: Weaning of the calves and pregnancy diagnosis



Period 4: Dry cow management and preparation for calving

The 12-month production cycle for cow



Calving

Period 1 - Calving and preparation for breeding

1. Correct management just before and during calving
2. Survival of newborn and young calves
3. Test and prepare bulls for the breeding season
4. Preparation of cows for the breeding season

Breeding

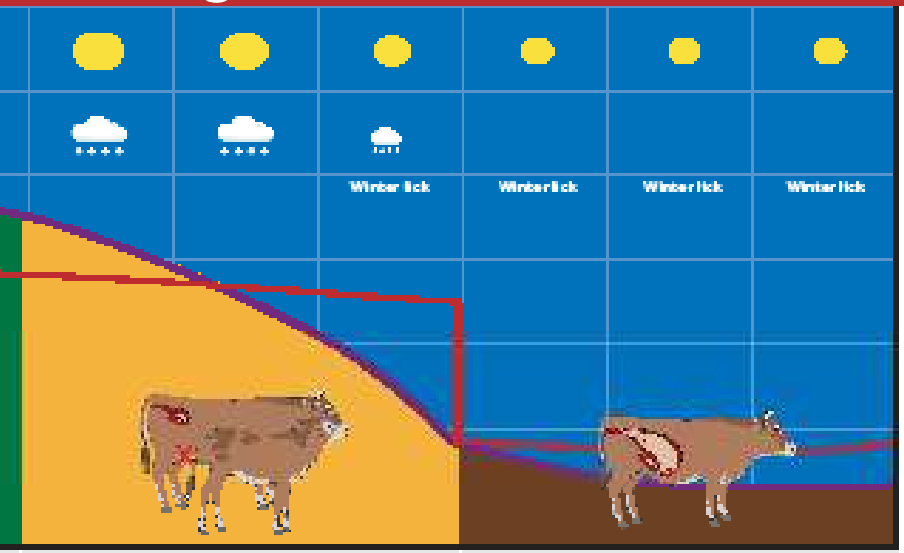
Period 2 - Breeding and pre-weaning growth of calves

1. Management of bulls
2. Management of cows
3. [illegible]
4. Management of heifers
5. [illegible]
6. Optimal growth of calves before weaning

Calving to breeding

Cow is

vs calving at the start of the wet season



Weaning

Period 3 - Weaning of the calves and pregnancy diagnosis

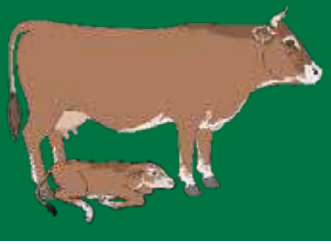
1. Preparation for and weaning of calves
2. Pregnancy diagnosis and body condition score
3. Selection and management of replacement heifers
4. Budget and plan for the next year

Dry

Period 4 - Dry cow management and preparation for calving

1. Active marketing of cull animals and management of dry cows
2. Preparation of the cows for the calving season
3. Preparation of replacement heifers for [illegible] calving season
4. [illegible] on the farm

pregnant for 9 months before calving.



Period 1 - Calving and preparation for breeding

	Critical control points Breeding season	Production goals Breeding season
1	Correct management just before and during calving	Observe to confirm that calving is normal. Give assistance during calving, if needed. Special care for heifers that calve for the first time.
2	Survival of newborn and young calves	Monitor intake of colostrum and vitality of calves. Identify calves and record the calving date. Ensure that all sick calves are treated immediately.
3	Test and prepare bulls for the breeding season	The veterinarian must test the bulls for breeding soundness, as well as for venereal diseases.
4	Preparation of cows for the breeding season	Monitor condition and reproductive activity (showing heat) of individual cows and heifers that will be mated.

Checklist of calving actions

- ☑ Livestock handlers know how to identify cows close to calving and understand the normal calving process.
- ☑ Livestock handlers are trained to rectify the most common calving problems and understand when veterinary assistance is required.
- ☑ Calves are monitored to ensure that they take in enough colostrum.
- ☑ Bulls selected for breeding are tested six weeks prior to mating.
- ☑ Cows showing standing heat prior to breeding season are observed and recorded.
- ☑ Body condition is scored and teeth are checked of cows to be bred.

Controlled breeding: The biggest challenge in cattle production

Getting the cow pregnant within three months after calving to produce one calf per cow per year.

The practical challenge is that we do not farm with only one cow but a number of cows that don't calve on the same date. This means the last cow that calves will still require three months to get pregnant.

For this reason, it is important to manage the breeding season in such a way that the majority of cows become pregnant at the beginning of the breeding season, when they show standing heat during the first three weeks of the breeding season, so that they calve at the same time over a short period.

1 Correct management just before and during calving

Management action:	Identify and manage animals due to give birth shortly.

For effective management of this process, it is necessary to identify animals close to calving and separate them from the rest of the herd in a calving group.

Signs to look for:

1. Slow (one to two months before calving) and then rapid enlargement and filling of the udder (two weeks before calving).
2. Lifting of the tail root owing to relaxation of the ligaments.
3. Swelling of the vulva.
4. Just before calving, the cow will isolate herself from the herd and display nesting behaviour.

Good stockmen will learn to detect even more subtle signs that the animal is ready to calf if they closely observe a number of animals before and during the calving process.

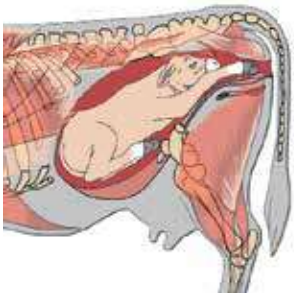
Management action:	Understand the normal calving process.

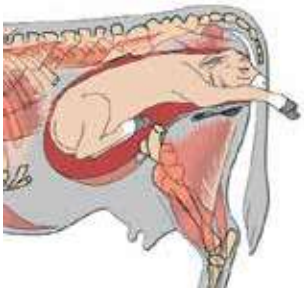
It is important for the cow and the survival of the calf that livestock handlers understand the normal calving process. For practical purposes, the normal calving process can be divided into three phases, but remember it is a continuous process.

The first phase is when the cow starts straining and the calf moves into the birth canal. This lasts on average two to six hours.

The second phase starts when the water breaks and the calf is actively pushed out. Active calving must be finished within one to two hours in cows and two to four hours in heifers (calving for the first time), after the water has broken.

In normal calving, the front hooves and then half the front legs and the nose of the calf will become visible soon after the water has broken and the cow has started to push actively.





The third phase is where the afterbirth is pushed out. This is normally completed within six hours after birth.

