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SHEEP AND GOAT PRODUCTION BUSINESS

TRAINING COURSE FOR YOUTH AGRI-ENTREPRENEURS

Ethiopian Agricultural Transformation Institute

ADDIS ABABA, ETHIOPIA
2025

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OVERVIEW OF THE MODULE

Because of their fast reproduction cycle, small initial investment requirements, and high demand at the domestic and export markets, the sheep and goats are a good option for youth entrepreneurs to be engaged as a business in Ethiopia. However, young entrepreneurs are required to equip themselves with the necessary knowledge and skills of small ruminant production before engaging into it. This training module addresses the most relevant skills and knowledge required by an entrepreneur. The objective of this training module is to equip jobless youths with sheep and goat production skills and knowledge and engage them in the business. This module contains introduction, training methods, target participants and in addition to the different sections of the module. There are six sections under this module. These sections included sites selections for sheep and goat production business, selecting base flock/stock, feeds and feedings of sheep under production, mating and breeding soundness of rams and bucks, housing and health management of sheep and goats in production and marketing and distribution of the produced sheep and goats. Under each of the sections overview, learning objectives, learning questions, inputs (where necessary) and time required are addressed. However, under the six module, the current sub contents are not strictly followed. Sub sections under this module are well addressed. Each of the section of the module were concluded by post training assessment questions and take-home message. In addition of the sections of the module, record keeping and potential risk factors and mitigation strategies of sheep and production business is addressed. The target group for this training module are youth agri-business entrepreneurs preferably jobless young women.

The Agriculture-focused Dignified Employment for Youth (ADEY) program is implemented by the Ethiopian Agricultural Transformation Institute in partnership with the Mastercard Foundation to enable 611,343 inclusive and dignified work opportunities for young women and men and support youth entrepreneurship, employability, and sustainable livelihoods in the agribusiness sector.

INTRODUCTION

Sheep and goats have short generation cycles compared to cattle, for instance. They also give twines and triplets in most parts of the country where feed shortage is not a problem. Relative to cattle, small land and capital are required to start a sheep and goat production business. These animals tolerate stresses and drought than cattle. The small feed and space requirement of these animals makes them more suitable for business. There are no religious or cultural restrictions or taboos on the consumption of mutton and goat meat. A sheep or a goat could be slaughtered at a household level and consumed within a short period and do not require preservation facilities like refrigerator. Such characteristics of sheep and goats make them a more suitable business for anybody including youth entrepreneurs. Domestic and export markets could be targeted while engaging in the sheep and goat business.

Youth unemployment rate in Ethiopia was about 27.2% which was more pronounced for female youths (35%) than male youths (17.2%). The unemployment rate prevailed in Ethiopia was a higher than the general unemployment rate (18%). Rural youth unemployment poses a significant challenge in Ethiopia, jeopardizing the country's economic development. The majority of young people depend on subsistence farming for their livelihoods. However, the availability of land is diminishing due to population growth and the fragmentation of plots. Additionally, high levels of underemployment and landlessness further exacerbate the situation. As a result, many rural youths migrate internally to cities or abroad in search of work. To address this issue, effective policies are crucial, focusing on obstacles such as landlessness, inadequate infrastructure, financial exclusion, and the lack of rural job opportunities.

Jobless youth could be engaged in the sheep and goat production business either in groups or individually. However, some basic knowledges and skills are required for any youth showing interest to engage in either sheep or goat production business. Hence, this training module contains principles and skills a youth or group of youth entrepreneurs are required to be equipped with.

Training Methodology

Training methods: Lecture, demos, pre-and post-assessment, online self-paced, interactive learning, group discussion.

Training materials: Weighing balance, tape meter, flip chart, notebooks, pen/pencil, computer, projector, video on some portions, flip charts, markers, etc.

Target participants: Youth agri-business entrepreneurs preferably jobless young women.

Total time required:

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SECTION 1: SITE SELECTION FOR SHEEP AND GOAT PRODUCTION BUSINESS

Overview of the section

Under this section details of appropriate site selection is discussed. How far the site of sheep and goat production should be particularly from residents and water source are briefly presented. The manure management systems are also entertained under this section

Learning Outcomes

- Information on the criteria of site selection for sheep and goats production business provided.

Duration: 2 hours

Learning question

- At what distance a sheep and goat production business farm should be established from residential areas?
- How the greenhouse gas emission from sheep and goat farm be reduced?

1.1 SELECTING APPROPRIATE SITE

Selecting an appropriate site for sheep and goats' production is very important. The sites should be judged from the viewpoint of distance to neighboring residences, the direction of prevailing winds, topography, and soil types.

- Start a sheep and goat production farm at a relatively distant place from inhabited areas. It is advisable to start at about 1000 m away from residential areas. This will enable for minimization of residents' complaints that could emerge from these sheep and goat farms particularly the manure of sheep and goat.
- The suitable distance from water source: water sources for sheep and goat production shall be at about 600 m from the farm. However, if the water sources are pipe-based and groundwater, which could be made available at the farm gate.
- The suitable slop of land for sheep and goat farms should be about three percent.
- Consider marginal lands for sheep and goat production farm if the land access is limited
- Make the sheep and goats production facilities out of your neighbors' sight. Construct a tree or other visual barrier to shield the operation.
- Consider the direction and strength of the local winds in constructing the small ruminant production houses.

