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Shelters and Housing for Sheep and Goats



ESGPIP

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FOREWORD

This technical bulletin titled “*Shelters and housing for sheep and goats*” is the 32nd in a series produced by the Ethiopia Sheep and Goat Productivity Improvement Program (ESGPIP). The ESGPIP is a USAID funded Project with the objective of improving the productivity of Ethiopian sheep and goats in Ethiopia.

Sheep and goats need to be protected from extreme changes in climate and also from predator attack. Suitable shelter or housing that matches with climatic conditions, type of production system needs to therefore be provided if sheep and goats are to produce optimally.

This technical bulletin deals with the issue of housing including the need to provide housing, possible types based on production system and climatic conditions. The information contained in the bulletin is useful for development agents to train farmers/pastoralists and also for other users engaged in business ventures based on sheep and goat rearing.

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TABLE OF CONTENTS

FOREWORD.....	i
TABLE OF CONTENTS	ii
1. Requirements of good sheep/goat housing.....	1
2. Traditional methods of housing.....	1
2.1. <i>Types of traditional housing</i>	1
2.2. <i>Shortcomings of traditional housing</i>	2
3. Types / designs of recommended housing options.....	3
3.1. <i>Where to locate animal housing/sheds</i>	3
3.2. Orientation	3
3.3. <i>Materials for building an animal barn</i>	4
3.4. <i>Type of housing</i>	4
3.5. <i>Recommended housing options</i>	9
3.3.1 Production systems.....	9
3.3.2. <i>Agro-ecology</i>	13
4. Summary	14
5. Messages to Development agents.....	14
6. References.....	14

Shelters and Housing for Sheep and Goats

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1. Requirements of good sheep/goat housing

Sheep and goats are raised in all climatic zones of Ethiopia. These climatic zones are very diverse with some being dry and others wet. Extreme heat is a major characteristic of some zones while others experience cold temperatures. Each situation has its own requirements for the design and construction of optimum animal housing.

The basic requirement of good animal housing is that it should alter or modify the environment for the benefit of animals and also protect them from predation and theft. Animal housing should buffer the animal from climate extremes to reduce stress allowing optimal animal performance in terms of growth, health and reproduction. The main climatic factors from which protection is needed are high and low ambient temperatures, environmental humidity, solar radiation, wind and rain. Additionally, houses are important in protecting feed and equipment from damage, in saving labor, and in aiding effective management, including breeding. Sheep and goat housing should meet animal requirements and serve a producer's needs at the lowest possible cost.

Small ruminant housing need to:

- Be strong enough to last a long time;
- Be large enough for the number of animals to be accommodated comfortably.
- Allow freedom of movement for all animals;
- Be well-drained or have well-maintained dry bedding and easy to clean. Sheep and goats do not tolerate mud well; therefore, yards and shelters should be built only on well-drained ground;
- Receive morning sunshine evenly;
- Be well lighted and ventilated. Air circulation, dust levels, temperature, relative air humidity and gas concentrations should be at levels that will not harm animals;
- Have suitable isolation pens for sick or injured animals as far away from the main house as possible.

2. Traditional methods of housing

2.1. Types of traditional housing

Traditional sheep and goat housing is made of varying designs and construction materials depending upon local custom and availability. Some main types of housing include:

- Housing at one corner of the main family house;
- An overhang attached to the roof of a house;
- Open yards with no roof (Figure 1);
- In a basement under the family home such as seen in north Shoa;
- Separate houses of thatched roofs (Figure 1).

- Lambs and kids are, in some areas, kept in a dome made of bamboo or other locally available material (Figure 1). This prevents the young from straying or mixing with the flock, except during suckling. The dome is usually kept outdoors during the day if there is no rain.

		
a. Yards without roofs	b. Night shelters around Abergelle, Tigray	c. A bamboo dome for lambs/kids
		
d. Dry season housing (Menz)	e. Wet season housing- basement and human house upper floor (Menz)	f. Raised sheep/goat housing (north Gondar)
		
g. Lamb shelter in Afar	h. Adult (right) sheep shelter in Afar	
Figure 1. Night shelters under the traditional system		

2.2. Shortcomings of traditional housing

Traditional sheep and goat shelters are usually poorly lit and have inadequate ventilation and drainage (Figure 2). Housing sheep and goats within the family house can have serious consequences should an outbreak of zoonotic diseases (e.g., anthrax) occur. Diseases such as mange and coccidiosis could be transmitted to children. Housing animals in close quarters also encourages spread of external parasites, and bacterial and viral infections among animals.