Management action:	Prepare to assist cows during the calving season.

Every calf is worth on average R3 500, therefore farmers can invest in good preparation for the calving season by discussing and obtaining the equipment (for example gloves, lubricant, calving ropes) needed from the herd veterinarian. The veterinarian can also train livestock workers in all the correct procedures that must be followed (for example hygiene) when evaluating the normality of the presentation or providing basic assistance during calving.

When is intervention/assistance required?

During stage 1 of the calving process:

- If the cow gets contractions (uneasy, lies down and gets up again) for more than eight hours without observing the breaking of the water. Some abnormality is preventing stage 1 of the birth process to progress to stage 2.

During stage 2 of the calving process:

- If the water broke or the water sack is visible for two hours and the cow is not trying to push.
- If the cow/heifer has been trying for over 30 to 60 minutes and is making no progress.
- If the cow has stopped to push for more than 20 minutes after an initial period of progress. Breaks between pushing normally should not exceed five to 10 minutes.
- If the cow or calf are showing signs of excessive fatigue and stress – such as swollen tongue of the calf or severe bleeding from the vagina or rectum of the cow.
- If you observe an abnormal delivery.

When is the help of a veterinarian required?

A trained livestock handler will be able to establish very effectively when he/she is dealing with a case that needs veterinary assistance.

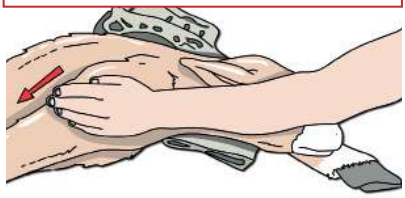
The basic rule is that if a trained livestock handler cannot assist to get the calf out in 30 minutes, call in the help of a veterinarian. Any further pulling or manipulation will just cause damage to the cow.

Management action:	Basic assistance by the livestock handler to correct the most common problems early.

The first principle to remember is that if either the front legs or the head is bent backwards, the calf cannot come out.

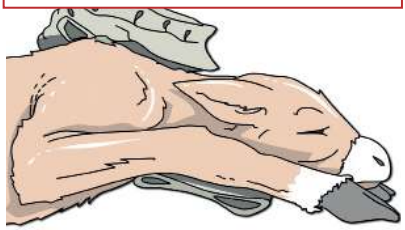
With the right training, the following three common problems (incorrect postures) can be observed and corrected easily when done soon after the water has broken and the birth canal is still very wet and naturally lubricated.

Only one front leg and the nose (head) are visible.



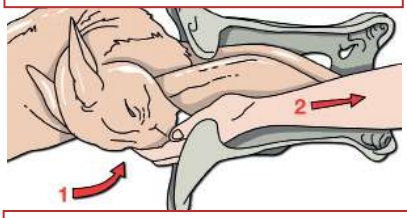
In this case, one of the front legs is bent backwards – the calf must be pushed back and the other front leg must be carefully straightened without damaging the uterus. The birth process will then proceed normally.

The nose is visible between the front hooves.



This indicates that the front legs are not straight and the elbows of the calf will become stuck at the cow's pelvis. Push the calf backwards, pull and straighten both legs. The birth process will now proceed normally.

The two front legs are out but you can't see or feel the nose (head).



The calf must be pushed back and the head straightened. The birth process will then proceed normally.

2 Survival of newborn and young calves

Management action:	**Increase the survival of the newborn animal by ensuring it gets enough colostrum within the first six hours after birth.**

Calves and lambs are born without any resistance to disease-causing germs. Over the first three months of their lives, they will be exposed to these germs and will need to build up immunity.

They get immunity from their mother through the first milk, colostrum. This colostrum is very special as it contains some of the mother's blood components.

A normal calf will try to get up soon after birth and by one hour, a normal calf will be able to stand on its own. The calf will then start to look for the udder and teats to start suckling.

During the first six hours after birth, the stomach of the calf or lamb doesn't digest the first milk obtained from the mother. Instead, this milk (full of antibodies from the mothers blood) is taken up into the blood of the newborn through small openings in the intestine of the newborn.

This is quite incredible and it is like a blood transfusion from the mother's to the calve or lamb. This will provide the newborn with antibodies for protection against germs for the first three months of their life.

This process can only take place during the first six hours after birth. Thereafter, the small openings in the intestines close and the stomach start to digest the milk as food for the calf or lamb.

If the calf doesn't suckle effectively within the first six hours after birth, the colostrum must be milked out and at least two litres of colostrum given to the newborn calf.

In many cases calves are borne in heavily contaminated areas. In these cases the disinfection of the navel with iodine is essential in preventing disease-causing organisms entering the bloodstream of the newborn animal through the navel after birth **causing disease conditions such as joint ill.**

3 Herd veterinarian tests bulls before breeding

Management action:	Book the herd vet visit to ensure bulls are ready to be used in the breeding season.

On appointment, the herd veterinarian will test the bulls that will be used during the next breeding season.

This test involves:

- Examining the bull, especially the testicles and sheath
- Collecting and examining the semen
- Testing for diseases that can be transmitted by the bull.

This test must be completed at least six weeks before the start of the breeding season because remove the sperm (semen) takes six weeks to develop.

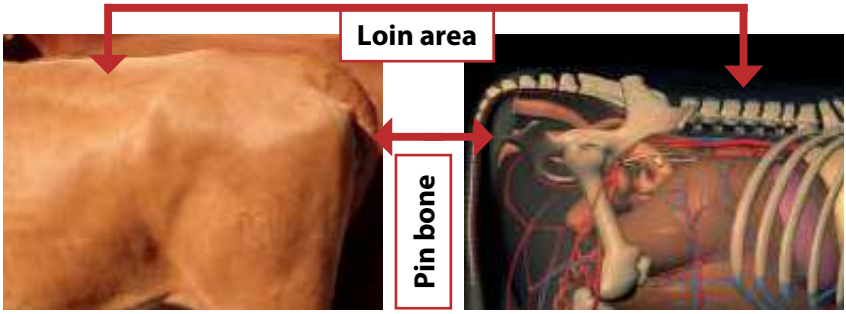
The role of the livestock handler in preparation of the bulls

- The fertility of bulls can change with ime. Therefore, it is important to manage valuable bulls in such a way that they gain weight to produce good semen and build up body reserves for the breeding season. Make sure that bulls have supplementary feed but that they are not overfed on supplements, as it can cause laminitis (inflammation of the feet of the bulls), which will prevent them from mating.
- Tick control is crucial for the protection of the testicles and sheaths. Weekly inspection and treatment when needed is required to prevent permanent damage.

