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MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES

GOAT PRODUCTION MANUAL



THE NATIONAL AGRICULTURAL ADVISORY SERVICES (NAADS)

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Table of contents:

	Page
1. Chapter 1: Introduction	1
1.1 Background	1
1.2 Importance of goats	1
1.3 Comparison of goat farming to cattle.. .. .	2
1.4 Issues to note on grazing habits of goats	3
1.5 Potential and opportunities for goat farming in Uganda	3
1.6 Principles of goat farming	3
 2.0 Chapter 2: Breeds of Goats in Uganda	5
2.1 Introduction	5
2.2 Description of Goat breeds	5
2.3 Goat breeds in Uganda	6
 3.0 Chapter 3: Goat Production Systems and Nutrition..	9
3.1 Introduction	9
3.2 Tips on Feeding	9
3.3 Common grazing Systems in Uganda	9
3.4 Water	12
3.5 Mineral Salts	12
3.6 Common grasses and regumes	13
3.7 Supplementary feeding	15
3.7.1 Forage Supplements	15
3.7.2 Feed supplements	16
 4.0 Chapter 4: Goat Breeding and Reproduction	19
4.1 Introduction	19
4.2 Breeding Options	19
4.3 Principles of Goat breed selection	20
4.4 Selecting a good and healthy goat	21
4.5 Planning for Breeding	23
4.6 The kidding process	25
4.7 Requirements for kidding	26
4.8 Raising kids	26
4.9 General tips on goat breeding	27
 5.0 Chapter 5: Goat housing	28
5.1 Introduction	28
5.2 Types of houses	28
5.3 Principle features of Goat houses	28
 6.0 Chapter 6: Health and Hygiene	33
6.1 Introduction	33
6.2 Assessing heath and disease	33
6.3 Tips to remember about goat health	36
 7.0 Chapter Seven: Good Management Practices .	40
7.1 Introduction	40

7.2	Records Management	..	..	..	..	..	..	40
7.3	Animal Identification	..	..	..	..	..	..	42
7.4	Hoof trimming	..	..	..	..	..	..	44
7.5	Dehorning and Disbudding	..	..	..	..	..	..	44
7.6	Castration	..	..	..	..	..	..	45
7.7	Deworming	..	..	..	..	..	..	45
7.8	Measuring body temperature	..	..	..	..	..	..	46
7.9	Managing Diarrhoea	..	..	..	..	..	..	47
7.10	Goat weight estimation	..	..	..	..	..	..	47
7.11	Estimating the goat age	..	..	..	..	..	..	48
8.0	Chapter Eight: Management of goat waste & Environment							50
8.1	Introduction	..	..	..	..	..	..	50
8.2	Goat manure	..	..	..	..	..	..	50
8.3	Soil Fertilizers	..	..	..	..	..	..	50
8.4	Fish pond	..	..	..	..	..	..	51
9.0	Chapter 9: Basic Principles of Economics in goat Farming							53
9.1	Introduction	..	..	..	..	..	..	53
9.2	Efficiency of production	..	..	..	..	..	..	53
9.2.1	Productive efficiency	..	..	..	..	..	..	54
9.2.2	Reproductive efficiency of Goats	..	..	..	..	..	..	54
9.2.3	Industrial reproductive performance	..	..	..	..	..	..	55
9.2.4	Flock reproductive performance	..	..	..	..	..	..	55
9.3	Case study - Mpigi district	..	..	..	..	..	..	55
10	Chapter 10: Processing and Marketing of goats and goat products							57
10.1	Introduction	..	..	..	..	..	..	57
10.2	Milk and Milk products	..	..	..	..	..	..	57
10.3	Meat and carcass products	..	..	..	..	..	..	59
10.4	Skins	..	..	..	..	..	..	59
10.5	Marketing goats and goat products	..	..	..	..	..	..	60
10.6	Market Interventions	..	..	..	..	..	..	61
11.0	Chapter 11: Sustainable Goat development	..	..	..	..	..	..	62
11.1	Introduction	..	..	..	..	..	..	62
11.2	Group development	..	..	..	..	..	..	62
11.3	Key issues to information and technology transfer	..	..	..	..	..	..	63
11.4	Laws and policies affecting the goat industry	..	..	..	..	..	..	63
11.5	Assessment of goat management problems	..	..	..	..	..	..	64
References	..	..	..	..	..	..	..	65
Other contacts	..	..	..	..	..	..	..	66

Table of Tables

Table 1:	Comparison of Goat Cow and Human Milk Content	..	..	..	2
Table 2:	Shows different feed mixtures and the cost	..	..	..	16
Table 3:	Leguminous and Browse Species	..	..	..	17
Table 4:	Post harvest feeds, kitchen and food processing products	..	..	..	18

Table 5:	Common goat diseases / conditions	..	..	..	..	..	..	36
Table 6:	Identification records	..	..	..	..	..	..	40
Table 7:	Reproduction records...	..	..	..	..	..	..	40
Table 8:	Production records	..	..	..	..	..	..	41
Table 9:	Health records	..	..	..	..	..	..	41
Table 10:	Expenditure / Income records	..	..	..	..	..	..	42
Table 11:	Flock numbers	..	..	..	..	..	..	42
Table 12:	Body weight estimation using heart girth	..	..	..	..	..	..	48
Table 13:	Gross margin of 3 does and one buck in Mpigi District							56

Table of Figures:

Fig 1:	Goats with different colours	..	..	..	..	..	..	5
Fig 2:	Small East African	..	..	..	..	..	..	6
Fig 3:	Mubende goat	..	..	..	..	..	..	6
Fig 4:	Boer goats	..	..	..	..	..	..	7
Fig 5:	Alpine goat	..	..	..	..	..	..	7
Fig 6:	Toggenburg goat	..	..	..	..	..	..	8
Fig 7:	Saanen goat	..	..	..	..	..	..	8
Fig 8:	Galla showing browsing ability	..	..	..	..	..	..	9
Fig 9:	Goats in a night boma - extensive system of management	..	..	..	..	..	..	10
Fig 10:	Tethed goat	..	..	..	..	..	..	11
Fig 11:	A farmer in Masaka providing feed to her zero-grazing goat	..	..	..	..	..	..	11
Fig 12:	Goats drinking water in Masaka District	..	..	..	..	..	..	12
Fig 13:	Goats licking mineral block	..	..	..	..	..	..	12
Fig. 14:	Chloris gayana	..	..	..	..	..	..	13
Fig. 15:	Panicum maximum	..	..	..	..	..	..	13
Fig. 16:	Pennisetum purpureum	..	..	..	..	..	..	13
Fig. 17:	Setaria sphacelata	..	..	..	..	..	..	13
Fig. 18:	Desmodium uncinatum	..	..	..	..	..	..	14
Fig. 19:	Desmodium intortum	..	..	..	..	..	..	14
Fig. 20:	Centrosema pubescens	..	..	..	..	..	..	14
Fig. 21:	Macroptilium atropurpureum	..	..	..	..	..	..	14
Fig. 22:	Lablab purpureus	..	..	..	..	..	..	14
Fig. 23:	Leucaena spp.	..	..	..	..	..	..	15
Fig. 24:	Calliandra calothyrsus	..	..	..	..	..	..	15
Fig. 25:	Acacia	..	..	..	..	..	..	15
Fig 26:	Parent Boer male	..	..	..	..	..	..	20
Fig.27:	Parent Indigenous Doe	..	..	..	..	..	..	20
Fig.28:	F1 cross	..	..	..	..	..	..	20
Fig.29:	F2 cross	..	..	..	..	..	..	20
Fig 30:	Goat with pendulous udder	..	..	..	..	..	..	21
Fig 31:	Hermaphrodite goat	..	..	..	..	..	..	21
Fig 32:	A Healthy goat	..	..	..	..	..	..	21
Fig 33:	Good Boer buck	..	..	..	..	..	..	22
Fig 34:	Good Toggenburg Doe..	..	..	..	..	..	..	22
Fig 35:	A goat strains in labour	..	..	..	..	..	..	25
Fig 36:	A goat shows water bag at vulva	..	..	..	..	..	..	25
Fig 37:	Layout of a design for goats permanently housed	..	..	..	..	..	..	29
Fig 37b:	Layout of a design for goats housed at night only	..	..	..	..	..	..	29

Fig 38: Brick house	30
Fig 39: Mud houses of different shapes	30
Fig 40(a-c): Stilted houses, slated floor	31
Fig 41(a-b): Ground level housing of local materials	31
Fig 42: Goat house raised floor	32
Fig 43: A Boer goats showing signs of ill-health	33
Fig 44: A goat very sick with hair falling off	33
Fig 45: Goat showing signs of orf	34
Fig 46: Goat limping due to tick infestation	35
Fig 47: Goat whose inter digital space laden with ticks	35
Fig 48: Goat and sheep dip back and dimensions	35
Fig 49(a-c): Different methods of identification of goats	43
Fig 50: Over grown hooves	44
Fig 51: Trimming / normal hoof	44
Fig 52: Hoof trimming and equipment used	44
Fig 53: Rubber ring elastrator method	45
Fig 54: Burdizzo castrator	45
Fig 55: Before applying the burdizzo	45
Fig 56: Applying burdizzo and castrate	45
Fig 57: A drenching gun	45
Fig 58: Drenching using a bottle	46
Fig 59: Simple dosing syringe.. .. .	46
Fig 60: Body weight estimation using heart girth	47

Table of Boxes

Box 1: Service providers role and gender division of labour	2
Box 2: Service provider and Environmental issues	3

Foreword

The Goat Production Manual is being produced as a short-term fulfilment of pillar four of the NAADS Information and Communication strategy; enabling service providers to become agricultural information providers.

Goat Production has been identified as an enterprise that provides small-scale farmers with clear opportunity for income improvement. For poorer farmers, owning goats and properly managing their goats is an important link with reducing poverty. Proper management and sustainable off-take of goats and goat products will produce meat (goat kids), milk, skins and manure, which taken together will impact on household income and nutritional status. Goats and goat produce will reduce the incidence of poor nutrition, reduce the impact of HIV/AIDS and through the sale of goats and goat products will reduce poverty.

Within a community, goats' have an undeserved reputation as a destroyer of crops and of the environment through uncontrolled grazing and over stocking. The challenge is to dispel this reputation, by prioritising technical information on improved management and improvement of stock. Through the NAADS programme farmers are being organised to access the provision of advisory services to increase productivity, increase quality and effectively engage the market.

The Goat Production manual provides basic information on goat breeds, goat husbandry, processing, marketing and profitability. The manual is for the use of District and Sub-County NAADS technical staff, especially service providers and key farmers.

The purpose of the goat manual is to provide quality assured technical information that can be used by service providers, to support farmers improve their ability to increase goat productivity through increased numbers of kids born, their survival and live weight gain whilst using appropriate husbandry to conserve the productivity of the natural resources utilised. Good quality starts with the selection of breed that can benefit from the prevailing husbandry practices. Good husbandry and good stockmanship provides the environment for the goats to flourish. Those farmers whose stockmanship and husbandry is good will reap rewards, through higher profitability. The manual gives advice on husbandry operations (management) that, if applied correctly, will increase goat productivity.

The Manual is divided into nine parts:

- Breeds of Goat in Uganda
- Goat production Systems and nutrition
- Goat breeding and reproduction
- Goat housing
- Goat diseases
- Good management practices (record keeping)
- Management and utilisation of goat waste (manure)
- Economics of goat farming
- Processing and marketing of goat products

Information contained in this manual may become outdated. Service providers must be aware of any updates, for example on quality standards. Research results may also change husbandry and management practices. Service providers must therefore actively seek information from the research system on the latest research results and integrate this with the information in the manual. It is important not to forget that farmers too have information, which may be useful



Dr S Nahdy,

Executive Director, NAADS

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Introduction

Goats form a critical part of many farmers' livelihoods. A goat enterprise is an important source of revenue and other products; milk, meat, milk products and skins. Socially, for the owners (irrespective of social class), goats are an important source of meat and prestige for important family occasions. For poorer farmers, owning goats is an important stepping-stone on the road out of poverty. Household food security is an important goal of any farmer; small ruminants such as goats play a key role in household food security. Goats if managed correctly, are highly productive, giving very nutritious milk as well as giving birth to twins.

Farmers in all Districts of Uganda, using different farming systems, rear goats. In the densely populated areas of Uganda, such as Kapchorwa and Mbale, goats are reared in a "cut and carry" system. In less densely populated areas of Uganda (Soroti, Lira and Mbarara) goats are reared in a semi-extensive system. However, under current management systems, the overall goat productivity is sub-optimal; through the provision of good quality service provision NAADS wants to increase the area and the productivity of goat enterprises.

The purpose of this manual is to provide good quality technical advice. The service provider, using this manual, in addition to obtaining more current or site-specific information from NARS (NARO) or other information sources or providers (E.g NGOs and/or commercial farmers) can deliver good quality advice on goat management and husbandry. Through the delivery of good quality advice and the provision of information, will encourage farmers to utilise the information to up-grade his/her goat husbandry practices and management system.

An important assumption of the manual, the service provider (including Community Based Facilitators, lead farmers and nucleus farmers) will be an “information seeker”. An information seeker is a person or organisation, who actively seeks information, transforming it and delivering the transformed information to the farmer. The concept of the service provider as an information seeker is part of the NAADS information and communication strategy. Reliance on the manual alone is insufficient. The service provider must seek out other reliable good quality information sources or information providers, through which to enhance the information contained in this manual. Such advice will ultimately lead to reduced environmental damage, better husbandry practices, better pasture management and overall enhanced production performance. Above all, the service provider, through using the manual, will help farmers avoid making poor management decisions.

The manual is targeted at providing good quality technical information to service providers, extension agents and key farmers. It has long been recognised that there are markets for goats locally, regionally and internationally, particularly in the Middle East. However, Uganda does not have the market infrastructure to access any of these markets, notwithstanding that the National herd does not have the productivity or the quality (in terms of lean to fat ratio or dressed weight) to address any regional or international market opportunity.

GLOSSARY

Agro-pastoralists:	Farmers who grow crops and keep animals.
Allergy	Very sensitive to some food or other substance which other people are not sensitive to; such as milk, the fur of particular animals or dust, causing someone who eats it, touches it or breathes it to feel uncomfortable or become ill, although it is harmless to most people.
Body conformation	Body shape/structure according to society's expectation of known standard.
Browsing	Feeding on grass or leaves in a relaxed way as exhibited by goats.
Capital assets	Useful or valuable property of an individual or organization, which can be used to generate money or used for payment of a debt.
Carbohydrates	Any of several substances such as sugar or starch which provide the body with energy. Cassava, rice and Matoke are examples of carbohydrates (see protein)
CCPP:	Contagious Caprine pleuropneumonia, a condition in goats affecting the respiratory system that has both high morbidity and mortality rates.
Cheese	A food made from milk which can either be firm or soft and usually yellow or white in colour.
Colostrum	The first milk which a kid receives from its mother, is thick, viscous liquid and contains many substances such as antibodies, vitamins and laxatives.
Dam	Mature female animal or Doe in case of goats.
Demeanor	A way of looking or behaving.
Dressing	Slaughtering and removing the skin of an animal.
Dual function	Having two functions.
Energy	The power and ability to be physically and mentally active.
Enterotoxaemia	Presence of toxins in the blood formed by certain type of bacteria that has entered the body.
Fattening	The process of providing more feed to an animal to make them heavier or fatter.
Flushing	Providing nutritious feed to an animal at a certain period in order to increase the chances of success. An example is providing good feeds in the last 2-3 weeks of pregnancy increases the chances of normal delivery.
Gestation	Pregnancy.
Growth	The process of increasing in size.
Helminthes	A type of intestinal worm found inside the body of an animal.
Helminthosis	A disease as a result of the presence of worms in the body of an animal
Hermaphroditism	A condition where an animal or person has both male and female sex organs.
Hernia	A medical condition in which an organ pushes through a weakness or hole in the wall of muscle, which surrounds it. Particularly common where the intestines comes through body wall as a result of muscle strain
Heterosis	The difference between the offspring and mean of the parents. Can be negative or positive, where the performance of the offspring is superior to its parents.
Highly digestible	Food that is very easily broken down in the gut (gastro-intestinal tract).

