

Beef Production: The Basics

Calf Rearing, Castration and Dehorning

Calf rearing is a specialized task best left to the cow. If the dam is adequately fed and cared for, she will wean a healthy calf able to grow into either a productive female producing a number of calves or a bull able to impregnate many cows for a number of seasons.

Where calves are removed from the dam to provide milk for sale or household purposes, or a dam dies leaving her calf an orphan, calf rearing becomes necessary. Raising calves demands daily attention for at least the first 4 to 6 weeks of their lives. The most common practices include:

- Dairy ranching, where the calf is removed from the dam for a portion of every day, for example during the daytime, to allow milking in the evening. The calf then suckles at night. The opposite procedure, *i.e.* removing the calf during the night and milking the dam in the morning, stimulates her to come into heat earlier post partum.
- Hand rearing the calf after it has been removed from the dam permanently. Whole milk from the dam or another cow, or a milk substitute, is used to feed the calf.

Many variations of these two systems are possible. Some farmers make use of foster mothering, where one cow is used to rear two or more calves while the other cows are milked.

Colostrum

Colostrum (the yellow milk secreted by a cow during the first days post-partum) contains **antibodies against disease. The colostral antibodies can only enter the calf's body for a limited time because the antibody permeability of the calf's intestinal walls declines after birth.** If a calf is not fed enough colostrum within the first 4 hours after birth, it will have little or no immunity against disease and calf mortalities will be high. The colostrum must **preferably come from the calf's dam, but any cow colostrum** is suitable. Colostrum can be stored frozen for use in case of emergencies or can be allowed to curdle, when it can be used for up to 6 weeks.

Rumen development

Research has shown that the sooner a calf is introduced to concentrates and starts eating roughages, the sooner its rumen starts functioning, and weaning can take place earlier.

Calf housing

Calves can be raised using a tethering post (an umbrella for shade is advisable in sunny areas) or a calf hutch. A roofed shed or a calf rearing pen on slats is used in many dairies. The important factors to consider are hygiene and protection against the elements, especially wind and rain. If calves are protected from wind and are relatively dry, they can survive very cold weather quite satisfactorily. Wet conditions are ideal for bacterial growth and wet animals are susceptible to disease and perform poorly. See Addendum B for illustrations of calf housing.

Where hutches or tethering posts are used, the calf is at first placed at the lower end of a slope and moved up the slope in stages, thus moving it uphill, away from the bacterial build-up around its living area. When calves are reared under a roof, it must be possible to clean floors properly. Slat, where excrement can be washed through or fall through, are ideal for floors.

Disease control

Calves must be dewormed at least twice before weaning and periodically until the age of 18 months. A vaccination programme is necessary and should take the prevalence of local diseases into account.

Hand reared calves are very susceptible to infectious diseases, especially diarrhoea (scours). Good hygiene and correct feeding practices will prevent infections by intestinal pathogens, including coccidiosis, colibacillosis and salmonellosis.

Live mass

The size of calves and their growth rates differ significantly between different breeds of cattle. Target live masses for different ages are reflected in Table 4, which can be used for average breeds *i.e.* breeds where the cows have an average mature live mass of 450 to 470 kg.

Table 4. Expected live mass for calves at different ages.

Age in weeks	Mass (kg)
0 - 4	25 - 50
4 - 8	50 - 75
8 - 16	75 - 140
16 - 22	140 - 190

Calf rearing programme

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 R (preferably 4 R) 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 (37C). 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.

14. 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.

Castration

Male calves are castrated to:

- Prevent unwanted pregnancies where male and female cattle are run in one herd
- Although castrates have a slower growth rate, fat deposition in castrates is higher than in intact males
- Prevent animals injuring one another because intact males tend to fight

- Fighting bulls damage fences and handling facilities

Male castration can be done in one of three ways:

- Knife (open wound) castration
- Elastrator rings
- Burdizzo or bloodless castration

Knife castration

Knife castration is the only completely safe method to sterilise male animals and can be done at any age, although with older animals the task is best left to a qualified veterinarian. With this method of castration there is always a danger that the wound can become infected and the necessary precautions must be taken.

With young animals, the lower part of the scrotal sack is cut off and each testicle removed by cutting the membrane enclosing the testicle and the relevant testicle is extruded. The spermatic cord and arteries are cut off using a scraping action to inhibit bleeding. Tying off the spermatic arteries can also be used to prevent excessive bleeding.