4 Preparation of cows for the breeding season

Management action:	Monitor cows' condition score to ensure they are in optimum condition to fall pregnant when the breeding season starts.

Body condition score (BCS) in beef cattle



Determine the body fat and muscle reserves by observing as well as feeling (palpating) the loin area and pin bone.

Negative energy balance — **Transition** — **Positive energy balance**

1	2	2.5	3	4
Loin area				
				
No eye muscle can be felt and the bone ends are sharp	Eye muscle very indented but the bone ends just feel rounded	The eye muscle is half full and the bone ends feel well rounded	The eye muscle is full and the bone ends can only be felt with pressure	The eye muscle is full and covered with fat and the bone ends can't be felt
Pin bone				
No fat between the skin and bone	1 mm fat can be felt under the skin	2-5 mm of fat can be felt under the skin	5-10 mm of fat under the skin	>10 mm of fat and can't feel the pin bone
1	2	2.5	3	4

The role of the livestock handler in preparation of the cows

Two actions to take in preparation of the cows for the next breeding season is body condition scoring (BCS), which is explained on the previous page, and observing the reproductive activity of the cows.

- **Assess and record the body condition score of all cows one month before the start of breeding. Cows must have a BCS of 2.5 and gain weight for the best conception. Cows in a 2 or lower condition will require energy supplements.**
- **Observe each cow individually for signs of heat. The explanation below can be used to identify and record cows showing standing heat. Standing heat is a clear sign that the cow has recovered after calving and is ready to mate with the bull again.**

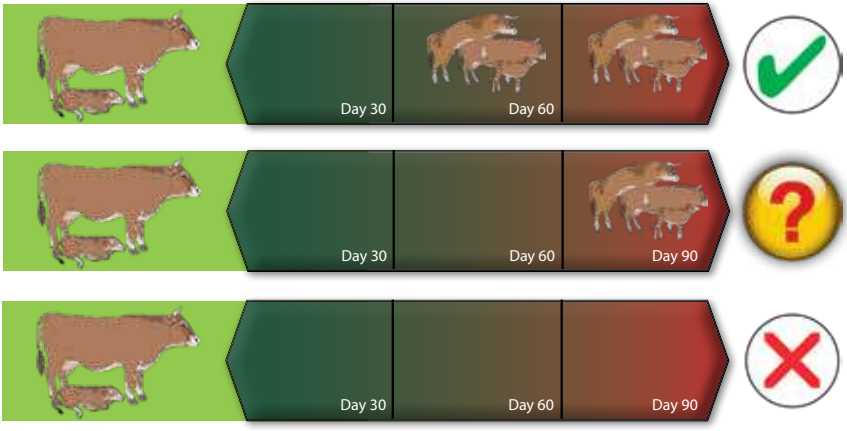
The day before the cow is on heat
The cow becomes restless, the exterior reproductive organ (vulva) is swollen and the cow sometimes tries to mount other cows. If more than one cow is in this stage, they will group together. If other cows try to mount this cow, she will run away.

The day the cow is on heat
The most reliable sign that a cow is ready to be mated with the bull is standing heat. This means that if the bull or another cow jumps onto the back of this cow she will stand still and not try to move away. The vulva will be swollen, moist and a clear string of mucus (it looks like egg white) will be visible hanging from the opening of the vulva. The hair on the tail will be roughened because of other animals mounting the cow.

The day after the cow was on heat
Because of all the previous day's activity, the cow that was on heat will be tired, stand alone or lie down a lot. There will be no more interest in mating with the bull or in joining the activity of the other animals.

The most important (and most difficult) task is to manage a cow in such a way that she calves once every year. The cow has to be mated three months after calving. To enable her to do that, the cow has to resume reproductive activity after calving. She must start showing signs of standing heat. Once this happens, the cow will repeatedly show these signs every 21 days, on average, until she mates successfully again with the bull.

The livestock handler's job is to record the date of calving for each cow and then to observe if she shows signs of heat thereafter. By day 60 after calving, a normal cow would have shown signs of heat. A cow that takes up to 90 days after calving before showing signs of heat needs further support and a cow that doesn't show heat for up to 90 days after calving will not produce one calf a year. The most important reason for a cow not to show heat by day 60 after calving is too low body condition.



The goal is to identify and group cows that are not cycling so that they can be given supplementary feed or receive other management actions. These can be discussed with the herd veterinarian to get them reproductively active before or at the start of the next breeding season.

Contolled breeding: The biggest challenge in cattle production

Getting the cow pregnant within three months after calving to produce one calf per cow per year.

The practical challenge is that we do not farm with only one cow but a number of cows that don't calve on the same date. This means the last cow that calves will still require three months to get pregnant.

For this reason, it is important to manage the breeding season in such a way that the majority of cows become pregnant at the beginning of the breeding season, when they show standing heat during the first three weeks of the breeding season, so that they calve at the same time over a short period.

Important management actions before the start of breeding

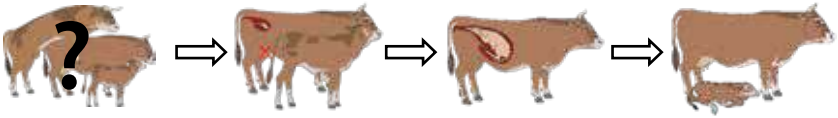
As discussed before, during Period 1 (calving and preparation for breeding) there are two management actions to complete before the start of Period 2 (the breeding season):

1	**Observe and record all animals that show standing heat in the month before the start of the breeding season.**	
2	**Complete a condition score before the start of the breeding season – cows must have a minimum body condition score of 2.5.**	

Manage animals that have not shown standing heat and/or have not obtained the minimum condition score as a separate group, providing extra supplementation, otherwise they will not fall pregnant during the limited three-month breeding season.

Making an informed decision of when to start the breeding season

The only production management decision the farmer can control is when to start the breeding season and for how long it will last.