Hypoglycaemia	Low blood sugar.
Judges Wig	A covering of artificial white hair worn on the head by judges in court to cover own hair
Kidding rate/percentage:	Relates to the number of breeding does mated and is given by either the number of kids born in comparison to the number of does exposed to the buck or the number of kids weaned in relation to the number of does mated.
Lactation	To produce milk
Lactose intolerance	Inability of the body to accept milk from certain species without reacting badly (Allergy).
Maintenance	Ability to sustain normal functioning of the body.
Minerals	A chemical substance obtained from the ground and necessary for normal functioning of the body.
Morbidity	Sick or diseased.
Muzzle	The mouth and nose of an animal.
Nutrient	Any substance which plants or animals need in order to live and grow.
Oestrus	In or on "heat", ready to be served by Buck
Parturition	Giving birth or kidding process in case of goats.
Pendulous	Hanging down loosely.
Phenotype	The way an animal's genetic composition is seen in physical characteristics or the physical characteristics of something living especially those that can be seen, as influenced by both its genes and the environment in which it lives.
Physiological status	Normal state or condition of the body.
Pneumonia	Inflammation of the lungs.
Polled	Without horns.
Prolific	Producing a great number.
Protein	Any or a large group of chemicals which are necessary to and found in all living things. Broadly referred to as body building nutrients. Meat is mostly made up of protein (see carbohydrate)
PPR	Petit pestes de ruminantis –a disease of small ruminants.
Protozoa	A group of very small, usually single-celled organisms, some of which cause disease in animals. Malaria, a disease of humans is caused by a protozoa.
Proximity	Close or near to.
Purposeful selection	Choosing the animals to retain or breed on the farm with a good reason for doing so.
Recumbency	Lying down
Respiratory diseases	Unhealthy conditions or diseases that affect the respiratory tract (the system of an animal responsible for breathing).
Roan	Coat colour which is either red,black or brown with some white hairs mixed in.
Starch	A chemical that exists in large amounts in particular foods such as potatoes and rice and is a source of energy.

Stilts	Long pieces of wood or metal used to support a building so that it is above the ground or water.
Submandibular oedema:	A swelling below the lower jaw as a result of water retained in the tissues caused by heavy worm infestation.
Surrogate mother	Not the biological mother, but provides milk to a kid from another goat.
Teaser male	A male animal in the flock that is used to detect the females on heat but one that cannot serve them, for example a castrated one.
Vitamins	A group of natural substances which are necessary in small amounts for growth and good health and which must be obtained from food/feed.
Volatilisation	The process of changing state from a solid or liquid to gas.
Voluminous	Large or a lot
Vulva	The opening of the vagina on the outside.
Withers	The highest part of the back of an animal, which is situated above the shoulders.
Yoghurt	A slightly sour thick liquid made from milk with bacteria added to it, sometimes sweetened and flavoured with fruit and sometimes eaten plain

Chapter One

Introduction

1.1 Back ground

The aim of this chapter is to highlight the importance of goat farming and reasons extension workers and advisory service providers must strongly justify to the farmers why goat farming is one of the important and profitable enterprises to engage in. The chapter emphasizes that resource poor farmers, medium and large scale farmers, children, women and men can engage in goat farming as a way of fighting poverty, and food security. Service providers must emphasize issues of: -

- Housing
- Nutrition
- Animal health and hygiene,
- Economics
- Marketing and processing of products
- Management of goat waste
- Record management.

Cross cutting issues on issues on gender, human nutrition and poverty are all integrated into the text rather than being separate topics.

1.2 Importance of goats

Goats play an important role in human nutrition, food security, household income, social and cultural functions. They provide useful products (milk, meat and skins) as well as manure for crop and fish production. Goats are an important component of an integrated production system.

The products from goats include:

- Meat
- Milk
- Milk products, like yoghurt, butter, and cheese.
- Skins for making clothes, shoes, bags
- Hair for making judges wigs.
- Other products from goats include horns used for buttons, bones, bone-meal, manure fertilizing crop fields and fish ponds.

Household uses of goats include:

- Goat milk which is highly nutritious (see Table 1)
- Infants can easily digest goat milk and adults who suffer from digestive problems, can counter allergies and lactose intolerance because it contains a higher proportion of short and medium fatty acids compared to cow milk.
- Goat milk has a higher content of calcium and phosphorus than cow's milk.
- It is a vital supply of vitamin A.

Table 1: Comparison of goat , cow and human milk contents.

Contents	Goat	Cow	Human
Protein %	3.0	3.0	1.1
Fat %	3.8	3.6	4.0
Calories per 100ml	70	69	68
Vitamin A(i.u./gram fat)	39	21	32
Vitamin B (ug/100 ml)	68	45	17
Riboflavin (ug/100ml)	210	151	26
Vitamin C (mg ascorbic acid/ 100ml)	2	2	3
Vitamin D (i.u./gram fat)	0.7	0.7	0.3
Calcium	0.19	0.18	0.04
Iron	0.07	0.06	0.2
Phosphorus	0.27	0.24	0.06

Source: Adapted from dairy goat production handbook

In addition to direct cash income that accrues from the sale of meat, milk, skins, hair and by products.

- Goats have economic advantage because they are cheap to buy
- Multiply very easily and flocks expand in a relatively short time forming a major part of the family capital assets.
- Twinning is common in both exotic and improved breeds and even in local goats if well selected. From three goats (1 male and 2 females) a resource poor farmer can easily accumulate 39 goats in four years.
- Goats are small in size and this makes them convenient to provide meat for family celebrations, social functions, religious and cultural rituals
- They can quickly and easily be sold off for cash to meet family emergency needs like health costs, educational needs, in times of death, and therefore are the first step out of poverty and insecurity in case of calamities (See Box 1).
- There are no or few social, religious and cultural taboos associated with keeping goats in Uganda and Africa.

1.3 Comparison of goat farming to cattle

In comparison to cattle goats: -

- Are hardy animals and do not easily succumb to diseases
- They can withstand harsh environmental conditions (see Box 2)
- They feed on vegetation not used by other domestic species of animals since they are browsers.
- Can be kept by people living in marginal agricultural areas
- Are easy to handle and can be looked after by children and women.

Box 1: Service Provider's role and gender division of labour

Service providers must specify that in Africa where issues of land, capital, and property ownership and gender equity are key issues in livestock agriculture, then the goat enterprises would take priority because it is easier for women to own goats and improve their lives. Cattle normally belong to men. In addition, the goats, offer a better drought survival strategy against crop failure especially in marginal cropping areas.

1.4 Issues to note on 'grazing habits of goats'

- Goats can be destructive animals
- They will eat all the young trees and shrubs in their environment causing problems and will prevent tree re-generation.
- Will stray and eat neighbors' crops.
- They are often blamed when the culprits are the people managing them who have insufficient knowledge on their management
- They are associated with over-grazing and other related land degradation.
- By browsing, they leave vegetation preferred by other animals.

1.5 Potential and Opportunities for Goat Farming in Uganda

- Abundant and largely untapped pastures and shrubs can be utilized for goat farming and since they are browsers, they will utilize forage that is not easily eaten by other species like cattle. They can therefore be kept with cattle and sheep.
- The government of Uganda through the Ministry of Agriculture, Animal Industry and Fisheries has recognized the role of goats and supported goat production under a special programme - the Strategic Intervention Programme (STP) by importing and availing to the farming community high quality meat goats to boost goat production in the country. The STP is a five-year programme that started in the financial year 2001/2.
- The potential for marketing of goat and goat products exists within Uganda and Eastern Africa. These markets are already being accessed by private sector.
- There is need to address broader issues of quality and quantity; if specifications for Market demands are met e.g. specific color coats, like white or black, live bodyweight of 10 –15Kgs at 5-10 months of age, and stated disease status.

Box 2: Service Providers and environmental issues

Service Providers must at a later stage be able to spell out the issues of environmental impact associated with goats and the actions that the goat farmers must undertake to avoid these problems. The environmental measures issues and mitigation measures are integrated into the text

1.6 Principles of Goat Farming

Successful goat farming can only be achieved through good goat management. It entails: -

- Keeping goats for improved herd production and goat productivity. This means increased output per goat and per herd i.e. meat, milk and average number of kids that are born and raised to a time when they are disposed off for cash or retained for breeding.
- Basis upon which farmers should focus on rearing goats: -
 1. To get increased number of kids and raise kids for sale.
 2. To raise kids for breeding by self or to other breeders.
 3. To fattening goats for slaughter.
 4. To produce quality meat for market.
 5. To produce milk for home consumption and /or for sale to get income.

6. Good pasture management to maximize goat production but to minimize environmental destruction (no or reduced over grazing caused by over stocking).
7. Good record keeping of all inputs and management decisions made. This includes proper financial records.
8. Proper livestock husbandry (or management) access to adequate water, feed and grazing. Hooves well kept, breeding periods kept within normal breeding and non-breeding periods.

Chapter Two

Breeds of goats in Uganda

2.1 Introduction

A **breed** is a group of animals within a species that has a common origin and certain similar physical characteristics, which are easily distinguishable. It is therefore important that extension workers and service providers guide the farmers in understanding the basic criteria for characterization, classification, and identification of specific goat breeds in Uganda. When selecting animals, it is important to consider the environment and geographical area where the goats are to be raised and whether they will perform in that environment. Details on breed performance and improvement will be discussed in Chapter 4.

2.2 Description of goat breeds

Breeds are classified according to different parameters which include among others:-

- Origin
- Body size
- Colour
- Coat type
- Ear shapes and length
- Function
- Height of withers (ridge between shoulder blades)

Origin:

Breeds in Uganda originate from a number of countries from within Africa, Asia, and Europe.

The goats are either:

- Indigenous (local breeds) e.g. Mubende goat, Small East African, Kigezi, Karamoja and Sebei goats
- Imported (exotic breeds) e.g. Boer from South Africa, Galla from Kenya, Anglo- Nubian, Alpine, Saanen and Toggenburg from other parts of the world.

Colour pattern:

Colours of goats in Uganda range from the typical pure Black Mubende Goat, brown tinged crosses, through to various degrees of patchy colours which are usually reflective of varying grades of crosses, to the purely white Saanens and Somali goats (see Figure 1) .



Fig.1: Goats of different colours

Coat type:

Most goats in Uganda have short thin coat, which has been adapted to reflecting sunlight and keeping the goat cool. Hairy coats are suspected to be offspring of the South African bred 'Angora goat' breed. This breed of a goat has the highest fibre yield in the world.

Function:

- Classified according to the major functions of milk production and meat production.
- Goats are rarely classified on their fibre (hair) or skin.
- The majority of goats are “non-descript”.
- Boer goats are classified as meat producers. Alpine, Saanen and Toggenburg are classified as milk breeds.

Body Size:

Mainly classified in three categories:

- large breeds, over 65cm in length (head to tailbase), more than 35 Kg
- Dwarf breeds of less than 50 cm length (head to tailbase), less than 20 kg
- Medium breeds 50 - 65 cm length (head to tailbase), 21- 35 kg.

Remember! Size often depends largely on the nutrition status as much as genotype and natural selection

- Body size and conformation classifications are rarely used when selling goats.

2.3 Goat Breeds in Uganda

Small East African (see Figure 2)

- Colour range from pure white to pure black with intermixes of roan and speckled brown.
- Fine short hair coat, small horns, small and forward pointing ears.
- Average wither height is 60 cm.
- Adult male weighs 25 –30 kg, Female weighs 22 kg. Edible and saleable proportion after dressing is 48% of the live body weight (equivalent to 12-14.5 kg)
- Sexual maturity is 7 months but a relatively slow growth rate.
- Age at first kidding may be up to 18 months.
- Goats are mainly kept for meat. They have good potential for selection to increase productivity.



Fig. 2: Small East African goat

Mubende goat: (see Figure 3)

Pure black or black & white mixture of hair coat with straight hair coat (short /long). The skin is of high quality

- An adult male weighs 25 – 35 kg live weight
- A female 22-28 kg live weight.
- Edible and saleable proportion after dressing is 56% of live body weight
- Males have manes and are commonly polled.



Fig. 3: Mubende goat

Kigezi

- Origin from highland areas of Kabale and Bundibugyo districts of Uganda.
- Colour is black and the goat has long-haired at hindquarters.
- Small compact, short-legged body.
- Average live weight, males 30 kg, female 25 kg.

Sebei goat

- Origin from highland areas of Mt Elgon in Kapchorwa district
- Goat is nondescript
- Suitable for upland areas and south-Western Uganda

Karamoja

- Adopted from the arid areas of Kotido and Moroto districts of Uganda.
- Short haired, colour is white, and is near relative to the Galla goat of Kenya.

Boer goat from South Africa- (See Figure 4)

- Developed through selection program in South Africa.
- Very stocky body, well-muscled, strong bones. Ears are pendulous (flop down). Have prominent horns.
- Colour is usually white on body, brown spots, with red /brown head and neck.
- Mature body weight in females 50 –65 kg, 55 to 80 Kg in males.
- Very prolific breed, kidding rate of 1.5, 50% twins, and 7 % triplets.
- Mean daily milk is 1.2 –1.8 kg, with average milk yield (Av. MY) over 160 kg/lactation period of 120 days. Butter fat (BF) content is about 5.6%.
- Valuable for meat, milk and skin but has been promoted for its meat potential.



Fig. 4: Boer goats

Alpine (See Figure 5)

- Imported to Uganda for its milk production.
- Relatively hardy and has adapted fairly well to tropical conditions.
- Hair coat varies from short to long
- Colour is dark brown to black colour with light stripes on either side of the face, which are often very distinct.
- May have long horns or may be polled.
- Average height withers, 75-80 cm, mature body weight is 50-60 kg in females and 55-65 kg in males.
- Average daily milk yield approximately 0.9 –1.3 kg with average lactation of 274 kg over 209 days. BF content is 3.6%.



Fig. 5: Alpine goat

Toggenburg (see Figure 6)

- Originated from Switzerland.
- Colour varies from brown to chocolate with white markings down on each side of the face from the eyes to the muzzle, on the edge of the ears, on the rump, and on or about the tail.
- The legs are white from the knees and hocks downwards.
- Goats maybe hornless. The males usually have longer hair than the females. Average wither height is 65-75 cm. Adult male weighs 50 kg and female 65 kg.
- It is mainly kept for milk with Average milk yield of 1kg.



Fig. 6: Toggenburg

Saanen: (See Figure 7)

- Originated from Switzerland or France.
- Large size, white color with black spots on the nose, ears and udder. Hair coat is short, ears are erect and forward and upward. Face is straight, slightly dished, ears pointed.
- Hermaphroditism occurs, associated with polledness therefore it is advisable to use the bucks, which are horned.
- Good body conformation, BF is 3.5 %. May serve a dual function. The udder is developed. Milk production has been recorded to 1-3 kg.



