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TECHNICAL BULLETIN No.4
SELECTING BREEDING STOCK FOR
SHEEP PRODUCTION



ESGPIP

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FOREWORD

Selection is the basis for any flock improvement effort. The success of sheep production enterprises depends largely on the productivity of the entire flock. Good breeding animals must be selected as breeding stock to begin or expand sheep farms of purebreds or crosses. Maintaining marginal animals that do not contribute much to income generation results in loss of profit.

This fact sheet titled “*Sheep selection for breeding*”, is produced by the Ethiopia Sheep and Goat Productivity Improvement Program (ESGPIP). The focus of the fact sheet is to serve as a simple guide for selection of sheep for breeding purposes. The fact sheet is intended to serve as an extension aid for Kebele Development Agents (KDA’s) to help improve the productivity of sheep genetically. The information contained in this fact sheet is also useful for other users engaged in business ventures based on sheep and also production of other types of ruminants.

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SELECTING BREEDING STOCK FOR SHEEP PRODUCTION

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1. Introduction

The sheep farmer or pastoralist must make difficult decisions when selecting breeding animals because these animals will determine the performance of future generations. Selection is the method by which the flock is improved genetically. Essentially, selection is deciding which animals will be parents, how often they will be parents, and for how long they will be parents. Most sheep producers select breeding animals based on visual appearance, also known as phenotype. However, phenotype is a reflection of both genetics and the environment under which an animal is maintained and performs and may not accurately portray the animal's true genetic merit.

The success and profitability of the sheep production enterprise depends on the productivity of the entire flock. Sheep producers can improve their stock and, hence, their income by selecting superior replacements from better performing ewes and culling inferior, low-producing females. When beginning or expanding existing sheep farms, good breeding animals must be selected. Maintaining marginal animals that do not contribute to income generation causes loss in profit.

In commercial sheep farming, sound selection emphasizes important economic traits, which contribute to better production, efficiency and profit. As income from sheep production in Ethiopia comes mainly from the sale of sheep for meat, a reasonable selection program should focus on traits that will optimize meat production.

Performance records of individual animals are the most reliable tool to use when making selection and culling decisions to improve the genetics of your flock. Faster progress will be achieved if culling decisions are made based on objective information and appropriate records. The genetic progress that could be expected within a flock also depends on how many traits the sheep producer considers in a selection program. If only one trait is selected, such as weaning weight, faster progress is made than if combinations of two or more traits are selected for simultaneously.

Small scale sheep producers can use a simple and quick selection method of ranking individual animals for a particular trait based on their performance data within a contemporary or management group.

2. Selection tools

Following are some tools that could help sheep producers achieve their goals in genetic improvement and profitability in sheep meat production or live sheep marketing:

- Have unique identification system for individual animals in the flock;
- Establish performance and pedigree recording systems;

- Collect relevant data on breeding, reproduction, production, growth, carcass quality, etc.;
- Identify top producing ewes and rams based on evaluation of their records;
- Evaluate growth potential of lambs based on bodyweight gain measured by weighing periodically; and
- Record mortality and morbidity.

3. Traits to consider when selecting breeding stock

- 1) Growth:
 - Birth weight
 - Weaning weight (90 day weight)
 - 6-month weight
 - Yearling weight
 - Pre-weaning average daily gain (ADG)
 - Post-weaning ADG
 - Feed efficiency
 - Body conformation
- 2) Reproduction:
 - Conception rate
 - Number of lambs born per ewe mated and lambing
 - Number of lambs weaned per ewe
 - Lambing percentage
 - Weaning percentage
 - Litter size and weight
 - Fertility or birth problems
 - Ewe weight at weaning
- 3) Carcass yield and quality:
 - Dressing percentage
 - Rib-eye (loin-eye) area
 - Fat thickness over the rib-eye
 - Lean: bone: fat ratio or %
 - Carcass conformation and muscling
- 4) Health:
 - Mortality and morbidity rates
 - Tolerance or resistance to parasitism
 - Disease resistance

4. Types of herd management and performance records

There are various types of records and record keeping systems. However, a good record keeping system allows having an accurate and simple way of keeping flock records. Performance records can be kept on printed cards, in books or on electronic forms. Some of the most important types of records of management and performance kept in sheep production enterprises include:

- Pedigree data;
- Production and reproduction data;
- Breeding data;

- Health data; and
- Financial data.

Having a sound and reliable herd management and performance record keeping system will help producers to:

- Select superior breeding stock and replacements;
- Identify top producing ewes and rams;
- Identify and cull unproductive animals;
- See and document progress toward selection goals;
- Make management changes based on the economic analysis of the enterprise; and
- Add value to animals to be marketed by providing potential buyers with relevant production data.

