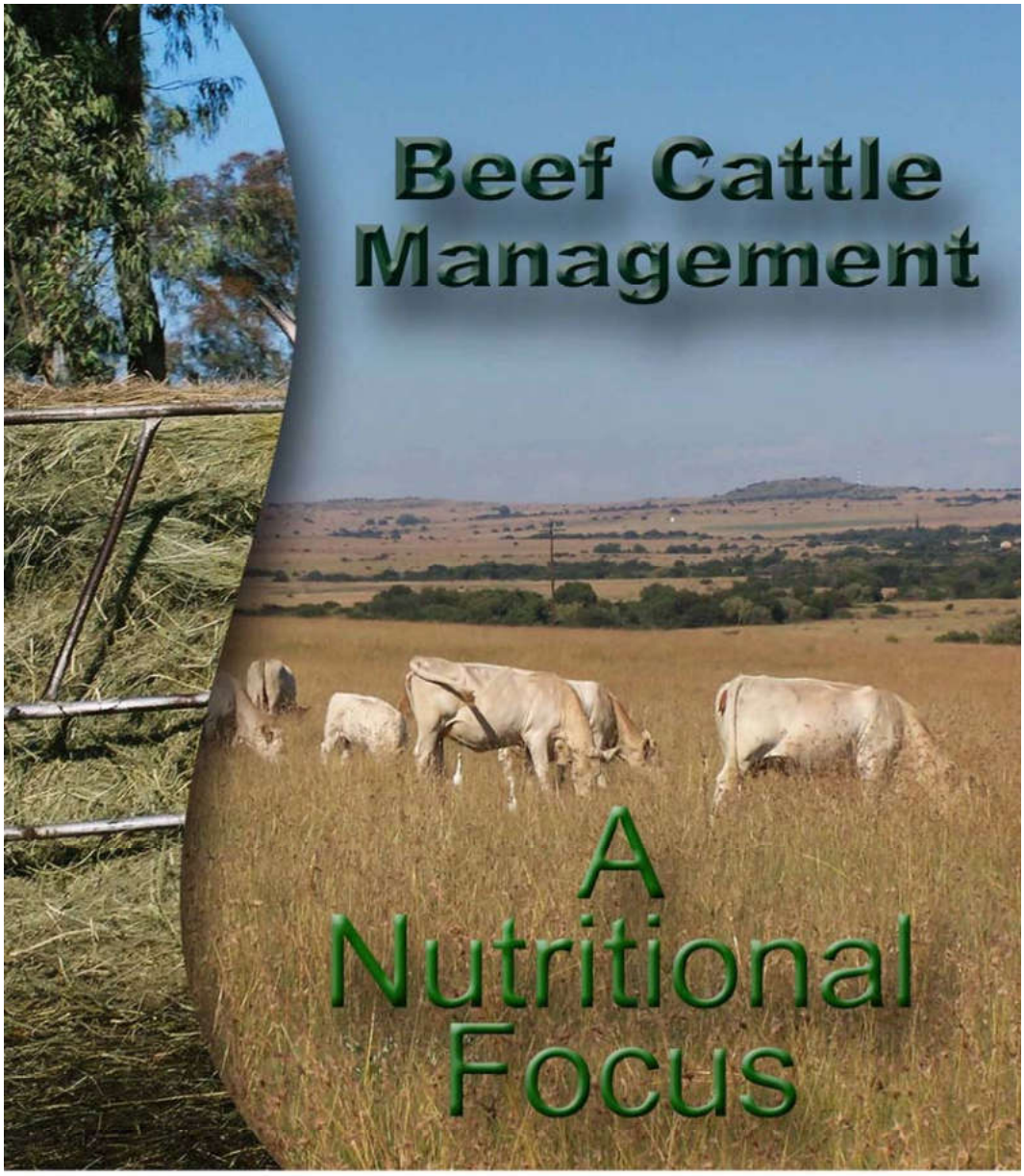

agriculture

Department:
Agriculture
REPUBLIC OF SOUTH AFRICA

ARC • LNR

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This manual was compiled to fulfill the institutional mandate of technology transfer and information dissemination.