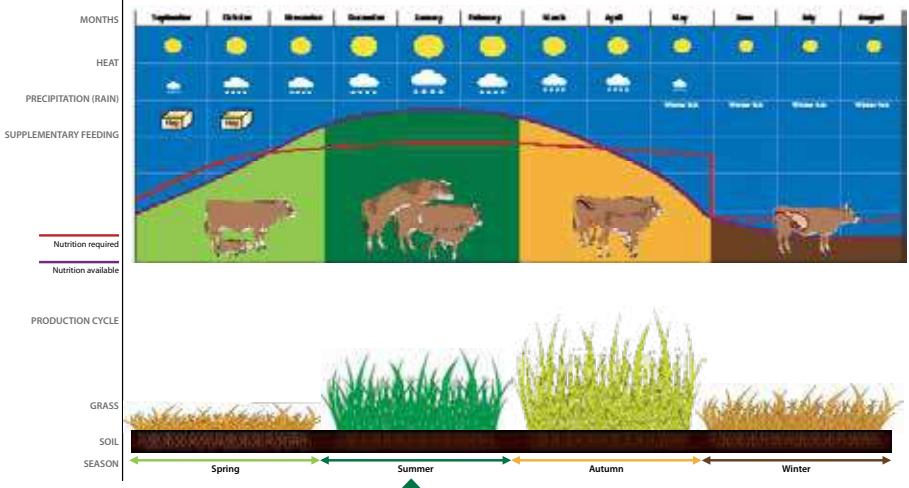


However, the farmer cannot control the 12-month production cycle.

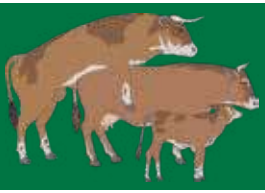
This decision is therefore very important if the management goal is to synchronise the highest nutritional need of the cow, with the highest availability of the best grazing.

The decision is taken with two outcomes in mind:

1. Will there be enough food available (grazing, stored food or supplement) when the cows start to calve nine months later?



2. When is the best grazing available that will ensure the highest pregnancy percentage over a short breeding season?



Period 2 - Breeding and preweaning growth of calves

	Critical control points Breeding season	Production goals Breeding season
1	Management of bulls	Enough quality bulls to get cows and heifers pregnant during a limited breeding season.
2	Management of cows	60% of the cows must conceive during the first 21 days of the breeding season.
3	Management of first-calf cows	60% of the first-calf cows must conceive during the first 21 days of their second breeding season.
4	Management of heifers	85% of the heifers must conceive during the first 21 days of their first breeding season.
5	Effective vaccination of calves	Calves must be protected against clostridial disease through vaccination, which will ensure that no calves are lost owing to black quarter.
6	Optimal growth of calves before weaning	Calves must maintain an average daily gain of 0.8 to 1kg per day during the fast-growing period.

Checklist of breeding actions

- ☑ Observe bulls' serving ability and capacity.
- ☑ Observe and keep record of cows mated.
- ☑ Observe udders of cows to confirm that calves are feeding.
- ☑ Score body condition of cows at the end of the breeding season.
- ☑ Group and closely manage first-calf cows in their second breeding season.
- ☑ Group and closely manage heifers in their first breeding season.
- ☑ Vaccinate calves against clostridial diseases.
- ☑ Weigh calves at 100 days of age to evaluate growth rate.

1 Management of bulls during the breeding season

Management action:	**Monitor the serving ability and capacity of the bull.**

The veterinarian's breeding-soundness examination does not normally include the evaluation of serving ability or capacity.

The livestock handler can only evaluate these during the first 21 days of the breeding season by observing the bulls mating with animals showing standing heat.

Serving ability	Observe bulls closely to see if they push through (back feet lift from the ground) at the end of the mating process.
Serving capacity	Observe to see that the bulls are actively seeking out animals showing standing heat. Many matings take place late in the afternoon or early morning.

The normal bull-to-cow ratio is one bull for every 25 cows.

Immediately replace an injured or non-performing bull

2 Management of cows during the breeding season

Management action:	Monitor and manage the cows body condition score and keep a record of these.

Actions that must be completed before the start of the breeding season:

- Do a body condition score before the start of breeding. Separate and manage thin cows (body condition score less than 2.5) as a separate breeding group.

- At the same time, check cows' teeth. Do not breed cows with worn teeth. Sell them after their calves are weaned.

Actions during the breeding season:

Observe and keep record of cows mated by the bull.	This is done to determine the number of cows not pregnant after mating. Fewer than four out of every 10 animals should be served again 21 days after the first mating.
Observe the udders of cows to see that calves are feeding.	By observing the fullness of the cows' udders, the livestock handler will immediately detect a cow with a full udder. This means the calf is not suckling and can be sick and needs to be examined immediately, or it can mean that the calf is lost.

Actions to take at the end of the breeding season:

Do condition scoring at the end of the breeding season for background recording. This recording will be used after the veterinarian has done the pregnancy diagnosis to interpret effectively the results of the examination.

3 Management of first-calf cows during their second breeding season

Management action:	Closely monitor first-calf cows and be prepared to assist with calving.

This group requires the most attention before and during the breeding season. On many farms, this group presents with a low pregnancy percentage because of the following reasons:

1. When these heifers calve for the first time, they are still immature and the birth process is more difficult. It therefore takes longer for them to recover before they can fall pregnant again.

2. It is the first time that they have had to produce milk and they are still growing themselves. It is further complicated by the fact that they are still changing teeth, which affects their feed intake.

Manage these first-calf cows as a separate group to ensure they get the best grazing available and provide supplementary feeding before and during the breeding season, if needed.

At the start of their second breeding season, they should:

- **weigh 85% of the adult cow's weight.**
- **be in a minimum condition score of 2.5.**

The livestock handler looking after this group must observe the mating activity of the bulls closely and give feedback to the farmer if the activity is low, especially during the first 21 days of the breeding season.

4 Management of heifers during their first breeding season

Management action:	This is the next most vulnerable breeding group and requires close attention to ensure optimum breeding success in their first season.

Actions to take before the start of the first breeding season:

- Ensure that all heifers are numbered. If you have not done individual identification, it is a good idea to start with the heifers. Without individual identification, it is not possible to keep a reproduction record of individual animals.
- Deworm all heifers before the start of the first breeding season.
- Vaccinate heifers before the beginning of the breeding season against diseases (such as BVD, IBR and vibriosis), which can cause poor conception and abortions.
- Ensure that growth is maintained and nutrition adjusted so that the heifers reach 70 to 75% of their expected mature weight (critical mating weight) at the beginning of the first breeding season.
- Weigh all heifers at the start of the breeding season to check their weight and manage accordingly.

The production goal is to get at least 85% of the heifers pregnant in the first 42 days of the breeding season.

This production goal is pursued with two outcomes in mind:

1. Select replacement heifers only from the group that became pregnant within the first 42 days of the breeding season. This is the most important opportunity to select effectively for fertility and the type of animal that will fall pregnant again under the specific conditions on your farm.
2. Better observation, assistance during calving and supplementation after calving when these heifers calve for the first time over a shorter period.