5. Selection and culling of sheep

In any sheep production enterprise, and particularly those targeted to produce sheep meat and export live sheep for meat, there are important considerations upon which to focus while selecting sheep for breeding. These include:

- Rapid growth;
- Accelerated lambing (having three lamb crops in two years);
- Good body conformation (good muscling, large body size, strong feet and legs); and
- Good adaptability to a particular production environment (resistance or tolerance to diseases and parasites).

It is generally believed that systematic selection for the traits mentioned above will enhance production efficiency of ewes (kg of lamb weaned per ewe mated per year) and profit from the farm.

Culling is undertaken for a variety of reasons and the process can be complex. If good records are kept, these will serve as tools upon which a producer can base culling decisions.

5.1. Selection of breeding rams

It is said that “The ram is half of the flock.” This is true because a ram could be mated to several ewes resulting in many offspring at a given time or mating season while a ewe could have at most twins or triplets at any given lambing. To have a successful meat sheep enterprise a producer must use above average rams for breeding. Breeding rams for meat sheep production should have good mutton characteristics. A further consideration in ram selection is that he will determine the quality and growth performance of progeny and the qualities of female lambs kept for replacement ewes.



Figure 1: Menz Rams at the Debre Birhan Sheep Multiplication Center, Photo: Alemu Yami – ESGPIP.



Figure 2: Horro Rams at Bako Research Center. Photo :R.C Merkel, LU

5.1.1 Visual appraisal

Visual appraisal is a selection method where producers visually inspect animals and judge which individuals are closest to the ideal for desired traits, in this case meat production. This is accomplished through appraising both the conformation and muscling characteristics of animals. While easy to use, visual appraisal requires that producers apply a systematic method in evaluating and comparing characteristics of different animals. Most farmers use visual appraisal and it is believed that much of the progress made in sheep production has come through this method. The main weakness of visual appraisal is that type and general appearance are lowly correlated with some factors that influence productivity and efficiency. However, market grades and prices of live sheep are mainly determined through visual appraisal.

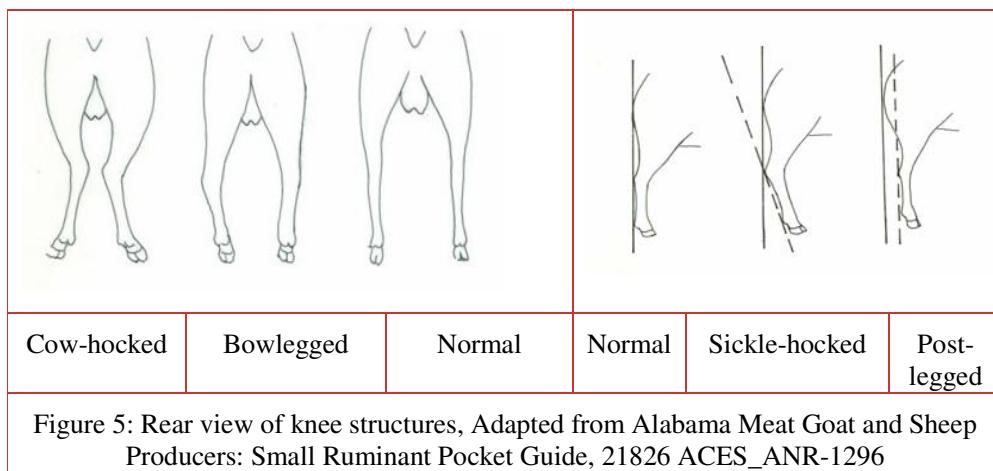
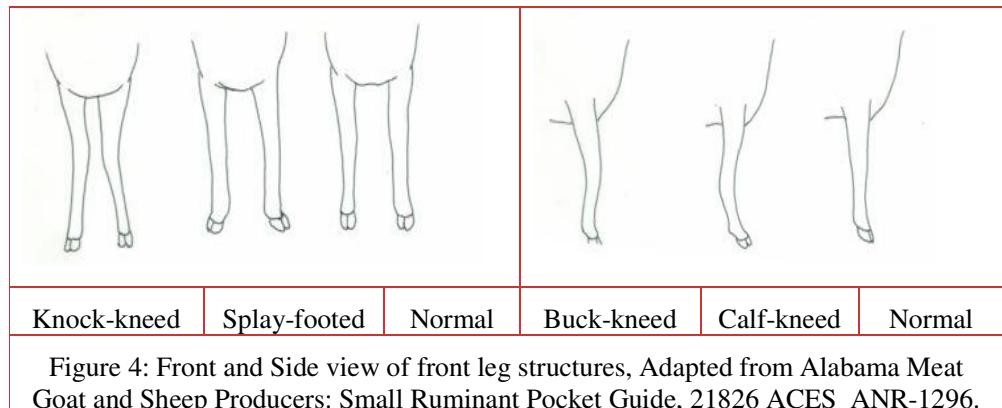
General conformation