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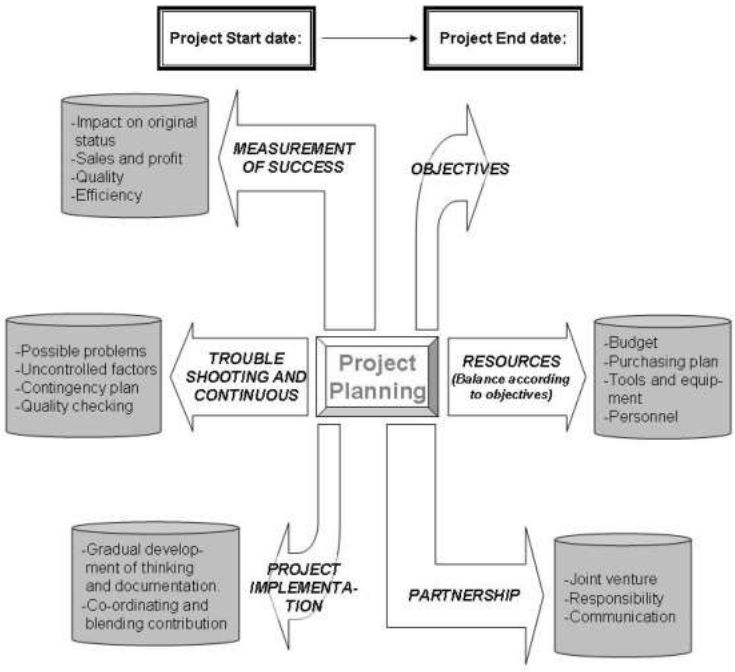
BEEF PRODUCTION IN SOUTH AFRICA - OPPORTUNITIES AND CHALLENGES

Most government programs support the development of emerging farmers through technology transfer and market development. A large percentage of beef cattle are in the hands of these developing farmers of which only a few make it into the commercial market. More than 70 % of the commercially available beef comes from the feedlot. In the past decade, white meat and pork has gained momentum which has resulted in a suppressed red meat market. Imported beef also makes it difficult for local players.

However, the deregulation and liberalization of the South African agricultural sector has brought with it many challenges and opportunities. The challenges and opportunities covers issues ranging from market development, the assessment global and domestic markets, understanding of new value chains, international trade to issues pertaining to policy design and implementation, upliftment of the rural poor and information provision. These issues can only be addressed in a comprehensive and efficient manner by taking cognizance of the deficiencies that exist in the agricultural milieu within South Africa. However, for success it is necessary to lay down proper plan of activities.



BEEF PRODUCTION SYSTEMS

There are three main types of beef production systems:

- **Cow-calf production** - mainly produces calves for sale.
- **Purebred breeding** - produce bulls for the cow-calf operation
- **Slaughter cattle production** - cattle from the cow-calf system are fattened for slaughter

The type of the system will determine the feeding and management plan to be implemented.

VELD MANAGEMENT AND GRAZING SYSTEM

Before grazing system is considered, camps must be properly fenced off. When putting up camps on a farm, veld variation must be considered to prevent area selective grazing.

A prerequisite for maximum production is a sufficiently high intake of nutrients to ensure that the animal can grow and produce after maintenance requirements have been met. High intake occurs only when an adequate quantity of quality forage is available. Quantity is dependent on stocking rate, separating veld variations and grazing to correct height. Quality is dependent on grazing period, grass species and soil fertility.

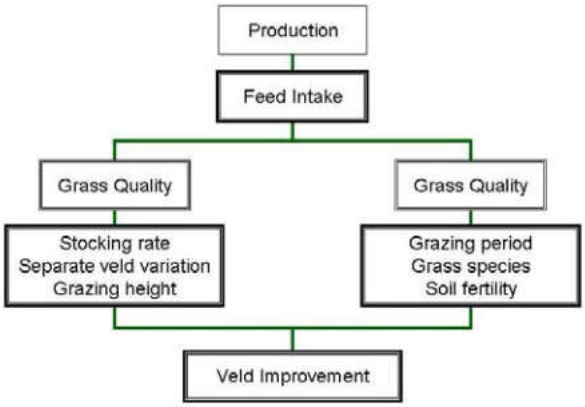
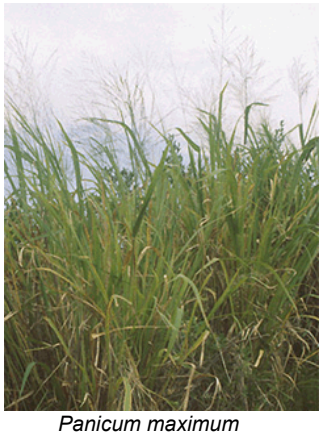


Figure 2: Basic principles of veld management (Adapted from Ivy and Ivy, 1984).

