CHAPTER FOUR

Sheep and Goat Management

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Objective

1. To highlight some management techniques used in sheep and goat production.

Expected Outputs

1. Understanding of the purpose and requirements of housing.
2. Familiarity with various types of facilities.
3. Ability to body condition score (BCS) sheep and goats.
4. Understand the purpose of castration and the techniques used.
5. Ability to list factors responsible for mortality of newly born animals.
6. Knowlegde of the management techniques appropriate for different classes of sheep and goats.

4.1. Site Selection for a Sheep and Goat Farm

Due consideration should be given to the following points in site selection for a sheep and goat farm.

- **Drainage:** The area should be slightly sloped for effective drainage.
- **Wind direction:** Animal houses should be partially or totally protected from the direction of strong winds depending on the wind intensity of the area.
- **Climatic factors:** Such as temperature and rainfall.

4.2. Sheep and Goat Facilities

Essential sheep and goat facilities differ according to the system of management and climatic conditions. In modern production systems, where large flocks of sheep or goats are raised and managed, facilities to handle sheep and goats are essential for efficient management. Some of these facilities are:

- Fences
- Handling pens
- Housing (house/barn – different kinds of buildings)
- Dipping vats/spraying area
- Isolation ward for sick animals
- Manure disposal pit (away from the house), and
- Equipment (feeding and watering troughs, etc.)

4.2.1. Fences

Fences are important not only to protect animals against predators or theft but also to isolate them from other animals. Fences could be constructed from locally available materials with considerations for cost and durability. Materials resistant against termites are most durable. Alternatively, wooden posts of treated eucalyptus could be used. Barbed wire is commonly used but can damage the skin when animals try to squeeze through an opening. Fences require regular supervision and maintenance. In some instances trees or brush may be grown and fashioned into a live fence.

4.2.2. Handling pens

Sheep and goats need to be handled, either in groups or individually, for vaccination, treatment, mating, weighing, etc. Handling pens are useful in reducing injury and stress on animals and workers. An ideal lay-out for a handling pen includes a receiving pen, forcing pen, crush, sorting gate, foot bath, dip or spray race (long and narrow passage wide enough for only one sheep or goat), draining pens and a holding pen. In particular, the receiving pen should match the number of animals expected to be handled at one time. Under the current smallholder conditions of Ethiopia, one handling pen per village may serve the purpose as long as complications with disease transmissions are minimal.

4.2.3. Housing

The type of housing varies with the production system, the objective of raising sheep and goats and perhaps tradition. Housing can range from very simple structures made of a roof and partial walls to complex structures fitted with automatic feeders and waterers. Animals may be kept either in an area within the family home or in a separate animal shed.

A separate house for sheep and goats with a raised wooden floor 30 cm above the ground is observed in some areas (Konso). The animal shed could be located outside the homestead or it could be adjacent or attached to the family home.

Despite variation in types, the common purposes of housing are to:

- Protect animals from climatic stress (extreme heat, cold, rain, wind, etc.), thus creating an environment suitable for the animals' physiological state;
- Provide protection against losses by predators and theft; and
- Make management easier and save labor.

4.2.3.1. Design of sheep and goat housing

Having an appropriate design for sheep and goat housing is crucial prior to beginning construction. The design should include floor plan, walls, roofing and other additional facilities.

Floor plan

The space requirement of the animals to be housed influences the design of the floor. Table 4.1 presents the suggested requirements for different classes of sheep and goats. Space requirements vary depending on whether animals are kept in individual or group pens. The space requirement also varies with the size of animals, i.e., bigger animals require larger space than smaller ones.

Table 4.1. Space requirements for sheep and goat housing.

Type of housing	Space (m^2/animal)			
	Breeding female	Breeding male	Young stock	Additional
Permanent confinement (zero grazing)	1.2	2.0	0.8	Exercise yard, feed racks and watering trough
Night housing and day time grazing	0.8	1.5	0.5	

Floor design is particularly important in wet climates, where dung and urine on a damp floor make ideal conditions for the multiplication of disease-causing organisms. In particular, kids and lambs are very susceptible to pneumonia and it is wise to avoid damp and poorly ventilated houses.

The floor should be sloped, porous or slatted for water drainage. A minimum floor slope of 5% is recommended; that is, for every 1 m there should be a fall of 5 cm. Houses with raised, slatted floors have a number of advantages including keeping the floor clean and dry. Ventilation is good and dung and urine drop through the floor, preventing build-up and reducing risk of disease spreading. The spaces between slats need to be big enough to allow manure to drop easily, but small enough to prevent feet from passing through. A spacing of 1.5 cm is optimal for adult sheep (slightly narrower for goats). For young lambs, 1.3 cm is enough.

In some cases, mobile wooden slats are placed on floors providing the advantage of easy cleaning. Where slatted floors cannot be constructed and concrete or earthen floors are used, it is important to control temperature of the floor and avoid muddiness. In such cases, bedding materials may be used. Straw or wood shavings or any material that can absorb moisture can be used for this purpose. Floors may be made from stones or bricks. With all floors, ease of manure removal and disposal should be given attention.

Roof

The roof is important as it protects animals against the sun and rain. The under-surface of the roof should remain cool and watertight. To ensure adequate ventilation, the height of the roof and the design should be considered. A high roof encourages air movement but is more likely to be damaged by strong winds.

In some cases a design with a chimney or roof vent could be useful to assist ventilation and remove ammonia that could easily accumulate.

The following materials are used for roof construction in different locations:

- Iron sheet
- Grass/bushes
- Wood
- Stone/brick
- Earth

The majority of houses have roofing made of grass/bushes.

Walls

In warm climates walls are partially open to allow movement of air through the house. In some cases, however, complete walling is needed to keep out predators.

Ventilation is important to remove heat, moisture and pollutants so that animals stay cool, dry and clean. Outer walls protect the animals from external influences while separation walls within the house prevent mixing among the animals. Attention needs to be given to construction of pens within the house. Pens serve as a means of controlling animals and for management purposes, such as controlling breeding. Areas for lambing/kidding and isolation of sick animals should be included. It is always wise to keep in mind the possibility of expansion when building houses for sheep and goats. An appropriate flock development plan has to be made to anticipate future construction needs.

4.2.4. Additional facilities

Dipping vat

Mobile dip vats have replaced the conventional dip vats made of concrete. Several years of effort to introduce dipping vats into tropical countries have had limited success, the major problem being maintaining the vats. Mobile dip vats made of plastic are meant to overcome the shortcomings of conventional, permanently placed dip vats. The size of plastic, mobile dip vats could vary according to flock sizes.

a. Mobile dipping vat demonstrated to ESGPIP trainees Semera, Afar regional state

b. Dipping sheep at Lallo Mama Woreda, North Shoa

Figure 4.1. Mobile dipping vat.