Good conformation is vital for sheep to achieve maximum efficiency in meat production. A meat sheep with good conformation has:

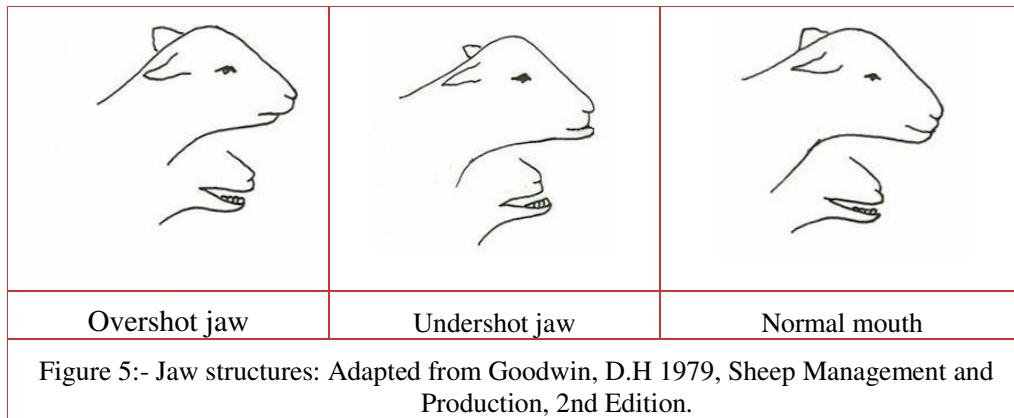
- A wide, straight back;
- Smooth shoulders;
- Fullness through the heart area;
- A good spring of ribs; and
- A long, well balanced body, with adequate skeletal size.

Check shoulder, back and loin area for covering of firm flesh; See also if the ram to be selected has bold masculine head with bright eye and correct mouth.	Check spring of rib, width of loin area and fleshing over rump.
Figure 3: Ram selection by visual evaluation of conformation.	

- **Feet and legs:** - The legs of good looking sheep should be straight and set squarely under the corners of the body. The legs should not be very close at the hocks or very widely apart or bowed. Strong feet and pasterns guarantee a sheep to remain in the flock enabling it to have a long, productive life. Hoofs should be trimmed when necessary to prevent feet and leg problems.



- **Mouth:** - Adult sheep have eight incisors on the lower jaw. In normal sheep, the upper dental pad and lower jaw are correctly aligned. A farmer or pastoralist should cull sheep with overshot jaws or parrot mouths where the lower jaw is shorter than the upper jaw. Similarly, sheep with undershot jaws where lower jaw is too long must also be culled from the flock.



Young and healthy sheep require less attention than old broken-mouthed ones. Broken-mouth refers to sheep that have lost their incisor teeth. It is known that the majority of sheep keep all permanent incisors until the age of five or six.

- **Testicles:** - A ram must first be examined to see if it is sound to be used as a breeding ram. A trained animal health agent should perform a physical examination of the ram, including the external genitalia. One important factor when evaluating a ram's breeding potential is testicle size. There is a direct correlation between testicle size and semen quality. The scrotal circumference measured around the widest point of both testes is a good indicator of healthy scrotal size. Yearling rams should have a scrotal circumference of at least 25cm. The testicles should also be firm when palpated and of equal size.
- **Age:** - A sheep producer should consider the following factors before deciding what age group of animals to purchase. These include price difference due to age, quality of the young stock, soundness and thriftiness of older animals and availability of performance data. The age of a breeding ram influences the number of ewes he could serve at a given breeding season. The number of ewes to be served by a ram in a season ranges from 25 to 40 depending on his age.

Muscling

An important consideration is adequate muscling in the loin and rump areas as these parts provide high priced carcass cuts.

5.1.2 Performance

Performance selection is based upon measurable indicators or observable responses such as growth rate measured through bodyweight from birth and at various stages of growth. The advantage of performance selection over visual appraisal is that there is less risk of subjective valuation or guesswork as more emphasis is placed on characteristics of high economic importance. If a producer fails to consider performance characteristics in the selection process, his or her flocks will not reach the highest envisaged production levels. Keeping individual production records of both rams and ewes will allow the producer to select and cull accurately and objectively.

