



## agriculture & rural development

Department:  
agriculture  
& rural development  
PROVINCE OF KWAZULU-NATAL

### Beef Production: The Basics

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## Heifer and Cow Management

The life cycle of an animal starts at conception. With cattle, the calf is born after a period of 283 days or approximately 9 months of pregnancy. One of the most important factors affecting the management of breeding, is the length of this gestation period (the time the cow carries the calf from conception to birth). After calving, a cow should not be brought to the bull before at least 50 days have elapsed to allow the uterus time to undergo involution (a necessary period of rest and recuperation from possible injuries suffered at calving).

In herds where calving takes place in a restricted breeding season, a cow has a very limited period of time to fall pregnant. Adding 50 days to the 283 days of gestation and subtracting the total from 365 days, leaves the cow 32 days to conceive in time to calve the following year at approximately the same time of the year. On average a cow comes on heat every 21 days (heat lasts 6 to 18 hours), which means that she has at most 2 chances during these 32 days (often one chance only) to reconceive.

### Pregnancy

During the first days after conception, the chances of successful fertilization and implantation of the fertilized ovum into the uterine wall is enhanced if the cow is exposed to as little stress as possible.

### Cow

Pregnancy can be divided into first, second and third trimester, each comprising approximately 3 months. During the first trimester the cow is suckling a young calf and the foetus of her next calf is in the early stages of development. The dam's milk production is at its peak at the beginning of the first trimester and declines as this trimester progresses. Her calf still has a relatively high milk demand and she must obtain additional nutrients from her diet to build up her own body reserves. The foetus does not have a high nutrient demand at this stage.

During the second trimester of gestation, the cow's calf is rapidly maturing into a ruminant able to provide nutrients for its own requirements through grazing. Weaning commonly takes place about the middle of the second trimester. The foetus is starting to demand more nutrients from the dam, albeit a relatively low demand. The dam can therefore replenish her own body reserves comfortably during this time on condition that, where seasonal breeding is applied, the timing of the restricted breeding season is right and that grazing management is of a high standard. If overgrazing is a problem or at higher altitudes where veld is entering the winter dormant phase, steps must be taken to allow the dam the opportunity to replenish her body reserves by supplementary feeding. With excessive feed

shortages, such as during a drought, early weaning of the calf towards the end of the first trimester should be considered to prevent an excessive loss of body condition in the dam.

Foetal growth during the third trimester of pregnancy is very rapid and consequently there is a high demand for nutrients from the cow. Should a cow's current calf be left with her, although milk production is rapidly declining, there is an unnecessary drain on the dam's nutrient resources. With seasonal breeding, especially in sourveld areas, the availability of nutrients from natural grazing lands is declining or very low when the cow is in the third trimester of pregnancy. Supplementary feeding is often essential. However, excessive feeding, resulting in gross fat deposition, should be avoided. A period of at least 6 weeks during which the dam does not suckle a calf will allow her udder a period of rest during which time involution of the udder tissue will ensure a good milk supply for the next calf.

### *Heifer*

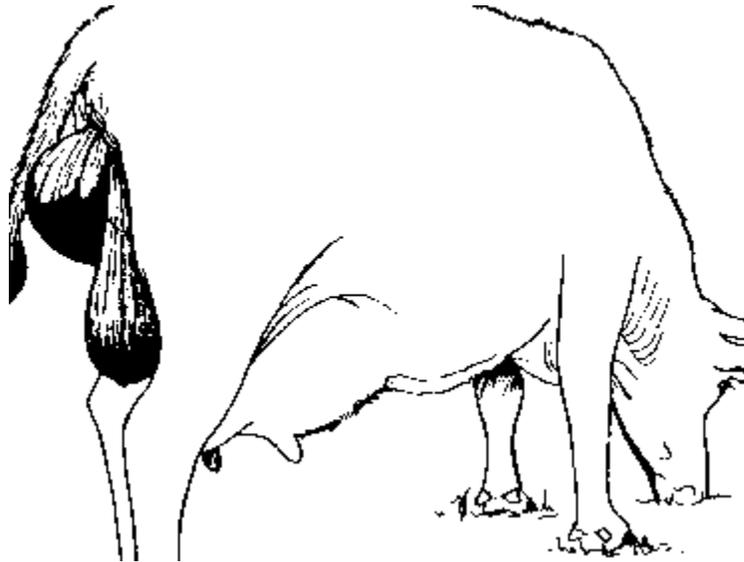
Pregnancy in heifers follows the same pattern as in cows, except that the heifer does not require nutrients for milk production, and with heifers there is also a need to provide additional energy and protein for the heifer herself to grow to full maturity. Heifers that have been bred at a relatively light weight (60% of mature live mass), have a much higher demand for nutrients for growth than heifers bred at a higher live mass (80% to 90% of mature live mass). With most breeds of cattle, cows do not achieve full mature size before 4 to 5 years of age, which coincides with the weaning of their second calf. Heifers as well as first calvers therefore need good nutrition and extra care if the intention is to have mature cows which have grown out to their full genetic potential for size.