Feeding trough and hay racks

Feed troughs for concentrate and hay racks for forage feeding are required where these practices are conducted. The size of racks and troughs is determined

by the body size of sheep and goats and by animal numbers. Approximately 30 to 40 cm per animal space is the minimum. Movable troughs are usually 2 to 4 m long. Fodder should not be put on the ground for sheep and goats. A feeding rack can be made from wood or other locally available material such as bamboo. The rack should be high enough to prevent adult sheep and goats from putting their heads in it and from jumping into the rack. The bottom should be above normal head height.

It should be noted that the feeding behavior of goats is different from that of sheep and a barrier is needed to prevent animals from jumping into the trough. In a system called 'tombstone or keyhole barrier', each animal puts its head through an individual wooden barrier to eat without being able to push its body into the trough. Suggested dimensions for a concentrate trough are a width of 30 cm with a depth of 15 cm, with the trough standing on 15 cm legs.

In general, troughs placed directly on the ground are not desirable because mud or soil can get into the trough, and sheep and goats are tempted to put their feet in. When only a limited amount of supplementary feed is given, it is essential that the trough is long enough to allow all animals to eat at once. Some troughs are fitted with a yoke to restrain animals during the short period of supplementary feeding. Such structures allow individual recording of the amount of concentrate consumed by each animal.

Watering trough

The need for watering troughs depends on the size of the flock. For small flocks, water tight tins, buckets or bowls can be adequate. Any type of watering trough used should be easy to clean.

4.3. Body Parts of Sheep and Goats and Body Condition Scoring

4.3.1. Body parts of a goat

Knowledge of the various parts of sheep and goats is important for different management purposes. The body parts of a goat are presented in Figure 4.2.

Figure 4.2. Body parts of a goat. http://www.goatweb.com/discover/goats/parts.shtml

4.3.2. Body condition scoring (BCS)

Condition scoring is a system of describing or classifying animals by differences in relative body fatness. It is a subjective scoring system but provides a fairly reliable assessment of body composition. Body condition at the time of mating has an important influence on the number of lambs and kids born and on the proportion of barren ewes/does.

Changes in body condition are inevitable with large fluctuations in feed supply. There are circumstances where body weight *per se* does not reflect an animal's condition, i.e., an animal with a large frame may have a higher body weight when at a low level of body reserves than another animal with a small frame but abundant reserves.

Large variation in gross live weight may also occur because of changes in gut fill, pregnancy and parturition. The nutritional plane to which an animal has been exposed over a reasonable length of time is reflected by the extent to which fat is stored or muscle mass has been diminished. This may be assessed visually and expressed as a condition score.

Body condition scoring is a simple but useful procedure which can help producers make management decisions regarding the quality and quantity of feed needed to optimize performance. It can also play an important role in sheep and goat marketing.

4.3.2.1. How to assign a score

It is important that the animals are touched and felt in order to assign BCS. Body parts to be examined are the lumbar region, the rib cage and the sternum.

Lumbar region

This area contains the loin muscle and is located immediately behind the last rib and before the hip bones. Scoring in this area is based on determining the amount of fat and muscle over and around the vertebrae. Lumbar vertebrae have two protrusions, the vertical protrusion called the *spinous process* and the two horizontal protrusions called the *transverse process*. Both processes are used in determining BCS.

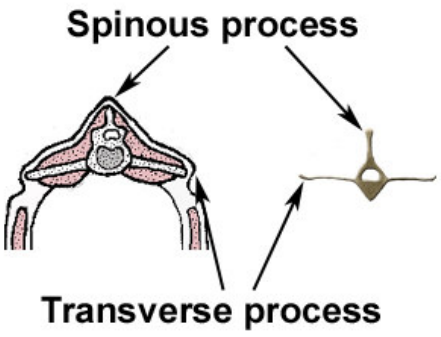

Figure 4.3. Spinous and transverse processes.

Although the principle of body condition scoring is similar for sheep and goats, it is important to note differences that exist between sheep and goats.

- Compared to sheep, goats have much less subcutaneous fat cover (most of the fat deposition in goats is internal around the intestines and kidneys). In fat-tailed or fat-rumped sheep breeds, the tail could serve as additional measure of body condition. These do not exist in goats.
- The sternum could be used as an additional area to assess condition in goats. This would be difficult in sheep that have a mane.

The following process may be followed during scoring:

Feeling the spinous process

- Feel the spinous process in the center of the sheep/goat back behind the last rib and in front of the hip bone and try to rank the animal based on the answer you give to the question: are the tips sharp or rounded?

Assessing the loin muscle

- Feel the fullness of muscle and fat cover on either side of the spinous process (either side of the backbone) and determine if the ridge of the spine is above the level of the muscle. Is the loin muscle shallow, moderate or full?

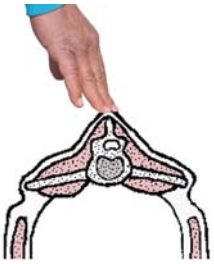

Figure 4.4. Spinous process.

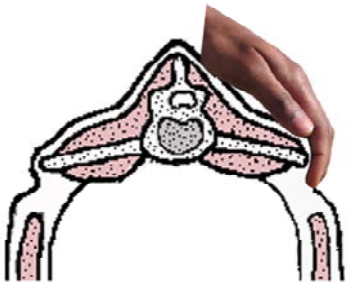

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Figure 4.5. The transverse process.

Feeling the transverse process

- Feel for the tips of the transverse process. Is it sharp or smoothly rounded?
- How far will the tips of your finger go under the transverse process?

You should run your hand over this area and try to grasp these processes with your fingertips and hand as shown in Figures 4.3 to 4.5. The degree of sharpness or roundness of the lumbar vertebrae is assessed.

Different authors use different scales in scoring but a scale of 1 to 5 with 0.5 increments is the most common.

The rib cage

The second area to assess is the rib cage and fat cover on the ribs and intercostal (between ribs) spaces. Touch this area and determine if you can feel each of the ribs.

Figure 4.6. The rib area.

The sternum area

The sternum is the third part to assess. In goats, it is an important area to assess. The fat cover over the sternum (breast bone) is based upon the amount of fat that can be pinched.

In goats and sheep, scores range between 1 and 5 with the lowest-scoring animals being the thinnest and the highest-scoring animals being the fattest. An animal with average body condition would have a score of 2.5 to 3.

With practice, evaluating the BCS of an animal will only take about 10–15 seconds. By adding BCS as a regular part of your management program, you can effectively monitor your feeding and herd health program for a healthy and productive herd. To be more objective, two or three individuals (farm personnel) may assign scores independently and the average taken as a reliable score.

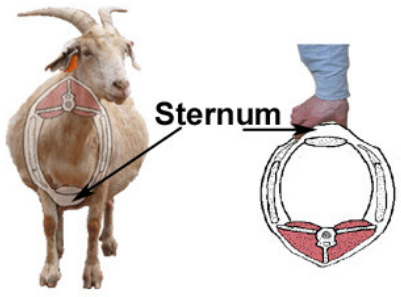

Figure 4.7. The sternum area.

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It is also important to note that BCS could vary according to the physiological status of the animal. An example which shows such a change is depicted in Figure 4.8 for ewes. At the time of mating does/ewes should have a score of 3 for optimum result with a range of 2 to 3 being acceptable. Pregnant females need to be watched closely to make sure they are close to a score of 3 throughout this period.