Soil erosion has encroached to more than 50% in the last century. This has affected the productive capacity of the land. As farmers we are really neither stock nor grass farmers but primarily soil farmers. Stock can be replaced overnight, grass reclaimed in a decade but one inch of soil take a thousand years to form from rock. A thin layer of soil stands between food for all mankind and national disaster though hunger, thirst and disease.

As a farmer, know the grass types that the cattle like and those they do not like i.e palatable and unpalatable grasses. Such knowledge is important in designing a grazing system and making informed management decisions. Camps may be rotationally grazed based on the season and veld type.

Example of common palatable grass species:



Panicum maximum

Cynodon datylon

Urochloa mosambicensis

Examples of common unpalatable grass species:

Cymbopogon spp

Eragrostis curvula

Aristida spp.

The objective of veld management is to provide a good soil cover of edible/palatable and perennial grass plants that will ensure long-term sustainable animal production, with maximum financial return.

Why manage veld?

Differences in the palatability and nutritive value of individual grass species.

- Animals graze selectively.
- Grass plants react differently to grazing treatments.
- Good animal production is only possible when animals have access to enough palatable grasses.

How is the veld managed?
By managing the type, number and distribution of animals.
- Type = grazers and/or browsers
- Number = stocking rate (ha/LSU)
- Distribution == grazing system (e.g. Fodder Bank System)

Principle do's and don'ts

1. Know the different grass species and their grazing values.
2. Realise that all grasses are not equally suited for grazing. Palatable perennial grasses are the main fodder source.
3. Plan the management of your farm and construct fences according to vegetation types.
4. Realise that good animal production is only possible when animals have access to enough palatable grasses.
5. Remember that cattle are primarily grazers and will only browse when the grass are over grazed.
6. Don't overstock and adapt animal numbers seasonally according to the prevailing climatic conditions.
7. Don't overgraze. Leave enough grass behind for regrowth (take half leave half!)
8. Veld must rest in the growing season. Rotational grazing does not necessarily mean rest.
9. Keep record of the number of animals and the number of days that they spent grazing in a camp.
10. Organic material on the ground and an abundance of perennial grass species are positive signs.

Prerequisites before a system can be applied:
* **Carrying capacity** - no system works if the veld is overgrazed by too many cattle.
  Regularly reduce cattle numbers. Reduce early in April in dry years.

Value of correct stocking (sweetveld)

Season	Cattle (LSU)/100ha	Kilograms meat/100ha	Held health
Wet	17	1400	Down
Wet	11	2100	Up
Dry	9	1800	Up

* **Camps:** there must be a sufficient number to apply a system of rotational grazing and resting.

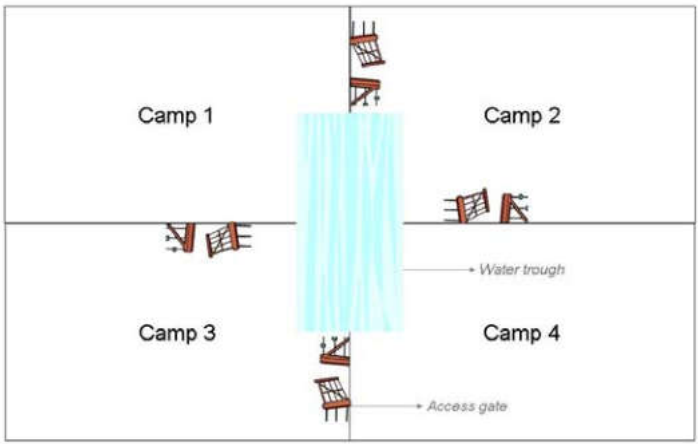


Figure 3. Sample of camp layout

Value of rotating veld - sufficient resting

Tawoomba Research Station 40 years

Resting	Kgs Meat /100 ha	Veld Health
No rest	2000	Down
½	3300	Up

Signs of overgrazing or low capacity are: thin cattle at the end of winter; a high percentage of old land and an abundance of grass pioneers; erosion, bush encroachment and damage due to termites and game. These are clear-cut signs that stock numbers should be reduced.