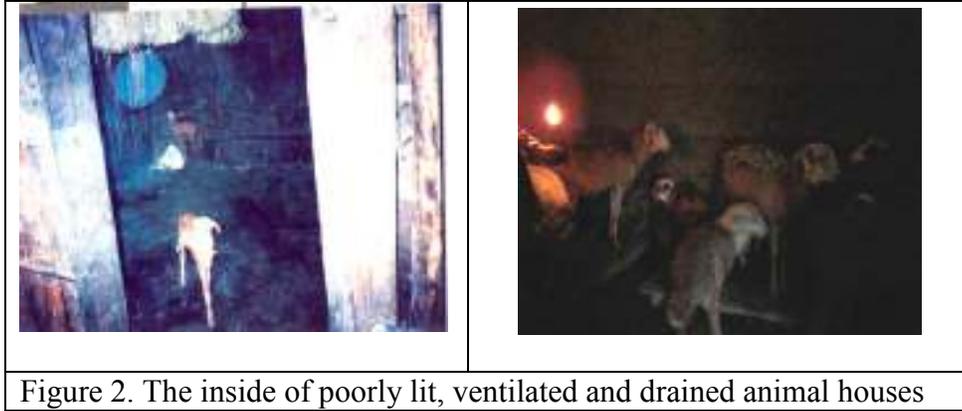


Figure 2. The inside of poorly lit, ventilated and drained animal houses

3. Types / designs of recommended housing options

3.1. Where to locate animal housing/sheds

The location of the house/shed is important for animal comfort and safety. Sheep and goat housing should be built:

- ❖ On a well-drained area.
- ❖ Downwind from the owner's house.
- ❖ Near to the family house to keep an eye on the animals but far enough to minimize smell (at least 10 meters).
- ❖ On a floor 1-1.5 m above the ground should the area be waterlogged or prone to flooding.

It is always wise to keep in mind the possibility of expansion when building housing for sheep and goats. An appropriate flock development plan has to be made to anticipate future construction needs.

3.2. Orientation

The orientation of the shed can be important depending on the climate. One can prevent the sun from heating up the stall too much by placing the longitudinal axis of the stall east - west. If, on the other hand, one wants the sun to shine on the floor so that the floor dries up and parasites die, it is better to build the shed along a north - south axis (This is preferred in humid areas).

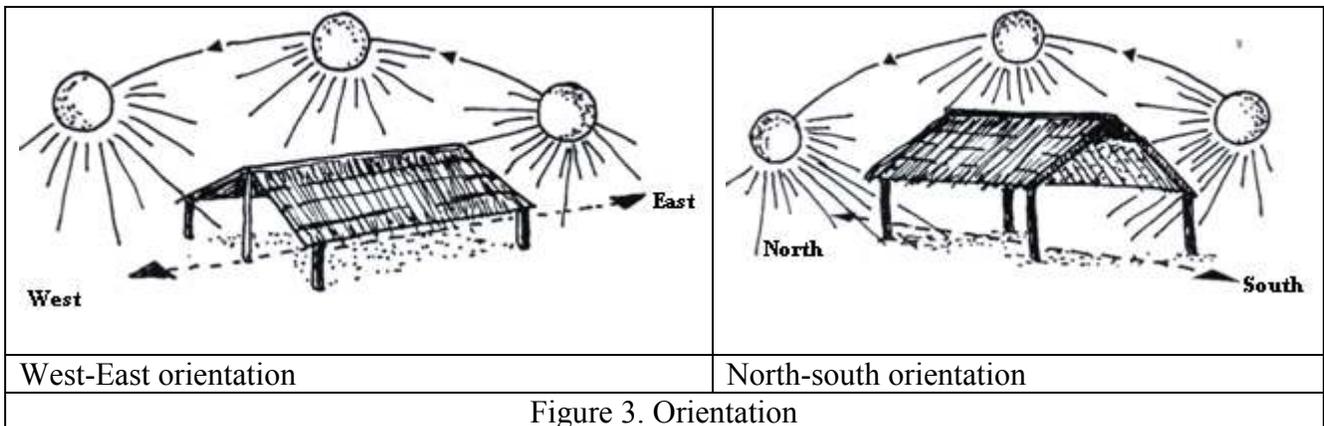


Figure 3. Orientation

Ventilation

The purpose of ventilation is to provide the desired amount of fresh air, without drafts, to all parts of the shelter; to maintain temperatures within desired limits; and to maintain ammonia levels below specified levels. Ventilation is of utmost importance to maintain a desirable interior temperature of 28 to 30°C. If the animals cannot get rid of heat because the surrounding temperature is too high (above 30°C), they eat less and therefore produce less. Majority of pneumonia cases can be traced to excessively warm and humid interior and sudden changes in temperature. It is, therefore, necessary to make the shed sufficiently high and make sure there are openings for ventilation in the roof or walls. It is essential to note that ventilation is good, but draughts are bad! The ventilation openings must, therefore, be placed high enough so that air does not blow directly past the animals (draught).