Table 4.2. Scales for body condition scoring of sheep.

Condition	Score	Description
Starving	0	Extremely emaciated and on the point of death. It is not possible to detect any muscle or fatty tissue between the skin and the bone.
Very thin	1	The spinous process is prominent and sharp. The transverse processes are also sharp, the fingers pass easily under the ends, and it is possible to feel between each process. The eye muscle areas are shallow with no fat cover.
Thin	2	The spinous process feels prominent but smooth, and individual processes can be felt only as fine corrugations. The transverse process is smooth and rounded, and it is possible to pass the fingers under the ends with a little pressure. The eye muscle area is of moderate depth, but has little fat cover.
Moderate	3	The spinous process is detected only as a small elevation; it is smooth and rounded and individual bones can be felt only with pressure. The transverse process is smooth and well covered, and firm pressure is required to feel over the ends. The eye muscle area is full, and has a moderate degree of fat cover.
Fat	4	The spinous processes can just be detected with pressure as a hard line between the fat-covered eye muscle area. The end of the transverse process cannot be felt. The eye muscle area is full, and has a thick covering of fat.
Very fat	5	The spinous process can't be detected even with firm pressure, and there is a depression between the layers of fat in the position where the spinous process would normally be felt. The transverse process cannot be detected. The eye muscle area is very full with thick fat cover. There may be large deposits of fat over the rump and tail.

After the lambs/ kids are born and during lactation, it is normal for condition scores in ewes/does to reduce. However, make sure they do not drop from a score of 3 to a 2 or 1 too quickly. Lactation is demanding in terms of nutrient requirements. If lactating animals are not fed properly during this period, body reserves could be mobilized, resulting in poor body condition. Lack of attention during this period will impact the growth of the nursing lamb/kid as well as milk yield.

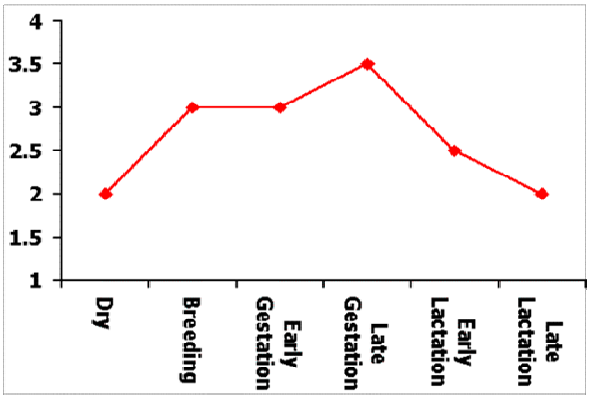

Figure 4.8. Expected body condition score changes throughout a ewe's production cycle.

Under ideal conditions, ewes/does should never be allowed to go below a BCS of 2. The same is true of the higher end of the scale. Ewes/does should not reach a BCS of 4, and should never reach a BCS of 5. Ewes/does with high scores often do not breed, and if they do they may have difficulties.

Ewes/does can increase in body mass, even in early lactation, with adequate, good quality feed. However, in most cases, there is a decrease in body mass in early lactation when milk production is high and an increase in body mass in later lactation with declining milk production. In such cases, body condition score is useful in adjusting supplementary feeding up or down.

Exercises

The only way to learn about BCS is through experience. Practice body condition scoring as follows:

1. It is recommended to begin practicing with animals varying widely in body condition.
2. Ideally, scoring should be done independently and results compared with the score results of other group members.
3. Discuss with the group why you assigned your score and ask each member of the group why he or she has assigned a particular score.

4.4. Identification and Marking

Goat/sheep keepers on small farms often know all their stock by sight. This is more difficult with larger flocks or where flocks graze together. If grazed together, all animals belonging to one owner could be marked in the same way so that they can be identified and sorted. This can help to recover them if they are lost. Individual animal identification is required for genetic improvement (evaluating records for dam or sire selection) and provision of individual care. Identification is also very important for recording important events in the flock, such as vaccination dates, disease outbreaks, etc. Identification of animals and recording is an important management tool in intensive production systems.

Methods of identification

Three possible methods of identification may be used. Whichever system is used, it is important to ascertain that the method is safe and reliable. Three commonly used methods are tattooing, ear tagging and ear marking or notching. For farmers who do not have access to animal identification equipment, a rope collar with a washer having a number inscribed or punched on it can serve as an identification method. Problems occur when collars or numbers are lost.

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Figure 4.9. Tattoo plies, numbers and ink.

Tattooing: Animals can be tattooed on any visible part of the body. The ear is the most popular place. If done on other parts of the body, skin damage could occur, reducing its value.

The method involves use of tattoo pliers using tattoo numbers or letters that make a series of pierced marks through the ear into which tattoo ink is rubbed.

Ear tagging: Attaching a tag to the ear enables easy identification of an animal throughout its lifetime. An ear tag applicator and uniquely numbered ear tag are used. This can be very useful for recording management and breeding activities.

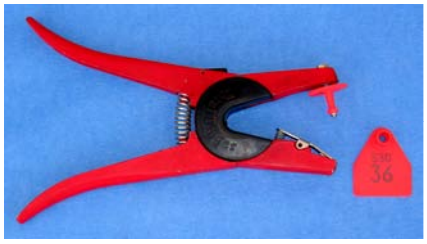


Figure 4.10. Ear tag applicator with ear tag.

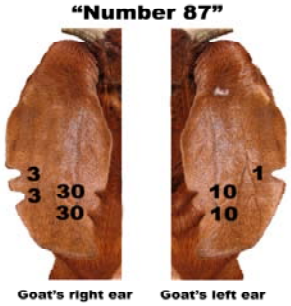
Figure 4.11. Application of an ear tag.

Figure 4.12. Ear tag after application.

Ear marking (Ear notching): This involves cutting notches out of the side of the ear in a sequence. It can be done with a sharp knife or ear clipper. Generally, notches on the animal's left ear mean: 10 (top), 1 (bottom), 100 (end); and 1,000 (center hole). On the right ear notch values are: 30 (top), 3 (bottom), 300 (end); and 3,000 (center hole).

Thus, a goat with the number 135 would look as follows:

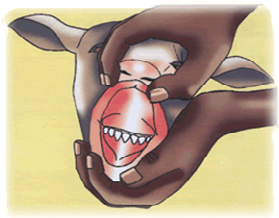
- 1 notch on end of left ear (100);
- 1 notch on top of right ear (30),
- 2 notches on bottom of left ear (2);
- 1 notch on bottom of right ear (3)
- with a total value equaling 135.



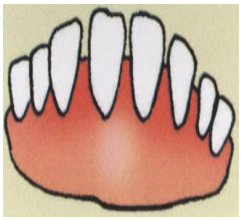
a. Ear marking (notching)

b. Ear notching pliers

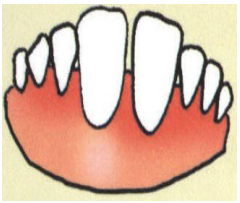
Figure 4.13. Ear notching and pliers.