Fig. 7: Saanen

Chapter 3

Goat Production systems and Goat nutrition

3.1 Introduction

Economic and profitable feeding of goats for meat or milk production will be achieved through controlling available feed resources. All breeds, sexes and ages of goats require the following basic nutrients: **protein, energy, minerals, vitamins and water**. Energy needs could be derived from dietary carbohydrates (starches and/or fibre) such as maize grain or fats or even from excessive protein such as cottonseed or soybeans cake. The goat requires these nutrients for **maintenance, growth, gestation, lactation, and fattening**. The daily maintenance requirements may range from 50 – 100% of total daily nutrient requirements, depending on whether the animal is growing, gestating, lactating or fattening.

3.2 Tips on feeding

As a service provider, you need to give the following feeding tips to goat farmers:

- Goats are good feeders, in that they will eat anything on offer.
- They require a mixed diet (grasses, legumes, shrubs, tree leaves, crop residues and weeds) in order for them to receive a balanced diet and to reduce the effects of poisonous plants should there be any in the feed.
- Goats prefer clean, fresh or well-conserved forage.
- Goats will not eat dirty, wet or rotting feed
- Give little feed at a time to avoid wastage.
- Goats are browsers and will prefer to feed on small trees and shrubs as their basic diet.
- If goats are housed; tie feed on pegs, side poles, and roof or on horizontal beams from which branches are tied.
- Goats are selective and will always prefer to eat the better parts of the feed. Young shoots and fleshy leaves are preferred.
- Goats are able to eat and utilize certain plants that are not utilized by other livestock species, like sheep and cattle.
- Goat feed is made up of 74% tree and shrub leaves and 26% grass.



Fig. 8: Galla showing browsing ability

3.3 Common grazing systems in Uganda

Goats are reared under four systems:

- i. Tethering system
- ii. Extensive grazing system
- iii. Zero grazing
- iv. Semi-intensive system

A number of factors including culture, tradition, land size and number of goats determines the system practiced.

1. Extensive grazing/browsing system

This is commonly practiced under the Teso and Lango systems, in the ranching areas and in other rangeland areas of the country. Pastoralists that keep goats, sheep and cattle practice it. During the day, Goats graze on natural vegetation and/or browse on shrubs or feed on crop residues. But at night the herd is kept in a boma ¹(See figure 9)

Advantages of extensive system:

- i. Goats feed on natural vegetation and have plenty of choice.
- ii. Goats select the pasture they want.
- iii. Herding the goats protects them from theft and predators

Disadvantages of extensive system

- i. Controlled breeding may be difficult
- ii. The communal system exposes goats to intestinal worms, external parasites and other diseases
- iii. Increased chances of loss and thefts if not herded
- iv. Not easy to identify and treat sick animals.
- v. Off take is low.



Fig. 9: Goats in night boma-extensive system of management

2. Semi-intensive system

- i. Practiced by agro-pastoralists
- ii. It is a mixed farming system but the emphasis is on livestock production (40 % cropping and 60% livestock)
- iii. Relies on communal land for grazing, supplemented with crop residues, grazed on farmland after harvest
- iv. Herds are moved in the dry season in search of water and grazing pasture, leaving some animals behind to provide milk for those remaining on the farm.
- v. Production levels are higher than in pastoral systems because the goats have a mixed diet.

¹ A boma (or Kraal) is a compound with a shelter in which to keep goats during the night.

3. Tethering system

This is the most common system used by smallholders (with less than one acre of land) in Uganda who own less than 10 goats per family. In this system, the goats are tied to a peg, tree or shrub (See Figure 10).



Fig. 10: Tethered Goat

The advantages of tethering

- i. Reduced animal straying and destruction of neighbour's crops,
- ii. Goats can be tied in any place where there is pasture or in the fields after crop harvest.

Disadvantages of tethering

- i. Grazing is limited and goats are usually underfed.
- ii. Goats are rarely watered
- iii. Goats easily fall prey to stray/mad dogs (not very common though)

4. Zero-grazing system

In this system, a moderate number of goats (3 – 10) are kept. Goats are permanently housed and feed is provided (Figure 11). It is a system of choice for dairy goats in Uganda and is recommended for highland areas like Kabale and Mbale where land area can be as low as 1 acre per household. It is a highly intensive system. The fodder could be grown on farm or collected from communal areas.

Advantages of zero grazing

- i. Goats are protected from harsh environment and from thieves and predators (to a certain extent)
- ii. The herdsman/farmer can engage in other farm activities at home since the goats are confined.
- iii. Controlled breeding can be achieved.



Fig. 11: A farmer providing feed to her Zero-grazed goat, Masaka District

Disadvantages of zero grazing

- i. An inappropriate system for large flocks (more than 10 goats).
- ii. Carrying of feeds and water is very labour intensive.
- iii. Goat limited to eating only what is provided and denied ability to select own feeds.

3.4 Water



Fig. 12: Goats drinking water, Masaka District. An ideal water /feed trough

- a. An ideal water and feed trough should be made of material that is easy to clean (cement or plastic according to the means of the farmer (see figure 12).
- b. The depth should be low enough (about 30 cm deep) to allow even the kids to drink from it.
- c. It should not be too low to allow goats, especially kids to stand in the trough and pollute the water.
- d. Allow a space of 45 cm width per goat.

Water needs

The amount of water needed by a goat varies with the breed, climate, the type of feed eaten and the purpose for which the goat needs water e.g. for milk and growth

Normal recommendation: Goats consume 4 times as much water as Dry Matter but for lactating goats, provide 1.3 litres of water per litre of milk produced. Provide clean water all the time.

3.5 Mineral salts

- i) Goats need mineral salts for good bones and teeth, appetite and weight gain and improve the hair coat appearance.
- ii) Feeds provide some of mineral requirements but extra minerals in the form of commercial mineral mixtures should be provided the whole year round.
- iii) Required mineral nutrients are mainly provided from commercial mineral mixtures that cost about Shs. 400/= per kilogram.
- iv) Phosphorous is very necessary for reproduction and milk production and its content in forages is usually lower than the calcium content, so phosphorous must be provided.
- v) Rock salt, though deficient in most of the essential mineral nutrients, should be provided in the goat house.



Fig. 13: Goats licking mineral block

3.6 Common grasses and legumes (with local names), fodder trees and supplementary feeds

Grasses:

- *Cynodon dactylon* (Star grass - Oluchwamba)
- *Chloris gayana* (Rhodes grass – Orunyankokore) – refer to Figure 14
- *Panicum maximum* (Guinea grass – Mukonzikonzi) – refer to Figure 15
- *Pennisetum purpureum* (Elephant grass – Bisagazi/ Bibingo) – refer to figure 16
- *Brachiaria* spp. (Congo signa – Kifuuta/Ejubwe)
- *Setaria anceps* (Dogs tail – Kakirakambwa/obuterante) – refer to figure 17



Fig. 14: *Chloris gayana* (Rhodes grass)



Fig. 15: *Panicum maximum* growing with a legume



Fig. 16: *Pennisetum purpureum* (Elephant grass – Bisagazi/ Bibingo)



Fig. 17: *Setaria sphacelata*

Legumes: (known generally as ebibowabowa/ebikamba)

- ❖ *Desmodium uncinatum* (Silverleaf Desmodium) – See Figure 18
- ❖ *Desmodium intortum* (Greenleaf Desmodium) – See Figure 19
- ❖ *Centrosema pubescens* (Centro) – See Figure 20
- ❖ *Stylosanthes gulanensis* (Stylo)
- ❖ *Macroptilium atropurpureum* (Siratro) – See Figure 21
- ❖ *Lablab purpureus* (Lablab) – See Figure 22
- ❖ *Neonotonia wightii* (Glycine)
- ❖ *Pueraria* sp (Kudzu)



Fig. 18 *Desmodium uncinatum*
(Silverleaf Desmodium)



Fig. 19: *Desmodium intortum*



Fig. 20: *Centrosema pubescens*



Fig. 21: *Macroptilium atropurpureum*



Fig. 22: *Lablab purpureus* (Lablab)
Desmodium intortum

Fodder trees:

- *Leucaena* spp. (*Leucaena*) – See Figure 23
- *Cajanus cajan* (Pigeon pea)
- *Gliricidia sepium*
- *Calliandra calothyrsus* – See Figure 24
- *Sesbania sesban* (*Sesbania*)
- *Acacia nilotica* – See Figure 25



Fig. 23: *Leucaena* spp.



Fig. 24: *Calliandra calothyrsus*

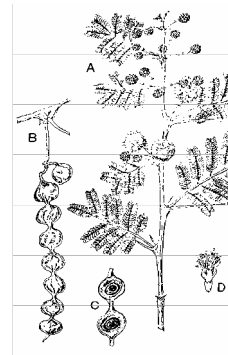


Fig. 25: *Acacia nilotica*
Adapted from Tropical forage legumes.

Supplementary feeds

- Sweet potato vines
- Banana peelings
- Protein supplements
- Sunflower, cotton seed cake, soya meal and bone meal.

3.7 Supplementary Feeding

Supplementary or additional feeds should be given to the following categories of goats:

- All goats during periods of pasture shortage/dry season
- Sick animals
- Pregnant animals in the last six weeks of pregnancy
- Mothers after kidding in the first 4 weeks of lactation (milking).
- Kids before weaning and up to 5 weeks after weaning
- Goats being prepared for the market

3.7.1 Forage Supplements

When planning for forage supplementation, it is prudent to always remember that a goat enterprise generates cash income from the sale of surplus kids and the culling of adults. To be economically viable, meat/milk goats must get most of their required nutrients from forages.

Protein supplementation may take many forms

- Fresh legume fodders e.g. lablab, leucaena, calliandra, gliricidia, etc

- Legume hays e.g. all dried forms of the above
- High protein supplemental agro-industrial by-products such as cottonseed and soybean meal.

Adequate energy is important for good conception rates, milk flow, and kid growth rates. High-energy supplements include

- Maize, rice or wheat bran
- Goat pellets.

3.7.2 Feed Supplements

Concentrates are feeds with a high nutrient content and are highly digestible. Different mixtures of supplements in varying rations can be mixed for goat feeding. The amount of protein needed by the goats will depend on the season, physiological status of the goat - growing kid, pregnant goat, feeding mother or breeding buck. The amount of proteins required to meet the specific physiological needs of the various categories of goats is given below:

- | | |
|-------------------------------------|---------------------------------|
| • Kids between 8 weeks and 16 weeks | 29% protein out of total ration |
| • Weaners between 3 to 4 months | 19% protein out of total ration |
| • Pregnant does | 25% protein out of total ration |
| • Breeding bucks | 16% protein out of total ration |
| • Feeding mothers | 29% protein out of total ration |

Table 2 outlines some recommended rations; which can be used in different situations depending on the availability and cost of the ingredients. Tables 3 and 4 suggests and recommends browse species and household waste feeds that can be incorporated into goat rations.

Table 2: Showing different Feed Mixtures & Cost of Ration Inputs

Approximate costs of inputs (Year 2004)		
No.	Description	Cost in US\$ /Kg
1	Maize bran	100
2	Wheat bran	60
3	Sun flower	300
4	Cotton seed	250
5	Soya flour	500
6	Mineral salts	400
7	Shells	400
8	Bone meal	500
9	Leguminous leaf meals	2,500

Mixture No 1	
Description	Percentage
Carbohydrate	70%
Protein (plants)	15%
Proteins (animals)	15%
Example	
Maize bran	7 kg
Meat and bone meal	1.5 kg
Cotton Seed Cake	1.5 kg
Total	10 kg
Cost	1,825/=

<i>Mixture No. 2</i>	
Description	Percentage
Carbohydrate	69%
Dry Protein (plants)	30%
Salt	1%
Example	
Maize Bran	6.9 kg
Leucaena leaf meal	3.0 kg
Kitchen Salt	0.1 kg
Total	10.0 kg
Cost	8,210/=

<i>Mixture No. 3</i>	
Description	Percentage
Greener matter	70%
Hay (roughage)	20%
Concentrates / cereals	10%
Example	
Potato vine/ Napier	4 kg
Hay	1 kg
Maize bran	0.5 kg
Cost (approximate)	3,550/=

<i>Mixture No 4</i>	
Description	Percentage
Carbohydrate	70%
Protein (plants)	15%
Proteins (animals)	15%
Example	
Maize bran	7.0 kg
Bone meal	1.5 kg
Sunflower Seed Cake	1.5 kg
Cost	1,900/=

<i>Supplement Mixture No 5</i>	
Description	Percentage
Carbohydrate	75%
Proteins	20%
Salts	3%
Minerals	2%
Example	
Maize bran	7.5 kg
Soya meal	1.5 kg
Cotton Seed Cake	5.0 kg
Salt	3.0 kg
Shells	2.0 kg
Cost	4,750/=

Table 3 : Leguminous and Browse species

Scientific Name	Local Name (Luganda)	Local Name (Runyakitara)
Acacia spp	Obusaana	Obugando
Albizia spp	Omulongo	Omushébeya
Cassia spp	Kasiya	Kasiya
Calliandra calothyrsus	Kaliyandura	Kaliyandura
Combretum molle	Endagi	Omurama
Leucaena leucocephala	Lusina	Lusina
Leucaena diversifolia	Lusina	Lusina
Mangifera indica	Omuyembe	Omuyembe
Sesbania sesban	Omuzimbandegeya	Omunyeganyegye
Cajanus cajan	Empinnamuti	Enkuuku
Vernonia amygdalina	Omululuza	Omubirizi
Ficus natalensis	Omutuba	Omutooma

Table 4: Post harvest feeds, Kitchen and food processing by-products

Common Name
Potato vines
Bean stalks
Banana leaves
Banana stems
Leaves of mango tree
Rice bran
Maize bran
Wheat bran
Dried brewers grain
Ground nut stalks
Kitchen by-products e.g. potato/banana peels

These feeds can be given in various forms depending on the type of feed e.g. potato vines can be fed green immediately after harvesting the sweet potatoes or the leaves can be dried and fed to the animals later. **Note:** Hygienic measures should be taken when preparing the above feeds or presenting the above feeds to animals.

Chapter Four:

Goat breeding and breeding performance

4. Introduction

It is important that a farmer has adequate knowledge and control over the selection and reproductive process of the male and female goats. This process is referred to as **breeding**. Breeding is concerned with the purposeful selection of the parents for the next generation for goats. It is important to determine how to breed for better performance in the next generation. This helps a farmer to keep and preserve goats with only desirable qualities. The bad qualities should be eliminated through **culling** i.e. removing the poor parents and their off springs. Proper breeding methods and plans will help prevent the hazards related to in-breeding. Goat farming is only profitable if a farmer always has goats and /or products to sell whenever money is needed.

4.2 Breeding options

There are two broad breeding methods;

1. **Close breeding:** mating of related parents e.g. **in-breeding** and **line breeding**
2. **Out-breeding.** Mating of unrelated parents; e.g. **cross breeding** and **back crossing**

In-breeding

- ♦ Often a necessity rather than choice.
- ♦ It gradually lowers the performance in characters like fertility, survival and size.
- ♦ When farmers cannot find a good or better sire other than their own.
- ♦ May lead to poor characteristics in the long run
- ♦ In Uganda many goats are in-bred out of ignorance
- ♦ Extension workers must stress the bad consequences of in breeding.

