

## CHAPTER THREE

# Sheep and Goat Production Systems in Ethiopia

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### **Objectives**

1. To describe the characteristics of different production systems in the context of sheep and goat production.
2. To describe important activities which characterize different systems of sheep and goat production.

### **Expected Outputs**

1. Knowledge of how to describe a production system and its different components.
2. Ability to visualize areas where appropriate interventions can improve productivity of sheep and goats.

### 3.1. Basis for Classification of Sheep and Goat Production Systems in Ethiopia

There are a number of ways to classify production systems. In this handbook, sheep and goat production systems were classified using criteria that included degree of integration with crop production and contribution to livelihood, level of input and intensity of production, agro-ecology, length of growing period and relation to land and type of commodity to be produced. Three major and two minor production systems are described.

The major production systems are:

- Highland sheep–barley system
- Mixed crop–livestock system
- Pastoral and agro-pastoral production systems

The other production systems that are not currently practiced widely but have a future are:

- Ranching
- Urban and peri-urban (landless) sheep and goat production system

### 3.2. Description of Production Systems

#### 3.2.1. Highland sheep–barley system

This system is found in the highlands above 3000 m.a.s.l. where the major crops grown are barley and pulses such as faba beans, lentils, etc. Temperature is the main factor determining productivity in the highland sheep–barley production system. At times, night temperatures fall below 0°C and frosty nights are common, particularly between October and January. Cropping intensity in these areas is generally low. Sheep are the dominant livestock species. The main feed resource-base includes wasteland grazing, stubble and sometimes straw. Sheep flock sizes range from 30 to several hundred head.

Although sheep are reared mainly for meat, skins and coarse wool production for the cottage industry of the central highlands are subsidiary products. There is, therefore, a clear possibility of establishing more formal sheep production enterprises using appropriate technology packages. Large sheep production ranches could be established where mainly meat or dual-purpose breeds could be maintained either by individual farmers or cooperatives. These highland areas are generally unsuitable for sustainable crop production.

#### 3.2.2. Mixed crop–livestock systems

Both sheep and goats are raised in mixed crop–livestock systems. These systems are based on cropping associated with livestock husbandry.

This system is generally found in areas where the altitude ranges between 1500 and 3000 m.a.s.l. The area has adequate rainfall and moderate temperature and is thus suitable for grain production. The integration of crops and livestock is high in most areas. The integration is lower in the perennial crop–livestock system (coffee growing areas) in southern Ethiopia where animals are of minor importance.

Livestock in general and small ruminants in particular play an important role in food security and food self-sufficiency in this production system. In the grain-based mixed production system, livestock are the main cash source for the purchase of agricultural inputs. Livestock are used as a savings and insurance mechanism. Cattle are the dominant livestock species and are kept mainly for draft power. Sheep and goats are kept to meet small and immediate cash needs.

Sheep are more dominant than goats in this production system. The major commodity is meat, while milk is a subsidiary product in some areas. Skin of hair ('*Gishe*') goats in the extreme highland areas has a local niche market for making saddles. Coarse wool is also produced from Menz sheep and other sheep in the central and north central highlands. The wool is usually used for the local carpet-making industry.

Land-holding per household is 2–3 hectares with some areas having much smaller holdings of less than 2 ha. The major feed resources are natural pasture and crop residues. In some areas, one-fifth to one-third of the holding is used for grazing. In most of the areas, however, livestock generally depend on grazing communal land that is dwindling in size and productivity. Sheep and goats in this system experience year-round nutritional stress due to increases in cultivated land area. This results in very high grazing pressure and subsequent shortage of feed. This area is also characterized by excessive soil erosion and soil nutrient depletion because of intensive cropping and overgrazing.

The system of sheep and goat production for the most part is a low input / low output system except in some cases of concentrate supplementation and use of anthelmintics for fattening sheep and goats. There is a need to intensify production because of the high population density in these areas. Potential for intensive small ruminant production through finishing activities and stratification of production exists.

### 3.2.3. Pastoral and agro-pastoral production systems

#### Pastoral system

In general, pastoral systems are associated with agro-ecological zones (AEZ) that are too dry to sustain crop production. These are characterized by little or no crop agriculture and high mobility in search of grazing and water.

Under Ethiopian conditions, pastoral systems of production are found at altitudes below 1500 m.a.s.l. and where the annual precipitation is less than 500 mm. The following characterize pastoral systems:

- Livestock are maintained as a principal activity. Fifty percent of household revenue comes from livestock or more than 20% of household food energy is derived directly from livestock or livestock-related activities.
- Rangeland is the main land resource.

Livestock species consist of camels, cattle, sheep, goats and donkeys. In recent years, pastoralists have shown an increasing interest in keeping larger numbers of sheep and goats. There are more goats than sheep in this system. Milk and meat are the two outputs. In drought years, goats gain more importance as suppliers of milk to the household. Goats also help to control bush encroachment.

Pastoralists depend on their livestock not only for their income but also for their survival. Consequently, risk avoidance is very important to the pastoralist. Livestock management is, therefore, directed towards risk minimization, which tends to reduce productivity. Pastoralism is ecologically, economically and socially important for sustainable development in dry lands.