1.2 MANURE MANAGEMENT

Adult sheep or goats could produce about 2.5 to 3 kg of fresh manure per day. Therefore, this manure shall be properly managed within the farm of small ruminants. The ideal storage site for solid manure is a roofed shade with an impermeable floor (e.g. concrete). Underground pit is also considered. Dry manure can be stored in solid form in stockpiles; however, the piles should be covered. Manure storage structures or sites should be located to minimize odor nuisance to neighbors as well as in such a way that it minimizes the greenhouse gas emissions.

Post assessment questions

- What is the appropriate site for sheep and goat production business?
- What is the slop of floor for sheep and goat production?
- How much manure is produced by a mature sheep and goat monthly and annually?
- Can you disaggregate this into feces and urine?

Take away message

Careful selection of appropriate site and waste management are key elements of sheep and goat production business.

SECTION 2: FOUNDATION FLOCK/STOCK SELECTION

Overview of the section

Acquisition of base flock or stock is very important in sheep and goat production business. The animal attributes including breed age, color, behavior and growth are addressed in this overview.

Learning outcome

- Youths and any interested individual or group agr-business entrepreneurs familiarized with animal attributes to be considered while selecting base flock/stock for sheep and goat production business.

Time required: 3 hours

Learning question

- Is there any superior breed of sheep and goat for agri-business entrepreneurs?
- What is the importance of starting with elite parents in the case of sheep and goats production?
- How do you purchase your foundation flocks

2.1 ANIMAL ATTRIBUTES: BREED, AGE, COLOR, BEHAVIOR, GROWTH

Sheep and goats in Ethiopia have high diversity across different agroecology. Jobless youths can be grouped systematically on sheep and goat production business. The process of identifying and delivering genetically superior breeding animal for both female and male stocks from local populations is crucial for the sustainability of the business. It is better if the businessman started with animals which has a full history related to ewe fertility, lambing rates, prolificacy, and pre-weaning survival rates). The following criteria are used for establishing a base flock to start a sheep and goat business.

Breed: acquiring male and female animals is mandatory as a base stock. The selection of sheep and/or goat breed types is based on availability in the area and market preferences. Select a breed which is superior in terms of production and productivity. Select these breeds which grow fast and reach their expected weight in a short period of time. Select those breeds that can adapt to the climate where your farm is located.

Color: black coat color is not preferred by consumers in most parts of the country, so profit margins may drop. Any other color could be considered other than black or mix of colors having black in it.

Age: the age of animals is determined using dentition, if the animals are not bought from farm that keeps record. Hence, it is advisable to have knowledge on hereunder points:

- Productivity and price of animals increase up to a certain age level and then decrease again at an older age.
- As the age of the animal advances (after certain points) prolificacy, mothering ability, and meat qualities are decreased.
- Ewes/does with in an interval of 3-5 parities are well productive than below and above.
- Rams/buck less than 15 months has high demand at export and high-ended domestic hotels
- Hence, culling of aged animals from farms increases the production and profit margin.

Behaviors: docile animals are more suitable than aggressive animals. Aggressive animals are easily stressed. Animals prone to stress are less productive.

Growth: the best merit of small ruminant production over large ruminant production is the short generation interval. Selecting fast-growing animals is very important.

Post assessment questions

1. Which parity of sheep and goat are suitable for sheep and goat production business establishment?
2. How do you determine the age of sheep and goat?
3. What is the importance of selecting docile animals than aggressive ones?

Take home message

- Selecting fast growing and breeds of sheep and goats with docile behavior is important in sheep and goat production business.

SECTION 3: FEEDS AND FEEDING SHEEP AND GOAT UNDER PRODUCTION

Overview of the section

The potential feed staff used for sheep and goat production, the nutrient requirement for maintenance and production, feeding of sheep and goat of different age and of different production status are addressed under this section. In addition, water source and requirements for sheep and goat production are discussed.

Learning Objectives

- Agri-entrepreneurs familiarized with different feeds staffs used for sheep and goat production,
- Agri-entrepreneurs differentiate nutrient requirement of sheep and goat for growth.

Time required: 5:00 hrs.

Learning question

- List energy source feeds of sheep and goat!

3.1 FEEDS FOR SHEEP AND GOATS AND THEIR FEEDING

Feeds are classified according to the amount of specific nutrients they supply. Two main classes of feedstuff are roughages and concentrates.

Roughages: These are bulky feeds containing relatively large amounts of poorly digestible material, that is, more than 18% crude fiber. They can be of two categories, namely dry (contain only 10 to 15% moisture) and succulent (containing up to 75% moisture) based upon their moisture content.

Succulent roughages could be:

- Pasture
- Cultivated fodder crops
- Tree leaves
- Root crops
- Silage

Dry roughages: Hay and crop residues fall in this category. Consider the Table (1) nutrient contents of different feed staff while feeding sheep and goats.

- There are many feeds the sheep and goats like. Here are some good feeds that can be used:

Sweet potato vines

- Sweet potatoes are a good crop to plant because it gives tubers for the family to eat and the leaves can be fed to the sheep and goats. The favorite food of goats can be planted beside river beds, steep hillsides, and steep areas along roadside edges.

Napier grass

- Napier grass (Pennisetum purpureum) is an important carbohydrate-rich fodder grass, also known as "elephant grass". Napier grass is propagated easily. It has deep roots, so is fairly, drought-resistant. The tender, young leaves, and stems are very palatable for livestock. Napier grass grows very fast. Plant Napier along river beds, along soil terraces, fence/row lines, road reserves, etc. Good Napier needs manure and top dressing with a fertilizer and needs weeding. Cut Napier often so it is easy for the goats to eat and digest. Where new fields are being planted mixed cropping with desmodium improves the quality of the fodder.