To achieve market weight, one needs to plan around target weight as required by the market. A good fodder flow plan is necessary for the achieving the market requirements. Production licks are just as important in

getting the animals well conditioned. Season and veld condition will determine the fodder flow plan and supplementation strategies. The fodder flow plan might include reduction of stock numbers at some stages of the year, especially winter time.

Examples of production licks

Ingredients	Parts by weight		
	Height palatability (%)	Medium palatability (%)	Low palatability (%)
Crushed maize	38.5	33	27.5
Third grade coarse salt	20	17	15
Molasses meal	20	17	15
Urea Gran Am	10 1.5	13 3	15 2.5
DCO*or Kynofos**	5	5	5
Vegetable Protein meal***	5	5	5
Approximate total crude protein %	37	46	52

NUTRITION AND SUPPLEMENTATION

The primary purpose of keeping animals is to transform feeds into meat, milk, wool, mohair and eggs. The conversion of feed to these uses must be done efficiently and economically.
Ruminants require a basal diet of roughage in the form of pastures or conserved feed with supplementation to augment specific nutrients at various stages of production cycles.
Animals must get sufficient fibre, energy, protein, minerals and vitamins to remain healthy and productive. Another most important nutrient is water. It is important to have a knowledge of feed or feed ingredients that supply each of the required nutrients and the importance of each nutrient in animals.

Energy

- As plants mature it becomes less available.
- Energy is supplemented to achieve high growth rates.
- It can be supplemented in finishing animals or at strategic times in producing animals.

Proteins
- The protein content is high in the young growing plants and falls as the plant matures.
- Required for production and reproduction.
- Grass has high protein content when still young.

Minerals
- Very important in the health of animals.
- Animals in many parts of the world get less that their exact requirement for different minerals.
- Phosphorus is low in many parts of the world

Vitamins
- Are necessary for normal growth, production, reproduction and health.
- Sometimes it is necessary to supplement animals with vitamin A during dry period.

Supplementation

Most roughages are low in quality and must be fed with energy feed. Feeding of animals is not just about gut fill- an error done by many. Gut fill without proper nutrition lead to digestive problems.

Hay
- best saved for drought feeding
- usually expensive in feed value terms and difficult to get during drought.
- Can be fed every second day
- Bale weights are important
- Buy in tones

Silage
- Silage is a complete feed rather than just a supplement
- Quality varies, depending on how the silage was made.
- Can be fed every second day.

Grain
- Must be mixed with protein sources
- Best supplement for late pregnant and lactating cows.
- Sorghum is best cracked
- One percent limestone must be added
- Feed every second day.

Protein blocks/lick
- Best used in the early drought phase

Supplementation in summer

- During mid-summer when there is ample grass volume, it might look like the cattle are getting everything they need whereas it is not so.
- If grass is allowed to become mature and is not kept at vegetative stage, the less digestible fibre component of the grass will increase and overall digestibility will suffer.
- Nutrient requirements will differ according to breed, frame size, stage of production and age.
- The ability to meet the nutrient demand by the forage base is complicated by rainfall patterns, management of pastures, soil type and fertility.
- One way to check if the animals are getting enough is to condition score them.
- Condition scoring can be done during the following times:
  - Mid-summer
  - Weaning
  - 90 –100 days before calving
  - Calving
  - Beginning of the breeding season

Common Health Problems associated with supplementary feed

Bloat

- Caused by malasses, grain or high quality lucerne hay.
- Can be prevented by good feeding management and bloat oil added to water.