Elastrator rings

Elastrator rings were developed to castrate sheep and have subsequently come into use to castrate bull calves. A rubber ring, the elastrator ring, is applied around the neck of the scrotal sack using the special instrument designed for this purpose. The testicles must be in the scrotal sack distal (away from the body of the calf) to the elastrator ring. After a while the testicles and that part of the scrotal sack distal to the elastrator ring degenerates and falls off.

Where fat deposition is not desired but the farmer wants the higher growth rates associated with intact males, short scrotum castration can be done. The testicles are pushed up against the body of the bull and the elastrator ring applied to the scrotum distal (away from the body) to the testicles but in a manner that will keep the testicles firmly in contact with the body. Such a bull is sterile, grows well and fat deposition is the same as with intact males.

Many veterinarians believe that the use of elastrator rings in cattle is inhumane. To minimize pain when using the rubber ring method of castration, they must be applied within three days of birth, which can be a problem because in some calves the testicles remain in the body cavity for a time post partum.

Burdizzo

The burdizzo (Figure 5) is an instrument used to cut off the blood supply to the testicles, causing cell death of the testicular tissues resulting in degeneration of the testicles. The best time to apply the burdizzo is as soon as the spermatic cords can be felt, which is three to four weeks after birth. In older animals the burdizzo does not work well because the connective tissue in the spermatic cord thickens with age, preventing the instrument from performing its task. Bulls older than 4 months become increasingly difficult to burdizzo as they get older.

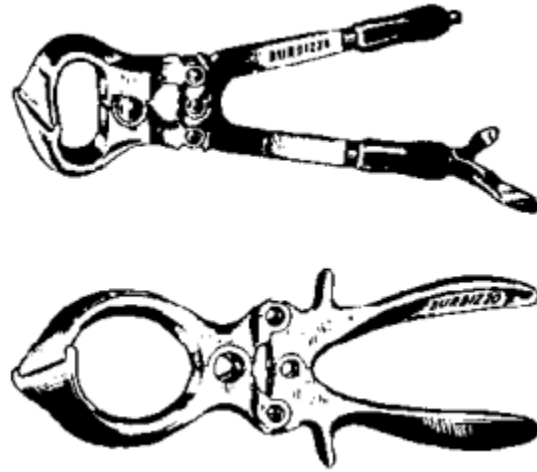


Figure 5. Cattle burdizzo (top) and sheep burdizzo (bottom; not drawn to scale). When storing burdizzo's it is best to leave the jaws open in order to prevent wear on the edges of the jaws.

The burdizzo is applied to each spermatic cord separately (Figure 6) in such a way that the blood supply to the testicles is damaged, while circulation to the scrotal sack remains intact. Gangrene can set in where blood circulation to the scrotum is lost. To achieve these objectives, the burdizzo is applied to the individual spermatic cords at opposite sides of the scrotum, leaving a central area free for blood to circulate or applying the burdizzo at different levels on opposite sides of the scrotum (Figure 7).

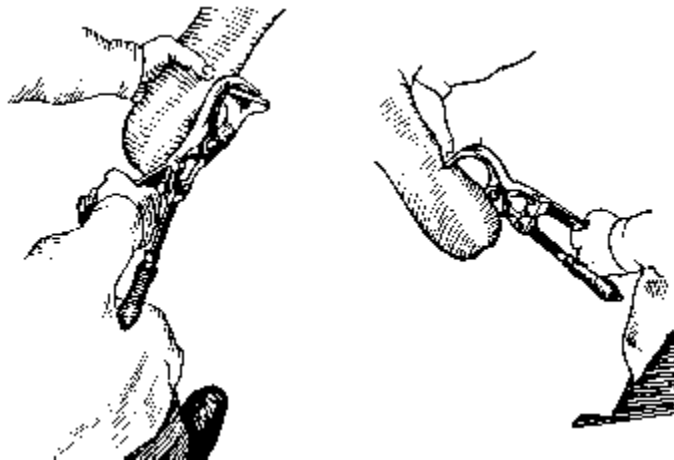


Figure 6. Applying the burdizzo to one spermatic cord at a time.