5.1.3 Pedigree

Pedigree selection occurs when animals are selected along family lines, especially from sire lines. Line breeding is a modified form of inbreeding that uses pedigree selection to concentrate the genetics of a superior ancestor. However, inbreeding in any form is in general detrimental and should be avoided. The use of pedigrees in selection will enable decisions that minimize the use of rams that are closely related or the matings of animals that are closely related.

5.2 .Selection of Breeding Ewes

Selection of ewes for breeding is also very important. A sheep farmer or pastoralist should first consider the qualities that he looks for before purchasing or selecting breeding ewes. The methods used for selecting breeding rams stated above under 5.1.1., 5.1.2. and 5.1.4. such as visual appraisal, performance and soundness could also be used in selecting breeding ewes. Apart from these, it is also important to consider some or all of the following characteristics:

5. 2.1. Health

Health in sheep and goats is shown by a general alertness and appearance. The ewes to be selected must have bright eyes, smooth and shiny hair cover, sound udder and feet. Normally, experienced farmers and pastoralists quickly notice sick animals based on symptoms like dull appearance and paleness of skin and eyelids. In most cases, sick sheep separate themselves from the rest of the flock or stand under a tree/hedge. Sick animals may also be coughing, have discharges from the eyes and nose and diarrhea.

5.2.2. Body size

It is a well known fact that large breeds (mature live weight 70 kg and above) produce lambs that grow faster and consequently reach market weight earlier than the smaller breeds (mature live weight 30 - 45 kg). Large breeds such as the Dorper and other exotic sheep require more supplementary feeding during feed shortages and can not be maintained at a high stocking rate on limited grazing areas. The producer must therefore decide whether to keep for example 10 large ewes with 20 or so lambs per hectare or 20 small ewes with similar number of lambs during periods of adequate grazing.

5.2.3. Udder

A ewe to be selected for breeding must have a good sized normal udder. The producer should turn up the ewe; gently probe the udder skin to see if there are any abnormalities such as swellings and lumps. Such abnormalities indicate a previous history of mastitis or other infections. The udder skin should be soft and pliable. The farmer or producer should also examine the two teats to see that they are normal, free from injury and not blind. Sometimes a ewe may be found with damaged teats or lost through predator bite.

5.2.4. Temperament and mothering ability

Disposition or Temperament of ewes is an important characteristic considered during selection. Some breeds of sheep like the Menz sheep are aggressive and difficult to handle. Other breeds are relatively docile and hardly excited when somebody walks round them. This characteristic is particularly important during lambing time. Ewes with good mothering ability will suckle their lambs readily and try to defend their offspring if predators or strangers approach. Poor mothers take little interest in their lambs and sometimes they even abandon them. Ethiopian breeds of sheep have not yet been thoroughly investigated along this line.

5.2.5. Grazing habit

There are evidences that show the existence of variation in grazing habits even among sheep breeds. Some such as the Afar, Menz and the Blackhead Ogaden are very thrifty and can make use of scarce feed resources and limited grazing. These breeds and most of our indigenous animals travel long distances either for grazing or watering.

5.2.6. Conformation and milking ability

Some studies indicate that there is a connection between body conformation, fleshing quality, ability to fatten and milking ability. Such analogy also exist in cattle where we have beef breeds that fatten faster, yet the cows produce very little milk compared to dairy breeds such as Holstein Friesian, Jersey or others. However, the mutton breeds such as the Dorper, Hampshire, etc produce enough milk to support their offspring.

6. Conclusion

The selection of good breeding animals is vital for a successful sheep production enterprise. Selection of superior breeding animals is the basis for sheep improvement programs. Only through superior animal productivity can enterprises be sustainable and profitable. A reasonable selection program should focus on economically important traits identified to meet the goals of the enterprise. To do this, a sheep farmer or pastoralist should select and choose breeding stock based on performance records of traits that can be readily measured and accurately evaluated.

Annex 1. Breeding/Lambing Record

Individual Dam and Lamb Performance Record															
Dam ID:			Dam Birth Date:				Dam Weaning Weight (kg):								
Sire ID:		Sire Breed:		Dam ID:			Dam Breed:								
Dam Source:			Reason for Culling:				Culling Date:								
Comments:															
Preweaning Performance							Weaning				Ewe/Doe Status			Remarks	
Lamb/Kid ID	Birth Date	Sex	Birth Type (S/T/M)	Sire ID	Sire Breed	Birth Wt. (kg)	Weaning Date	Weaning Wt. (kg)	Type of Rearing	Wt. at Marketing	Price (Birr)	Condition Score	Pregnancy Check	Preg. Or Open	