In warm climates, where the stalls are fairly open, a low wall of about 1 meter on the side the wind comes from is sufficient.

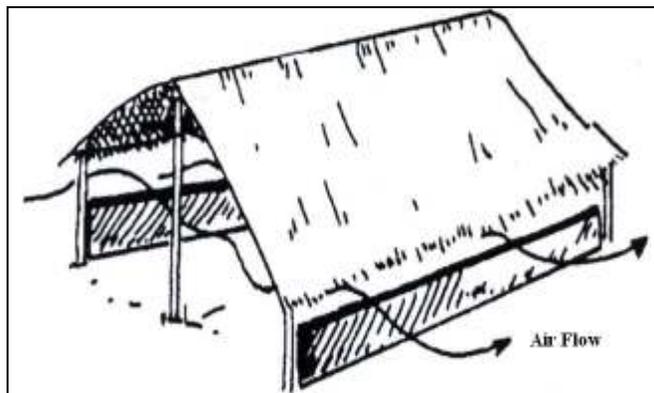


Figure 4. Ventilation in stall

3.3. *Materials for building an animal barn*

Sheep and goat barn construction need not be complicated or expensive. The materials used in construction should be those locally available that will result in a long-lasting structure. Animal safety and welfare is very important in the design and construction of housing.

3.4. *Type of housing*

There is no one, single blueprint for housing; choose the form that best suits your situation. Build the structure so that sheep and goats can easily live, eat and rest. Make sure that you can work there comfortably.

Housing requirements are more or less the same for sheep and goats. The type of housing built will vary depending on the type of production system, size of operation and environmental conditions. In terms of sophistication, animal housing can range from very simple structures made only of a roof and no walls to complex structures with solid walls fitted with automatic ventilators, feeders and waterers.

Animal housing in tropical and semi-tropical regions should be kept to a minimum except for intensive production systems. In the arid tropics, no protection other than natural shade may be required. In humid climates, a simple thatched shelter will provide shade and protection from excessive rain.

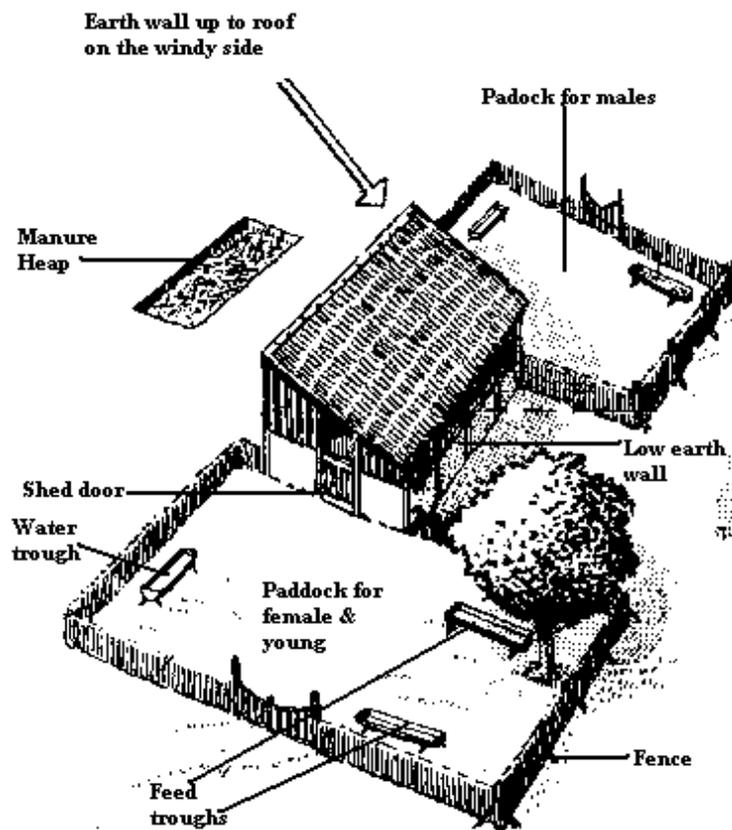


Figure 5. A well designed simple set up of a sheep farm with paddocks

Figure 6 is a close up of the shed with the roof left out to show the inside better.