### **Calving**

Under extensive beef production systems, there is a need for "no-nonsense" cows *i.e.* cows that can calve without assistance. Discussions on how to help with calving difficulties is therefore aimed at reducing losses rather than promoting the retention of problem cows. When a cow is assisted, both the cow and the calf must be marked for culling.

Enlarging of the udder, loosening of the ligaments around the tail root and oedema (swelling) of the vulva are signs that a cow is nearing the time to calve down (parturition). Cows often move away from the main herd as they near parturition. Some cows, especially heifers and high milk producers, are prone to severe swelling of the udder, which is uncomfortable and even painful to the cow. In extreme cases it might be necessary to milk the dam before the birth of the calf to relieve some of the discomfort. Should it be necessary to milk the cow before the calf is born, it is advisable to keep some colostrum to feed to the calf after birth (post partum).

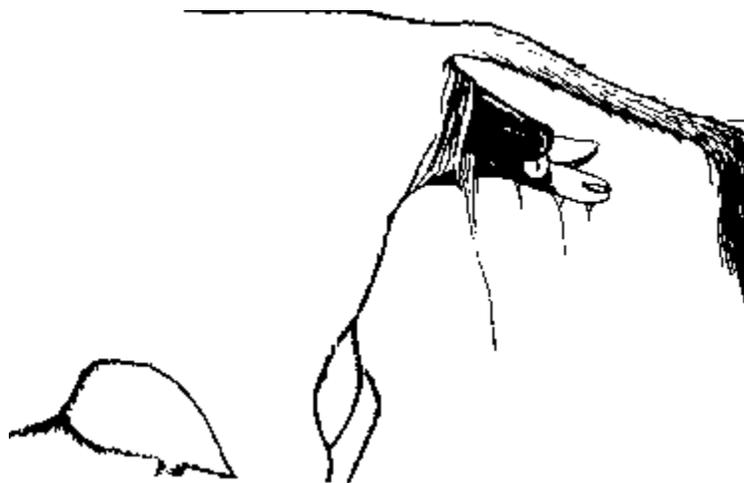
Some heifers and young cows tend to develop oedema (swelling) in the area between the udder and the umbilicus before calving. Post partum, once the calf commences suckling, this oedema usually disappears without any adverse side effects.



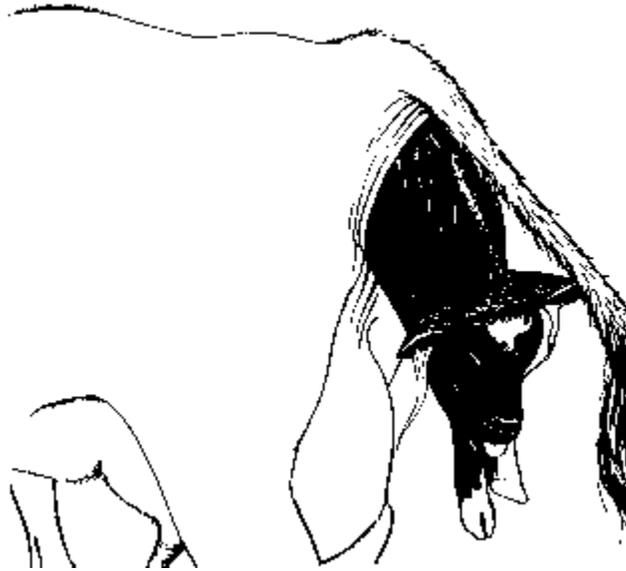
**Figure 1.** During the initial phases of calving, the fluid filled foetal membranes appear.

During the initial stages of parturition (calving), the cervical opening enlarges, a necessary process to allow the calf to be born. Unless the cow is examined internally, distention of the endo-cervical channel cannot be seen. After a time, the foetal membranes appear (Figure 1).