FEED STAFF CLASS	DM (%)	CRUDE PROTEIN (%DM)	ME MJ/KG DM
Straws / stoves	3–4	5.5–7.5	88–92
Cereals	9–11	12–14	89–91
Grasses	10–22	9–12	20
Oilseed cakes	22–50	12–14	89–91
Green legumes	17–24	10–12	15–27

Table 1. Nutrient composition of feeds used for sheep and goats.

Nutritional Requirements: Sheep and goats do not require specific feedstuffs. They require energy, protein, vitamins, minerals, fiber, and water. The feed requirement differs by the purpose of feeding; whether it is for maintenance or production

Energy

- Energy makes up the largest portion of the diet and is usually the most limiting nutrient in sheep diets. Carbohydrates, fat, and excess protein in the diet all contribute towards fulfilling the energy requirements of sheep. Carbohydrates are the major sources of energy. Concentrates (grain) contain starch, which is a rich source of energy.

Protein

- Protein is usually the most expensive part of the diet. Since the rumen manufactures protein from amino acids, the quantity of protein is more important than the quality of protein in a goat or sheep's diet. Protein requirements are highest for young, growing kids/lambs that are building muscle and lactating does/ewes that are producing milk proteins. Though levels vary, grains are usually low in protein. Urea is the most inexpensive source of protein or dietary nitrogen. Other sources of protein include soybean meal, sunflower meal, cottonseed meal, whole cottonseed, whole soybeans, peanut meal, canola meal, fishmeal, and alfalfa pellets. Legume hays, when harvested in the early to mid-bloom stage are intermediate sources of protein.

Calcium and phosphorus

- Calcium (Ca) and phosphorus (P) are interrelated in the development and maintenance of the skeleton. Deficiencies may result in rickets. An imbalance of Ca and P in the diet can cause urinary calculi (solid particles in the urinary system) in male animals. The calcium in most forages is usually adequate to meet the needs of sheep/goats. Deficiencies of calcium most often result when high-grain diets are fed. The ratio of calcium to phosphorus in the goat/sheep's diet should be at least 2:1.

Vitamins

- Goats and sheep require vitamins A, D, and E. Vitamin A is absent in plant material, but is synthesized from beta-carotene. Vitamin D is required to prevent rickets in young animals and osteomalacia (soft bone disease) in older animals. B vitamins are not required in the diets of ruminants because they are synthesized in the rumen. Vitamin K is essential for blood clotting.

The most important practice for feeding mature animals is:

- Provide clean water throughout the day and night
- Fresh and clean forage is best
- Diverse feedstuffs ensure a more nutritious diet.

BODY WEIGHT	CONFINED	EXTENSIVE	MAINTENANCE	PREGNANCY
10	2.32	3.25	15	30
20	3.91	5.47	26	50
30	5.3	7.42	35	67
40	6.58	9.21	43	83
50	7.78	10.89	51	99
60	8.92	12.49	59	113

Table 2. Daily maintenance requirement estimates for energy and digestible crude protein (DCP) for sheep and goats based on their body weights

MINERAL	REQUIREMENT	TOXIC LEVEL
Copper	7–11	25
Molybdenum	0.50	10
Cobalt	0.10–0.20	10
Manganese	20–40	1000
Zinc	20–33	750

Table 3. Micro-mineral requirements and toxic levels.

3.2 FEEDING RAMS AND BUCKS

- Give more feed two months before the ram or buck has to serve
- When a ram or buck is being used a lot to serve ewe or does, separate it from other sheep or goats for about 2-3 hours per day to allow it time to eat and rest.
- Offer an increased amount of clean water throughout the day/night for breeding males just because of their increased activity.
- Ensure access of breeding males to a mineral lick or access to lose minerals at any time. This will help keep balanced electrolyte levels.

Figure 1. Mineral leak

3.3 FEEDING BREEDING AND LACTATING EWES AND DOES

- One month before mating, feed and water ewe, and does very well so as she is in the best of health. If she is very well, she is more likely to have twins or even triplets.
- Feed concentrates on ewes and does just before the ewes and does are served by the ram and buck.
- Increase feed gradually for 2 months up until the ewe and doe give birth
- Continue feeding concentrate while she is giving milk
- Mineral licks hasten coming heat
- Always have fresh water for sheep and goats to drink at any time.

3.4 FEEDING DURING PREGNANCY

- The nutritional needs of pregnant females change throughout the pregnancy.
- Avoid vaccinating and pronounced changes in feeding practices during the first 30 days of gestation.
- Provide slightly above maintenance level of nutrition for ewes for the first 15 weeks of pregnancy to avoid taxomia and milk fever.
- Nutrition in late pregnancy affects the size and vigor of kids/lambs and the milk-producing ability of the doe/ewe.
- During the first two months after lambing or Kidding Supplement ewes and does with at least 200 g/day of concentrate with half in the morning and the other half in the evening.
- Make this addition gradually so as not to disrupt her gastrointestinal system.
- Reduce concentrate supplement to 100 g/day after the 3rd month of lambing or kidding