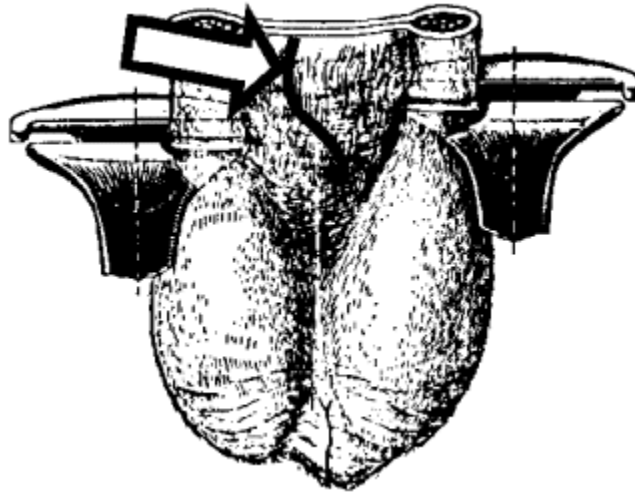


Figure 7. Illustration to show how the burdizzo is applied to opposite sides of the scrotal sack at different levels, leaving a space between the pinched areas, in order to preserve the circulation (arrowed line) to the lower part of the scrotum.

Castration with a burdizzo is best performed by two persons. The calf is first immobilized (*e.g.* tying it with ropes) or placed in a crush with a thick pole behind its hocks to prevent it from kicking. Holding an animal's tail firmly in a vertical position is very effective in preventing it from kicking, which requires a third handler. One handler holds the burdizzo and opens its jaws. The second handler guides the burdizzo, first moving a spermatic cord to the side of the scrotal sack, after which the relevant cord is hooked over the tooth at the side of the one jaw of the burdizzo. The first handler is then instructed to close the jaws slowly, while the second handler ensures that the spermatic cord does not slip out from between the jaws. Once the burdizzo is closed to the point where the spermatic cord can no longer slip out, the first handler closes it with an even, firm motion. Slamming the jaws shut must be avoided to prevent tearing the skin. The burdizzo is left closed for five to six seconds. The second cord is then nipped on the opposite side of the scrotal sack using the same technique. Cutting off the blood supply to the testicles causes ischaemia (loss of oxygen to a body part), causing death of the testicular tissues. With successful castration, on the day after castration, the testicles are swollen. Over a period of weeks the testicles shrivel up and are replaced with connective - and fat-tissue.

Dehorning

Horned cattle are not only dangerous to people working with them, but cause a great deal of damage to hides. Should one or more cattle in a group sent to an abattoir for slaughter have horns, the probability of bruised carcasses is very high. Dehorning or using polled bulls prevents these problems.

Dehorning can be done by

- hot iron cauterization of the horn bud (electric, gas and fire-heated irons are available)
- cauterization using chemical pastes
- removal of the horn or horn-bud surgically, for which various instruments are available.

The most convenient method of dehorning is cauterisation of the horn bud when calves are 4 to 6 weeks old using a hot iron. Dehorning irons have a cup-shaped hollow in front which fits over the horn bud. To prevent flaming caused by the hair catching light and to make the horn bud visible, the hair around the bud is clipped using sharp scissors. After heating the dehorning iron to the right temperature (the iron can be tested on a plank and must provide an immediate black burn), it is firmly pressed over the horn. By holding the iron at an angle and moving it around in a circulate motion, the skin right around the horn bud is cauterised. The objective is to cause the skin under and around the horn bud to die, preventing horn-growth. Care should be taken to ensure that the hot iron **is not held against the calf's head** too long because brain damage can cause death. Five seconds is usually enough time to achieve effective cautery.

Chemicals, usually included in a paste, are available for chemical dehorning. Because chemicals that burn can damage eyes and other parts of the skin, especially if unexpected rain washes the chemicals down over the face, care is needed in their use.

In older animals, surgical procedures must be used, especially if horns have grown to a length of 2 cm or more. Hot iron dehorning can usually be done with ease up to the age of 2 to 3 months (while the dehorning iron still fits over the bud comfortably), whereafter horn growth is fairly rapid, making surgical removal necessary. The removal of larger horns causes a great deal of pain and anaesthetics should be used with dehorning and steps taken to prevent bleeding. Blood attracts flies and blow-fly strike causes serious problems in open wounds. Once horns have grown very large, removal of the horns exposes the hollows in the skull and these must be closed to prevent infection. When a horn is removed surgically, using a dehorning iron to cauterise the skin around the base of the horn will prevent the possibility of horn tissue growing again and the hot iron can be used to prevent bleeding by cauterising bleeding blood vessels.

It is noteworthy that dehorning is stressful to animals. To reduce losses, the right age (younger animals have small horns requiring small procedures) and season should be selected for dehorning. Thus winter would have less problems with blowfly strikes, but animals are usually relatively old by the time they reach their first winter. Dehorning in early summer and treating for flies at the same time is a useful strategy to overcome this problem. Circumstances should also be taken into consideration. Where animals are bought and some cows have not been de-horned, a good strategy would be to dehorn younger cows, but leave older cows who will be sold in the near future in any event.