Cows close to calving should not be disturbed as they tend to try and delay calving when there are strangers nearby or when they are exposed to abnormal environmental conditions.



**Figure 2.** With normal presentation, the front feet and head usually appear first.

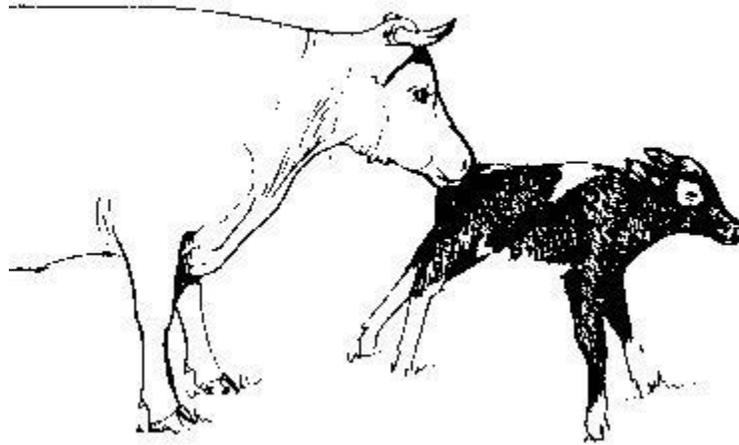


**Figure 3.** A cow usually lies down during the latter stages of calving when the calf is ejected, although some stand up, allowing the calf to drop to the ground.

Should the front legs and head of a calf not appear first (Figure 2 & 3), the dam must be monitored to ensure that an abnormal presentation (*e.g.* hind quarter of the calf appearing first) does not prevent her from delivering the calf or that an extended birth period tires her and the calf unnecessarily. The inclination to assist with birth is natural, but premature aid masks cows prone to calving difficulties and should therefore be avoided.

After calving, a cow will lick her calf (Figure 4) and eat the afterbirth, which is usually pushed out soon after birth. Eating the afterbirth is a natural process and must not be discouraged because the afterbirth serves as a valuable source of nutrients for the cow. Where cows do not eat the afterbirth or leave pieces of it behind, these should ideally be buried to prevent the spread of disease.

Should the afterbirth remain in the uterus *i.e.* the afterbirth is retained, it is better not to try and remove it forcibly. If long pieces of afterbirth are hanging out and are in danger of being trampled on by the cow, the pieces hanging down can be cut off at the level of the hocks. Daily treatment with pessaries will prevent infections and the cow can be left for 3 to 4 days to eject the afterbirth on her own, or allow the afterbirth to loosen before steps are taken to remove it. When pessaries are placed into the uterus, the membranes can be lightly pulled ("milked"), but tearing must be avoided. With difficult calving or retained afterbirth, treatment for the prevention of uterine infections must be applied. Uterine pessaries can be put into the uterus until the cervical opening closes, after which a pipette is used to deposit disinfectants in the uterus.



**Figure 4.** The dam licking her calf after birth.

Healthy calves usually start to try to stand up within minutes after the dam has started licking it and will then try to suckle. Experienced and good dams usually encourage the calf to suckle. Should the dam prevent the calf from suckling or her udder be so swollen that the calf has difficulty suckling, assistance must be provided. The objective is to ensure that the calf ingests enough colostrum within 4 hours post partum. A calf needs a minimum of 4 R colostrum. Although many heifers are instinctively good mothers, some are not. Udders are prone to tenderness post partum, especially in heifers, inciting them to avoid efforts by the calf to suckle.

### **Heifer mating**

Heifers are usually mated at either 15 or 27 months to calve down for the first time at 2 or 3 years respectively. As a rule of thumb, heifers should first be mated when they weigh at least 60% of mature mass. The age at which this target mass is reached will differ depending on level of nutrition (amount and type of feed available), breed, the age at which she cuts teeth and the time of year she was born.

First calf cows (*i.e.* heifers that have calved and are brought to the bull for the second time; by definition, a heifer becomes a cow at the birth of her first calf), have notoriously low conception rates, partly as a result of the fact that the intercalving period between the first and second calf has been shown world-wide to be longer than subsequent intercalving periods. Inadequate nutrition is probably a contributory cause of the extended first intercalving period. One of the strategies advised to overcome this difficulty is to breed heifers 4 to 6 weeks before the main herd. This practice compensates for the extended first intercalving period and allows extra time between the first and second calf for the dam to build up body reserves as well as grow. It has been demonstrated that conception rates in first calvers can be improved by breeding heifers ahead of the main herd, avoiding the imprudent loss of good genetic material where there is a policy to cull all skips (cows diagnosed non-pregnant at the time of pregnancy diagnosis).