#### Agro-pastoral system

This system is characterized by less integration with crop production as compared to the crop–livestock production systems. Producers under this system have a permanent residence and their movement is limited in terms of both distance and duration. The system is characterized by a high degree of dependence on milk and meat production. Some crop agriculture is practiced around the permanent homestead. This is also a low input / low output system. The system is usually practiced below 1500 m.a.s.l. but with higher rainfall to support short season crops compared to the pastoral system.

### 3.2.4. Ranching

Ranching is a range-based system of livestock production similar to the pastoral systems but with different production parameters, livestock functions and management. Ranching can be considered as a modern land-use system. It is a labor-extensive system focusing on the production of marketable commodities from one or two selected species. This is mainly in the form of producing live slaughter animals for meat. The main function of the system is to generate cash income.

Management of livestock is characterized by grazing within defined borders and an individual tenure system with possibilities of intensified feeding and watering of animals. The form of ownership in ranching could be parastatal, cooperative or private (companies or individuals). Ranches can be differentiated by the following characteristics:

- *Targeted livestock species and product:* Although the most common system is cattle ranching, sheep and goat ranching for the production of skins (Karakul), wool (Merino), and meat (Dorper sheep and Boer goats) exist in various parts of the world.
- *Intensity and level of development:* This system of ranching works with a minimum of fixed investments and extensive management practices. This system requires heavy investment and improvement practices and well-planned and executed livestock management and grazing systems.
- *Stratified system:* In this case, ranches could be specialized to produce weaner lambs or kids for fattening or finishing by other production systems.

The ranch system of production is important in arid and semi-arid zones of Africa, particularly in eastern and southern Africa (Kenya, Tanzania, Zambia, Zimbabwe, Botswana, Namibia and South Africa). Ranches are also found in some highland areas.

Both highland and arid/semi-arid ranching can be undertaken in Ethiopia. Sheep ranching can be established in the highland sheep–barley system, where there is very little crop cultivation, with targeted production objectives of either meat, coarse wool or both. Extensive ranching can also be established in the arid/semi-arid areas of the lowlands or pastoralist areas for market-oriented sheep or goat meat production using specialized breeds such as the Dorper sheep or Boer goat and their crosses with local stock.

It is possible to produce sheep and goats that are more uniform and targeted to satisfy the increasing export and domestic market if such systems could be introduced into the pastoral, agro-pastoral and the highland sheep–barley production systems.

### 3.2.5. Urban and peri-urban (landless) sheep and goat production system

This system involves the production of sheep and goats within and at the periphery of cities. Quantitative data is not available on the importance of urban and peri-urban production systems but it is not uncommon to observe sheep and goats in urban areas including the capital Addis Ababa. Feed resources are usually household wastes, market area wastes, mill leftovers, by-products and roadside grazing (particularly in the peri-urban system).

In addition, small-scale sheep fattening is emerging as an economic activity in many growing cities. The viability of this activity depends on its acceptance into the formal extension services. It could either be a high input / high output or low input / low output system.



Figure 3.1. Sheep in the heart of Awassa city, southern Ethiopia.

In most cases, the type of sheep and goats available from this system are meant for local consumption, being well-finished, fatty animals demanded by the local Ethiopian market.

### 3.3. Integrating Sheep and Goats in Commercial Crop Production

Sheep and goats can be beneficial in many commercial cropping ventures, including fruits, vegetables, and tree crops. As an example, in Southeast Asia, sheep and goats are raised in plantations producing rubber, oil palm, coconut, coffee, and various fruits.

In many of these systems, herbicide was traditionally used to control weeds and grass that compete with the main crop for soil nutrients. Sheep and goat grazing is an alternative weed and grass control method. By using sheep and goats, herbicide use and labor costs for application are decreased, leading to reduced production costs and fewer harmful chemicals released into the environment. The animal manure assists in recycling soil nutrients and improves soil fertility. The animals also become a source of income for the enterprise when sold.

Contrary to popular opinion, sheep and goats do not ruin the crops. Proper management and grazing techniques can prevent damage to trees and other crops by small ruminants. Integrating sheep and goats into commercial crop production systems diversifies production and allows for two income streams, those from crops and livestock, to be realized from the same plot of land. In Ethiopia, such integration could occur in coffee plantations, rubber plantations in the southwest and other tree and fruit crop farms.

### 3.4. Sheep and Goats in Vegetation Management

Sheep and goats are important animal species in controlling unwanted and invasive vegetation. There are many plant species that cattle do not prefer that are consumed by sheep and goats. As cropland increases and animals are forced to graze increasingly less productive land, the need for animals that consume a diverse array of plant species is paramount.

Sheep and goats can assist in stopping the spread of some weeds and unwanted brush. This reduces the need for manual chopping or weeding. It has been said that goats are particularly destructive to an environment. However, used correctly, sheep and goats can be a conservation tool that helps protect biodiversity of plant species. These animals consume invasive plants allowing other plant species to grow and flourish. Proper management of animals and grazing is key in managing vegetation. Many of the problems associated with small ruminants, in particular goats, and environmental degradation are actually the result of man incorrectly managing these animals or trying to raise too many livestock in areas unsuited for the practice.

#### Exercises

1. What characterizes the integration of livestock and crops in the mixed production system?
2. What major problems exist under the mixed crop–livestock production system?
3. Briefly describe the type of production system or systems existing in your area.

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