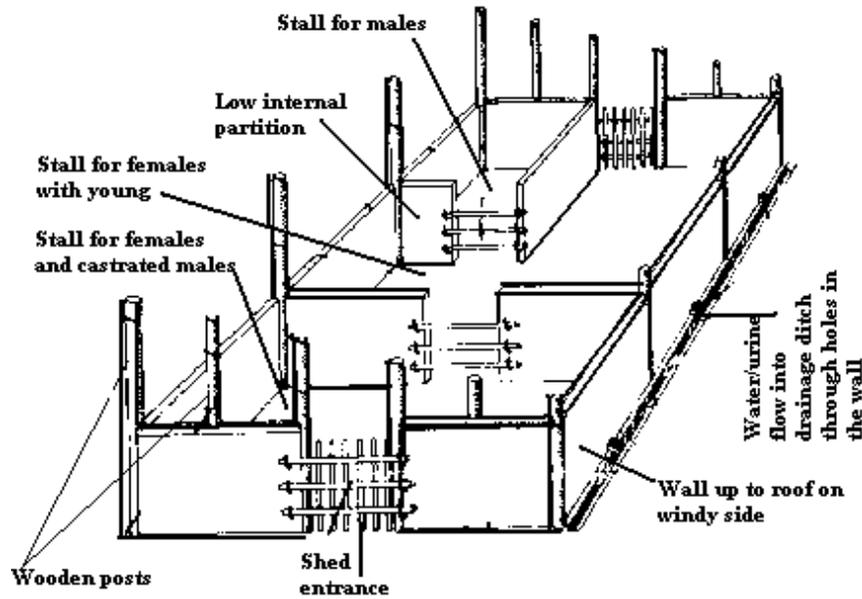
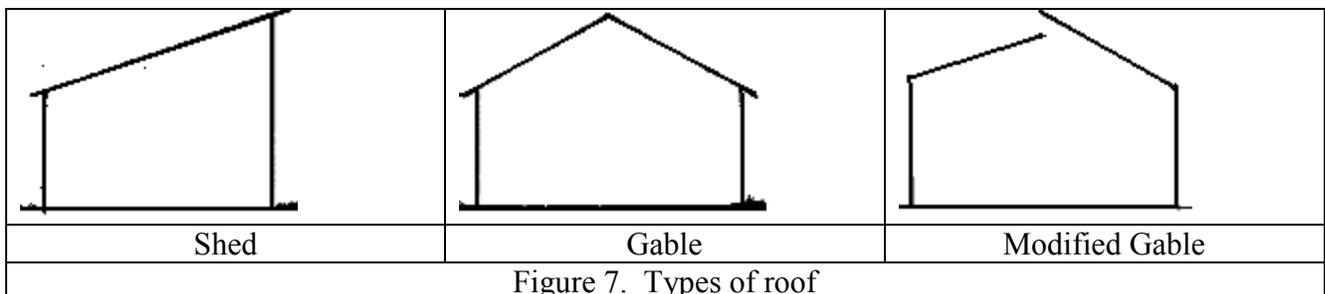


Figure 6. Lay out of the interior of a shed

Roof: The roof provides protection from sun and rain and can be of a shed, gable or modified gable style (Figure 7). Slope is important in removing rain and thatched roofs need a greater slope than iron sheeting. A greater slope is also beneficial in areas with high rainfall. The roof should be waterproof with sufficient overhang to prevent rain from blowing in. Adequate ventilation is essential in maintaining animal health. A high roof encourages air movement but is more likely to be damaged by strong winds. A roof vent can assist in proper ventilation. Roofs can be constructed from iron sheet, grass/bushes, wood, stone/brick or earth depending on production system, material availability and climate.



Wall: The wall should not be completely solid to allow air movement through the house. Good air movement (ventilation) is essential to remove moisture, excess heat in hot weather and/or odor and gasses from animal waste so that animals stay cool, dry and clean. Inadequate ventilation can lead to problems such as pneumonia. While good ventilation is essential for animal health, drafty conditions must be avoided. Air circulation should be above the animals' heads and ventilation openings should be placed high enough so that air does not blow directly past the animals. Air movement can be effected through mechanical (e.g., ventilator) or natural means. Providing openings or short side

walls of about 1 meter height will provide sufficient ventilation. A hedge can also fulfill this function.