Where first calvers are run with the mature cows and/or if calves of first calvers are not weaned before the main herd, the practice of mating heifers ahead of the mature cows does not achieve its aim of improving conception rates in first calvers. If anything, failing to wean calves from heifers mated earlier, places additional stress on animals still in their growing

phase. Another problem with breeding heifers ahead of the main breeding season is that the breeding season is timed to synchronise the available fodder production with the feed need of the mature cows. By breeding heifers earlier, their nutrient requirements are not matched to the fodder production of the farm unless supplemental feed for the heifers is provided. In practice it could be better to breed heifers with the main herd and at the same time ensure that there is adequate feed for all the animals on the farm. Where heifers are mated with the main breeding herd, more heifers must be retained annually to compensate for the additional loss of first calvers that do not re-conceive.

Keeping heifers and first calvers in separate herds allows younger, growing animals access to better quality feed and an equal opportunity to reach feed or lick troughs.

### **Overmating**

The aim of overmating is to ensure that only pregnant heifers are used as replacements. In most beef herds, between 15% and 25% of cows are culled each year and must be replaced. With theoretical stock flow calculations, 20% is commonly taken as the replacement rate, whereas 16% of mature cows are replaced annually in commercial extensively farmed cattle herds in KwaZulu-Natal. With overmating, 20% to 30% more heifers than the number needed for replacement, are mated and kept as replacement heifers. Thus, if 20 replacements are needed for a 100 cow herd, 25 heifers are mated and the following year 20 are selected as replacements.

### **Cow and heifer selection**

With beef herds, replacement heifers are selected from the calf crop each year and, up to the time that they are mature animals and calve down themselves, further selection takes place from time to time. Although heifers considered less desirable are culled, it can be said that with heifers the emphasis is selecting for desired traits, whereas with cows the emphasis is on culling poor doers.

Selecting heifers and culling cows in a beef herd must be based on the goals set for the relevant enterprise but some factors are important irrespective of goals. These include:

- **Fertility.** Reproductive rate (number of calves born in relation to the number of cows bred) is the most important factor determining economic efficiency in a beef herd and is dependent on cow fertility, which in turn is highly dependent on nutrition. Fertility has been shown to have a low heritability and is therefore a trait that does not respond rapidly to selection. Cows that do not reconceive are unproductive and a burden to the beef enterprise. However, before deciding to cull a cow for not falling pregnant during the breeding season, the situation must be evaluated with care. It is noteworthy that pregnancy is an all or nothing event and research has shown that skip cows have a high probability of conceiving in the subsequent breeding season (Table 2). Non-conception can be caused by a number of factors, including poor nutrition, bull infertility, poor management, uterine infections etc. To avoid the needless loss of productive breeding animals, cows must only be held responsible for not falling pregnant if it is certain that they are at fault. A good practice is to allow a cow one skip in her life time, excluding skips that could be attributed to other causes. The objective is to reduce the number of first calvers in a herd and to increase the proportion of mature cows producing calves each year.
- **Adaptation to local environment.** Although adaptation is one of the most important factors affecting efficient production, there is no simple measure, except farmer experience, to determine environmental adaptation.
- **Quality of calf.** Calves are selected annually as replacements for a breeding herd and the remainder divided into groups which are sold according to quality. Should a cow

regularly produce a weaner that does not adhere to the requirements of the enterprise, she should be considered for culling.

- **Age.** Older cows tend to produce calves that are poor performers because the dam is no longer able to supply sufficient milk for the calf to grow well. Worn teeth, preventing the dam from grazing efficiently, is the most common cause of poor calf growth rate during the first 100 days of existence. Regular mousing of cows will keep the farmer informed as to the dental status of his breeding herd. Under conditions where cattle graze coarse grass or there is a lot of sand adhering to their fodder, teeth tend to wear faster and culling rate in the herd is high. In areas where dental wear is relatively intense, the productive life expectancy of cows is 8 to 10 years. On the other hand, in some areas cows as old as 18 years have only moderate dental wear and are still highly productive.
- **Conformation.** It is accepted practice to use conformation as one of the selection parameters for heifers. However, some defects only appear at a later age, for example poor udder conformation cannot be evaluated in a heifer. As a cow ages, weaknesses in udder conformation are apt to be revealed, as well as problems such as weak legs. A mistake often made is to assume that udder conformation is only important in dairy herds. In many beef herds where udder conformation was ignored, many new-born calves have to be assisted to suckle for some days and even weeks, placing a demand on labour requirements.
- **Injury.** Where injuries to cows cause functional defects, they must be culled.