The function of the livestock handler is to pay close attention to the breeding activity in this group. It is best to select and use bulls that are known to produce smaller calves and are free of sexually transmitted (venereal) diseases. The ratio of bull to heifers is 1:20. Only use experienced bulls that have mated before.

Replacement heifers are ideal candidates for a synchronisation and AI programme.

An AI programme can lead to faster genetic progress in the herd and further shortening of the first breeding season. If this is the first time using synchronisation and AI, a uniform group of well-grown heifers provides the perfect opportunity to start using this technology.

5 Effective vaccination of calves

Management action:	Vaccinate calves, as their protection from the antibodies in the colostrum will decline. This vaccination is normally required at three months.

First clostridial vaccination

The protection the calf gains from the first milk (colostrum) starts to decline from the very first day. After three months, this protection no longer adequately protects the calf against disease-causing organisms.

This is a very dangerous transitional period. The only way to overcome it is to expose the calves to diseases through vaccination. Their immune systems are now mature enough to react to the vaccine and develop their own immunity.

Vaccination is the known exposure of the calf to the organisms. This will prime the immune system in all calves at the same time. The organisms in the vaccine are inactivated and modified so that they mimic the pathogen but do not cause the disease.

It is also a time when vaccination will have minimal effect on production.

It is important to vaccinate against the most important bacterial diseases, such as black leg and other clostridial diseases.

Booster clostridial vaccinations

- When administering any inactivated vaccine to cattle, it is important to give a booster four weeks later.
- This is especially important in the case of immature immune systems.

Management action:	Keep a record of vaccinations.

Farmers who sell weaner calves must keep written record of all vaccinations up to the point of sale. Using this written proof of vaccination history is a very effective way to differentiate the value of calves when marketed.

6 Optimal growth of calves before weaning

Management action: **Describe overall condition and weigh calves at 100 days.**

Between 60 to 120 days, calves grow at their peak rate. By measuring their performance at this stage, you will know if you are on track to obtain target-weaning weights. Weigh calves and calculate their average weight and average daily gain (ADG). Evaluate the overall condition and coat of the calves as a group after they have been separated from the cows. Also, evaluate their overall appearance in relation to the condition score of the cows.

Give them a score on appearance:

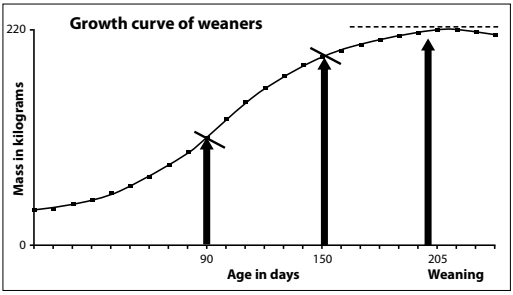
1 - good, 2 - average, 3 - bad.

Infestation with internal parasites is the most general cause of calves in poor condition.

Management action: **Deworm after first exposure to worms.**

Key points

- Calves between 90 to 150 days of age, in the stage where they have the potential for the fastest growth.
- The feed conversion (4:1) is also extremely beneficial and leads to very efficient use of nutrients.
- Calves at this age have no or little resistance to internal parasite contamination (roundworms and tapeworms).
- If they can be kept free from parasites during this period, it can have a dramatic improvement on the individual weaning weights and the total weaning weight of the group.

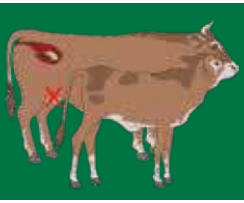


Time of treatment of young beef calves

Traditionally, beef calves are dewormed at weaning. In beef herds where cows calve in spring or the start of the rainy season, the highest infestation of calves occurs during mid-summer and early autumn, and not only at the start of the winter at weaning.

The optimal time to treat against the prevailing internal parasites is when the highest exposure occurs and the calves have the potential to grow fast.

Use a broad-spectrum product that is effective against tapeworms and all the roundworms. Deworm calves at the start and end of the breeding season.



Period 3 - Weaning of the calves and pregnancy diagnosis

	Critical control points Weaning management	Production goals Weaning management
1	Preparation for and weaning of calves	Complete vaccinations at least two weeks before weaning. Reduce stress after weaning by placing them on good grazing and provide a supplement.
2	Pregnancy diagnosis and body condition score	Pregnancy diagnosis by the veterinarian is a critical management action. It determines the success obtained during breeding. Results are used to manage cows effectively during the dry period.
3	Selection and management of replacement heifers	Select heifers to be kept as replacement heifers. Heifers that didn't grow well and have functional faults are identified for selling along with bull weaner calves.
4	Budget and plan for the next 12 months	Obtaining a good price when selling calves, cull heifers and non-pregnant cows.

Checklist of weaning actions

- ☑ Wean calves using methods involving minimal stress.
- ☑ Book veterinarian for pregnancy examination.
- ☑ Record pregnancy results and condition score.
- ☑ Group cows according to pregnancy and condition status.
- ☑ Select replacement heifers and commence replacement heifer management plan.
- ☑ Identify, manage and market animals – calves and cull animals – for sale.
- ☑ Budget and plan for the next 12 months.

1 Preparation for and weaning of calves

Management action:	**Weaning must be done in such a way that it creates minimal stress to reduce disease and weight loss after weaning.**

Weaner calves are very susceptible to lung infection (pneumonia) after weaning. The risk will further increase if they are mixed with calves from other herds that carry different disease-causing organisms. The highest risk is if they are transported after weaning under very cold conditions. All these factors decrease the efficiency of resistance against pneumonia.

On farms where this problem occurs annually after weaning, livestock handlers must administer preventative vaccination before weaning in accordance with the herd veterinarian.

Do the following at least two weeks before weaning:
1. Vaccinate against the viruses that make the lungs susceptible to bacterial infection.
2. Vaccinate against the bacterial organisms and the toxin produced when infecting the lungs.
3. If needed, treat calves against internal and external parasites at the same time.
4. Provide creep feed to calves to adapt the big stomach for supplementary or feedlot feeding after weaning.

A very practical way of low-stress weaning is to use a plastic nose ring. The calf still stays with the mother for a while before separation. It also gives the flexibility to wean the older calves first or wean a calf when the cow's condition falls below 2.5 condition score.

2 Pregnancy diagnosis and body condition score

Management action:	Keep a record of mated cows.

Key points

- Pregnancy diagnosis forms the main evaluation of production performance and the results are used for planning the following year.
- A non-pregnant cow that remains in the herd until the rest of the cows have calved, will consume more than 1 tonne of roughage and an extra R500 of supplementation (expense) without producing a calf (income).