Line breeding

- ♦ Is a slower inbreeding process
- ♦ Concentrate the genes of a specific ancestor.
- ♦ Gives better results

Cross breeding

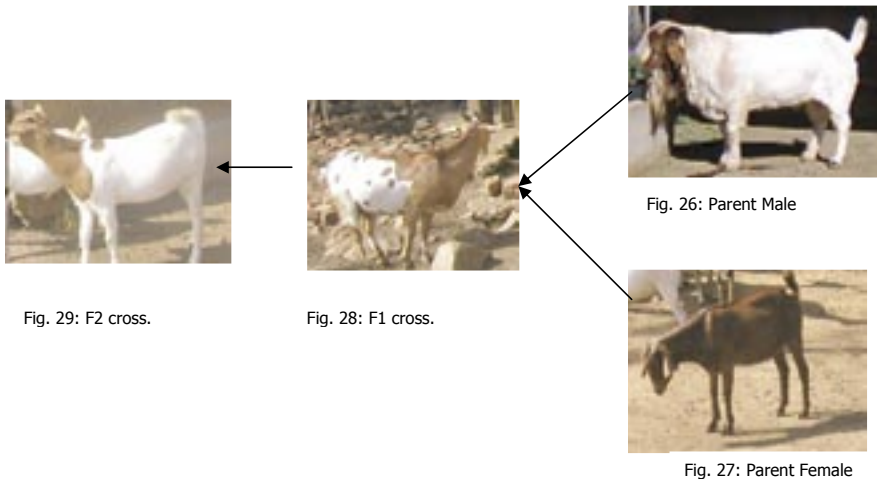
The basic cross breeding process is outlined in Figures 26 - 28

- ♦ Usually there is increased phenotypic variation
- ♦ Performance sometimes better than pure bred (Heterosis)
- ♦ Adaptation to environment
- ♦ Can be done between species, breeds, strains or lines
- ♦ F_1 crosses in Uganda are sometimes stronger, bigger and with faster growth rates than the parents.
- ♦ An F_2 cross can be achieved by further crossbreeding or back crossing

Back crossing

- ♦ Often involves breeding back to one of the parents' breed.
- ♦ Usually holds some of the benefits of the F_1 cross.
- ♦ An F_2 cross can be achieved through back crossing (see Figure 29)

The basic cross breeding process



4.3 Principles of Goat Breed Selection:

Profitable goat farming is aimed at maximizing production and productivity through efficient utilization of available resources and minimizing the outside inputs. One way to achieve this is through **careful selection of the goat breeds**.

Goat breed selection is a process that allows goats of a certain breed or breeds to be parents of the next generation while depriving others of that chance. **The basic principle in selecting a breed is the purpose for which one wants that breed.** There are breeds in the world developed for milk, meat, dual purpose or hair production. Once the purpose is known, the following should be considered;

- The environment in which a particular breed performs best.
- Ability to live, adjust and perform well in the new environment.
- Production potential
- Cost of the breeding stock
- Cost –benefit analysis of the enterprise or gross margin

Superiority on performance is based on: -

- i) Individual data.
- ii) Lifetime performance data
- iii) Pedigree information (parents and grandparents)
- iv) Progeny performance (performance of off-springs)

- v) Performance of the relatives.

All these are based on good record keeping.

Performance data in goats:

- i) Number of kids born.
- ii) Number of kids weaned.
- iii) Weight of the kids at birth
- iv) Weaning weight of kids
- v) Growth rate
- vi) Milk yield over a lactation period
- vii) Slaughter weight



Fig. 30: Pendulous udder

Common problems associated with poor selection and breeding.

1. Reduced performance of the flock.
2. Deformities which may include: -
 - ♦ Undershot or overshot jaws
 - ♦ **Bucks** with one testicle.
 - ♦ **Does** with long pendulous/hard udders (See figure 30)
 - ♦ Hermaphrodite or Pseudo hermaphrodite (See Figure 31)
 - ♦ Infertile females and males.



Fig. 31: Hermaphrodite goat

4.4 Selecting a good and healthy goat.

Characteristics of a healthy goat are, (Figure 32 shows what a healthy goat should look like):

1. Smooth, shiny clean coat
2. Goat eats and drinks well and has good appetite
3. Chews cud after eating.
4. Strong legs and hooves, which are able to walk and run (not lame).
5. Optimal milk production in milk breeds.
6. Animal is alert and inquisitive.
7. Does not isolate itself from the rest of flock.
8. Must pass out firm and pelleted faeces.
9. Body temperature is between 38.7°C and 39.5°C.
10. On a very hot day, temperature may rise over 40°C.



Fig. 32: A healthy goat

11. Respiratory rate 12-20 breaths per minute in adults.
12. Mucous membranes (colour of tissue surrounding the eye ball) are pink, moist and clean.
13. Has no strange discharges from any opening

The buck (male)

This is an older male goat, which is used for mating with females. The male goat is the most important animal within the breeding herd. "Your buck is half the herd". It should be selected with care at all times. Figure 33 shows a healthy buck (male goat), sound feet, interested in the surrounding does, with no obvious abnormalities. A good buck meets the following criteria:

1. Two well-developed testes.
2. Testicles easily seen easily from the back.
3. Testicles not hard neither too soft to touch.
4. No wounds nor scars on scrotum
5. Strong limbs with no limb deformities especially of hind limbs.
6. Wide chest, straight body and strong masculine head and neck.
7. Heavy muscles over the loins, hips and upper fore legs.
8. Must look fierce or aggressive, and show Libido (willingness to mount).



Fig. 33: A good Boer buck

The doe (female)

This is an older female, which is ready to reproduce (have kids). If records are not accurate, it is always better to select pregnant females or those with a history of giving birth to normal offspring. Figure 34 shows a Toggenburg Doe, which is alert, with sound feet, not obviously lame or other abnormalities.

A good doe meets the following criteria:

1. Good-sized udder
2. Udder soft to touch, with 2 well-separated teats, pointing slightly forward and functional. Udder not sensitive or inflamed
3. Good strong hind legs.
4. Wedge shaped conformation if dairy goat.
5. Voluminous (large) chest area and wide on weaning.
6. No split hooves or signs of lameness



Fig. 34: A good Toggenburg Doe

Kids

A young animal can only be selected for breeding if there are records of its parents. **The parents** should have **proven records**, which in addition to the above list includes:

1. Known number of kids (young ones) born alive per kidding.
2. Ability of mother to nurse and raise her kids.
3. Records of good milk production in case of a dairy goat.
4. Good temperament of the goat including its feeding habits.
5. No previous history of difficult kidding, prolapsed uterus or difficulties in falling pregnant.

4.5 Planning for Breeding

Breeders must select the time of the year when there is plenty of food supply available for the animal until when the kids stop suckling. This means that food must be available for at least 3½-4 months in order to rear the kids as cheaply as possible. Ensure that the Does are not very fat one month before mating. This can be achieved by administering feed in the form of residues plus regular mineral lick supplement and/or small amounts of maize daily or kitchen refuse.

Males should not be used for breeding until 8 – 9 months in case of pure lines and 10- 12 months in case of cross breeds. It is only at this age that they will produce enough sperm, which is of good quality for breeding. In comparison, the females should not be used for breeding until 7 months in some breeds but preferably 12 months in most breeds. At this time the female reproductive organs are developed enough to allow the goat to go through the process of mating and reproduction.

Every 18 – 21 (average 21) days, the adult female (doe) is ready for breeding and therefore comes on heat. **Extension workers should stress to farmers the importance of proper records for such days.** Farmers must be aware and ready to present a male goat to the female for mating as soon as she is ready. The doe should be mated or inseminated during oestrus. This is the only time that a doe will get pregnant. If the goat does not show signs of heat, you may place a teaser male with it before mating time.

The following signs will help the farmer to know when the goat is on heat:

- The goat is restless and bleats.
- Vulva is swollen, reddish and with slimy mucous discharge. The discharge is clear at the beginning of heat period but turns white towards the end of the heat period.
- The goat wags her tail frequently and rapidly to the sides and also upwards
- Sometimes she shows frequent urination
- The goat may mount other goats and in many cases she will accept to be mated.
- If there is a male in the herd, the goat on heat will be seen to stay within the vicinity of the male.

The Mating Season

For mass mating, it is recommended that one buck (Male goat) is given 35 – 40 females for effective function of the animal and for maintaining good semen quality. Where single mating is practiced, one male can be given a maximum of 50 does for mating. During daytime of the mating season, the billy goats must be kept in confined places, which have shelter from direct hot sunshine. The does on heat can be brought to them while in the evening the billy goat can be let loose and run with the females. The

breeding buck also needs extra care in terms of extra nutritious food, water and if mass mating, regular veterinary examination may be recommended.

The females "on heat" may be let to run with the males for 2 - 3 days from the time when signs of heat are detected. This will maximize the chances of fertilization /pregnancy. Once a female goat is pregnant, it does not stand to be mated by a male and does not show signs of heat again for the next 5 months. If it shows signs of heat 18 - 21 days after the last oestrus, it means that the goat did not get pregnant during mating.

Managing a pregnant doe

Once the doe is pregnant, it requires extra care in terms of nutrition and protection from playful young males, which may mount it and cause abortion.

The goat remains pregnant for a period of 5 months (144 – 152 days). A good plane (level) of nutrition during pregnancy will improve fertility and increases the chances of giving birth to twins. Flushing does in the last days (3 weeks) of pregnancy will improve the chances of normal delivery, because two thirds of the growth of the foetus takes place during the last three weeks of pregnancy.

The farmers must be very familiar with signs of heat, which are: -

1. Restless and bleating.
2. Vulva is swollen, reddish and with slimy mucous discharge.
3. Discharge is clear at the beginning of heat period but turns white towards the end.
4. Frequent and rapid tail wagging sideways and upwards.
5. Frequent urination.
6. Mounting other goats and accepting to be mounted
7. Searching for and getting close to males in the herd

Tips to remember

1. Mass mating, 1 buck to 35 - 40 females
2. Single mating 1 buck to 50 does.
3. Bucks must be kept in confinement.
4. Does on heat to be bought to buck.
5. Breeding buck needs special care in terms of nutrition, water and regular veterinary examination.
6. Females "on heat" run with males for 2- 3 days.
7. Pregnant females do not stand to be mated.
8. Signs of heat after 18 - 21 days indicate no conception.

Signs that show that the doe is about to give birth:

1. The udder is large, firm and tender to touch.
2. Fluid oozes out of the teats if the udder is pressed hard.
3. The muscles of the hip joints soften and they appear to sink in.
4. The vulva is swollen and shows a red inner part, which opens slightly showing a thick white discharge which may flow.
5. The female goat becomes restless and wanders about aimlessly.

4.6 The Kidding process

(See Fig a)

- Animal does not want to eat.
- Breathes rapidly
- Constantly turns & gazes at her flanks

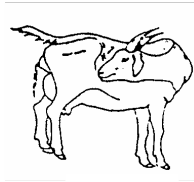


Fig a



Fig. 35: A goat strains in labour

Fig b:

- Animal strains in labour pain (See Figure 35)
- Appearance of a water bag at the vulva (See Figure 36)

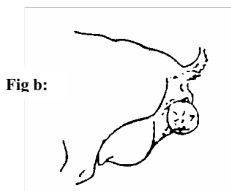


Fig b:



Water bag

Fig. 36: A goat showing water bag at the vulva

Fig. c.

- Muscles of the abdomen are frequently seen to contract (See Figure c)
- The water bag protrudes further until it breaks
- There is a sudden rush of water from behind

Fig. c.



Fig. d.

- Appearance of two front legs of the young one
- Appearance of the head resting on the front legs
- The rest of the body is pushed out
- In case of twins or triplets, the other kids also come out at 10 –20 minutes interval

Fig. d.

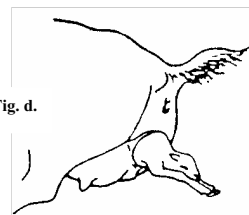


Fig. e.

- The mother starts to clean her young
- Cleans away the mucus from the nostrils and mouth
- The young begins to breath and may immediately attempt to get up

Fig e



If there are abnormalities – you will need a qualified assistant, either a veterinary scout or a veterinary surgeon.

4.7 Requirements for kidding

The period of kidding requires a great deal of attention and care and therefore the farmer should be prepared for it. There is need to keep the pregnant goat under observation by an attendant. Before the pregnant goat kids, prepare appropriate supplies.

Tips for Preparation:

- Feed bottles e.g. used for children
- A tincture of iodine
- Some antibiotics.
- Attendant must be available to keep watch.
- Intervention is recommended 20 minutes after water bag has ruptured or 45 minutes after onset of labour with no sign of advancement

Tips after successful delivery

- i) Check that the kid is breathing by removing the mucus from the mouth and muzzle using a clean cloth.
- ii) If the kid still appears life-less, hold it by its hind legs in an upside down position and swing.
- iii) The sides of the newborn may be pressed until it shows life.
- iv) Apply tincture of iodine on the umbilical cord.
- v) You can also clean the umbilical cord using diluted dettol detergent liquid.
- vi) If the dam has no milk, any other goat with milk, may be utilized as **foster mother**.
- vii) Assist the kid to suckle by holding it and guiding its mouth to the teats of the dam.
- viii) Check that the teats are not blocked.
- ix) Where all the above fail, then feed the kid on milk from a cow using a feeding bottle.
- x) The kid must suckle **colostrum** within the first 12 - 48 hours after which it will not have the intended impact

4.8 Raising Kids

Day 0 - 14

1. Kids stay close to dam during day
2. Kids stay with dam at night for the first nights.
3. Subsequently kid stay in kid box. A kid box is where kids are put for the night and are kept warm.
4. Kids suckle at least every 4-6 hrs

2 – 8 weeks

1. Kids fed at least x3 times per day.
2. After the 2nd week, provide leafy material for the kids to nibble, to develop their rumens (stomachs).
3. Goat kids **weaned** at the age of 3-4 months.
4. Kids graze alone for up to 4 months.

Between 8 and 10 weeks,

1. Kids join flock.
2. Ensure kids are de-wormed.

4.9 General tips on goat breeding

- Young females from the age of 3 months should be separated from males until mature.
- Female goats that are mated earlier than 8 months will stop growing and becomes stunted.
- Often times they even produce weak kids, which may also grow very slowly.
- Select breeds that suit the farm environment and purpose for farming.
- Breeding males must be sold or exchanged before they get close to breeding their siblings and own offspring.
- Old males must be disposed of after 7-8 years of breeding.
- Young males not wanted for breeding must be castrated or sold.
- Female offspring from good parents must be retained in the herd.
- Stunted and unthrifty animals must not be used for breeding.
- Always give the goats proper animal health care, adequate housing and satisfactory nutrition because all of these factors affect the breeding performance of the goats.

Chapter Five

Goat housing

5.1 Introduction

Appropriate and adequate housing is an absolute necessity for goat farming. It is important that goats are adequately sheltered to protect them from adverse environmental and harsh conditions. Goat keepers can lose up to 50% of their kids due to diseases and complications caused by poor and unhygienic housing. Goats need shelter and are usually afraid of rain. Shelter is also necessary to protect goats especially kids from predators like dogs, wild animals and thieves. The adult goats suffer reduced production and productivity due to bad weather.

5.2 Types of Houses

The type of goat house to be selected varies with: -

1. Goat Farming System
2. Size of herd
3. Resources available.

Goat houses may be built using cheap materials, which are locally available. Different groups of goats have special housing requirements. These are:

- Breeding males.
- Pregnant Does (in the last stage of pregnancy).
- Goat kids.
- Sick goats.