3.5 FEEDING LAMBS AND KIDS AND YOUNG STOCK

- Ensure that newborn lambs and kids suckle colostrum within 24 hours.
- Leave the newborn with mothers in the first 24-48 hours after being born, but with some supervision, to make sure the newborn can nurse and receives colostrum.
- For one week, provide lambs and kids with small quantities of good clean feed e. g. sweet potato vines, tree legume leaves or natural tree leaves.
- Make sure that lambs and kids continue with milk for the first three weeks and 3 to 4 months with milk and fresh mixed fodder.
- The young stock should be fed on fresh, highly nutritious mixed fodder
- Give mineral blocks at this stage

3.6 WATER SOURCE FOR SHEEP AND GOAT

- **An adequate source of water:** Water is very important for small ruminant production. Water participates in nearly all body functions.
- Provide 4 to 14 liters per day depending upon its physiological state and the environmental conditions.
- Beware that the water requirement for sheep and goats depends on:
- **The type of feed the animals eat:** mature sheep or goats fed dry feed drink more water than animals fed wet feed, for example, an animal weighing 20 kg can drink an average of 4 liters of water. The higher the amount of salt in the feed, the greater the availability of water for the animals, and the greater the productivity of the animals. However, the amount of salt in the ration of animals should not surpass 2% of the total dry matter of the feed of the animals.
- **The local weather:** Generally, animals require a higher amount of water in hotter months of the year than in colder months. Unsheltered animals have higher water consumption than sheltered animals. Because they need a lot of water to withstand the heat of the environment.
- **The type of animal:** Animals that are heavy and large in body size need more water than animals that are low in weight and small in body size need, as they eat more dry roughage.
- **The temperature of the water:** Do not give very hot or cold water to sheep and goats. Shelter the areas of drinking troughs where the ambient temperature is high.
- **The purity of the water:** Make sure that the water supplied to animals is clean. If there is dirt in the water, animals will not want to drink it. Make sure that water used for drinking by animals is free of salt and harmful chemicals or minerals. One of the things that contaminates water is when the animal tries to drink from the water through with feed within its mouth. Therefore, locate water troughs away from feeding troughs.

Input required: different feed staffs for demonstration.

Post assessment questions

1. Mention energy and protein source feeds for sheep and goat production!
2. Why mineral is mandatory in sheep and goat production. How much litre of water is needed for mature sheep and goat for a month and for a year?

Take home message

- Feeds and feeding are very important segment of sheep and goat production business. Water and basal feed shall be available to sheep and goat in production each time.

SECTION 4: SHEEP AND GOAT SELECTION, MATING METHODS AND BREEDING SOUNDNESS EVALUATION OF RAMS AND BUCKS

Overview of the section

The sheep and goat 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. Estrous detections, hand and pen mating methods and breeding soundness evaluations are assessed under this section in addition to the selection and culling of sheep and goats production business.

Learning outcome

The following points indicated:

1. The selection and culling criteria of sheep and goats
2. The signs of heat detection in sheep and goats,
3. The mating ratio and mating methods in sheep and goat production,
4. The breeding soundness evaluation criteria for rams and bucks.

Time required: 3 hours

Learning question

- What traits do you consider while selecting the sheep and goats for production?
- How do you detect whether female sheep or goat are ready for breeding? Discuss the mating methods you know.

4.1 SELECTION AND CULLING STRATEGIES FOR SHEEP AND GOAT PRODUCTION

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

Selection tools: the following are some tools that could help sheep and goat producers' producers achieve their goals in genetic improvement and profitability in sheep and goat meat production or live sheep and goat 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;
- Record mortality and morbidity.

Traits to consider when selecting breeding stock:

Growth

- Birth weight
- Weaning weight (90-day weight)
- 6-month weight
- Yearling weight
- Pre-weaning average daily gain (ADWG)
- Post-weaning ADWG
- Feed efficiency
- Body conformation

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
- Lambing interval

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

Health

1. Mortality and morbidity rates
2. Tolerance or resistance to parasitism
3. Disease resistance

4.2 ESTRUS DETECTION

Signs of a doe/ewe in heat include the following:

- paying attention to or seeking out the buck/ram
- decreased appetite
- increased restless behavior
- frequent urination
- increased vocalization
- mounting and/or allowing mounting with other females
- a swollen vulva with the presence of mucus (clear during early estrus, thicker and opaque later in estrus)

4.3 MATING METHODS

The profitability of goat and sheep operations is largely reliant on successful reproduction programs. The number of kids and lambs raised and weaned successfully ultimately determines the profitability of the operation. Does has an estrus cycle of 18 to 22 days, and they display estrus for 24 to 48 hours. Ewes have an average cycle length of 17 days, with most being between 14 and 20 days. They display estrus for 24 to 36 hours. The gestation period is 5 months, and twins are common, **though single and triplet births are not rare.** Female kids and lambs may enter into the breeding flock at 5 to 10 months of age, depending on breed, as long as they have reached approximately 60 to 70 percent of mature body weight and are in good condition. Breeding too early can negatively impact their reproductive lifespan and milk-producing abilities. Overfeeding to achieve a larger body weight earlier also has negative consequences on reproductive lifespan and milk-producing ability and should be avoided. Buck and rams are generally fertile by 5 months of age or earlier. In some breeds, puberty is reached at a young age; it is therefore important to separate doe/ewe and buck/rams at an early age.