In well-managed herds, the livestock handler keeps records of mated cows. If a cow didn't show standing heat after the last mating, she has probably conceived during that last mating.

In very large cattle herds, it is not possible to do such record keeping. The veterinarian will therefore do a pregnancy examination six to eight weeks after the end of the breeding season when the calves are five to seven months old.

Management action:	Preparation for pregnancy examinations.

It is important that the farmer (manager) and livestock handlers are prepared for the veterinarian's visit. Make sure you separate calves from the cows beforehand. The farmer must be present and is responsible for recording the results of the examination.

Bad handling facilities will lead to injury
Poor preparation and/or facilities will result in longer examinations, unnecessarily increasing the cost of the visit.

The pregnancy examination consists of two components:

1. Rectal examination
This will determine whether the heifer or cow is pregnant. The stage of pregnancy can also be determined by approximation to distinguish if animals became pregnant early or late in the breeding season. This is necessary when dividing the herd for better management and more cost-effective supplementation.

2. Condition score
During the examination, the veterinarian will establish the nutritional status (fat reserves) of each of the animals by allocating a condition score. This is extremely important as the examinations often coincide with the end of the growing season of the grazing.

Management action:	**If the condition of the cow falls below 2.5, the calf must be weaned.**

After pregnancy, examine the group and manage the cows according to their pregnancy and condition status:

1. **Pregnant cows in good condition**
2. **Pregnant cows in bad condition**
3. **Non-pregnant cows in good condition**
4. **Non-pregnant cows in bad condition.**

3 Selection and management of replacement heifers and beginning of three-year heifer plan

Management action:	Actively identify and manage the replacement heifers.

Key points

- The fertility and health of a beef cattle herd can be built up in stages over a few years by focusing on the management of replacement heifers.
- Improving fertility is based on selection for functional efficiency and careful management of replacement heifers from weaning until the end of their second breeding season.
- The long-term herd health status is built around a complete vaccination programme that should be followed strictly with replacement heifers.

At or after weaning, select one and a half times the number of heifers that will be required for replacement.

The goal of the selection is to select a uniform group of heifers that are functionally efficient.

Retain these heifers as a separate group and manage them until the end of their second breeding season.

Do this according to a three-year management plan, worked out for this individual group and stretches from weaning until the veterinarian has confirmed them pregnant for the second time.

Management plan for replacement heifers						**Production goal**		*Breeding of heifers at 24 months for the first time*				
Name of group		*2020 spring calves*				**Heifer numbers**						
Month	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**	**March**
Management action	Weigh, wean and first heifer selection Vaccinate: brucellosis		Vaccinate: redwater & anaplasma		Vaccinate: - 3-day stiff-sickness, lumpy skin disease	Weigh Second selection Vaccinate: Rift Valley fever						Weigh Deworm Vaccinate: brucellosis RB51
Age (months)	7	8	9	10	11	12	13	14	15	16	17	18
Management action	Vaccinate: broad spectrum clostridial diseases. botulism and anthrax Deworm				Vaccinate: - 3 -day stiff-sickness, lumpy skin disease and Rift Valley fever	Weigh Vaccinate: repoductive diseases- BVD, IBR and vibrio		Weigh Deworm	First mating season	First mating season	First mating season	Pregnancy diagnosis
Age (months)	19	20	21	22	23	24	25	26	27	28	29	30
Management action	Vaccinate: broad spectrum clostridial diseases, botulism and anthrax Deworm				Vaccinate: 3-day stiff-sickness, lumpy skin disease and Rift Valley fever	Good management of first calving	Good management of first calving	Weigh Deworm	Second breeding season	Second breeding season		Pregnancy diagnosis
Age (months)	31	32	33	34	35	36	37	38	39	40	41	42

4 Budget and plan for the next 12 months

Management action:	Prepare an annual herd health and production management plan and budget.

- The income generated from the marketing of animals funds the investment in health and production actions and is therefore a critical component of the production chain. Marketing of animals is dealt with in a separate manual.

Budget for supplements

Supplementation is by far the largest cost in beef cattle farming. Therefore, it is the most important input cost to control. To minimise this cost, only give supplementation to productive animals.

Given the results of the pregnancy test, as well as the condition score, the livestock handler can plan the winter feeding programme effectively for this group of animals. The goal is for the pregnant animals to calve with a condition score of 3.

The farmer must draw up a basic budget for the cost of supplementation. It must stretch over the next 12 months, and should be done for each age group on the farm.

This step puts the farmer in charge of the largest direct expense incurred during the next 12 months in respect of his beef cattle herd.

Determine the potential income and production

The results of pregnancy diagnosis give the beef farmer a complete overview of all potential sources of income on the farm. If the farmer uses this opportunity effectively, he/she will know exactly which animals are available for sale after the veterinarian's visit, namely:

- Number of weaners (6 to 8 months old)
- Number and condition of cull heifers
- Number and condition of cull cows.

Furthermore, the results allow the farmer to predict the number of calves (pregnant cows and heifers) that will be available for sale in the next 12-month cycle.

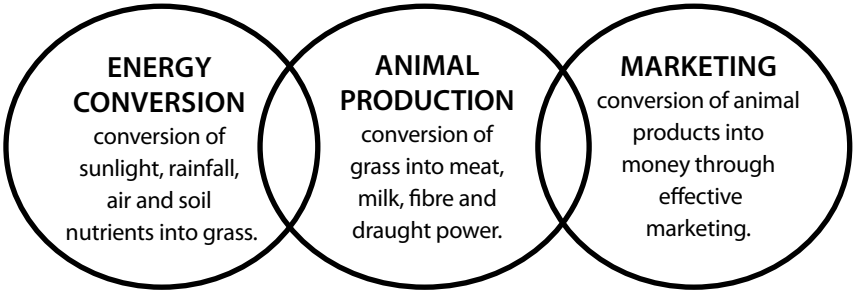
Within the scope of half an hour, set up a simple budget for the expected income from sales for the next 12 months. Such a budget is a basic tool for planning in any business but most beef cattle farms still do not use it effectively.