Grain poisoning/ lactic acidosis

- Usually due to excess intake of grains or pellets to which the animals are unaccustomed.
- Animals may die after eating only moderate amounts of grain.
- Circumstances under which grain poisoning may occur include:
  - Accidental access to grain stores;
  - Stock access to stubble paddocks containing excess grain after harvest
  - Stock access to standing crops.
  - Cattle and sheep on feedlot ration without proper introduction
  - Grain feeding during drought without proper introduction.

Urea poisoning

- Caused by excess intake of urea.
- Symptoms are increasing respiration, excitement bloating and salivation.

Treatment: mix and drench the animal with 0.5 litre water 0.5 litre vinegar and 1kg sugar or molasses

CONDITION SCORING

To remain in the breeding herd, a cow must produce and successfully raise a calf each year and successfully reconceive within 90 days of parturition. To ensure that the cow has the best possible chance of fulfilling these requirements, she must be in optimum condition at mating. The nutritional status of a cow is reflected in her body condition, and therefore can be controlled, to a large extend.

Body condition scoring of beef cattle can be an effective management tool for evaluating the energy reserves of cows and the whole nutritional program throughout the year. Females that are too thin or too fat can be an expensive investment. Thin cows can have difficulty rebreeding while fat cows are prone to calving problems and excessive feed cost. Body condition scores allow producers, extension personnel, and researchers to communicate more effectively regarding the herd's nutritional status.

Condition scoring is a simple management tool, aimed at assessing and describing the body condition of cows at strategic stages of the production cycle. The procedure is easy to learn although subjective.

In South Africa the condition scoring is based on a five point scale: 1 represent an extremely thin animal and a score of 5 a grossly fat animal,. A cow with a score of 3 is considered to be in a trim condition. In the UK and the USA, a 9 point scale is used.

Condition scoring involves the subjective assessment of the fat cover over two specific areas. These areas are:

- The loin area (between the hip bone and the last rib) which incorporates the spinous and transverse processes of the lumbar vertebrae;
- The area around the tail head.

Cows that are either too thin or too fat at mating are less likely to conceive. Calving interval may also be affected by the condition of the cow at mating. It is important to remember that a cow will normally lose at least half a condition score at calving, and consequently one should strive to achieve a condition score of 3.5 at calving. Provided that adequate levels of nutrition is maintained between parturition and mating, the then the cow should be at a condition score of 3.0 by the time she goes to the bull. If an adequate level of nutrition is not maintained, she will lose substantial condition after calving with a consequent decrease in calving rate.

The condition of a spring calving cow will depend on her autumn condition, and the feeding regime employed during the previous winter. It is therefore important for the farmer to know how much feed is required to achieve certain condition scores, and the time-span should then be possible to calculate the feeding costs.

If a target condition score of 3,5 is to be achieved by calving, then animals in poor condition (1.0 to1.5) will require higher quality feed for a longer period than animals in a reasonable condition (2.0 to 2.5). It is more economical to maintain an animal in good condition than it is to “feed up” an animal to regain a good condition. To minimize winter feed costs, the calf should be weaned before the condition of the dam falls to such an extend that excessive feeding is required to regain body condition. In this context, it is suggested that, as a general rule the calf should be weaned when the condition of its dam is between 2.0 and 2.5, but preferably near to 2.5. When calves are weaned on a group basis, the mean condition score of the dams should not fall below 2.3. After weaning, the cows should gain condition because of their reduced nutritional requirements.

It is important to note that condition scoring involves assessing the physiological state of the beef cow by means of observing the amount of body fat in the key areas and must not be confused with technique of assessing fat cover to determine carcass grade.

Methods of scoring

A body condition score can be assigned to a cow either by visual appraisal, by palpation or by combining sight and touch. Cattle can be scored equally well by palpation of fat cover or by visual appraisal. Accurate visual appraisal may be hampered by hair coat. For cattle with long coat, handling is of value,

but when hair is short handling is probably not necessary. One has to remember though that gut fill and late pregnancy stage may make animals appear fatter than they actually are.

Score description

Thin

1 Severely emaciated; Starving and weak; No palpable fat detected over the back, hips or ribs; tailhead and individual ribs prominently visible, all skeletal structures are visible and sharp to touch; animals are usually disease stricken. Under normal production systems cattle in this condition score are rare.