It is critical to decide on a mating system that fits your production plan. There are four main breeding systems commonly employed including hand mating, pen breeding artificial insemination, and out-of-season breeding in the goat and sheep industry. For simplicity, consider the first two.

Hand mating: This method involves selecting the buck/ram for the doe/ewe and mating them. This method has the advantage of allowing the exact breeding date to be recorded. It is, however, quite labor intensive, requiring the manager to accurately identify the doe/ewe in heat and facilitate the mating.

Pen mating: in pen breeding, the buck/ram is put in a pen of does/ewes to facilitate their mating. This method relies on the male to detect females in heat. It is significantly less labor-intensive when compared to hand breeding. Pen breeding has the disadvantage of resulting in a less certain day of breeding record. Also, if more than one female comes into heat on the same day, the male may single out one female and miss the others. There may also be the requirement of follow-up pregnancy ultrasounds to determine the female's due date. Additionally, the age of the male must be taken into account when determining breeding densities. A yearling male should be placed with 10 to 25 females, while a more mature male can be placed with 15 to 40 females.

4.4 BREEDING SOUNDNESS EVALUATION

Check the following general requirements for breeding ram or bucks before using them for mating.

- Good general health
- Good conformation
- Normal genital tract
- No previous history of infertility
- Body condition score of 3 to 4
- Scrotal circumference: 30 cm or more for <14 months of age, 33 cm or more for 14 months or older

Post assessment questions

- List the traits to be considered during the selection and culling of sheep and goats in the production process
- List the signs of heat detection in sheep and goats.
- Differentiate hand and pen mating methods.
- What are the criteria for breeding soundness evaluation of rams.

Take home message

- Knowing the selection and culling criteria and signs of heat and mating methods are important phenomena in sheep and goat production business.

SECTION 5: HEALTH MANAGEMENT AND HOUSING OF SHEEP AND GOATS

Overview of the section

- The specific topics addressed under this section are the overall health management (vaccination and treatment) of sheep and goat production. Symptoms for economically important diseases are also given.

Learning outcome

- Overall health and housing aspects of sheep and goat production provided.

Time required: 3 hours

Learning question

- What are the economically important diseases of sheep and goat in your area?
- Do all sheep and goat require similar area?

Input required

Animal health equipment and medications, locally available materials for house construction.

5.1 HEALTH MANAGEMENT OF SHEEP AND GOATS

Treatment: The management, diagnosis, and care of a patient to combat disease or disorder.

Vaccine: the effective way of protecting animals against harmful diseases, before animals come into contact with disease.

Disease: state in which normal physiology of animal functions are disturbed or altered at cellular, tissue, organ, or whole organism level. There are some economically important diseases in sheep and goats in Ethiopia.

DISEASE/PARASITE	SYMPTOM	VACCINE CYCLE/TREATMENTS	REMARK
Deworming for GIT parasite	Weight loss, diarrhea, anemia, poor growth rate, poor hair coat	Twice a year	Follow appropriate dose and broad spectrum anti-helminthic
External parasite	Weight loss, irritation, hair loss, wound, inflammation of the skin and soft body, etc	Twice a year	Spray with the appropriate dose during a mixture
Brucellosis	Fever, Malaise, Fatigue, Night sweat, Muscle and joint pain, abortion	Once a year	Given for apparently healthy animal
Peste des petits ruminants (PPR)	pyrexia, oculo-nasal discharges, necrotizing and erosive stomatitis, gastroenteritis, diarrhea and bronchopneumonia	Confers immunity for 1year	Given for apparently healthy animal
Sheep and Goat pox	Fever, Cutaneous nodulation, or visceral eruption	12 to 30 months depending on the strain employed	Given for apparently healthy animal
Contagious caprine pleuropneumonia (CCPP)	Severe respiratory distress, nasal discharge, coughing, dyspnea, pyrexia, pleurodynia and malaise	Confers immunity for 1year	Given for apparently healthy animal
Anthrax	Septicemia, Splenomegaly, gelatinous inflammation of subcutaneous and subserosal tissue	Once a year	Given for apparently healthy animal
Pasteurellosis	Fever, Listlessness, poor appetite, and sudden death	Twice a year	Withdrawal time 42 days
	Abscessation, wound, or skin abrasion	Once a year	Given for apparently healthy animal
Caseous Lymphadenitis	Inflammation of the skin horn junction, Ulceration and Necrosis	twice a year	Withdrawal time 21 days
Footrot	Exudation, Matting of the hair/wool, crust, and thick scabs	Once 1-3 yearly depending on the vaccine type	Withdrawal time 60 days.
Dermatophilosis	Exudation, Matting of the hair/wool, crust, and thick scabs	twice a year	Withdrawal time 21 days

Table 4. Ethiopian treatment calendar for the Small Ruminant Value Chain sites

5.2 HOUSING OF SHEEP AND GOATS

Housing required for sheep and goats varies by climate, season(s) of lambing, and management preferences. If lambing will occur during periods of extreme weather, more elaborate housing is usually required. If lambing will occur on pasture during periods of mild weather, simple shelters may be enough.

Lambing percentages are usually higher when shade lambing is practiced. Housed sheep have lower nutritional requirements, whereas sheep kept outside have fewer respiratory problems.
In addition, most operations need facilities where they can store feed, bedding, and equipment. Hay stored in a barn or shade will maintain its quality better than hay that is stored outside, even if the hay is covered. Equipment will last longer if it is housed under a roof. An area is needed to quarantine new animals and keep sick ones. Separate housing is often needed for sires, young stock, and pregnant and sick animals. However, housing costs can add significantly to the investment costs of the enterprise.