**Table 2.** The performance of breeding females in a beef herd during the subsequent season.

<b>Cow type</b>	<b>Calving rate</b>	<b>Days from bulls in to calving</b>	<b>Weaning mass</b>	<b>Total performance</b>
Open cow (skip)	85	304	201	165
Pregnant	83	313	192	151
First calver	68	320	179	110
3yr old heifer	94	303	188	164
2yr old heifer	88	315	177	133

In practice, all the animals in a beef herd are evaluated at some time during the year, usually at weaning (autumn in spring calving systems). At the same time an assessment is made as to how many cattle can be kept on the farm, which depends on the available feed (grazing) and the number of cattle the farmer needs to sell for financial reasons. Based on the evaluation and the weaning rate in the herd, the following is known:

- the number of replacement heifers (two-year old heifers of a desirable type) that are available for breeding during the subsequent breeding season
- the number of yearling and weaner heifers of a desirable type in the herd (replacement heifers)
- the number of cull two-year old, yearling and weaner heifers in the herd
- how many cull cows there are (*i.e.* the totally unproductive animals)
- and how many top (or most desired) cows there are in the herd.

With reference to quality, there is usually a group of "middle cows" between the cull cows and the top cows. The middle cows have to be evaluated with care. They are animals that

have some defects, but are still fully functional breeding animals able to produce a calf. The difficulty is that should the decision be taken to cull middle cows, they must be replaced with pregnant heifers who have yet to prove themselves. It is known that the production level of the calves from heifers is lower than that of mature cows. According to a number of studies, the weaning mass of calves from heifers was 15% to 20% lower than the weaning mass of calves from mature dams, which means that the quality of the replacement heifers must be appreciably better than that of the middle cows they are to replace. Furthermore, a higher percentage of replacement heifers in a breeding herd results in a higher percentage of first calvers in a herd. The problem is intensified by the difficulty of comparing old cows with young heifers. Other factors that warrant consideration include:

- the potential selling price of older cows versus pregnant heifers
- the farmer's financial status
- the season (e.g. available fodder for wintering in sourveld areas; grazing available during the dry season in sweetveld areas)
- replacement rate in subsequent seasons. Thus, in an expanding herd, more cows and replacement heifers should be kept if there are few acceptable weaner and yearling heifers.

Taking all these factors into consideration, the decision must be taken as to which animals will be kept and the remainder marked as culls which will be sold. The cull animals must leave the farm immediately unless there is enough feed to keep them for fattening or to sell at a more opportune time when beef prices are at an optimum. On the other hand, it can happen that the farmer carries little or no debt, that beef prices are relatively low and fodder is plentiful because of a good season, in which case cull two-year old, yearling and weaner heifers can be re-considered for keeping one more year. Cull two-year old heifers can even be bred to provide additional calves the following summer. It is noteworthy that cull cows are a liability and must be sold in any event.

### *Heifer selection*

Heifer selection is one of the most important tasks a beef farmer must perform because the type of heifer selected will determine the type of cow comprising the breeding herd. Deferring heifer selection as long as possible assists in accuracy of selection. Thus, if all heifers could be kept until they have produced their first calves and the calves evaluated, heifers can be selected on the quality of their first calf. This practice is usually not practical and reliance must be placed on selection based on the heifers own performance, the performance of her parents and her conformation. Factors that can be considered in heifer selection include:

- Functional deficiencies. There are many functional deficiencies, of which the most common are wry face and poor leg structures.
- Inability to conceive. Heifers should be put to the bull and all that do not conceive within a short breeding season, should be culled.
- Genetic defects can be tested for at a nominal cost, including the relatively common Robertsonian 1/29 translocation.
- The farmer's breeding and production goals will determine a number of selection criteria.

With cattle breeding, selection criteria should not be too harsh because it has been demonstrated that strict selection has the effect of narrowing down a gene pool. Selection criteria should be clearly defined and in choosing them, only proven selection criteria warrant consideration.