1.5 Emaciated; similar to BCS 1, but not weakened; little visible muscle tissue;
tailhead and ribs less prominent.

2 Very thin; no fat over ribs or brisket; backbone easily visible, slight increase in
muscling over BCS 1.5.

Borderline

2.5 Borderline; individual ribs noticeable but overall fat cover is lacking; increased musculature through shoulders and hindquarters; hips and backbone slightly rounded versus sharp appearance of BCS 2.

Optimum

3 Moderate, increased fat cover over ribs, generally only 12th and 13th ribs are individually distinguishable; tailhead full, but not rounded.

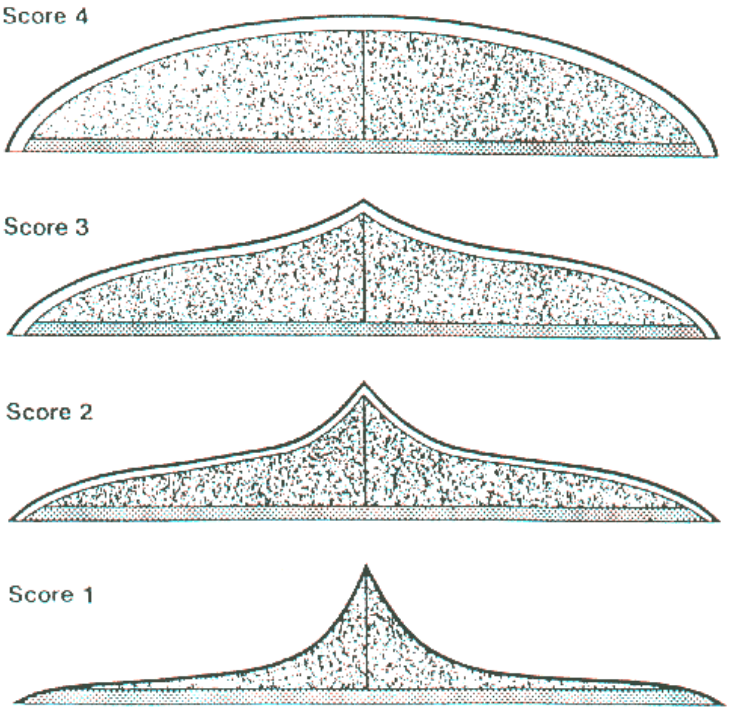
3.5 Good; back, ribs and tailhead slightly rounded and spongy when palpated; slight fat deposit in brisket.

Fat

4 Fat; cow appears fleshy and caries fat over the back, tailhead and brisket; ribs are not visible; area of vulva and external rectum contain moderate fat deposits; may have slight fat in udder.

4.5 Very fat; squared appearance due to excessive fat over back, tailhead, and hindquarters; extreme fat deposit in brisket and throughout ribs; excessive fat around vulva and rectum, and within udder; mobility may begin to be restricted.

5 Obese; similar to BCS 4.5, but to a greater degree; majority of fat deposited in udder limits effective lactation. Under normal production systems cattle in this condition score are rare.



CALF REARING

It is noteworthy that calf feeding takes place in 4 phases:

1. Colostrum phase (3 - 4 days)
2. Pre-ruminant phase (3 days to 20 - 30 days)
3. Transition stage (Liquids & dry feeds)
4. Post-weaning stage (dry feeds)

Programme

1. The calf must ingest colostrum within 4 hours of birth. At least 2 l (preferably 4 l) colostrum must be provided at this time. At this young age it is best to feed fluids to the calf using a bottle and teat. Should it be difficult to get a calf to drink, it might be necessary to use a stomach tube to feed it. As the calf gets older, it is possible to train it to drink from a bucket. However, allowing a calf to suckle i.e. continuing to use a teat (linked to a bottle, bucket or tube), stimulates the oesophageal tube to

close, directing the milk past the rumen directly to the true stomach, allowing better digestion of the milk. Bucket-fed calves have distended stomachs because of poorly digested milk which accumulates in the rumen.

2. During the initial feeding period, lasting from day 3 to day 21, milk is the staple diet and is fed at a rate of 8% to 10% of the calf's body mass. A milk substitute or colostrum can be used instead of milk. Feeding once a day is acceptable, but it is preferable to feed the calf twice a day, giving half its ration in the morning, the remainder at night. Ideally the milk must be given to the calf at body temperature (37ºC). However, once a calf is accustomed to drinking colder milk, as long as it is fed at the same temperature at all times and is not too cold, there should be no problem.