Outer walls are designed to protect animals from external influences and inner walls aid in animal management, such as controlling breeding. At a minimum, inner walls should create pens for:

- Males
- Females with young
- Females without young

Other pens to consider building are those for weaned young, young males of breeding age, young females of breeding age, and an isolation pen for sick animals. A paddock or yard alongside the shed where animals can exercise and be fed and watered can also be built.

Generally, animals are separated based on their physiological status. Partitioning a sheep/goat barn has the following advantages:

- It is easier to feed different classes of animals according to their needs.
- It is easier to follow a mating schedule.
- It is easier to control breeding and, thus, prevent inbreeding and mating at a very early age.
- Lactating animals can look after their young better and pregnant animals can give birth under a more relaxed environment.
- Sick animals can be isolated; thus, reducing the risk of disease dissemination.

At a minimum, barns should have separate pens for adult males, young males, pregnant females, and young weaned offspring. If the herd is large and space is available, additional pens should be constructed for:

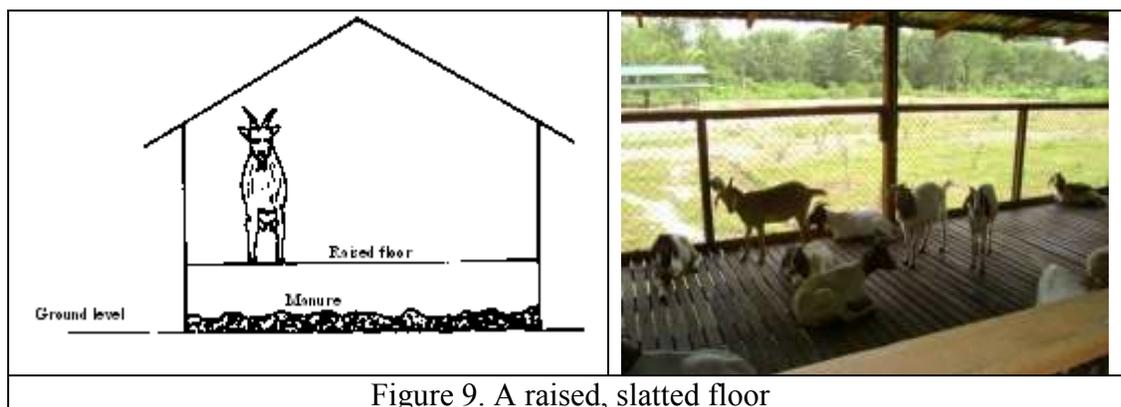
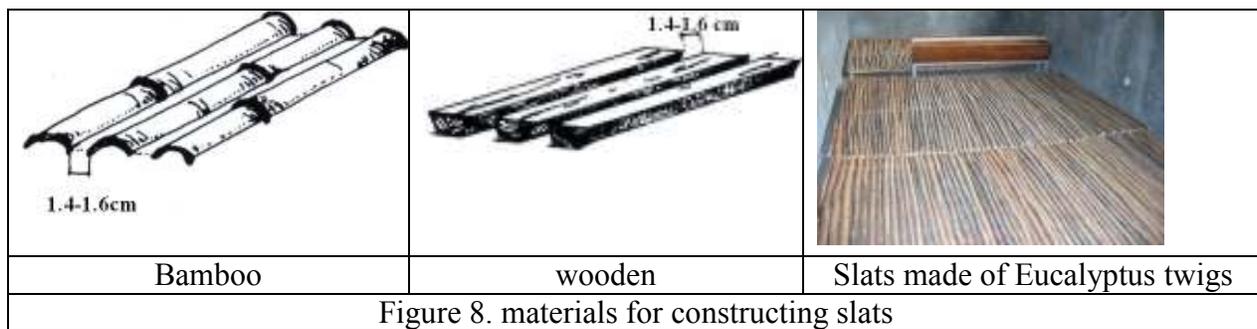
- Weaned male lambs/kids of the same size should be penned together and not mixed with younger, smaller animals unable to compete for feed;
- Pregnant females close to parturition should be penned separately from nursing females, young females not bred yet and adult males;
- Partitions for adult male pens should be high enough so that males cannot jump out to prevent unintended mating;
- Whereas small barns may not need an aisle between pens, particularly in large barns, a center aisle makes many management practices easier; such as sorting animals, feeding, monitoring breeding, etc. It also facilitates movement of workers in the barn.