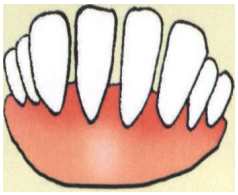
a. Dentition of sheep



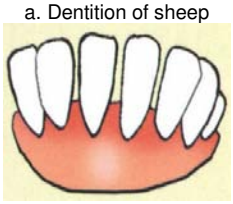
b. Milk teeth (<1 year)



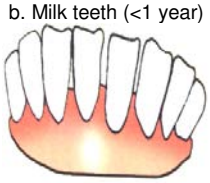
c. 2-tooth (1-2 years old)



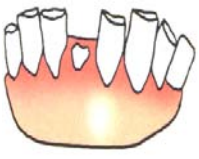
d. 4-tooth (2 years)



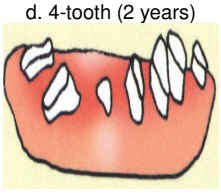
e. 6-tooth (3 years)



f. Full mouth (3-4 years)



g. Broken mouth (>4 years)



h. Gummy (aged)

Figure 4.14. Dentition and dentition class for sheep.

4.5. Age Determination of Sheep and Goats by Dentition

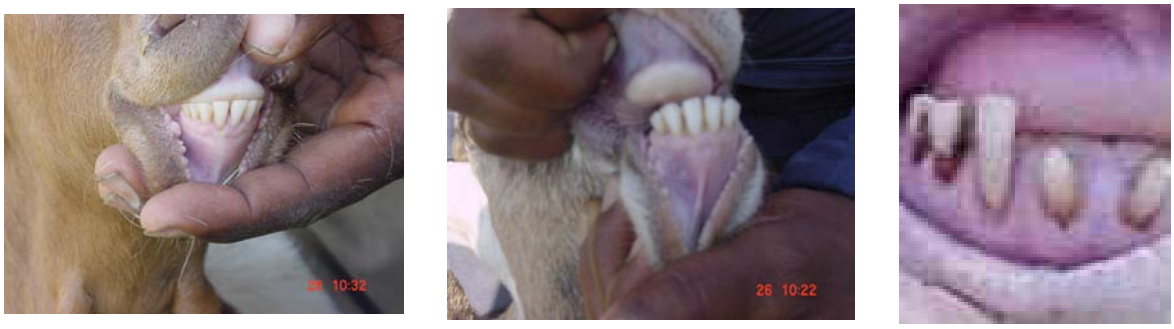
4.5.1. Why is it important?

Indirect ways of determining approximate age of sheep and goats are vital in systems where production records are unavailable. For instance, if the flock structure has to be determined, age of animals needs to be estimated. Application of drugs also requires knowledge of age and/or weight of the animal.

A few days after birth, lambs/kids will have milk teeth, also known as temporary incisors, arranged in four pairs in the lower jaw. These are replaced by larger permanent teeth as the age of the animal increases. There is a range of ages at which particular teeth appear because the speed of teeth growth will vary according to health and nutrition of sheep and goats.

The central pair of temporary incisor teeth is shed and replaced by the permanent teeth at approximately 14 months of age. At approximately 20 months, the second pair of milk teeth is replaced by a pair of permanent incisors.

At 3 and 4 years, the third and fourth pairs of permanent teeth appear. At 4 years of age the sheep has a "full mouth." When a ewe/doe loses some of her incisor teeth, she is called a "broken mouth."



a. A 10 month old doeling b. A 32-month old doe c. Broken mouth

Figure 4.15. Teeth of goats of different age.

Note that the doeling Figure 4.15a has her milk teeth fully grown and spread out. The doe in Figure 4.15b has had three pairs of teeth replaced.

Older sheep and goats that have worn teeth have difficulty in eating and will lose condition, become more prone to diseases and breed less than younger animals. Inspecting the teeth can be a very useful way of deciding when to cull. In an attempt to improve the precision of age determination, the following classes have been suggested (Table 4.3).

Table 4.3. Description of dentition with corresponding age estimates.

Description	Estimated age
Young without teeth often a new born	New born
With erupted and growing 1st and 2nd pair of milk teeth	1–2 weeks
With erupted and growing 3rd pair of milk teeth	2–3 weeks
With erupted and growing 4th pair of milk teeth	3–4 weeks
With fully grown milk teeth that started to spread out	9 month
The milk teeth have started to wear down, or are fully spread out	12 months
With erupted and growing 1st pair of permanent teeth	14–17 month
With erupted and growing 2nd pair of permanent teeth	18–23 month
With erupted and growing 3rd pair of permanent teeth	24–36 month
With erupted and growing 4th pair of permanent teeth	3–5 years
The four pairs of permanent incisors have started to wear down	4 years
The permanent incisors have worn down and have started to spread out	5 years
Worn down incisors are spread out and few are lost (broken-mouth)	6 years
Most of the incisors have been lost (smooth-mouth) or worn down to the level of dental pad	7 years

4.6. Castration

Castration is the removal of testicles from the ram/buck. In most cases, non-breeding males and males not slaughtered at a young age need to be castrated. Castration is done to control mating by preventing inbreeding and inferior males from breeding, or for production of fattened carcass.

Ideally, castration should be done at less than 3 weeks of age, but under Ethiopian conditions this is not usually the case. In the Southern Nations, Nationalities and Peoples Regional State (SNNPRS), farmers prefer to castrate male sheep at a later age, in most cases after sexual maturity is attained (yearling). The reason given for this is that early castration causes the development of a female-like body conformation and such an animal (early-castrated) lacks the desired muscling and market conformation and fetches low price. In Ethiopia there is a niche market for animals that are fattened to very high weight and condition (advanced age).

4.6.1. Common methods of castration

Three methods are commonly used:

- the application of elastrator ring,
- use of Burdizzo, and
- surgical method.

4.6.1.1. Elastrator ring

- A special applicator with rubber rings is used (see Figure 4.16).
- Castration using an elastrator ring involves putting a heavy rubber ring around the scrotum near the body. The ring stops blood circulation to the scrotum and testicles, causing these to dry, shrivel, and slough off in 10 to 14 days after application.
- The rings must be applied while the scrotum is still very small, i.e., from three days to three weeks of age

Figure 4.16. Elastrator with rings.

Figure 4.17. Inserting elastrator rings onto the scrotum.

Photos used with permission from the Meat Goat Production Handbook, Langston University.

depending on breed size, before the scrotal muscles and associated tissues develop.

- The ring is placed over the scrotum and spermatic cord, immediately below the supernumerary teats.
- When applying, care should be taken to ensure that both testicles are below the ring.

This is an easy method of castration, provided a continuous supply of rings is available. Animals castrated by this method will have female like appearance because of early castration.

One caution in the use of this method is the potential for tetanus to occur prior to the scrotum falling off.

Figure 4.18. Proper placement of the rings.

4.6.1.2. Burdizzo method

A Burdizzo is a pair of pincers used to squeeze and crush the spermatic cords. After application, the testicles degenerate and are absorbed but the external surface of the scrotum is not damaged. Castration with this method can be done at any time; but when done at a later age, it may bring about a shock in growth.