3. Providing a calf starter meal (17 to 18% crude protein, urea free) from the first day ad lib, stimulates the calf to lick the meal and if it ingests some, stimulates intake. Intake of meal can be encouraged by placing a small amount of meal in the calf's mouth every day at feeding time. The amount of meal the calf is taking in each day must be measured. The intake of concentrates usually increases rapidly after the calf is 7 days old.

   Complete calf meal can be used instead of calf starter meal. The calf starter meal should be fed for the first 6 to 8 weeks of age, after which a complete calf meal (urea free) is fed. Complete calf meal is usually about 14% crude protein.

   Meal containing Romensin (monensin) or Taurotec (lasalocid) is better because these ionophores suppress coccidial growth and are growth enhancers.

4. Fresh water must be continuously available to the calf, although calves usually only ingest significant amounts of water after 10 days of age. To ensure that water is always fresh, it is best to replace with fresh water twice daily.

5. A growth stimulant can be used if rapid growth is desired.

   When administering a growth implant in the ear, care must be taken that the pills are not crushed, or else the growth stimulating effect lasts only for a very short period. Where the intention is to keep an animal for breeding purposes, it is essential to ensure that all implants used will not affect fertility.

6. Once the calf is eating more than 0.75 kg of calf meal per day, milk can be removed from the diet i.e. the calf is weaned. Weaning is usually associated with a mass loss, which can be minimized by reducing the milk ration over a period of 7 to 10 days, ending with a period of feeding half the milk ration once a day only, preferably in the evening. Calves are usually ready to wean when they are 30 to 40 days old. If a calf is not ingesting more than the required 0.75 kg meal daily by the time it is 40 days old, wean in any event, but monitor its progress. Stress is reduced if the calf is kept in the hutch or tethered to the tethering post from weaning until it is 10 weeks old. Thereafter calves can be grouped and grazed in paddocks with good quality grass.

7. Feeding complete calf meal ad lib until the calf is 210 days (7 months) old will ensure rapid growth is maintained. At this stage, dairy meal can be used in place of calf meal.

   Damp or wet concentrates must not be fed to livestock because it becomes sour and moisture encourages fungal growth, both of which will have adverse effects on feed intake and on animal health.

8. Calves need roughage and good quality hay must be available to the calf at all times. When roughage is fed, stomach disorders from the intake of excess concentrates are not common.

9. If the calf is to be slaughtered, a standard feedlotting regime can be initiated when it is 7 to 8 months old. Depending on maturity type, calves fed in this manner are usually ready for slaughter at 12 to 15 months.

10. Vaccination programmes must not start earlier than three months of age because the antibodies ingested with the colostrum can interfere with the development of immunity during this period. A vaccination programme should include anthrax and quarter evil (2 shots 6 weeks apart) and preferably also botulism (2 shots 6 weeks apart), lumpy skin disease and three-day-stiff sickness. Heifers must be inoculated for contagious abortion at 6 to 8 months of age.

11. De-worming depends on conditions and management, but should include a remedy for tapeworms (one treatment at about 40 days old is usually adequate) as well as a broad spectrum remedy (at least one treatment, preferably two) before 7 months of age.