Floor: The floor could either be packed earth, concrete or slatted (Figures 8 and 9). Packed earth or concrete floors should have a slope of about 5% for good drainage. Raised platforms where sheep and goats can lie above the floor and away from manure and urine are beneficial. These can be placed along the longest wall of the barn.

Slatted floors should be raised about 1-1.5 meters above ground level to facilitate easy cleaning and collecting of dung and urine. The gap between the slats should be 1.4 to 1.6 cm to allow easy passage of fecal material and guarantee safe footing for the animals. Newborn and young lambs should not be put on slatted floors. A piece of wood temporarily placed on the slats will prevent leg injury to very young lambs and kids. A raised, slatted floor in tropical and subtropical areas has the following advantages:

- No need of bedding
- Allows manure, urine and debris to drop through the slatted floor, thus removing a major source of disease and parasite infestation
- Requires less labor to clean and maintain
- Remains relatively dry and clean
- Reduced space requirements
- Manure is easily collected for fertilizer use or for sale
- Allows air to pass through the slats increasing ventilation and comfort in hot weather.

The main disadvantage of raised, slatted floors is the high expense of construction. Some materials, such as bamboo, may be cheaper than wood but may provide less secure footing. For all but the smallest barns, commercial wood is preferred to bamboo as it stronger and more long-lasting. Cost, ease of installation and safety must all be considered when selecting flooring material for a slatted floor. Other concerns with slatted floors are leg and foot problems from too wide a gap or poor maintenance of existing slatted floors.



Space requirement:

In any type of housing for sheep and goats, adequate floor space must be provided. Recommended space requirements vary depending on animal size and the type of floor used (Table 1). Adjustments may also be made depending on local climate and flock size. Additionally for animals managed totally indoors, an open yard for exercising is required. Sheep and goats should not be crowded and must have room to lie down. Overcrowding promotes ill health.

Table 1. Recommended floor space for sheep and goats

Type of animal	Weight (Kg)	Floor Space (m ² /animal)		
		Solid Floor	Slatted Floor	Open yard
Ewe/ doe	35	0.8	0.7	2
Ewe/ doe	50	1.1	0.9	2.5
Ewe/ doe	70	1.4	1.1	3
Lamb/ kid		0.4 – 0.5	0.3 – 0.4	
Ram/ buck		3.0	2.5	
Pregnant ewes/does		2.0	1.5	

3.5. Recommended housing options

The kind of house and equipment will depend upon the particular kind of sheep/goat enterprise and the climatic conditions under which it must be operated. Below are examples of housing types for different production systems and agro-ecologies.

3.3.1 Production systems

Smallholder producer: Smallholder producers with few animals are characterized by low input, low output production systems where costs need to be kept to a minimum. Cost reduction techniques such as making the animal shelter attached to the main house (lean-to house) (Figure 10); using locally available, inexpensive materials; or, depending on the climate, providing minimum shelter (e.g., open yards) need to be considered. Designing animal houses for multipurpose use, such as including roof space to store farm implements, feed, seed, etc., (Figure 11) is one way of reducing the cost of housing sheep and goats. Thatched roof houses are often adequate.

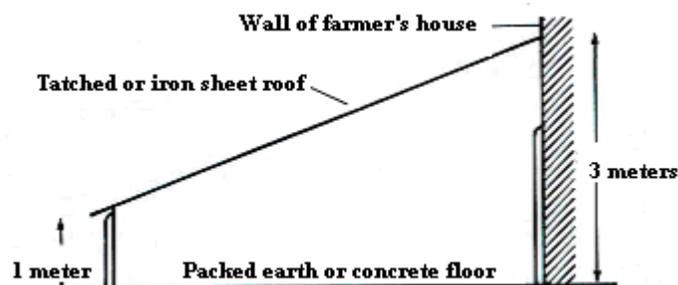


Figure 10. A lean-to house



Figure 11. Traditional sheep/goat houses with roof space to store seeds and farm implements.

Small scale commercial producers: Small scale commercial farmers produce sheep and goats from a business perspective and require improved management than that of smallholder producers. Basic requirements for good sheep and goat housing must be followed with the size of the barn commensurate with the number of animals expected to be raised. In dry areas, a house with a packed earth floor can be used since moisture buildup within the house would be minimal. In humid areas, a raised floor house (Figure 12) is advisable to keep animals clean and facilitate waste removal. The type of wall (open, semi open, closed) and type and height of roofing should be made according to prevailing local climate.