The following steps may be followed to castrate animals using a Burdizzo:

- Take the Burdizzo and draw one testicle downwards.
- Place the spermatic cord between the jaws of the Burdizzo and apply pressure. Do not crush the septum or tissue between the testicles. Rather, do one side at a time.
- Repeat the procedure for the second testicle.
- Some operators prefer to crush each spermatic cord in two places to minimize the possibility of the ram/buck remaining fertile.

Figure 4.19. Burdizzo.

Figure 4.20. Location on the testis for proper application of the Burdizzo.

4.6.1.3. Surgical method

The testicles may be surgically removed. A sharp knife is used to remove the bottom one-third of the scrotal sac; then each testicle is slowly pulled down and away from the body until the cord breaks. If the animal is more than 4 or 5 weeks old, the cord should be scraped through with a knife rather than broken. This will result in less bleeding. The wound is allowed to drain and heal naturally. This method is the most painful and also has the greatest potential for infection and fly infestation. It is essential that a proper aseptic technique is used when castrating by the surgical method. It is not advisable for non-health professionals to use this method of castration.

4.6.2. Effect of castration

The main effect of castration is on the composition of the carcass and weight development. In general, the following effects are noted.

- Carcasses from castrated sheep/goats have more fat tissue.
- Castration could retard growth and reduce the quantity of lean meat if done late (after 6 months).
- In the case of goats, meat from castrated males has no 'goaty smell' as does the meat from entire bucks.

4.7. Tail Docking

Tail docking is not a common practice in Ethiopia except in some parts of the country, e.g., Gojjam and some parts of Arsi, and it is normally done for ewe lambs only. It is important to note that a sheep's tail has a purpose. It protects the sheep's anus, vulva, and udder from weather extremes. Because of this, care should be taken while docking. Tails must be left long enough to cover the ewe's vulva and the ram's anus.

Docking has the following purposes:

- Even distribution of fat on the carcass.
- Easier ewe mating/breeding.
- Prevention of fecal matter from accumulating on the tail and hindquarters of sheep and lambs.
- Reduced fly strike (wool maggots).

4.7.1. Docking methods

Docking may be performed by using elastrator rings, Burdizzo or a knife.

4.7.1.1. Elastrator and rubber rings

This is a simple way of docking young animals. The rubber ring is placed between the vertebrate joints of the tail, leaving 3–5 cm of the tail, sufficient to cover the vulva in ewe lambs. Rings should be applied before two days of age and the tail will normally drop off in 7–10 days.

4.7.1.2. Burdizzo and knife

A large Burdizzo is used to crush the tail between the vertebrate joints. The tail is then cut off with a knife. Spraying the wound with antiseptic powder is recommended to prevent infection.

Although castration and tail docking can be used as management tools, some communities do not accept meat from docked or castrated sheep or goats. For instance, the Muslim Festival of Sacrifice requires unblemished lambs. An unblemished lamb is one that has not been docked, castrated, or had its horns removed.

Exercises

1. Is castration common in your area?
2. What is the main purpose of castration and what are the methods used?

4.8. Hoof Trimming

In management systems where sheep and goats are mostly confined and do not walk daily on hard ground-cover or climb rocks, abrasion of the hoof is not balanced with hoof growth. This will affect mobility and could lead to reduced intake from grazing. It may additionally lead to diseases such as foot rot. To avoid these problems, hooves need to be examined regularly and trimmed as needed.

A sharp knife or hoof shears such as those shown in Figure 4.21a can be used for hoof trimming. First use the point of the hoof trimmers to remove any dirt from the outside and the bottom of the hoof. The front of badly overgrown hooves can then be removed. The sides of the hoof should be cut back evenly with the sole of the foot. Continue to trim the sides around one toe and repeat the process on the other toe. Trim the frog and heel flat until the sole is parallel to the hairline of the pastern. Trim off thin slices. A good rule to follow is to stop when you see pink. If blood appears, stop trimming and finish the trimming at a later time.

a. hoof trimming tools

b. Using a hoof trimmer

c. Practical training of ESGPIP trainees on hoof trimming

Figure 4.21. Hoof trimming.

4.9. Dehorning

Dehorning may be performed as a management tool in intensive systems to avoid damage that could possibly arise from fighting or as a safety precaution for personnel dealing with the flock. Under extensive systems this may not be necessary as horns are a defensive mechanism and also may be used by producers in restraining animals.

Dehorning of sheep and goats will not be treated in further detail as it is not practiced in Ethiopia.

4.10. Flushing

Flushing is a feeding practice commonly used in some sheep and goat production systems. It is the practice of providing a high energy/protein diet prior to and during mating. The duration most commonly used is 2 to 3 weeks before and after mating.

The impact of this practice is evident on thin ewes and does. Flushed ewes/does respond to the increased level of nutrient intake by increased ovulation rate which leads to improved prolificacy. This practice is particularly useful when pasture quality and availability limits nutrient intake and digestibility.

4.11. Care and Management of Pregnant Ewes/Does

Knowledge of stage of pregnancy is important to provide necessary care to a pregnant animal. It is customary to divide the pregnancy period into early, mid and late gestation.

4.11.1. Early or first month of pregnancy

During this period, it is generally recommended that the body condition of the ewe/doe is maintained, thus minimizing embryo and early fetal losses. A very high level of nutrition can be as detrimental for embryo survival as a very low one.

4.11.2. Mid or second and third months of pregnancy

This period is characterized by rapid growth of the placenta. Growth of the fetus in absolute terms is very small. Loss in body weight should not exceed 5% over this period. Feeding during this period should be targeted at avoiding excessive loss.

4.11.3. Late or fourth month of pregnancy up to parturition

In this phase, the gain in mass of the fetus amounts to 85% of its birth weight. Nutrient intake should be increased during this period. Concentrate sources of energy should be available as the rumen size is limited because of the developing fetus.

However, care should be taken to avoid excessive feeding to reduce the chance of difficult birth. Multiple-bearing dams should receive more feed than single-bearing dams. It is advisable to separate dams at an advanced stage of pregnancy from the main flock. This will help to give them effective care.

Bring pregnant animals into lambing/kidding corrals 4 to 6 days before parturition and provide the maximum possible comfort. If possible, provide bedding material. It is not advisable to handle pregnant animals too frequently.