Procedures in constructing houses for sheep and goat production

- Construct a simple shade with low-cost housing materials for sheep and goat
- Shades with mud floors are suitable for most of parts of the country except where high rainfall is observed.
- Construct in an elevated area to prevent water stagnation.
- Make the floor of the shade firm and can absorb water. Construct the floors in such a way, that they can be easily cleaned.
- Construct the shade with proper ventilation.
- Grow fodder trees around the shed, which can act as a source of feed.
- Make available clean drinking water.
- Make sure that the walls of the shade are free from cracks or holes while constructing.
- Construct an open-type housing with a covered area (for shelter of animals during the night) and run space.
- Construct cover space only when animals are sheltered during the night time and grazed during the day time.
- Construct the pen and run system of housing when the animals are housed intensively.
- Constructing a comfortable house east-west orientation with generous provision for ventilation /air movement to dry the floor will be suitable.
- The length of the shelter a shelter has no limit, however the breadth of the shed should not exceed 12 meters and the optimum breadth of the shelter is 8 m.
- Target 2.5 m height of wall and 3.5 m of ridge.
- Construct separate feeder and water troughs for concentrate feeds, green fodders, and water

Figure 2. House types for sheep and goats (Modern, open, and loose houses, from right to left, respectively)

Floor space requirement for sheep and goats: The floor space requirement could vary by age and type of animals. The following floor space requirement could be considered for sheep and goat houses (Table 5- 7).

AGE GROUPS	COVERED SPACE(SQ.M)	OPEN SPACE (SQ.M)
Up to 3 months	0.2 - 0.25	0.4 - 0.5
3 months to 6 months	0.5 - 0.75	1.0 - 1.5
6 months to 12 months	0.75 - 1.0	1.5 - 2.0
Adult animal	1.5	3.0
Male, Pregnant or lactating ewe/doe	1.5-2.0	3.0 - 4.0

Table 5. Floor space requirement for sheep and boats by age groups

TYPES OF ANIMALS	MINIMUM FLOOR SPACE PER ANIMAL (SQUARE METER)
Ram or buck in groups	1.8
Ram or buck – individual	3.2
Lambs or kids - in group	0.4
Weaner in groups	0.8
yearling or goatlings	0.9
Ewe or doe in groups	1.0
Ewe or doe with lamb/kid	1.5

Table 6. Floor space requirement per animal by type of animals

TYPE OF ANIMAL	SPACE PER ANIMAL (SQUARE CM)	WIDTH OF WATER TROUGH(CM)	DEPTH OF WATER TROUGH (CM)	HEIGHT OF INNER WALL OF WATER TROUGH (CM)
Sheep and goat	40 – 50	50	30	35
Kid/lamb	30 – 35	50	20	25

Table 7. Floor requirement for feeding and watering sheep and goats

Post assessment questions

- Which one of the following is right?
  A. Disease prevention is better than disease control.
  B. Diseases control is preferable than disease treatment.
- Calculate the area required for the production of 50 heads of sheep/goat!
- Mention the advantages and disadvantages of individual pen and group housing.

Take home message

- Proper housing could entail not only good health of sheep and goat but also optimum production.

SECTION 6: RECORD KEEPING

Record keeping: viable performance records of sheep/goats are used to make effective management decisions. A good farm record-keeping helps the owners to do realistic forecasting. It provides valuable information on which methods work and predicts price changes of inputs and products from expenditures and sales records kept from previous years. Example breed, mating methods, birth weight, weaning, age of marketable, parity, calving interval, age of first calving, cost of input used, health issue, financial report, etc

Rearing market-oriented small ruminant production: The first thing to start a new sheep or goat enterprise is what type of animals to rear.

a. Based on the stocks you planned to commence; prepare land, labor, capital, feed, house, water, and other management.
b. After determining the breed to rear both males and females in the recommended ratio (1:20 male-to-female)
c. Raising sheep or goats for profit can be a satisfying enterprise mostly for meat in Ethiopia. Sometimes reared for milk (Afar) and wool (Manze sheep).
d. Producers who evaluate growth traits should adjust weaning weights to account for the sex of the lamb or kid, the age of the dam, and birth and rearing type.
e. Rearing type refers to how to lamb or kid was raised: single, twin, or triplet.
f. It is better to get similar animals to supply animals to markets sustainably.
g. However, there are some management skills that sheep or goat producers should have to be successful.

Selecting outstanding animals: To commence small ruminant production agribusiness selecting potential breeds from the country and the right animals within breeds is profitable.

a. It's better if the first selected animal's history (pedigree) is well documented.
b. There are two methods to select livestock: animal performance and visual appraisal.
c. Animals should first be selected on performance and then the higher performing animals should be evaluated visually.
d. Starting with similar ages is important to manage animals easily and synchronize with market demand.

Culling undesirable animals: If the animal might be abnormal, dwarf, or undesirable to enhance farm efficiency.

Sustain undesirable animals on the farm minimizes farm profit, increases feed cost, and labor costs, and increases undesirable animals in the farm. Therefore, timely culling of undesirables increases farm efficiency and needs knowledgeable farm managers.

Selling: Market-oriented small ruminant production is fetched animals purposively.

The animals are produced targeted for specific markets both export and domestic market. The animals are graded for specific markets. Targeting national holidays is the best.