A basic management plan for bulls, cows and calves that can be further developed or adapted with the advice of the herd veterinarian

Herd health management plan												
Stage of production	Calving and preparation for breeding			Breeding			Pregnancy examination and weaning			Dry cow management and preparation for calving		
Month	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
Calves				Vaccinate: clostridial diseases		Vaccinate: anthrax, botulism and booster clostridial diseases	Vaccinate: respiratory diseases at least two weeks before weaning	Wean Sell bull calves and cull heifer calves				
Age (months)	Born	1	2	3	4	5	6	7	8	9	10	11
Cows	Calving		Body condition score			Body condition score	Vaccinate: black quarter, botulism	Pregnancy diagnosis Body condition score			Body condition score	
Bulls		Breeding soundness examination Deworm	Body condition score	Breeding			Vaccinate: black quarter, botulism					
Season	**Spring** Strategic blue tick control Strategic liver fluke control			**Summer** Tactical blue tick and multi-host tick control Tactical liver fluke control			**Autumn** Tactical blue tick and multi-host tick control Tactical liver fluke control			**Winter** Protein supplementation		

Also see Afrivet Plan A for an example of a comprehensive health and production management plan.

Marketing the product (calves and non-productive cows) is the last link in the production chain



The profit generated is calculated through a very simple equation:

PROFIT = INCOME (kg produced x price) – EXPENSES

A 10-cow unit is used as an example to explain the basic calculation of the possible profit that can be obtained:

1. Ten cows produce eight calves per year (80% calving success rate).
2. Four of the calves are bull calves and are sold at weaning when they weigh 220kg. The price obtained is R20/kg.
3. One of the heifer calves weighing 200kg is also sold at weaning at R18/kg.
4. The three heifer calves are kept as replacements for the cows.
5. One two-year-old heifer that didn't grow well or didn't fall pregnant is also culled and sold.
6. The two cows that didn't produce a calf during this year are also sold. They weigh 450kg and the price obtained is R15/kg.
7. The cost of supplementary feeding was R600 per cow for the year and the cost of medicine, dip and vaccine was R50 per cow.

The profitability calculation is simplified as an example for training purposes but contains all the principles the livestock handler, whose primary role is to prevent production losses, must understand.

Basic profitability calculation for a 10-cow production unit

Income:	Quantity	Weight	R per kg	R per animal	Income	% of income
Bull calves	4	220	R 20	R 4 400	R 17 600	44%
Heifers 1	1	200	R 18	R 3 600	R 3 600	9%
Heifers 2	1	300	R 17	R 5 100	R 5 100	13%
Cows	2	450	R 15	R 6 750	R 13 500	34%
Total income	**8**				**R 39 800**	**100%**
Less						
Expenses:	**Quantity**	**Unit**	**Unit cost**		**Expense**	**% of expense**
Supplementary feed	**10**	**Cows**	R 600		R 6 000	42%
Animal health	**21**	**Herd**	R 75		R 1 556	11%
Transport	**12**	**Month**	R 125		R 1 500	10%
Other expenses	**12**	**Month**	R 450		R 5 400	37%
Total expenses					**R 14 456**	**100%**
					Profit	**GP%**
Profit					**R 25 344**	**64%**
Average monthly income					**R 2 112**	
	Loss	% of profit				
Loss of calf	R 4 400	17%				
Loss of cow	R 6 750	27%				

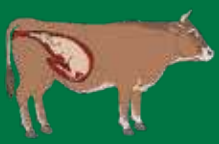
PROFIT = INCOME – EXPENSES

60% of income comes from sale of calves after weaning.

40% of income comes from the sale of cull animals (non-productive heifers and cows).

The loss of one calf (R4 400) not successfully weaned and sold will decrease the profitability of this production unit by nearly 20%.

The loss of one cow (R6 750) must be deducted from the possible profit, resulting in a 25% reduction in profit.



Period 4 - Dry cow management and preparation for calving

Critical control points Dry-cow management	Production goals Dry-cow management
1 Active marketing of cull animals and management of dry cows	Market cull animals to: • Decrease the number of animals on limited dry-season grazing • Obtain a good price for the cull animals as they form a big part of annual income.
2 Preparation of the cows for the calving season	Cows must gain condition after weaning to calve down at a minimum condition score of 3 for normal calving, high milk production and fast recovery of the reproductive system.
3 Preparation of replacement heifers for their first calving season	Manage pregnant heifers to maintain growth but prevent overconditioning for normal calving and to secure >85% pregnancy during the second breeding season.

Checklist of dry-cow actions

- ☑ Condition score pregnant cows prior to calving season.
- ☑ Group and manage cows in suboptimal conditions.
- ☑ Plan for and provide supplements and/or stored feed to overcome local seasonal nutritional shortages.
- ☑ Vaccinate cows annually before calving.
- ☑ Group and closely manage heifers before their first calving season.
- ☑ Feed and market any animals kept back for sale.

1 Active marketing of cull animals and management of dry cows

Management action:	**Take non-pregnant and/or non-productive animals off grazing intended for pregnant animals.**

The price (income) obtained for cull cows and heifers is very important, as 50% of the income generated in a weaner-calf production system comes from marketing cull animals.

After pregnancy diagnosis and weaning, manage the remaining pregnant dry cows as a uniform group with more or less the same nutritional requirements other than those that have lost significant condition prior to weaning.

Weaning causes cows' nutritional requirements to fall overnight. Therefore, use the dry period to regain condition before calving.

2 Preparation of the cows for the calving season

Management action:	**Do a condition score on all cows between 45 and 60 days before the start of the calving season.**

Between 70 to 80% of the total growth of the calf inside the cow (foetus) takes place in the 60 days before calving.

The condition of cows at calving plays a major role in:

- The length of the birth process
- The vitality and growth of the calves after birth
- The quality and amount of colostrum produced
- Milk production during the lactation period
- The length of time from calving until the cow can fall pregnant again (reconception rate).

Cows must be in a condition score of 3 at the start of calving.

Separate cows with a condition score lower than 3 before calving and managed as a separate group by providing extra energy, supplements before calving and stored hay after calving.

The goal is to identify and group cows that are not in a 3 condition score before calving to give them additional supplements.

1	2	2.5	3	4
Loin area				
				
No eye muscle can be felt and the bone ends are sharp.	Eye muscle very indented but the bone ends just feel rounded.	The eye muscle is half full and the bone ends feel well rounded.	The eye muscle is full and the bone ends can only be felt with pressure.	The eye muscle is full and covered with fat and the bone ends can't be felt.

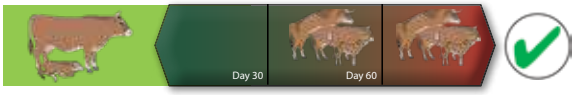
3

All cows must have a condition score of 3 before calving, meaning that the eye muscle (loin area) must be full.

Body condition at calving determines the first heat after calving.

To achieve the production goal of one calf per cow per year (12 months) the cows must start to show heat from one month after calving.