5.3 Principal Features of Goat Houses

The key features, however include:

- **siting,**
- **design**
- **type of floor** and
- **roof.**

Design of the house depends on: -

- Purpose.
- Specialized needs
- May be permanent or temporary.
- Made of mud, bricks, or timber.
- Should have adequate ventilation.
- Floor must be easily cleaned.
- Roof and a wall must be strong.

Recommended specifications

1. Permanent Housing: 1.5 m² (1.22 x 1.22 m) per goat with an exercise yard and space for feed and water troughs
2. Night Housing: 1.0 m² (1 x 1 m) per goat
3. Kidding pen: 3.0 m² (1.73 x 1.73 m) per doe
4. Permanent buck pen: 3.0 m² per buck with an exercise yard and space for feed and water troughs
5. See Figure 37a, for what these design specifications mean in practice.

Layout design of goat house

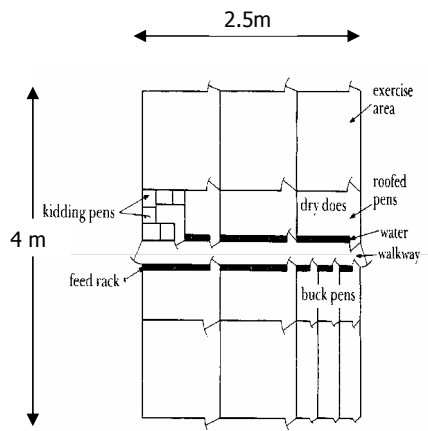


Fig. 37a: Lay out design for 5 goats (1 male & 4 females) permanently housed

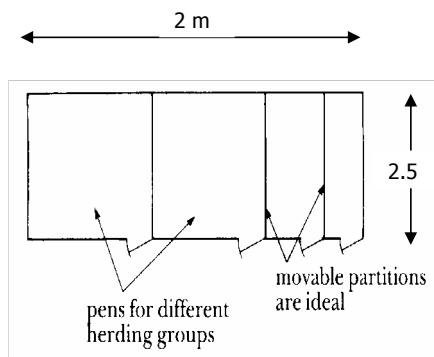


Fig. 37b: Lay out design for 3 goats (1 male & 2 females) housed at night only

Dimensions

For permanently housed goats, if you have 5 goats, the requirement is for 1.5m^2 per goat, therefore $5 \times 1.5 = 7.5\text{m}^2$. See figure 37a (immediately above), the dimensions are $4 \times 2.5\text{m} = 10\text{m}^2$. This will be sufficient to house 5 goats, using the recommended spacing, but the more space the better.

For goats housed during the night only, Figure 37b is for 3 goats, the recommended spacing is 1m^2 per animal. Therefore for 3 goats 3m^2 is required, in Figure 37b (immediately above), the dimensions are $2 \times 2.5 = 5\text{m}^2$. This will be sufficient to house 3 goats.

With goat housing you need to plan for the future. What reproductive rate do you anticipate? If for example with a high level of husbandry, the does produce twins, therefore in the first breeding year 4 does \times 2 kids each = 12 animals. If all these are kept, with the male being replaced = 13 Goats total. If they are permanently housed – $13 \times 1.5\text{m} = 19.5\text{m}^2$ (at least) = A house with the following minimum dimensions – $4.5 \times 4.5\text{m}$ plus an exercise yard and space for feed and water. The dimensions will be $6\text{m} \times 6\text{m} = 36\text{m}^2$.

Floor

1. Houses can be set on the ground or stilted.
2. Ground level housing may have a floor of rammed earth / clay or concrete.
3. Mud floors must be compacted to allow easy cleaning.
4. Stilted floor must have be raised to at least about 1.5 - 2m off ground.
5. Wooden slats must have a separation gap of 1.5 - 2cm to allow manure to fall through the ground.
6. Avoid making big slats, which trap the goats' legs.

Roof

1. All goat shelters/ houses must have roofs.

2. Roofs are made from corrugated iron sheets, papyrus, grass or polyvinyl material (*kaveera*).
3. Roofs must slope to allow water run off and must not leak.
4. A veranda or platform constructed around the house prevents rainwater from entering the house or damaging the foundation.

Brick House (See Figure 38)

Advantages

- Structures are usually permanent
- Not easily demolished by animals

Disadvantages

- Bricks are expensive
- Houses are often of poor ventilation,
- Floor needs special attention and may not be easily cleaned



Fig. 38: Brick house

Mud House (See Figure 39)



Fig. 39: Mud houses of different shapes

Advantages

- They are cheap to construct
- Are semi permanent.
- Materials are cheap and locally available

Disadvantages

- Often ventilation is not adequate
- Floor is difficult to clean.
- Most mud houses also have grass-thatched roofs, which easily leads to leaking during rainy seasons.

Stilted house, slatted floor

(See Figure 40a)

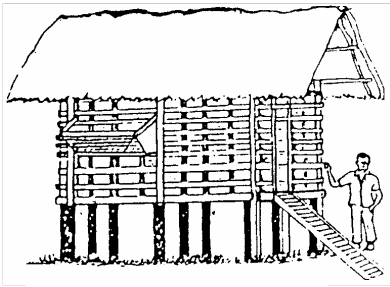


Fig. 40a: Stilted house, slatted floor

Advantages

- Can house a large or small number of goats (see figure 40b. Compare with figure 40c)
- Adequate ventilation
- Cleaning is easy and not labour intensive
- Urine and faeces can be collected for other purposes
- House is durable (see Figure 40c)
- Stilts protect goats from large predators

Disadvantage:

- Expensive to construct: since material use is high.



Fig. 40b: Stilted house, slatted floor
30mx5m can hold 300 adult goats

Some recommended specifications for animal space

- Kid 0.3 m^2 (0.55m x0.55m) per animal
- Doe (non pregnant) 1.5 m^2 (1.22mx1.22m) per animal
- Doe pregnant 1.9 m^2 (1.37mx1.37m) per animal
- Buck 2.8 m^2 (1.67m x1.67m) per animal



Fig. 40c: Stilted house, slatted floor
10m x 3m can hold 30 adults

Goat houses made from local Materials



Fig. 41a: Ground level housing, Rakai



Fig. 41b: Ground level housin , Kamuli



Fig. 42: Goat house raised floor

Goat houses made of local materials are more than adequate. The principle requirement is to keep goats dry during rain showers. Figure 41b shows the minimum required – a roof only. More sophisticated designs can be used; figure 41a shows ground level housing. The walls are simple, made from eucalyptus poles, widely spaced to keep the goats confined, yet well ventilated.

Figure 42 shows a further level of development, by raising the goat house above ground level, means urine and dung falls through the slats, making the collection easy.

General tips on goat housing

- If the goats do not get enough space for movement in the house, their activity is restricted and this has a subsequent effect of reduced goat productivity.
- Congestion in the house makes goats susceptible to respiratory diseases.
- The goat house should be cleaned everyday because the accumulated droppings make a good environment for multiplication of infectious agents and parasites that cause diseases.
- Young goats are very susceptible to parasites found in the faeces and urine whereas the adults suffer skin and foot infections from dirty houses.
- People should not share houses with animals.

Chapter Six

Health and Hygiene

6.1 Introduction

Animal health is a very important factor in goat production like in all other livestock systems. High economic losses range from death of more than 50% of flock, to slow and progressive isolated cases of mortalities or, increased morbidity. These subsequently reduce production and are associated with weak veterinary services and /or ignorance of farmers. The production and productivity of the goats depend entirely on the health status of the animal, which in its turn is affected by **husbandry practices, breeding programs, nutrition and stress** (among others). **The extension workers and advisory service providers must remember that these are the main predisposing factors to diseases. They should train the farmers to effectively identify signs of ill – health in goats both at herd and individual animal level.** This chapter only gives highlights of diseases. Details can be got from textbooks of veterinary medicine. It in doubt, consult your veterinary scout or veterinary surgeon.

6.2 Assessing health and disease

1. Time spent on obtaining an accurate description of the problem or disease / infection is time well spent. Every morning the herdsman must visually observe his herd. Figure 43 shows a goat with signs of ill health.
2. Some of the **indicators of ill health** are: -
 - ♦ Goats isolating themselves
 - ♦ Poor demeanor
 - ♦ Poor coat (see Figure 44)
 - ♦ Dyspnoeic (difficult) respiration
 - ♦ Coughing and shivering
 - ♦ Inappetance
 - ♦ Bloated rumen
 - ♦ Failure to chew cud.
 - ♦ Failure to ruminate.
 - ♦ Abnormal posture (see Figure 46)
 - ♦ Prolonged recumbency.
 - ♦ Lameness.
 - ♦ Abnormal head position.
 - ♦ Discharges.
 - ♦ Salivation and frothing (See Figure 45).
 - ♦ Mucus membrane congestion.
 - ♦ Mucus membrane pallor.



Fig. 43: A goat showing signs of ill health



Fig. 44: A goat very sick with hair falling off

Consequences of ill health

are:

1. Reduced production, or weight gain.
2. Reduced milk production in lactating goats.
3. Emaciation (thinness).
4. Infertility.
5. Death

Causes of goat diseases: -

1. Viruses
2. Protozoa.
3. Bacteria.
4. Fungi.
5. Helminthes
6. External parasites
7. Poisons
8. Physical injuries
9. Nutritional disorders.
10. Nutritional deficiencies.
11. Stress due to adverse environment.
12. Genetic problems.



Fig. 45: Animal-exhibiting signs of Orf around the muzzle

Control of tick Borne diseases

- i) Main diseases are anaplasmosis (Red water) and heart-water.
- ii) Usually associated with poor tick control (a chemical that controls / kills ticks).
- iii) Ticks must be controlled with acaricide.
- iv) Control is by spraying or dipping.
- v) Specific attention must be given to acaricide application.
- vi) Apply in ears, around the horns, tail, limbs and between the hooves (see Figures 46 and 47).



Fig. 46: Goat limping due to tick infestation



Fig.47: Inter-digital space laden with ticks

Dimensions of goat/sheep dip tank

Side elevation and plan view of a dip tank. The community usually owns tanks. Treatment of ticks can be undertaken using a spray applicator.

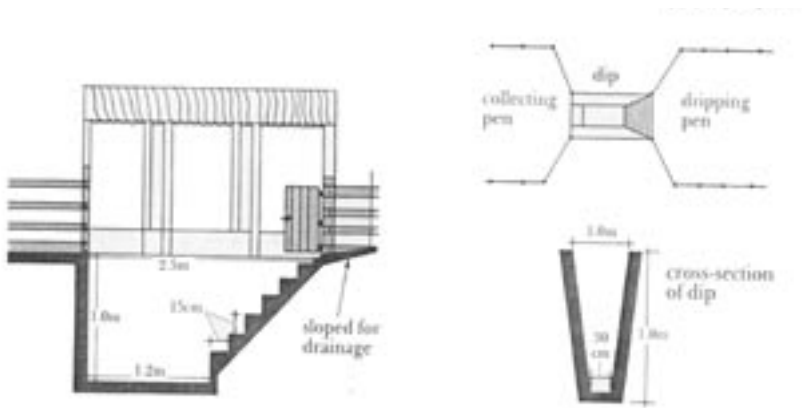


Fig. 48:A goat/Sheep dip tank; plan and side elevation

Notes:

Figure 48 outlines the plan and side elevation for a goat and/or sheep dip tank. These are approximate measurements. Each dip tank will be designed to fit into the area provided. Service providers (or other type of service provider) must therefore design the dip tank before construction is started. The above diagram is for information only.

The goat dip bath should be built away from the rest of the farm to avoid pollution.

It is constructed with a soak away drain or septic tank to dispose waste dip wash.

For easy filling, one must consider the source of the water point.

Care must be taken not to contaminate pasture and the water source with acaricide wash.

Spraying or dipping of goats can be done once or twice in a week or once in 2 weeks depending on the tick burden.

The goat/sheep crush

The goat/sheep crush measures 1m tapering to 0.5m at the base, height of approx. 1.2m high.

6.3 Tips to remember about goat health

1. General animal care, which includes: good feeding, shelter, breeding, care of hooves, treatment and prevention of diseases is necessary.
2. Ill health leads to reduced growth in the young and productivity in adults, which in turn increases production costs as well as veterinary costs.
3. Failure of kids to suckle, poor sanitation and poor feeding make the animals more susceptible to disease/infection.
4. There is need to identify and isolate sick animals and give them special care until recovery.
5. Release the sick animal to join the rest of the animals, only after its feeding has returned to normal and signs of disease have subsided.
6. Routine health care including good management practices must be practiced and these include among others; treatment against diseases, de-worming and vaccination

Table 5: Common goat diseases/conditions

General problem	Possible cause	Prevention & control
Kid deaths	<p>Death before weaning is mainly associated with weakness due hypoglycaemia, or diarrhoea.</p> <p>It happens to kid, whom are too weak to suckle and they are not assisted.</p> <p>Predisposing factors are: failure to feed on colostrum, poor nutrition of dam leading to low milk production, dirty housing pens, dirty water, accidents by being hit by other adult goats or suffocation and predation by wild animals.</p> <p>Some of the infectious causes are coccidiosis, colibacillosis, and enterotoxaemia.</p>	<ol style="list-style-type: none"> 1. On kidding, weak kids must be assisted to suckle. It is important that the kid gets colostrum in the first 48 hrs of birth. 2. Where need arises, kid can be fed by a surrogate mother or fed using the feed bottle. 3. Ensure clean kid pen and care by separating young ones and ensuring that they have good ventilation, warmth and feed adequately. 4. Identify and treat the primary causes 5. Farmers should always consult the veterinarian in addition to first aid
Respiratory problems	<p>The skin diseases are associated with production losses if un-treated.</p> <p>Predisposing factors include poor ventilation, large numbers in inadequate space, introduction of infected goats into the flock.</p> <p>Possible causes include Anthrax, CCPP, Lungworm, meliodosis, PPR, Pneumonia and goat pox.</p>	<ol style="list-style-type: none"> 1. Usually respiratory diseases are highly infectious if not due to helminthosis. Hence where possible the infected goats must be isolated and placed in a warm, dry, well ventilated place.. 2. Ensure that newly introduced goats are well screened for such diseases. 3. Identify and treat the primary causes.