SECTION 7: FINANCIAL FEASIBILITY

Overview of financial feasibility

Financial feasibility describes whether agri-business is financially viable. It involves determining initial investment (resource) requirement to start the business, estimating production cost, operation expenses, and sales revenue. These are used to determine the initial investment requirement, profitability of the business, break-even point (minimum level of production) to attain the profit zone, and pay-back period (number of years required to recover initial investment). These series procedures are used to make wise decisions to accept or reject the agribusiness investment alternative.

Learning outcomes

Trainees equipped on:

- How to determine initial investment requirement to start the business
- How to estimate periodical production costs, operating expenses, and sales revenue of the business
- How to determine profitability and cash flow of the business
- How to calculate break-even point (minimum level of production) to recover total cost and generate profit.
- To calculate payback period (time requirement to recover initial investment and
- How to make decision to accept or reject the investment alternative

Training Method: Brainstorming, presentation, group discussion, exercise

Duration: 4:00 hours

Learning question

- Do you know how to determine financial feasibility of the given specific agri-business to make wise investment decision?

7.1 INITIAL INVESTMENT

1. Initial investment is the minimum capital requirement to start the business.
2. Example of initial investment requirement to start seed production business includes tools and equipment, seed storage, land, tractor, working capital, etc

DESCRIPTION	TOTAL COST	REMARK
Housing related costs		
Equipment required for fattening		
Production animal purchase costs		
Working capital		
Total		

Table 8: Template to estimate initial investment requirement for sheep and goats fattening agri-business

7.1.1 LONG-TERM INVESTMENT

- Long-term investment in agri-business involves all asset requirement for the business which can serve for more than one year.
  - Example tools and equipment, storage for feeds, land for housing construction, etc

TYPES OF INVESTMENT	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL COST

Table 9: Template to calculate total cost for acquisition of long-term investment

7.1.2 Working Capital

Working capital for the planned sheep and goats agri-business includes all payments requirement for day-to-day operating activities such as production costs and operating expenses.

Example

- Production costs include cost of fattening animal purchase, roughage and concentrate purchase for these animals, vaccination and medication costs, labor cost etc
- Operating expenses includes administrative salary, sales commission, promotion, etc

Working capital excludes long term investments such as housing for sheep and goats under fattening, tools and equipment, land, and etc.

A. Production cost

1. Production costs are a key component in any agri-business including in sheep and goats.
2. It includes all costs associated with production including value addition to make the product ready for sale.

TYPES OF COST	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL COST
Roughage feeds	Bales			
Concentrate feeds for supplementation	Qtl			
Vaccines	Vials			
Different medicaments	Litter			
Medicines for ecto and endo parasites				
Different medicine types to treat sick animals				
Caring sheep and goat in production	Hectare			
Total				

Table 10: Template for estimating production cost per hectare for onion seed production

B. Operating expenses

- Operating expenses are all costs not directly associated with production.
- They are common costs incurred for administrative and selling activities.
  - Example administrative salary, promotion cost, sales commission, transport cost to sale, etc

TYPES OF COSTS	TOTAL COST
Administrative salary	
Utility (electric, water, tele.)	
Interest	
Promotion	
Sales commotion	
Tax	
Etc…	

Table 11: Template to estimate operating expenses for agri-business

7.2 ESTIMATED PRODUCTION AND SALE REVENUE

- Production volume is the main source of revenue for the agri-business to generate profit.
- Producers should determine the estimated average production volume from the planned production season.

Formula -1
Tolal production volume = Total number of sheep or goat bought at initial into production

- After determining the estimated volume of production, it is possible to determine the expected sales revenue for the planned production.

Formula -2
Total sales revenue = Tolal production volume X unit selling price

A	B	C	D	E	F
TYPE OF ANIMALS	TYPE OF SEED	ESTIMATED PRODUCTION	TOTAL PRODUCTION	ESTIMATED SELLING PRICE/UNIT	TOTAL SALES REVENUE
Sheep	Male				
	Female				
Goat	Male				
	Female				

Table 12: Template for estimating volume of production and sale revenue

7.3 PROFIT AND LOSS STATEMENT

1. The primary objective of any business is to generate profit.
2. Profit and loss statement is the main tool to calculate profitability of the business.
3. It is used to accept or reject the investment based on estimated profit.

Formula -3

a. Gross profit = Total sales revenue – Cost of goods sold

b. Net profit = Gross profit – Total operating expenses

DESCRIPTION		
Sales Revenue		
• Sale of male sheep and goats		
• Sale of female sheep and goats		
Total Sales revenue		
Costs of goods sold		
• Animal fattening cost		
• Animal fattening animal purchase cost		
• Ending inventory		
Cost of goods sold		
Gross profit		
Operating Expenses		
Salary if any		
Utility (electric, water, tele.)		
Interest		
Promotion		
Depreciation		
Tax if any		
Total operating expense		
Net profit		

Table 13: Template for profit and loss statement preparation

7.4 BALANCE SHEET

Balance sheet used to know the total resource owned, amount of claim by creditors and amount of owners' equity

- Balance sheet contains asset, liability, and own capital
- Assets are all resources available for use or for sale
  - Example cash, inventory, warehouse, land, equipment etc
- Liabilities are all debts obtained from bank, microfinances, individuals or others
- Own equity/capital involves own/member contribution, grant/donation, etc