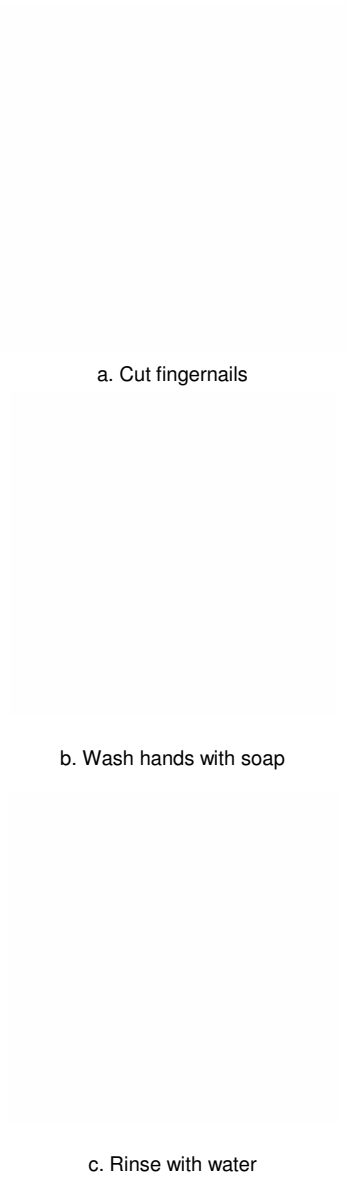
4.12. Care at Lambing/Kidding

Parturition in healthy ewes/does is generally normal. Maiden ewes/does in poor condition or small-framed females mated to big males can have difficulty in parturition and may have to be assisted.

Assistance may also be required during instances of abnormal presentations (Figure 4.24).

You should first see the front legs and nose or head of the lamb if it is a normal birth. In this case, delivery can be expected within fifteen minutes. If the ewe/doe is still laboring after 30 minutes, you should seek professional assistance. If that is not available, proceed as follows:

- Hygiene, lubrication and care are most important when assisting ewes/does during parturition. Prepare a bucket of clean, warm water with soap and get some disinfectant, a good lubricant such as Vaseline and towels. Wash your hands and arms and wash the vulva and surrounding area of the ewe /doe.



a. Cut fingernails

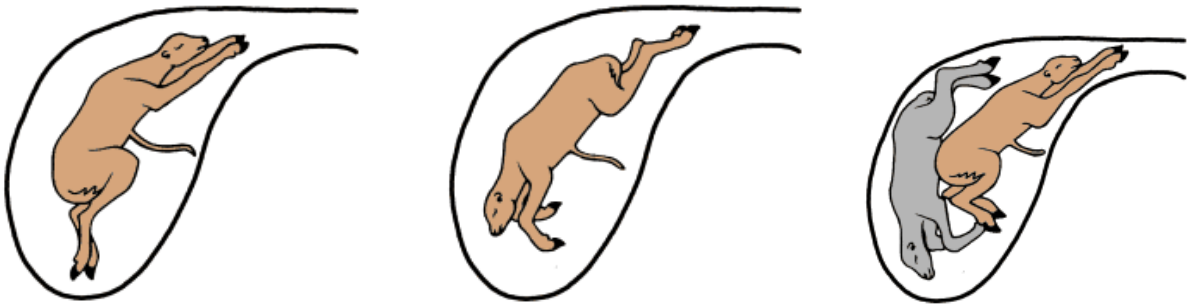
b. Wash hands with soap

c. Rinse with water

Figure 4.22. Preparation before assisting the ewe/doe.

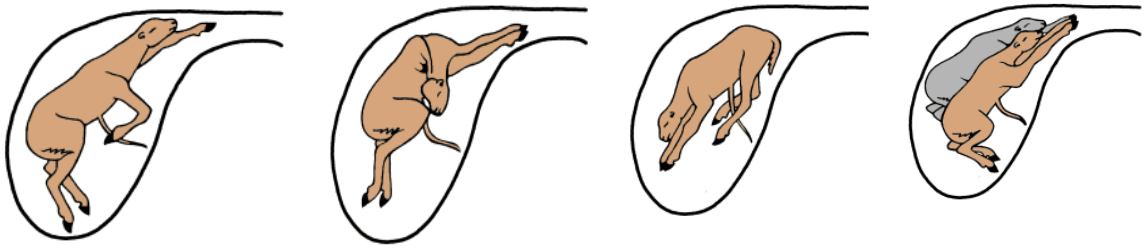
Wear latex gloves if available. There are some diseases that can pass to humans from assisting in birth.

- Apply a good lubricant and insert your hand into the reproductive tract to determine the position of the lamb/kid and take appropriate action.
  - ♦ If it is a normal birth, both front legs (hooves pointed up) and the head will be present.
  - ♦ If you feel the legs but no head, the lamb needs to be pushed in slightly, and the head found before the lamb/kid can be delivered.
  - ♦ If the head is coming but one or both of the front legs are missing, the lamb/kid will need to be pushed in slightly and the missing limbs retrieved, taking special care to cover the hooves to prevent tearing of the uterine wall. Once in normal birth position, the rest of the process should proceed smoothly.
  - ♦ If you find hind legs and a tail, this is considered a normal posterior position, although more stressful for the ewe/doe than the normal anterior position. There is a possibility that the lamb/kid will take in birth fluids.
  - ♦ You may also come along a breech delivery (tail but no legs). The lamb must be slightly pushed in and each rear leg needs to be retrieved one at a time with a lubricated hand.
  - ♦ As soon as the lamb/kid is born, remove all placental membranes and mucous from the nose so that the young can breathe. It can also be swung from its hind legs to clear out more mucous from the lungs and air passages.



a. Anterior presentation b. Posterior presentation c. Normal presentation of twins

Figure 4.23. Normal presentations during parturition.



a. One foreleg back b. Head twisted backward c. Abnormal posterior position d. Abnormal presentation of twins

Figure 4.24. Abnormal presentations during parturition.

4.13. Care and Management of Nursing/Lactating Ewes and Does

Ewes and does have a great capacity to mobilize energy reserves for milk production, especially in early lactation and, thus, ewes with marked difference in energy intakes sometimes produce similar volumes of milk. The quality of feed offered and particularly that of roughage is important. When a portion of milk produced is used for home consumption a compromise should be made between the requirement of the young and family needs.

Ewes and does nursing twins or triplets need special attention. They need to be fed sufficient quantities of good quality hay and concentrate (if available) to meet the high requirements during early lactation. There is also a need to provide plenty of clean, fresh drinking water.

4.14. Management of Newborn Animals (Lambs and Kids)

4.14.1. Birth to weaning

Conceptually, the management of lambs/kids starts before birth. Proper feeding and care of the dams during the last trimester of gestation is necessary to have healthy, vigorous offspring. Lambs/kids with birth weight within the normal range for the breed can be raised without much difficulty. Lambs/kids with low birth weight or are weak at birth need special attention.

Studies have shown that there is a clear relationship between lamb/kid survival and birth weight. Very low or very high birth weights (related to dystocia or difficult births) are detrimental to lamb survival.

Immediately after birth, the umbilical cord should be trimmed if needed using clean scissors and then dipped in tincture of iodine. The recommended concentration is 7% tincture of iodine. As much as possible, protect newborn lambs/kids from cold, rain and wind.

In free-grazing flocks of sheep and goats where parturition occurs without any attendant, survival of the newborn depends on mothering ability and the firm establishment of the mother-offspring bond. If a large number of ewes or does are giving birth simultaneously, mismothering could occur. Such problems might occur in pastoral systems and where lambing/kidding is naturally synchronized, or when done artificially under modern practices.