General problem	Possible cause	Prevention & control
Skin diseases and swellings	<p>Skin diseases can kill if un-treated. They are however associated with chronic production losses.</p> <p>Predisposing factors include: close proximity with infected goats, new introduction into flocks, poor nutrition and failure to vaccinate against certain diseases like pox in a susceptible area.</p> <p>Diseases include: Goat pox, Mange, Orf, Ringworm, Warts, Streptothricosis, Caseous Lymphadenitis, and abscesses.</p>	<ol style="list-style-type: none"> 1. Identify and treat the primary cause. 2. Good management including adequate space, proper nutrition, and screening of new entries. 3. Vaccinate where need arises
Anaemia (lack of iron in blood)	Restlessness, weakness, lack of appetite, pallour of the gums and around the eyes (mainly caused by worm infestation)	<ol style="list-style-type: none"> 1. Add iron to the diet. 2. Investigate the presence of worm infestation and treat. 3. Address predisposing factors: nutrition, vector ticks, dirty pens, inadequate anti-helmintic use
Abortion	<p>Young ones are born dead and/or come out before five months.</p> <p>Ears and hooves look undeveloped caused by infectious organisms and bad management.</p> <p>These include: brucellosis, Q fever, chlamydiosis, very hot and arid conditions</p>	<ol style="list-style-type: none"> 1. Farmer must seek veterinary help immediately 2. Farmer must report incidence of abortion to DVO
Navel ill	<p>Hot firm swelling around the umbilical cord.</p> <p>Animal may show lameness with swelling of the joints.</p> <p>It often occurs in new born due to infection.</p>	<ol style="list-style-type: none"> 1. Clean swollen navel with iodine or disinfectant for about 3 days 2. Keep the kid pen clean 3. If it is a hernia then the swelling can be gently pushed in the abdomen and will disappear. 4. Treat for secondary infection with antibiotics

Note: For proper diagnosis, it is essential that veterinary scout or veterinary surgeon be consulted

Table 5: Common goat diseases/conditions cont'd

General problem	Possible cause	Prevention & control
Pneumonia	Nasal discharges, short and rapid difficult breathing, raspy sounds from the lungs. Mainly affects young ones but may affect all ages	<ol style="list-style-type: none"> 1. Establish whether it is caused by CCPP or other causes 2. Separate young ones from adults and avoid overcrowding 3. If other causes, Improve ventilation and/or improve warmth 4. If CCPP – call Vet or report immediately to MAAIF
Mastitis	Strains in goats are similar to those in cattle and sheep. Commonest <i>Staphylococals. aureus</i> . Udder is hot and painful, milk is watery and contains clots	<ol style="list-style-type: none"> 1. Udder must be milked out twice daily 2. Intra-mammary infusion and injectable antibiotics used in severe infections. 3. Apply warm fomentations e.g. a warm cloth to improve blood circulation 4. Check udders of high yielding dairy goats post weaning. 5. Females with repeated problem should be culled or not used for breeding.
Diarrhoea	Blood or white diarrhea, which may be persistent. Animal becomes unthrifty, dull and loses weight. Death easily occurs in young.	<ol style="list-style-type: none"> 1. Give re-hydration fluids 2. Treat with sulphur preparations or any other appropriate drug 3. Identify and address pre-disposing factors
Internal Parasites	Unthriftiness, potbelly, weight loss, diarrhea, signs of anemia eg. Pale gums and weakness. Occurs in all ages as a result of worm/parasite-infested pasture. Liver fluke infestation is associated with grazing near swamps, <i>haemonchus</i> shows submandibular oedema and <i>E.ovis</i> shows nasal discharge.	<ol style="list-style-type: none"> 1. De-worm animals with appropriate drugs. 2. Offer good nutrition and sanitation and possibly stall feeding off the ground. 3. Practice rotational grazing-use clean pasture 4. For Liver flukes avoid swamp pastures or treat with right drug.
Mange	Alopecia, skin irritation leading to dermatitis of mainly head, neck and back due to rubbing. Areas become thick and scaly. Caused by mites, which burrow under the skin.	<ol style="list-style-type: none"> 1. Apply red oil mixed with cresyl (chemical available at drug stores). 2. Wash animals with appropriate chemicals like acaricides until skin looks normal. 3. Treat with available injectable drugs
Lice	Hair coat looks dull, rough and open. Skin irritation is visible and animal may lick coat.	<ol style="list-style-type: none"> 1. Powders and sprays available for application on the animals. 2. Clean the animal house with appropriate chemical to remove the lice from cracks.
Orf	Scabs form around the mouth and nostrils of the animals. Young ones may fail to suckle or eat. Pox lesions will also be found on feet, genitals and on the teats of their mothers.	<ol style="list-style-type: none"> 1. Apply iodine on scabs, may use antibiotic spray and give antibiotic cover as well. 2. When a kid fails to suckle, milk mother and feed it through the bottle.

Note: For proper diagnosis, it is essential that a veterinary scout or veterinary surgeon be consulted

General problem	Possible cause	Prevention & control
Tick Borne Diseases	Animal has serious laboured breathing, muscle tremours and nervous twitching in cowdriosis. Constipation may be reported in anaplasmosis and in all cases temperature is elevated. Ticks may be seen on animal.	<ol style="list-style-type: none"> 1. Keep sick animal in a shade and give some clean water. 2. Treat animal according to diagnosis 3. Check the acaricide you are using reference to dosage, mechanism of application, frequency of spraying or dipping and if dip you need to check for concentration.
Brucellosis	Commonest sign is abortion in females and signs of infertility in the herd. The male may or not have enlarged testes	<ol style="list-style-type: none"> 1. See description under abortions. 2. Identify source and if it the male then remove it from the herd 3. Advisable to carry out herd testing
Bloat	Digestive disorder caused by an accumulation of gas in the rumen. Belching discharges gas. Bloat can occur rapidly, within 15 mins. Bloat occurs when animals are turned out onto new pastures. Hungry cattle over eat and tend to bloat. After drought, when there is rapid plant growth.	<ol style="list-style-type: none"> 1. Reduce animal access to new or rapidly growing pasture. 2. Do not allow animals to graze wet pasture. 3. Identify and remove goats 4. Give 1 cup of mineral oil if available 5. Commercial anti-bloat preparations 6. Relieve gas bloat with needle and/or cannula.

Note: For proper diagnosis, it is essential that a veterinary scout or veterinary surgeon be consulted.

Chapter Seven

Good Management practices

7.1 Introduction

Good management practices and procedures is an essential tool in goat farming just like any other business. Farmers need basic knowledge and information about the animals in the day-to-day management of goat farms.

7.2 Record management

Records are very important tools in the management of any farm. They can be kept for many purposes and will vary in detail depending on the objectives of the farm and what information is needed. Records must be kept in simple formats, which can be understood by all people at the farm. There are different types of records, which must be kept. All herd records can be kept in an exercise book(s).

Identification records

These records help the farmers to remember each animal individually. Table 6 suggests a identification record format. An A4 size blank record sheet is in annex 1. Many farmers or herdsman do theirs in their head. They are useful when making head counts in order to trace the physical presence of the animal and for follow up on performance for each animal. Some of the records used for identification are:

Table 6: Identification in records

• Tag number	ID Tag no	Sex	Breed	Colour	Date of arrival	Age of arrival	Date of birth	Date sold
• Names given to the animals	27	F	Boer 50%	White	Dec 1999	2½		
• Colour pattern	38	M	Boer Pure	Brow/White	Oct 99			
• Sex	45	F	Local	Black			Sep 1999	
• Breed								
• Number of head count morning								
• Number of head count evening								

Reproduction records

These records (Table 7 suggests a reproduction or breeding record format. An A4 size blank record sheet is in annex 2) are used to monitor the expansion of the herd and information on individual breeding performance. It will also reflect on the performance of the male. Goats are monitored for service, pregnancy, at kidding, and growth and maturation of off springs. The records include:

Table 7 :Reproduction or Breeding Records

•Date of birth	Animal No	Date of service	Buck	Anticipated month of kidding	Date of kidding	No of kids	Other
•Weight at birth	38	12.12.99	45	Sept.	10.09.2000		
•Status at birth	36	18.01.02	R4	Oct.			
•Date of service (mated)							
•Identification of sire (male)							

- Expected month of kidding
- Date of kidding
- Young ones born alive /dead

Production records

Table 8 is a production record sheet, where individual animal performance records can be recorded. Alternatively the production records can be compiled on a herd basis. An A4 size blank record sheet is in annex 3. Such records are indicators of the economic performance of the herd or an individual performance. They will give signals when an animal is due for culling. Some of the production records are:

Table 8: Production records

- Liters of milk per day
- Young ones raised
- No. of animals successfully mated /sired (male)
- No. of times it kids in two years
- No. of times of kidding in its life span.
- Number of offspring produced (male and female)

ID Tag no	Date	Litres Morn	Litres Eve	Total / wk	Kids/yr	Sire ID
40	12/01/99	15	10	134	2/1999	007
39	-do-	5	3	50	1/1999	005
56	-do-	20	18	184	2/1999	007

Health Records

Give information on herd health (See Table 9). An A4 size blank record sheet is in annex 4. They enable farmer to detect the disease conditions affecting the herd, the animals with frequent health problems, the effectiveness of the disease prevention and control strategies on the farm. Some of the health records are:

Table 9: Health records

- Clinical signs

- History of sickness

- Duration of sickness

- Diagnosis made

- Treatment given

- Number of animals sick

- Previous sickness and treatment

- Any other information

Identification (No.)	Date	Clinical signs and Treatment	Remarks	Doctors Name Contact
005	20.01.02	Animal Coughing, Treated with Trimethosulf (®)	Repeat dose	John

Expenditure and Income records

Financial records are vital. To monitor and evaluate the income (or revenue) compared to the expenditure or costs is the essence of good business practice and the key to profitable goat

farming. Table 10 gives an example of an expenditure and income record sheet. An A4 size blank record sheet is in annex 5. They should reflect income versus expenditure and are therefore a key management decision tool as to whether the farmer should improve his goat farming business or change or quit.

Table 10: Expenditure / Income Records

Expenditure/costs

- Animals
- Animal feeds
- Drugs
- Vet Services
- Equipment
- Machinery
- Labour/staff
- Others

Income/sale

- Milk
- Adult animals
- Kids
- Skins
- Slaughtered
- Yogurt
- Others like crops

Date	Description	Expenditure/Income		Amount	Comments
		Input	Output		
12/01/99	Treatment of animals			12,000	
14.01.99	Sale of goat Kid			30,000	

Table 11: Flock number records

Flock numbers (see table 11)

- Make a head count every morning and evening
- Inspect flock regularly with impromptu checks.
- In case of reported deaths ask for evidence like skins.

Date		Category				Total Goats	Remarks
		Does	Bucks	Castrates	Kids F M		
12.02.02	Morning	50	5	20	10 5		
	Evening	49	5	20	10 5		
13.0.02	Morning	48	5	20	10 5		
14.02.02	Morning						
	Evening						

Other Good Management Practices

1. Identification of animals
2. Hoof trimming
3. Dehorning
4. Castration
5. Drenching of animals
6. Taking temperature
7. Ageing animals
8. Estimation of weight

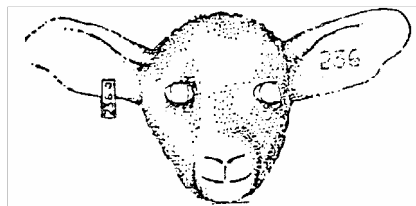
7.3 Animal Identification

It is important for farmers and herdsmen/women to distinguish one animal from the other at all times. This is important for record keeping purposes, security, breeding, identification of sick animals, and taking stock of the animals on the farm as well as traceability.

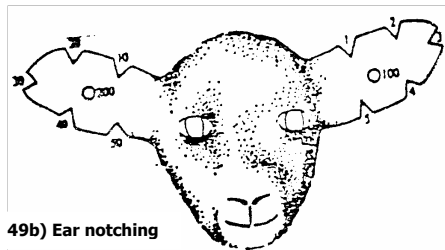
Methods used in identification of goats:

Different methods of identification are shown in figures 49a, 49b & 49c.

1. *Description of the colour pattern or giving names.* This process may be complicated.
2. *Ear notching.* The method is cheap but not applicable to many animals.
3. *Ear tattoo.* It requires special tattoo machine and the tattoo may not be legible.
4. *Ear tag.* Numbers will be legible and good but they may fall off during grazing. However, it is the most recommended method of identification.
5. *Neck collar.* Method is very easy but leaves loop hole in security for the animals. The collars can be changed easily between goats.
6. *Animal branding.* It is a permanent method of identification but lowers quality of the skins.



49 a) Ear tattooing



49b) Ear notching



49c) Ear tags

Fig. 49 a, b & c different methods of identification

7.4 Hoof Trimming

Figure 50 shows the characteristics of overgrown hooves.

- i) Hoof overgrowth occurs where there is no hard surface
- ii) Overgrown hooves are easily damaged.
- iii) Overgrown hooves lead to sores and ulcers
- iv) The curled "**slipper feet**" slow down grazing
- v) Figure 51 shows what a well trimmed and managed hoof should look like. Hooves trimmed like this, will reduce the frequency of lameness and poor breeding performance. Female goats with "slipper feet" are difficult to mount, they frequently cannot stand the weight of the buck. Likewise a buck with "slipper feet", have difficulty in mounting a doe.
- vi) Hooves must be inspected regularly
- vii) Hooves must be exposed to rough casts /surface
- viii) Veterinary assistance must be sought for trimming.
- ix) Figure 52 shows the foot trimming equipment required and how foot trimming is carried out.

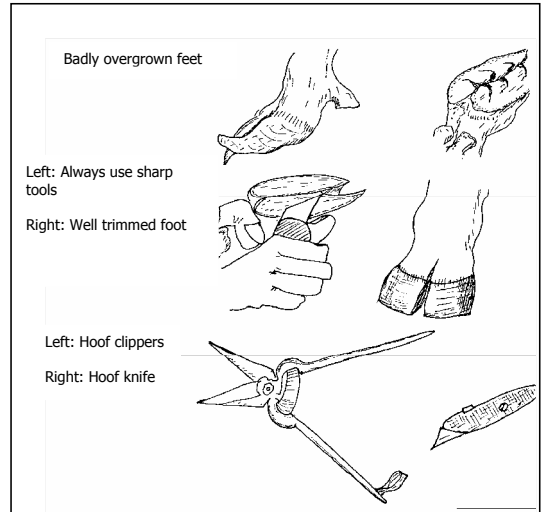


Fig. 52: Hoof trimming and Equipment



Fig .50: Overgrown hooves

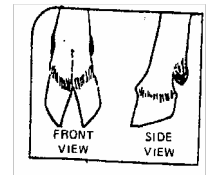


Fig. 51: Trimmed and Normal hooves

7.5 Dehorning and Disbudding.

- Recommended in young, injury and accidents.
- Intervention is surgical procedure to be done by Vet.
- Up to 2 weeks, the horn bud can be **disbudded**.
- Wounds created must be treated like any other wound

7.6 Castration

- Castrate all male goats, not needed for breeding.
- Preferable castration within the 1st 3 weeks
- Use open or closed castration methods.
- Open castration; use a bloodless castrator (burdizzo) or a rubber ring with elastrator.
- Figure 53, shows in three photographs from the top left, how a rubber ring castrator method is applied.
- Figures 54, 55 and 56 show in 4 photographs how a Buridizzo is used.
- Complications may result from using this method. Wounds may open which become infected. If wounds are created, they must be hygienically managed. After both methods have been applied, herdsman must regularly inspect the animals, especially 2 – 10 days after application.



Fig. 53: Rubber ring elastrator method, Castration using a rubber ring



Fig. 54: Burdizzo castrator



Fig. 55: Before applying the Burdizzo Pull the testicles down



Fig. 56: Apply Burdizzo & Castrate Carefully one testicle at a time

7.7 De-worming

1. Choose the right anthelmintic (worm medicine). This depends on the worms.
2. Monitor the worm burden 2 weeks after de-worming. A Veterinary person can help you to do this.
3. Effectiveness depends on season, drugs and dosage. It is recommended to de-worm 3 weeks after the beginning of the rainfall period.
4. Farmers can be trained to drench animals with instructions as follows: -
 - Use drenching gun, syringe or bottle.



Fig. 57: Drenching gun

- Hold head of the goat in normal position upright position (as in picture)
 - Insert bottle or syringe in cheek pouch.
 - DO NOT HOLD THE TONGUE.
- In case of asphyxia call a Vet Doctor immediately.



Fig. 59: Simple dosing syringe

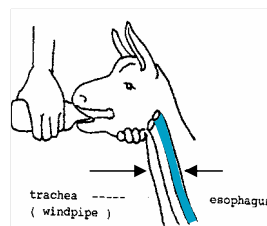


Fig. 58: Drenching with a bottle

For de-worming, several methods can be used. Use a beer bottle (see Figure 58). The bottle must have a neck; a “tusker beer” bottle is good, as is a wine bottle. But a “Nile special” or a “Bell” beer bottle is not suitable, the neck becomes too wide. Ideally the bottle must have a long thin neck. The bottle containing the de-worming medicine is placed on top of the tongue.