Formula -4
Total Asset = Total liability + Total own capital

DESCRIPTION		
Asset		
Current asset		
Cash		
Inventory		
Total current asset		
Fixed asset		
Tools and equipment		
Warehouse		
Land		
Total fixed asset		
Total asset		
Liability and Capital		
Liability		
Bank loan		
Debt from relative		
Total liability		
Owners capital		
Own capital contribution		
Grant/donation		
Total owners' capital		
Total liability and capital		

Table 15: Template for balance sheet preparation

7.5 CASH FLOW STATEMENT

Cash flow is all cash inflow and outflow for any purpose in the business operation

Example:

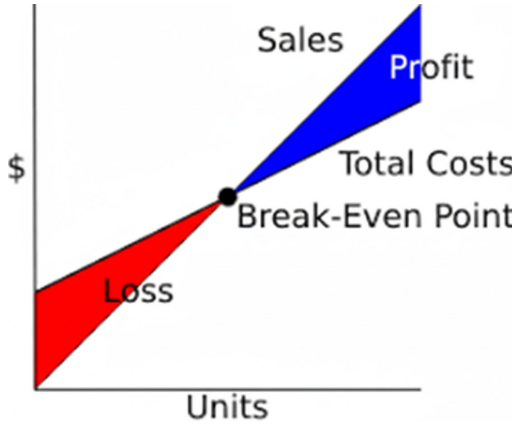
a. Cash inflows include sale of seed/seedling, debt obtained from banks, members capital contribution, etc
b. Cash out flow includes purchase of input, payment for construction, repayment of debt, payment for salary, etc

Formula -5
Beginning cash balance + total cash inflow = ending cash balance + total cash out flow

DESCRIPTION	AMOUNT OF OUTFLOW	AMOUNT OF INFLOW
Owners' investment		
Debt		
Grant		
Sale of seed		
Warehouse construction cost		
Purchase of equipment		
Purchase of input		
Cash Operating costs		
Ending cash balance		
Total		

Table 16: Template for cash flow statement preparation

7.6 BREAK EVEN ANALYSIS



- Break even analysis is used to determine the minimum level of production to cover total cost
- At break-even point no profit no loss
- To make profit, level of production and sale should exceed/greater than breakeven point.
- Fixed costs are fixed in total amount regardless of increase/decrease in volume of production.
  - Example depreciation, warehouse rent, administrative salary, promotion cost, etc
- Variable costs varied in total in response to increase/decrease in level of production
  - Example production costs, packaging cost, loading and unloading, etc

Formula -6
Break-even point = Fixed cost/ (Unit selling price – unit Variable cost)

7.7 PAYBACK PERIOD

Payback period is used to determine number of years/periods it takes to recover initial investment.

Formula -7

a. When the annual profit of the business is uniform/equal
   Payback period = Initial investment/annual profit
b. When the annual profit fluctuate/vary from year to year
   Payback period = # of year before coverage + uncovered amount/profit of the next year

Post assessment questions

1. Which of the following is part of working capital
   a. Purchase of feeds,
   b. Purchase of initial animals for fattening,
   c. Transportation cost,
   d. Purchase of chemical
2. Which of the following should include in profit/loss statement
   a. Purchase of tools and equipment,
   b. Sales revenue,
   c. Debt,
   d. Owner investment
3. Which of the following is variable cost
   a. Purchase of animals,
   b. Administrative salary,
   c. Depreciation,
   d. Rent of storage

Key message

- Analyzing financial feasibility of agribusiness enables to pre-determine the applicability of the business in terms of initial investment requirement, profitability, and sustainability.

Potential risk factors and mitigation strategies

Potential risks

- The reliance on genetics, nutrition, and husbandry practices
- Diseases that can limit production potential
- Stress factors impacting performance and productivity
- Poor nutrition causing reproductive and health problems
- Efficiency in converting feed into economically valuable products
- Feed as the largest expense in livestock production

Mitigation strategies

- Educating the young agribusiness entrepreneurs in goat and sheep science
- Supporting and pursuing innovative and translational research
- Preventing and treating diseases
- Facilitating technology transfer
- Developing sound agribusinesses

ANEXES

EWE RECORD							
Ewe Identification:		Breed:			Birth date:		
Sire:		Dam:			Type of birth:		
Birth weight:		Weaning weight:			Yearling weight:		
Comments (ease of birth, complications, etc.):							
Comments (purchase/sale information, temperament):							
FLOCK HEALTH RECORD							
Treatment Date (dd/mm/yy)	Animal or Pen Identification	Condition treated and/or signs	Product Name	Prescription (P) / Nonprescription (NP)	Dose	Estimated Animal Weight/ Number of A	Withdrawal Period for products
BREEDING RECORD							
Ram Identification:		Ram Breed:			Ram Birth Date:		
First day of breeding season (date ram turned out):		Last day of breeding season:			Total number of Ewes		
Lambing %: (total live lambs/total ewes exposed)		Average weaning weight (all lambs):			(current breeding season): Average market weight (all lambs):		
Comments:							
BREEDING STOCK MORTALITY/CULLING RECORD							
Animal ID		Animal Age	Date of death/ culling	Died on the Farm? (Y/N)	Reason for culling or suspected cause of death	Prior signs of illness (e.g. respiratory stress, off-feed, wasting, etc.)	Cause confirmed? (e.g. post mortem finding)

Annex 1. Recording format for sheep and goats production business

Ethiopian ATI

Agricultural Transformation Institute

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