3



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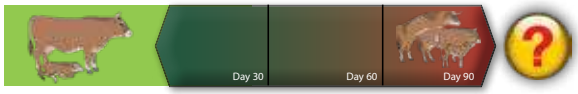

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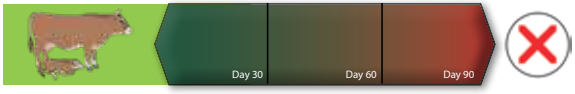
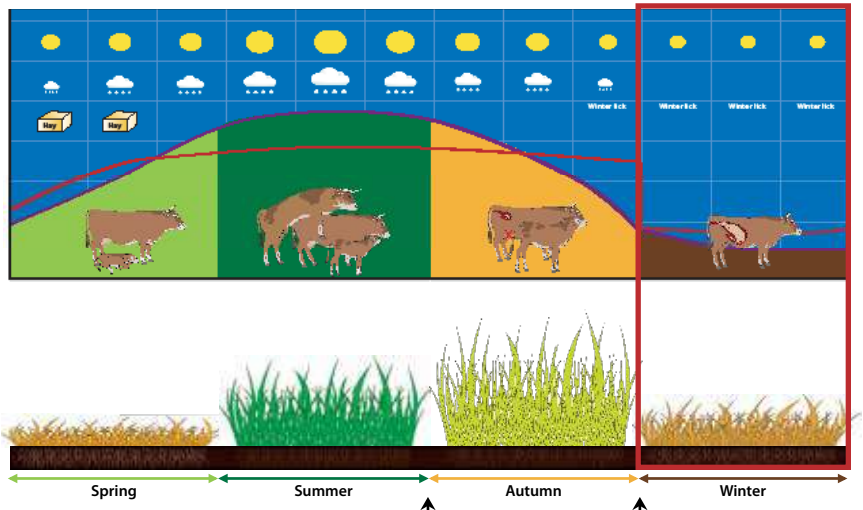


Supplementation according to season and stage of production

Cows after weaning and before calving



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

Dry season
The crude protein percentage in the grass is now below 7% and the amount of grass becomes limited.

BCS – 2.5

BCS - 2

Avoid condition loss owing to limited or no feed supplementation.

Provide protein supplementation to pregnant cows and heifers when the protein in the grass falls below 10% (identified by large amounts of tall dry grass) to maintain or improve condition.

Provide energy supplementation to pregnant cows and heifers in bad condition when there is limited dry grass available to maintain or improve condition before calving.

Management action:	Supplementation of the dry cow to maintain or increase condition on dry grazing.

Supplementation to increase intake of dry grass

Provide a protein (winter) lick

Cattle can still use the remaining dry grass effectively if protein is added.

This protein supplement, given in the form of a lick, replaces the protein normally found in grass and leads to better digestion of the dry grass in the rumen.

As cattle digest grass faster, they graze more and thus realise more of the available nutrition as a direct result of the protein lick.

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

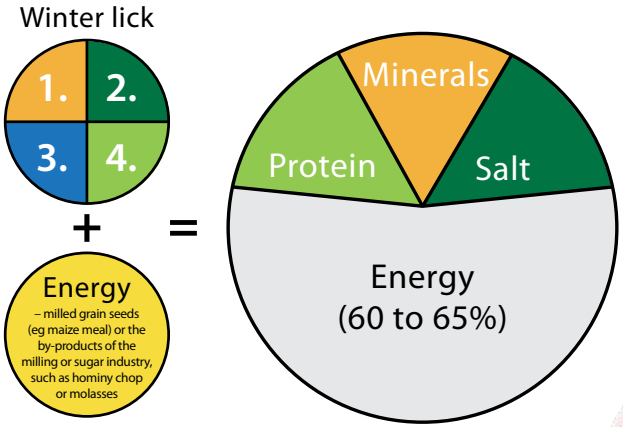
A protein lick contains four basic components:

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

See Module 3: Seasonal planning – Supplementary feed for more information on protein supplementation.

Management action:	Supplementation to increase energy levels when limited grazing is available.

Provide an energy or production lick to pregnant animals if they are below a 3 condition or if the grazing becomes limited.



Intake of the energy lick is between 1kg and 1.2kg per day and replaces the portion of the energy that is not available owing to limited grazing.

The aim is to keep cows in a positive energy balance up to calving. To be cost effective, only provide it to animals that need it or to the whole group if grazing is severely limited.

Management action:	Supplementation of trace minerals and vitamins.

Mix a ready-made pack of trace minerals and vitamins into the licks to supplement the requirements of pregnant animals.

The use of a trace mineral or vitamins that can be orally dosed or injected to individual animals before calving is now a standard management practice on well-managed cattle farms.

Use stored feed when grazing is limited

The biggest capital investment on well-managed cattle farms is to harvest and store feed in the form of hay or silage for the dry season. This management practice decreases the risk of running out of feed when grazing becomes limited towards the end of the dry season.

Stored feed is normally intended for cows after calving. When feeding it to cows before calving, check for mould, as it can contribute to abortions.

Management action:	**Vaccinate before calving.**

The annual vaccination against clostridial diseases, specifically black quarter and botulism, should take place 45 to 60 days before calving, at the same time as condition scoring. Vaccination at this point will boost antibodies in the colostrum at calving and help to protect newborn calves against these diseases.

Management action:	**Allocate and prepare calving camps.**

Identify and prepare calving camps before the start of calving.

3 Preparation of replacement heifers for their first calving season

Management action:	**Weigh and condition score heifers calving for the first time at two years of age, 45 to 60 days before calving starts.**

Weighing individual heifers is important, as it is a better measurement than condition scoring for this specific age group in terms of readiness for calving.

Because heifers haven't given birth or produced milk before, most will appear to be in a condition score of 3, except under very poor grazing conditions.

Correctly managed heifers should be in a condition score 3 to 3.5 and weigh 85% of the average weight of the adult cows before calving.

Pregnant heifers badly fed during the last third of pregnancy can have difficulty with calving because of stunted development of the pelvic bones.

Prior to calving, pregnant heifers must be given the best grazing camps available, supplemented with a protein lick to maintain intake of the dry grazing and to maintain the growth of the skeletal system, including the pelvic bones.

If pregnant heifers are in a good condition during the last third of pregnancy – condition score of 3 to 3.5 – do not provide an **extra energy supplement,** as it will lead to fat deposition in the birth channel.

Overfat heifers have more difficult calvings.

Management action:	**Be sure to complete all heifer vaccinations as outlined in the three-year heifer management plan in Module XXXX.**

- Rounding off of cull animals for sale is often an attractive option but the technical aspects of this are dealt with in a separate manual.

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