A drench gun can be used (see figure 57), when using a drench gun is applied through the side of the month. Again ensure that the drench gun is placed on the top of the tongue.

A large volume syringe (100 ml volume) can be used, as shown in figure 59. Remove the needle, as shown in figure 59, the syringe is applied at the side of the month. Use your hand to stop the animal shaking its head. Depress the plunger slowly, while massaging the goat’s throat at the same time. This encourages and/or stimulates the goat to swallow.

7.8 Measuring body Temperature

The following criteria need to be considered:

1. The body temperature of a goat ranges 38.5 - 39.5°C
2. Farmers must always take body temperature as first line (knowing the condition of a goat).
3. They follow a simple procedure as follows: -
 - Ensure that the thermometer is clean
 - Wipe the thermometer dry.
 - Shake the thermometer down to normal
 - If digital switch it off and then on.
 - Insert the thermometer in rectum against rectal wall.
 - Take reading without touching bulb.
 - Clean the bulb with clean water or with antiseptic.

7.9 Managing Diarrhea.

Whenever goats suffer from intensive diarrhea they often get dehydrated. Goats in this state can easily die and this is common in kids. Whatever the cause of the diarrhea may be, First Aid must be given before seeking professional help. A simple formula for preparation of oral re-hydration fluids for animals with diarrhea is given below.

- Tea spoon full of sugar
- ½ Tea spoon full of salt
- 1 Liter of clean water

The above is only a basic formulation, which can be used in emergency by the farmer and they must be reminded that ***the rules for drenching apply***

7.10 Goat Weight estimation

Estimated by measurement of the heart girth using an animal weight estimation tape or using an ordinary tape and converting the measurements into weight. Knowledge of the weight of the goats is useful in:

- Calculation of the drugs during treatment.
- Analysis of the growth rate of the kids.
- Purchase goats of specified weights.

In taking the weight, run the tape or string around the chest (**girth**) of the goat, as shown in figure 60 (below). Pull the tape tightly and take the measurement in inches or centimeters. Check for the weight in the given chart (Table 12), which corresponds to the measurement you got.

Example: According to the chart:

1. A goat of 15.3 inches or 38.7 cm measurement of the goat chest (girth), weighs 5.4 Kg.
2. A goat of 28.3 inches or 71.7 cm measurement of the goat chest (girth), weighs 34 Kg.

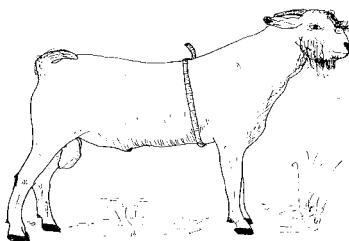


Fig. 60: Heart girth measurement using a tape

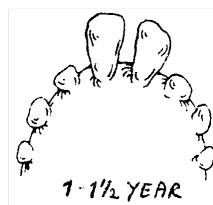
Table 12: Body weight estimation using heart girth

Inches	Centimeters Cm	Kg	Inches	Centimeters	Kg
10.8	27.3	2.3	26.3	66.7	28.5
11.3	28.6	2.5	26.8	67.9	29.9
11.8	29.9	2.7	27.3	69.2	31.2
12.3	31.1	3.0	27.8	70.5	32.6
12.8	32.4	3.2	28.3	71.7	34.0
13.3	33.7	3.6	28.8	73.0	35.3
13.8	34.9	4.1	29.3	74.3	36.7
14.3	36.2	4.5	29.8	75.6	38.1
14.8	37.5	5.0	30.3	76.8	39.4
15.3	38.7	5.4	30.8	78.0	40.8
15.8	40.0	6.0	31.3	79.4	42.1
16.3	41.3	6.8	31.8	80.7	44.0
16.8	42.7	7.7	32.3	81.9	45.8
17.3	43.8	8.6	32.8	83.2	47.6
17.8	45.1	9.5	33.5	84.5	49.8
18.3	46.4	10.4	33.8	85.7	52.1
18.8	47.6	11.3	34.3	87.0	54.4
19.3	48.9	12.2	34.8	88.3	56.6
19.8	50.2	13.2	35.3	89.5	58.9
20.3	51.4	14.1	35.8	90.8	61.2
20.8	52.7	15.0	36.3	92.1	63.4
21.3	53.9	15.9	36.8	93.4	65.7
21.8	55.3	16.8	37.3	94.6	68.0
22.3	56.5	17.7	37.8	95.9	70.2
22.8	57.8	19.1	38.3	97.2	72.5
23.3	59.1	20.4	38.8	98.4	74.8
23.8	60.3	21.8	39.3	99.7	77.1
24.3	61.6	23.1	39.8	101.1	79.3
24.8	62.9	24.5	40.3	102.2	81.6
25.3	64.1	25.9	40.8	103.5	83.9
25.8	65.4	27.2	41.3	104.8	86.2
			41.8	106.1	88.4

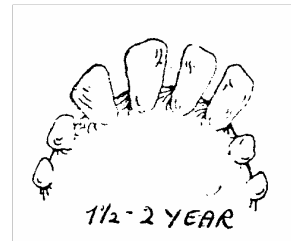
7.11 Estimating the goat's age

During birth or shortly after birth, the kid must have at least eight teeth in the lower front jaw. The teeth are small and temporary and are referred to as milk or suckling teeth.

After 1- 1½ years, the central pair of the suckling teeth is lost and is replaced with a pair of large white teeth. The teeth are easily noticed because they are visibly broader and stronger as compared to the others.



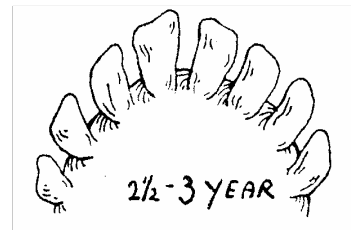
Over the next 8 – 10 months, the goats acquire another pair of strong teeth. So between 1½ - 2 years the second pair of the permanent teeth in the lower jaw will emerge.



At 2 - 2½ years, the goats have 3 pairs of permanent teeth in the lower jaw. The 6 teeth can be seen easily and differentiated from one small lateral pair, which is not yet permanent.



At 3 – 4 years all the eight teeth in the lower jaw are permanent. The goat has eight strong and permanent teeth. The goat now has a full set of adult teeth.



Chapter Eight

Management of Goat Waste and Environment

8.1 Introduction:

Goats have a bad reputation of degrading the environment. Goats are perceived by villagers to be uncontrollable pests, responsible for much damage to the environment and peoples' crops. Service providers must assure them that this reputation is now in the past and was based more on mismanagement than inherent faults, where livestock owners were not taking goat farming seriously, and would let the goats fend for themselves resulting in goat roaming villages in search of browse pastures of their own choice. Management was left mostly in the hands of women and children who had numerous other chores to handle. It is now agreed that the un-deserved reputation can be improved if extension efforts are focused to ensure that the goats find their rightful agriculture reputation including a balance between output from the environment and input into the environment. One such opportunity is to through proper management and utilization of goat waste by production of goat manure for use as soil and fish pond fertilizer. Details information on Waste management can be obtained from Peacock 1996. (for full citation see the reference section page 52).

8.2 Goat Manure

Goat manure has increasingly become a valuable product, which may be exchanged for cash. The following must be noted: -

- ♦ The quality and quantity of manure depends on the quantity and quality of the diet consumed.
- ♦ A goat is likely to produce 1-2 per cent of its weight as dry matter (DM) of manure per day. Therefore a 30 kg goat might produce 300 – 600 g DM manure per day, depending on the feed intake and digestibility of the diet.
- ♦ Goat wastes are approximately 66 percent solid waste and 33 percent urine.
- ♦ Urine is particularly rich in nitrogen and potassium.
- ♦ In order to collect solid and urine waste, the goat house must be constructed in such a way that allows trapping from underneath the goat house or allowing for drainage into a soak pit.
- ♦ In systems where goats are grazed, waste can only be collected from the night pens and it is limited in quantity and quality.

8.3 Soil Fertilizer

Manure used to fertilize crops may be applied to the soil in the following ways:

- Fresh and direct application
- Mixed with waste feed and bedding
- Stored and fermented with or without additional organic material allowing for composting.

The following should be noted:

- i) Addition of manure to organic matter such as waste feed, fruit skins and crop wastes can considerably improve the fertilizing quality of the compost.

- ii) Exposure of manure to air leads to the volatilisation of ammonia. The losses are greater at higher temperatures, under windy conditions, and if a large surface area is exposed.
- iii) The bacteria that break down the organic material also require nitrogen for their growth, which results in further losses.
- iv) Nitrogen can be leached out of manure by rain. To reduce these losses, compose manure in a covered pit otherwise use the manure fresh.

8.4 Fishpond fertilizer

Goat manure can be fed directly into the fishponds. The manure, urine, and high quality waste feed will fertilize the pond by supplying nutrients for a rich phytoplankton or algal growth (the water is green in colour) which is consumed directly by fish. Because of this, farmer s must be encouraged to integrate goat farming with fish production where resources are available. Information available has indicated that total income from a pond can be more than doubled by the addition of goat manure.

The following to be noted:

- i) Fertilizing a pond with goat manure alone will not produce high yields of fish.
- ii) Ponds can be supplemented with a higher quality source of nutrients such as purchased chemical fertilizers.
- iii) Pond can also be supplemented with manure from intensively fed chickens.
- iv) Fish can die through over manuring of ponds. A balance has to be found between manure loading and the oxygen demands of the fish.
- v) The ratios of organic matter nitrogen, phosphorus and potassium also affect the growth of phytoplankton, zooplankton, and water quality

Total fish yield depends on many factors, which include:-

- ♦ Stocking rate
- ♦ General water quality
- ♦ Phytoplankton growth, and
- ♦ Amount of dissolved oxygen in the water.

For futher information, see the NAADS aquaculture manual.

Observations to be made:

- ♦ Assess water quality by observing the pond early in the morning.
- ♦ A well-fertilized pond should be a fresh green colour.
- ♦ If fish are gasping for air at the surface of the pond, it is an indication of low levels of dissolved oxygen in the pond, and **manure should not** be added.
- ♦ Consult NAADS Fish Farming manual and extension workers working specifically on fish farming

Extensions workers must again emphasize the balance between enterprises. A goat farmer with both crops and a fishpond has to decide which of the 2 enterprises must receive more manure from the goats. Questions to consider are:

- Is there enough waste to make a significant contribution to the pond?
- Can other fertilizers be purchased for the pond or field?

- What are the relative costs and returns from fertilizing the field crops, compared with fertilizing the fishpond?

The farmer may decide to use the liquid waste and some solids for the pond, and the remaining solid manure for the crops.

Chapter Nine

Basic Principles of Economics in Goat Farming

9.1 Introduction

The abundant and largely untapped pastures and shrubs in many areas of Uganda can be utilized effectively for profitable goat farming. It is therefore necessary to associate the biological efficiency of goats with economic considerations.

- ? In the simplest terms, **economic efficiency** in this sense refers to the magnitude of the monetary value of the animal products: meat, milk, fibre and skins. It can be expressed in terms of gross and net returns per animal, per month, per annum (year), per hectare, per family or as rate of return per unit of invested capital. These factors depend on both the production and reproduction efficiency of the goats.

The service providers and extension workers must be in position to translate the above knowledge in very simple terms for the benefit of the farmers because: -

- ? Farmers must understand why they should opt for goat farming
- ? What is involved in an efficient and effective goat farming system
- ? What must guide them in decision making
- ? Undertake a simple economic analysis of goat farming.

Reminder

- ♦ Goats are smaller animals
- ♦ Cost less than cattle
- ♦ Require less feeds
- ♦ Present fewer risks
- ♦ Have quick turn-over
- ♦ Easier management

9.2 Efficiency of production.

Economic efficiency is influenced to a large extent by both productive and reproductive efficiency. **Efficiency of production** in farm animals defined as **production per unit** of **food eaten** by the animal. It is not easy to compare between different conditions and breeds.

Meat

The quality and quantity of meat determine the productive efficiency of meat goats and the following must be remembered: -

1. **Quantity** is measured as live weight before slaughter. It depends on: -
 - ♦ Depends on total amount of lean meat in the carcass.
 - ♦ Is determined by growth rate.

- ♦ Depends on the total number of animals available for slaughter.
- 2. **Quality** largely depends on the quality and distribution of fat.
 - ♦ Excess fat is undesirable.
 - ♦ The meat should be odourless or with as little odour as possible although this is difficult in goats.

Milk

In case of milk, the 2 important factors are:

1. **Quantity** is the lactation milk yield per head for lactation cycle.
2. **Quality** depends on the average butterfat and non-fat solids present.

9.2.1 Productive efficiency

1. Varies according to size of the animals and the level of food intake.
2. On a flock basis, the calculations must consider the following:
 - ♦ Nutritional costs of breeding females
 - ♦ Litter size
 - ♦ Age
 - ♦ Mature size
 - ♦ Mortality rates.
3. On a flock basis efficiency of meat production is reduced by inclusion of: -
 - Immature animals,
 - Castrated males
 - Unproductive animals including the infertile and diseased
 - Any animals that are due for culling.
4. Faster growing goats are more efficient in energy and protein storage as compared to slower growing goats.
5. Efficiency of milk production in goats is affected by:-
 - Lactation period
 - Feed utilization
 - Feed conversion efficiency.

9.2.2 Reproductive Efficiency of Goats

Reproductive efficiency in goats depends on the reproductive performance of the does and bucks. Extension workers must remember the following: -

1. Reproduction is the engine of the flock to ensure that the flock adequately expands to generate enough replacements and an excess supply of goats for sale.
2. The **reproductive rate** of both individual goats and the flock is the important determinant of the overall success of this objective. Factors that affect the increase in the number of breeding females include:
 - Age of females at first mating

- Number of years in the breeding flock
 - Animal death rate in the breeding flock
 - Number of female young reared to breeding age each year per 100 breeding females
3. The above factors are influenced by: -
- ♦ Number of conceptions
 - ♦ Multiple births
 - ♦ Frequency of parturition
 - ♦ Duration of gestation
 - ♦ Time taken to re-establish estrus.
4. Good reproductive efficiency may also mean using an optimum ratio of **bucks** to **does**. A suitable ratio under Ugandan conditions is 1 buck to 40 does. Under more controlled and intensive conditions, the number can increase to 1:50.

9.2.3 Individual reproductive performance

Farmers keep goats so that they reproduce. Kids are sold, generating revenue for the farmer's household. The farmer must monitor the doe's reproductive performance, over a given period usually one year, how many kids did the doe produce. Reproductive information is important in identifying reproductive problems, the male may be infertile, the doe may have a fertility problem. Or the doe is old and has come to the end of her productive life and therefore must be culled. Individual reproductive performance can be assessed using some measurement like:

- i) Kidding (parturition) interval, (Time between each kidding)
- ii) Litter size
- iii) Pre-weaning mortality rate

9.2.4 Flock reproductive performance

Section 9.2.3 looks at individual reproductive performance; there is a need to look at the overall herd reproductive performance. Access to feed, different rations and access to water as well as overall herd health problems will determine flock reproductive performance. The Buck will be major determinant in flock reproductive performance. An infertile buck will have a major impact. Keeping such records is essential to the early identification to poorly performing buck. Flock reproductive performance can be measured according to: -

- i) Kidding rate, which means numbers of kids born per number of breeding females per year.