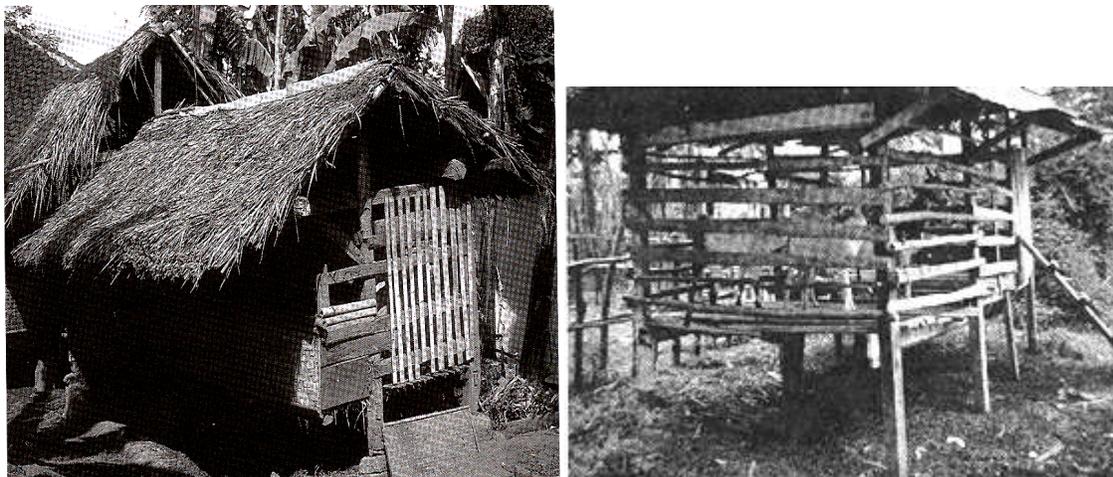


Figure 12. Raised houses of thatched roof (left) and corrugated iron sheet roof (right)

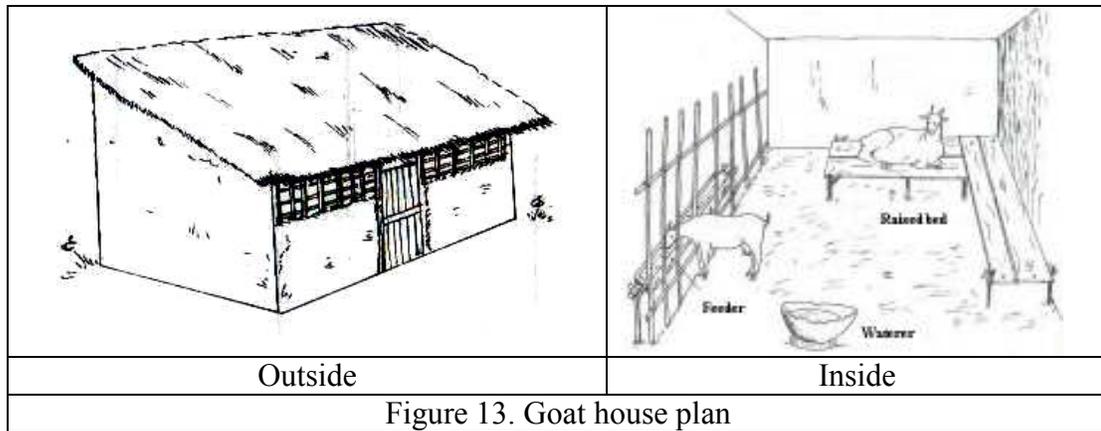


Figure 13. Goat house plan

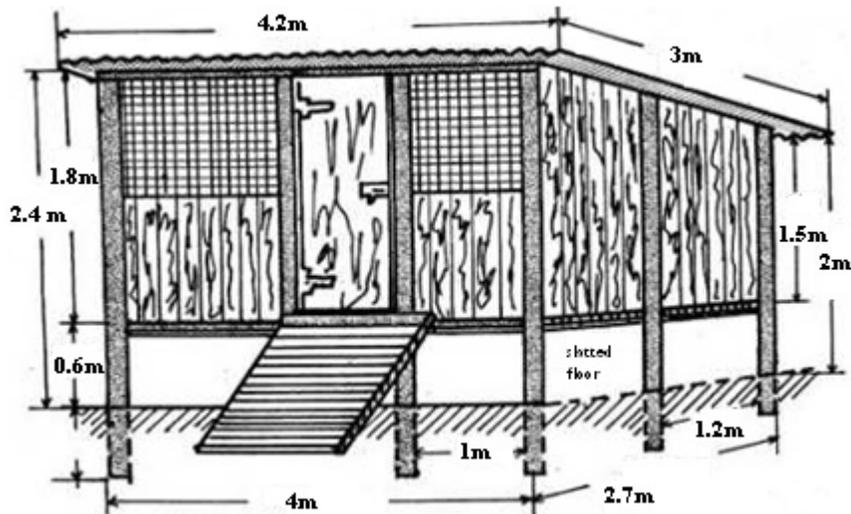
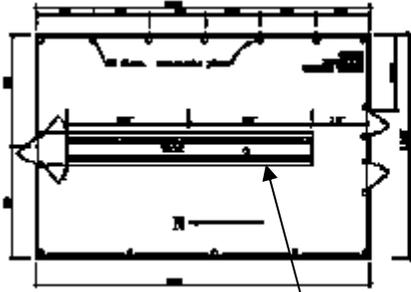