Mothering instinct in primiparous mothers (first kidders/lambers) often needs some time to fully develop. Do not handle lambs/kids too frequently immediately after birth and let the dams lick and recognize them properly. In order to ensure the establishment of firm dam-offspring relationships, the dams and their offspring should be confined together soon after birth or stay around the homestead for at least 4 days.

If the lamb/kid is not licked dry or is born in a wet/windy place or does not consume colostrum immediately, it will develop hypothermia (very low body temperature), especially if small in size (triplet, premature, mother malnourished). If the lamb/kid is shivering or has a cool mouth and extremities and is not suckling, check rectal temperature. Normal temperature is between 38.5 and 40°C. Dry the lamb/kid with a cloth and tube-feed if the temperature is 37.8 to 38.5°C.

The lamb/kid may need to be warmed with a heat source or with a hot water bath or warming box, particularly if body temperature is below 37.8°C. If only one of a twin birth needs to be removed for feeding or warming, it is best to remove both offspring. If one is left, there is the risk that the dam will not accept the treated one when it is returned. A wool sock over the body is safer than a heat lamp. A plastic coat protects lambs from rain.

Check the condition of lambs regularly. If lambs appear thin and weak, check the ewe to see if she is milking. Check for a mastitis problem, whether the teats are open, and/or if she has claimed the lamb. Hand-feed the lamb with colostrum or milk replacer (if available) if any one of these problems is observed.

Intake of colostrum, the "first milk", is crucial for successful rearing of lambs/kids. What is special about colostrum?

- Colostrum contains a high level of nutrients important for lamb health and performance.
- Colostrum also contains a high level of antibodies against a variety of infectious agents. At birth, the lamb/kid does not carry any antibodies because antibodies in the ewe's bloodstream do not cross the placenta.
- Colostrum imparts passive immunity.

Colostrum has to be fed during the first 24 hours; feeding colostrum later than this period confers little or no advantage. This is because the intestinal wall of the newborn is only permeable to antibodies (large protein molecules) during the first 24 to 36 hours and absorption is most efficient during this period.

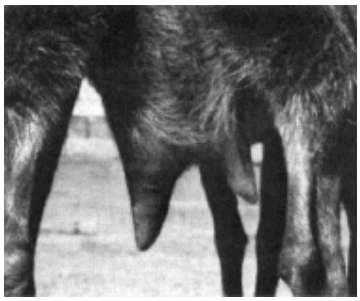
If the ewe/doe has inadequate colostrum, cow colostrum can be given. Normally, the newborn stands and suckles within 30 minutes of birth. In some cases, lambs/kids should be assisted to obtain colostrum. Plugs should be stripped out of each teat by hand and udder secretion inspected for any abnormalities.

Newborn lambs/kids are pre-ruminant animals in the early stage of development. It will take some time (usually 6–8 weeks) for the rumen to develop. When concentrate feed or hay is offered, consumption starts at about 2–3 weeks of age. Access to quality roughage feed or concentrate is essential as it stimulates early development of the rumen. It is recommended that forage be chopped and given to kids, and when possible concentrate feed should be offered but not in a dry form.

Growth of the young, particularly during the first weeks of life, is entirely dependent on milk of their mothers. For this reason, it is important to ensure that dams produce adequate milk. The health and structure of the udder should be examined.

Faulty udders may mean insufficient milk production for adequate lamb/kid growth (Figure 4.25). Females with faulty udders should be culled.

Pendulous udder



Udder damaged due to mastitis

Teats too large, bad udder

Fig 4.25. Types of faulty udder.

4.14.2. Grafting orphan lambs/kids

An experienced mother will accept a newborn covered with birth fluids immediately after delivering her own lambs/kids. If lambs/kids aren't being cared for by their mother or are not receiving an adequate amount of milk, they may become orphan lambs. The sooner this is detected the higher the chance of survival. Grafting

is defined as giving a lamb/kid to another ewe/doe. Always graft the stronger lamb, as the problem ewe/doe will normally take care of the smaller one.

Techniques to facilitate grafting include**:**

- Bathing the graftee in amniotic fluid from the new mother.
- A wooden stanchion to hold the ewe/doe in place while the orphan nurses may result in adoption in 7–10 days.
- If an orphan is older, tying its legs together so it appears helpless may help.
- If all this fails, the lambs/kids will have to be raised artificially:
  - Feed cow's milk. If they are newborns, they need to be fed frequently, i.e., 5–6 times daily. After the lambs/kids are 10–12 days of age, they may be fed only 3–4 times per day and offered creep feed.

4.15. Weaning

This is the time when lambs/kids stop feeding on liquid milk or milk replacer. After weaning, lambs/kids depend entirely on dry feed. This change has to be gradual to avoid losses due to faulty feeding management. Coccidiosis and pneumonia are the dominant diseases in this age group, particularly under conditions of confined housing. Decline of maternal antibodies and the stress of weaning appear to predispose kids to respiratory infection.

On the other hand, transition to solid feed encourages ingestion of coccidial oocytes while feeding. If lambs/kids are grazing during the rainy season, they become susceptible to gastrointestinal parasitism. Proper housing and hygiene are of paramount importance to reduce cases of death associated with these two diseases.

Retardation of growth commonly known as 'weaning shock' is common following weaning but every effort should be made to reduce it as excessive retardation might not be compensated for at later stages. Research results from Kenya have identified fresh leaves of sweet potato vines as the best weaning feed for kids. Hence, in areas where sweet potato is grown, e.g., in some parts of the SNNPRS and Hararghe, sweet potato vines could serve as a potential feed for weaning lambs/kids.

4.15.1. When or at what age to wean lambs/kids

In most production systems, lambs/kids are weaned naturally without attendant/shepherd intervention. Where intervention is made, weight development of the young rather than age should be used as a guide to weaning. Weaning should ideally take place when lambs/kids are consuming adequate amounts of solid feed.

Milk consumption by lambs and kids falls to a negligible level after 110 days. At the same time, consumption of herbage increases.

Some authors suggest that the young could be weaned successfully once the birth weight has increased 2.5-fold. This would mean a lamb with birth weight of 3 kg can be weaned at 7.5 kg body weight, which is attained at 2 to 3 months of age in Menz sheep. A weaning age of two months was found to negatively affect subsequent growth in Horro sheep, resulting in lower weights at six months of age.

Weaning age is variable for different production systems and depending on whether the milk is used as human food. However, in most production systems in the tropics, weaning at 120 days is common.

4.16. Mortality

Mortality of lambs and kids is one of the main factors adversely affecting sheep and goat production. Losses are usually as high as 50% of the lamb/kid crop.

An essential factor affecting return on investment in sheep and goat production is pre-weaning mortality. The highest losses usually occur during the first 30 days of life.

4.16.1. Causes of lamb/kid mortality

Causes of mortality are related to management and production system. Some of the causes are:

- Low birth weight
- Low environmental temperature at birth or shortly
- Litter type (single or multiple)
- Inadequate colostrum consumption
- Inadequate milk production of the dam
- Predators
- Diseases and accidents
- Season of birth

It has to be noted that all of these could be aggravated by poor management such as poor hygiene and overcrowding.