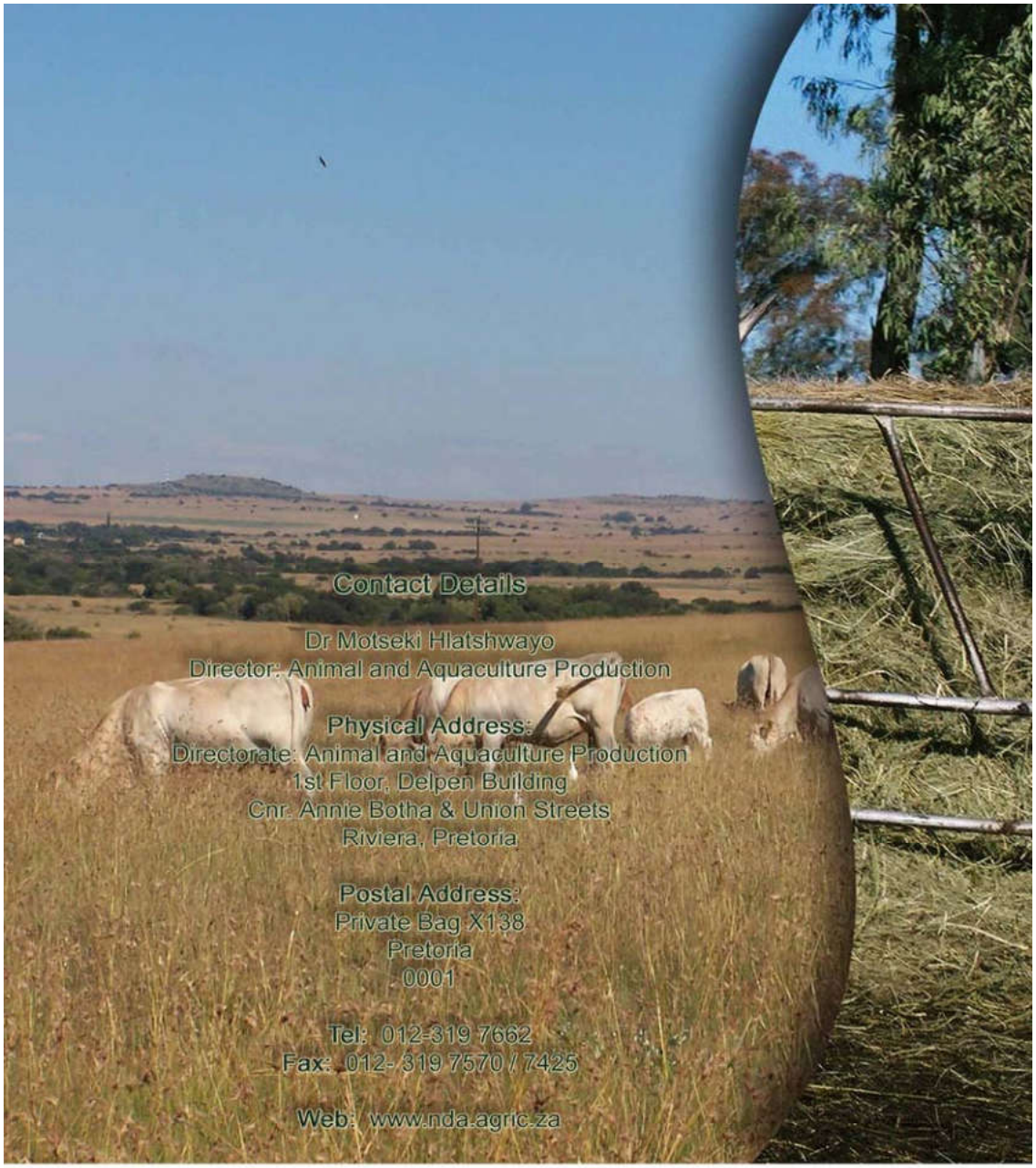
12. Management for tick-borne diseases is difficult where calves are artificially reared. If the calf remains in pens at all times, the chances are that ticks should pose no threat, but unfortunately, where there is no tick challenge, natural immunity does not develop.

Where the intention is to grow calves out to maturity and keep them for breeding purposes, it is better to refrain from dipping as long as possible and to expose the animals to a certain amount of tick infestation to encourage the development of natural immunity. Encouraging immunity against tick-borne diseases is as important as immunity against ticks. When a calf is exposed to ticks, it can contract a tick borne disease and can suffer abscess formation from tick bites, so extra care is warranted.

Should dipping become necessary where tick infestations become a problem, the correct dip must be used to ensure that the ticks are susceptible to the dip in use.

13 Reducing stress and ensuring good hygiene will increase the chances of a calf growing at a high rate of gain and will reduce the danger of disease.

The use of Vitamin A should be considered carefully. If milk is fed, Vitamin A is usually not supplemented. Where animals have access to dry feeds only for any length of time, especially if no green feed is ingested, Vitamin A supplementation is essential.



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