Figure 14. Plan for small scale farmers having 40 adult sheep or goats showing dimensions.

Large scale commercial producers: Large scale commercial sheep and goat production requires more elaborate housing than those of small scale producers (Figures 15 and 16). Large scale producers may have several different barns for different types of animals:

- Breeding ewes
- Breeding males
- Growing and fattening lambs after weaning
- Weaned young
- isolation pen for sick animals
- Hay storage shed (figure 13)
- Storehouse for concentrates



Central alley and feeding trough on both sides of the alley

Figure 15. Floor plan (left) and a house (right) for a large scale production.



Figure 16. A slatted floor, semi-open barn with feeding trough and a central alley



Figure 17. A large, raised sheep/goat house for a commercial flock/herd

Proper space allowances should be followed for expected numbers of animals in a pen, animal size and whether an open yard is available. Building dimension and orientation will vary according to flock size and local environmental condition. In hot, humid conditions, long, narrow houses may facilitate removal of heat and moisture.

Feed storage facilities are important on large scale farms. Shed size should be determined based on the amount of feed to be stored. A general guide for grass hay and straw storage is given in Table 2.

Table 2. Space requirement for a feed storage shed

Type of feed	Loose		Baled		Chopped	
	m ³ /ton	kg/ m ³	m ³ /ton	kg/ m ³	M ³ /ton	kg/ m ³
Non-legume hay	13-17	70-53	7-9	130-95	8.5-11	105-80
Straw	19-28	48-30	11-14	80-65	7-10	130-115

Source: Hinch and Lynch. (Undated).

3.3.2. Agro-ecology

Highland: Most highland areas are characterized by high rainfall and low temperature. Under these conditions, houses with raised floors, gable roofs with sufficient overhang to protect from blowing rain and solid lower walls are suitable. The upper portion of walls should allow air movement to provide sufficient ventilation. Both sheep and goats are susceptible to pneumonia if houses are damp and poorly ventilated. In some highland areas where the rainfall is low, a well-drained packed earth or concrete floor can be used.

Mid-altitude: In mid-altitude areas where the climate is humid, houses with raised floors or on stilts provide a numerous advantages. Ventilation is good and dung and urine drops through the slatted floor minimizing parasite and disease problems. In drier areas, packed earth or concrete can be used providing they are kept clean and barn ventilation is sufficient to keep walls and floors dry.

Lowland: Ethiopian lowlands are mainly arid and semiarid areas with hot temperature for most of the year. Most pastoral and agro-pastoral production systems are found in these areas. Traditionally, sheep and goat housing consists of open yards for nighttime enclosures. Natural shade from trees and shrubs provides protection against intense heat during the day (Figure 18). More elaborate animal housing for intensive and semi-intensive production requires partially covered long walls with roofing made of materials which do not create hot conditions beneath them at high ambient temperatures. Packed earth would be as suitable as slatted floors under this condition since moisture buildup is very low.



Figure 18. Sheep staying under a tree shade during the hot part of the day

4. Summary

Productivity of sheep and goat is influenced by the type of shelter provided. There are various housing and floor designs that can be used depending on the production system employed and local climate. Cost of construction, ease of cleaning, proper ventilation and drainage, and adequate lighting are important aspects to be considered in designing a house. Inner pens are needed for large flocks for proper handling and management, particularly controlled breeding. Proper handling of manure needs attention since it has health and economic benefits.

5. Messages to Development agents

- Should understand the role correct housing plays in improving overall animal productivity and advise farmers/pastoralists accordingly.
- Advise farmers/pastoralists on types of housing suitable for the area and scale of production.
- Should know and advise large scale farmers on the importance of holding pens and their design.
- Should know and advise farmers/pastoralists on how to handle and utilize manure.

6. References

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