4.16.1.1. Low birth weight

Lambs/kids having low birth weight are consistently at risk of dying at all stages of development (pre- and post-weaning). Low birth weight is usually caused by inadequate nutrition of the dams during the last trimester of gestation. Low birth weight can be prevented where supplementary feeding of dams is practiced or when there is adequate forage of reasonable quality.

4.16.1.2. Low temperature

Very often this is a problem encountered in the cool highlands where the ambient temperature falls below zero during some months of the year. In such circumstances, the newborn can die as a result of hypothermia unless it is protected against freezing temperatures. The newborn could be put in a lamb/kid box for the first few days to provide protection against cold.

4.16.1.3. Predators

If ewes/does are giving birth unobserved on the range, the newborns are exposed to predators or kids/lambs may be abandoned by their dams. Abandonment may happen frequently with first time mothers. Losses due to predators have been reported to be a major cause of kid loss in the Alaba Woreda of the SNNPRS. According to the key informants, the breeding time of the fox, a time of high nutrient demand, coincides with the major lambing/kidding season; thus, kids become prey.

4.16.1.4. Diseases

If lambing/kidding is unattended and appropriate management measures such as dipping the navel cord in iodine are not done, the chance of infection increases. Proper preventive management and attention to health and cleanliness of the rearing area will decrease the chance of acquiring diseases.

4.16.1.5. Dehydration

If lambs/kids are allowed to join their mothers grazing on the range and travel long distances in their first days of life, they may suffer dehydration. If there is no shelter to protect them from the extremes of weather,

they may suffer from heat or cold, especially if in combination with humidity. It is advisable to house the young and the dams for at least the first few days after birth before allowing them to graze with the flock.

4.16.1.6. Litter type

Mortality is higher in lambs/kids born in multiple litters than single-born lambs and kids. This might be a reflection of low birth weight, and inadequate nutrition in terms of milk from their dams as well as poor supplementary feeding management.

4.16.1.7. Season of birth

The effect of season varies for different places and seems to be related to nutrition of the dam, climatic condition and other factors as well as the presence of disease. For instance, kids born in the wet season had better survival than kids born in the dry season at Adami Tulu, while the opposite was true for kids at Awassa.

4.16.2. Reducing kid mortality

Reducing kid mortality focuses on two key issues.

- Improving birth weight of newborns by supplementary feeding of pregnant animals during the third trimester of pregnancy.
- Following standard hygienic practices to prevent/reduce incidence of diseases that affect young animals.

Exercises

1. Assess months and/or seasons when lamb/kid mortality occurs in your area.
2. What are the major causes?
3. Are there measures taken to reduce the incidence of mortality?

4.17. Taking Weight Measurements

Sheep and goats are weighed at different times for different purposes. In countries where the sale price is based on weight, live weight has a direct relation to the profitability of the enterprise.

Knowledge of animal weight is also essential for determining the dosage level of some drugs. On research stations, weight is an important and frequently measured parameter.

For light animals, a hanging weighing scale suspended from a tree branch as shown (Figure 4.26b) can be used.

a. Cage weighing scale with inlet and outlet door; ESGPIP trainees at Hawassa University weighing a goat using a mobile balance

b. Taking weight measurements using a hanging balance under field conditions

Figure 4.26. Weighing sheep and goats.

4.18. Estimating Live Weight

Under field conditions where scales are not available, weight measurements can be estimated using linear body measurements.

Chest girth, wither height, and body length are the most commonly used measurements, measured to the nearest centimeter.

4.18.1. Chest girth or circumference

Chest girth or circumference, sometimes called heart girth, is measured just behind the front legs.

4.18.2. Wither height

The highest point measured as the vertical distance from the ground to the shoulder tip. This can be measured with a tape but is best made with a special measuring stick made with two arms, one which is held vertically and the other at right angles to it and sliding along it (firmly not loosely). For higher repeatability, the measurement is best taken on firm and level ground.

4.18.3. Body length

Body length is measured from 'base of tail' (where it joins the body) to the first thoracic vertebrate or to the front of chest. Of the three linear body measurements, chest girth is the easiest to measure and also the least variable. Examples of equations developed to estimate weight from heart girth measurements are given in Table 4.4.

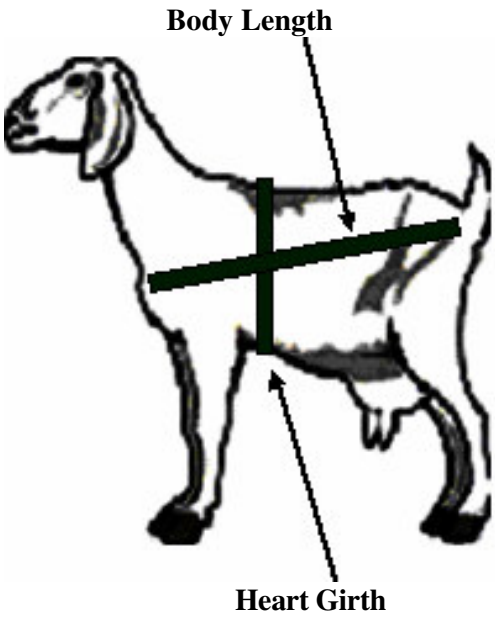


Figure 4.27. Linear measurement of body length and heart girth.

Table 4.4. Regression equations to estimate live weight at different stages of development.

Sheep/goat breed	6-month old	9-month old	12-month old
Menz sheep	-14.98 + 0.52 HG	-25.15 + 0.72 HG	-35.06 + 0.89 HG
Horro sheep	-17.89 + 0.58 HG	-28.71+ 0.78 HG	-40.36 + 0.99 HG
Somali goats	-17.66 + 0.57 HG	-22.79 + 0.68 HG	-

Example

The heart girth circumference of a Horro ram approximately at 9 months of age measures 70 cm. Estimate his weight.

Procedures:

1. Choose the equation found in column 3, second row
2. This is: Weight = -28.71+ 0.78 HG
3. Insert 70 cm into the above equation and solve.
4. Weight = -28.71 + 0.78 × 70
5. 25.89

The estimated weight of the ram is 25.9 or nearly 26 kg.

Exercises

1. Take heart girth measurements on 5 animals of different age categories and estimate their weight using the appropriate equation from Table 4.3.
2. If a weighing scale is available, weigh the same animals for which chest girth has been taken and compare the actual weight with the estimated weight.
3. Discuss the magnitude of the difference.

4.19. Culling as a Management Tool

Culling in sheep and goat flocks is an important tool for the development of a good flock. It helps to remove undersized animals and breed those closest to the desired ideal type. Selection criteria should be developed and followed when culling animals. For example, ewes that do not conceive after two successive matings should be culled. Animals with defects, poor udders, bad conformation, etc., should be culled. Culling should be stringent and used as a means of improving the genetic quality and productivity of a flock. Following such criteria could mean 10–20% culling annually. These animals can be sold to enter the meat market. Flock size can be maintained by replacing culled animals by ewe lambs or doelings in the flock.

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