9.3 Case study- Mpigi District

A simple 'on farm study' on the viability of goat farming was done. The study lasted 13 months. Ten indigenous (local) **does** were selected by smallholder farmer and reared with a **Boer buck** (see Table 13). The study was carried out at a farm where capital inputs were already met and therefore the findings only cater for sustainability of the project.

The following gross margin of goat farming was undertaken:

Table 13. Gross margin of three does and one buck in Mpigi District

<u>Inputs:</u>	<u>Ushs</u>
Cost of supplementary feeds	100,000
20 kg salt	4,000
1 Ltr De-wormer	13,500
250 mls Tsetse tick	12,000
Housing	100,000
Ropes	20,000
Service	10,000
Family Labour	<u>120,000</u>
Total	<u>397,500</u>

Three **does** gave twins, and seven gave single kids. The total kids available for sale were 13 at 100,000 each giving a total revenue of the Ushs 1,300,000 and a net profit of nearly 902,500.

Chapter Ten

Processing and Marketing of Goats and Goat Products

10.1 Introduction

Although the value of goats and their products has been appreciated, in the recent years, questions are still asked why the products from goats still are perceived to be of low commercial value. This then raises a question of 'how then can market for goats and goat products be popularized?'. There is need to maximally utilize the diverse range of goat products in addition to marketing of the live animals. Once a surplus to the family's requirements has been met, attention should be paid to the handling, processing and marketing of goat products in a value addition venture. The products include:

- Milk and milk derivatives e.g. yoghurt, ghee, skimmed milk, butter, cheese
- Meat and carcass products
- Skins
- Fibre
- Manure
- Horns.

One must target the peak market demand for the animals and products like during *Idd el fitri*, *Christmas/New Year festive and Easter* seasons.

1. Extension workers and advisory service providers should help farmers to think out carefully on the costs of any **processing equipment** and **extra labour** required in relation to the **market price**.
2. The farmers must also be reminded that there are diseases, which can be transmitted from goats to humans through milk and meat products e.g. brucellosis, tuberculosis, pneumonia.
3. During processing, farmers must also handle products in a manner that minimizes disease transmission risk to their own families and to consumers of the goat products.

10.2 Milk and milk products

The composition of milk varies with breed, nutrition, stage of lactation, and age of the goat. Important to note that milk is an ideal medium for the growth of bacteria, therefore care must be taken in its handling. Contamination can be avoided by ensuring:

- The Milker's hands are clean.
- Teats are cleaned with clean warm/cold water and soap.
- Milk is from mastitis free quarters (no clots or blood).
- Milk is free of drug residues in animals that are /were undergoing treatment.
- Milk is kept and stored in clean containers at cool temperature. Stainless metallic containers are the ideal.
- Free of the odours from the buck and certain plants.
- Not contaminated by faeces, urine, feed or antibiotics.

- After milking remove the container from the vicinity of the goat as soon as possible

Milk Handling, collection processing and marketing.

- ♦ By law, any milk going for human consumption must be pasteurized to prevent transmission of organisms causing brucellosis, tuberculosis, abdominal pains and diarrhea. Pasteurization is by heating to boiling point and keeping it there for one minute.
- ♦ Information on commercial processing of milk is available in various books including Peacock, 1996. Information can also be obtained from the small-scale processors in Uganda.

Condensed Milk

Making condensed, sweetened milk is one simple method of storing fresh milk for future use. The principle is to reduce the moisture content of the milk by 20-30% and then add sugar until the milk reaches a thick consistency. On a domestic scale, a large saucepan of milk should be brought to boil and then simmered for one hour, until moisture has been boiled off. Sugar should be added at the rate of about one third of the volume of the milk. The sweetened condensed milk can then be stored in a sealed container, such as a clean tin with a lid. Condensed milk can be stored in this way for 6-8 months.

Yoghurt

Yoghurt is the product of the process of souring milk using certain selected bacteria. Raw milk is heated nearly to boiling point for three minutes and cooled to about 45° C when a small quantity of a starter, such as previously made yoghurt, is stirred into the milk. The milk should then be left, undisturbed, to sour at a temperature between 30° C and 45° C. When incubated at 40° C it takes 15 – 24 hours. Flavours can be added.

Butter

Butter is a very valuable commodity in many societies. Goat's milk, from tropical breeds, has a high fat content, making it very suitable for butter making. In order to produce one kilo of butter, 25 litres of milk must be churned. In our farming systems, it is rare to get 25 litres of milk from one farmer. A group of goat farmers might consider getting together and contributing milk to a butter-making enterprise. Details for processing of butter can be read from Peacock 1996 as well as other books. In Uganda, ghee is a popular product made from cow's milk, which is an equivalent of butter. It is used for cooking, human beautification, and as medicine in some societies.

Cheese

Few countries in the tropics traditionally make cheese, and even fewer make cheese from goat's milk, although the fat-content in goat's milk is adequate for cheese making. In situations where cheese has never been made and is not traditionally consumed, there must be very good reasons for introducing the practice. Reasons include: -

- Inadequate opportunity to market fresh goat's milk.
- Surplus production.
- Motivation to earn from cheese making.
- Developing the cheese market potential .

This is already a small market for cheese in Uganda and will definitely continue to grow. Most traditional cheeses are soft. Greater skills, more equipment, and a greater volume of milk are needed to make hard cheese. About 7.5 litres of milk are needed to produce one kilo of fresh cheese. Over 10 litres are needed to make one kilo of hard cheese. Farmers can always attempt cheese making as long as they get a fair price for their product.

10.3 Meat and Carcass products

Goat meat, which is sometimes called **Chevon** is desired for its palatability and nutritional quality. Most goats in the tropics are either killed at home for use by the owner's family, friends and relatives or marketed as livestock for subsequent slaughter. In most developing countries, virtually every part of the carcass is consumed or used in some way. Prices per unit of weight differ depending on the geographical region, tribe, class and culture. In East Africa, specially marketed portions include;

- Head
- Offal
- Kidney and liver
- Carcass
- Hooves
- Blood

Preservation of meat

Goats that are slaughtered in the tropics are consumed almost immediately. Their small size makes them ideal to slaughter for a family and a few friends, at a time of family celebration or a religious holiday. However, on occasions when the carcass is too much to consume in one or two days and it would be helpful to store meat in some way. In the absence of refrigeration, some of the methods of preserving meat include: -

- Salting/curing
- Hot smoking
- Air drying
- Deep –frying

10.4 Skins

There are many diseases of goats that will damage the skin and affect its quality and price. They include goat pox, streptothricosis, ticks, mange, ringworm and warts. After slaughter or death, the sale of semi-processed hides and skins forms a valuable source of income both local and foreign exchange. Tanning skins and manufacturing leather products adds 5 to 10 times value to the skins. Skins naturally contain bacteria, which on the death of the goat will multiply and putrefy the skin. In hot humid conditions, this process of rotting will quickly spoil the skin. The first stage in the preservation of fresh skins is known as **curing** and there are 2 simple methods of skin curing.

- **Air-drying:** - The wet skin can either be pegged out on the ground or tied to a frame and dried upright. It is important to avoid any damage to the skin and to try not to spoil the edges through clumsy pegging or tying. In climates that are not too humid, skins can be cured in 1-2 days.
- **Salt Curing:** - The fresh skin is cleaned of any blood or dirt, and washed with clean water. It should be laid out with the inside facing upwards. Salt equivalent to 40 % of its weight is sprinkled on to it, until it is covered in an even layer. The salt will serve both to reduce its moisture content and to prevent bacterial development. The skin can be folded with the salted side inside and kept in this way for long periods before tanning.

The advanced form of skin processing is **leather tanning**. There are different types of leather that can be produce from goatskins. These include;

- Vegetable tanned leather: this has the most potential for rural area tanning.
- Book binding leather
- Clothing leather
- Glove type of leather

Common goat hair

Goat hair can be clipped, processed and used for various purposes.

- Locally, some nomadic desert tribes use hair for weaving coarse cloth for making tent covers and warm cloths.
- Commercially goat fibers are produced from mohair of Angora goat breeds, and Cashmere.

10.5 Marketing goats and goat products

Any goat product for sale whether it is milk, skins, or live animals should earn the farmer a good price. There are few dominating private sector marketing organizations and hardly any state run marketing organizations partly due to the policy of liberalization of trade or inadequate goat - focused market building research capacity.

For goat farmers, 'goat markets' and 'goat days' serve as a social function for self introductions and sharing goat farming experience as well as an occasion for eating some goat meat with drinks. In the current set up, goat farmers get little value when they market products under following situations: -

- Directly selling to local consumers.
 - Individual or single marketing.
 - Selling under environmental and climatic pressures like drought
 - When they have urgent needs cash needs like, children's education, and medical.
- In such situations, they tend to accept any price offered to them without considering labour, time spent and costs of replacement. Farmers must be made aware of the advantages of collective or cooperative marketing and what they stand to lose if they market their goats individually.
 - Extension workers must educate the farmers to always ensure that a fair price is obtained which will enable them purchase replacements using the surplus or with a little additional income.

10.6 Market Interventions

Interventions in markets can be considered when there is a very significant increase in production and the market cannot absorb it, which causes the price to fall or when a new product is being introduced where there is no existing market.

Suggested marketing options: -

- Direct collection** of goats or goat products from the farm gate or from an agreed to central collection point.
- Sale of **Processed products** e.g. like pasteurized milk, Cheese, processed meat and skins.

- 3) **Promotion sales** of the products especially the new products. This may not mean billboard products but may involve simple sensitizations using immediate families like wife, children and neighbors.
- 4) Investment into **collective transport**. Transporting of goats or goat products can be costly for an individual farmer. If farm gate prices are low, then farmers can invest in transport and carry their goats and products to a more distant market where prices are higher. This may include contract sale to a slaughterhouse or butcher's shop, or any other retail outlet.
- 5) Always remember that local market also have preference if a choice is offered.

Quote: **A consumer** wants a product he/she requires now, (**regularity**), on shelf where he/she found it the previous day, equal in appearance to the previous purchase (**brand**), equal in quality to the previous purchase (**consistency**), and feel satisfied that he/she can trust its safety for consumption (**traceability**).

Farmers can be assisted to strengthen their markets in the following ways:

- Forming Producers' groups, associations and cooperatives: groups of farmers might get together and form an informal (or more formal) group, in order to improve the marketing of their goats and /or products.
- Private companies may make a contract with farmers to buy their product(s) at an agreed price, quality and frequency. This arrangement can be beneficial to both parties.
- Government institutions like the PMA 'Marketing and Agro Processing Program' or NAADS might agree to help with the marketing of goats or a goat product by commissioning research studies or subject matter specialists on the topic with a well-defined targeted output. Alternatively a government might decide that goats are important enough to need their own marketing organization.
- Non-governmental organizations might help to set up a goat producers' marketing organization.

Chapter Eleven

Sustainable Goat Development

11.1 Introduction

For many years attempts have been made to improve the lives and productivity of the rural people. Reasons have been advanced why development programs have failed and these include:- **political systems, wars, civil strife, inadequate policies, inadequate regulations and bye laws, market price fluctuation and emerging disasters.**

There is a need to adopt an integrated approach in which all aspects of the enterprise development are addressed if sustainable development is to be established.

Extension workers must elaborate their '**stockmanship**' when working with farmers. They must have all round knowledge from **animal welfare, animal husbandry** practices to **marketing** and the ability to **communicate** the information and **transfer the technology** in a manner that farmers understand and will allow optimum performance from the goat.

What is required in the wider context is to help the farmers to efficiently help themselves to manage their animals, animal products and the benefits accruing from farming. One farmer says, '**we have a lot more to change with people than the changes we must make in the goats**'. He continues, '**In dealing with goat farming, you must know that you are dealing with the system not the animal itself.**'

It is on this note that emphasis to service providers is to develop the farmers themselves, so that they can initiate and make changes, which will challenge them to ensure that the development is sustainable.

11.2 Group development

There are many approaches that have been documented on group development, which the agricultural extension service providers must equip themselves with. Key issues to remember:-

- i) Change in rural communities is slow and often frustrating.
- ii) Extension workers can adopt improved communication through: -
 - Group work
 - Field days
 - Short training courses
 - Seminars
 - Individual farm visits and exchanges
 - Leadership development
 - Any other methods of rewarding and motivating farmers.
- iii) Extension workers must remember that the 'participatory approach' **is a process** and the communities are not homogenous (uniform).
- iv) Farmers must be defined on basis of geographical **locality, sex, tribe, age, tribe, social power groups** and /or even **political motivation**.

- v) Issues of information, knowledge and resources like **land** capital, **labour** will influence **access, ownership, control, and distribution**. They will dictate whether the communities adopt the information and technology that has been imparted to them and whether they can continue independently and sustain the benefits after 'donor' support is withdrawn.

The agricultural extension workers must be in position to advise the farmers on simple steps that they can undertake to develop themselves into groups. The following 12 steps are recommended:

- i) General **awareness** creation (through churches, youth groups, farmer's associations).
- ii) **Goat interest group (Gig's)** formation. The group has name, addresses, contact numbers, numbers of goats owned are collected at this meeting, and fed into the NAADS/district goats database).
- iii) **Organizational** education (basic information regarding the functioning of the group).
- iv) Choosing of **leadership**.
- v) Development of organizational **constitution** using available or group created guidelines.
- vi) Development of groups **business** and **financial plans**
- vii) **Group registration** and putting together all paperwork and submitting it to the relevant authorities or body.
- viii) Registering the members of the group membership numbers and membership cards. Register with sub-county chief.
- ix) Recruiting more goat members and goats producers, signing of agreements and contracts.
- x) Organizing in depth training or own **capacity building programs**, specific training in goat management and goat related issues.
- xi) Opening of bank accounts, or agreement to how to **manage funds**
- xii) Initiative for **market sourcing**.

11.3 Key Issues to information and technology transfer

Some of the key issues that still need to be addressed are:-

- Transfer of technology from the university researchers to the farmers
- Availing market information to the farmer
- Influencing change of mind set to technology adoption
- Communication mechanisms to change the perception of the farmers from traditional to improved profitable approaches

11.4 Laws and Policies affecting the Goat Industry

Extension workers must be familiar with the following Laws and Policies affecting the Goat Industry.

1. The Public Health Act (1964)
2. Animal Diseases Act (1964)
3. Prevention of cruelty to animal Act (1964)

4. The Drug Act (1994)
5. The Food Law (draft 2004).
6. The animal breeding policy and act 2002
7. Animal feeds policy and Act 2003
8. The meat policy 2003
9. The National Policy for the Delivery of Veterinary Services 2001
10. The National Veterinary Drug Policy 2002

11.5 Assessment of Goat Management Problems.

Low cost methods and higher cost methods have been described by Peacock in 1996.

1. **Low Cost Methods:** - are methods that require 'nothing more than a pencil and paper'. Local extension workers can use them without any outside assistance, because of their simplicity. They include: -

- i) Individual and Group Discussions
- ii) Rapid Herd/Flock Appraisal Method

2. **Higher cost methods:** - involve the use of larger samples from the available population and ensure that sampling is done over a wide range of different environments. The extra costs involved must be weighed against the precision of the results. Clear objectives must be set and farmer participation ensured for duration of the study. They have limitations in that they call for precision in measurements and replicability.

3. On Farm trials

Interventions and innovations tested with full involvement of farmers themselves in controlled trials on farms. They could be simple or complex but the objective of evaluating their practical benefit is most important.

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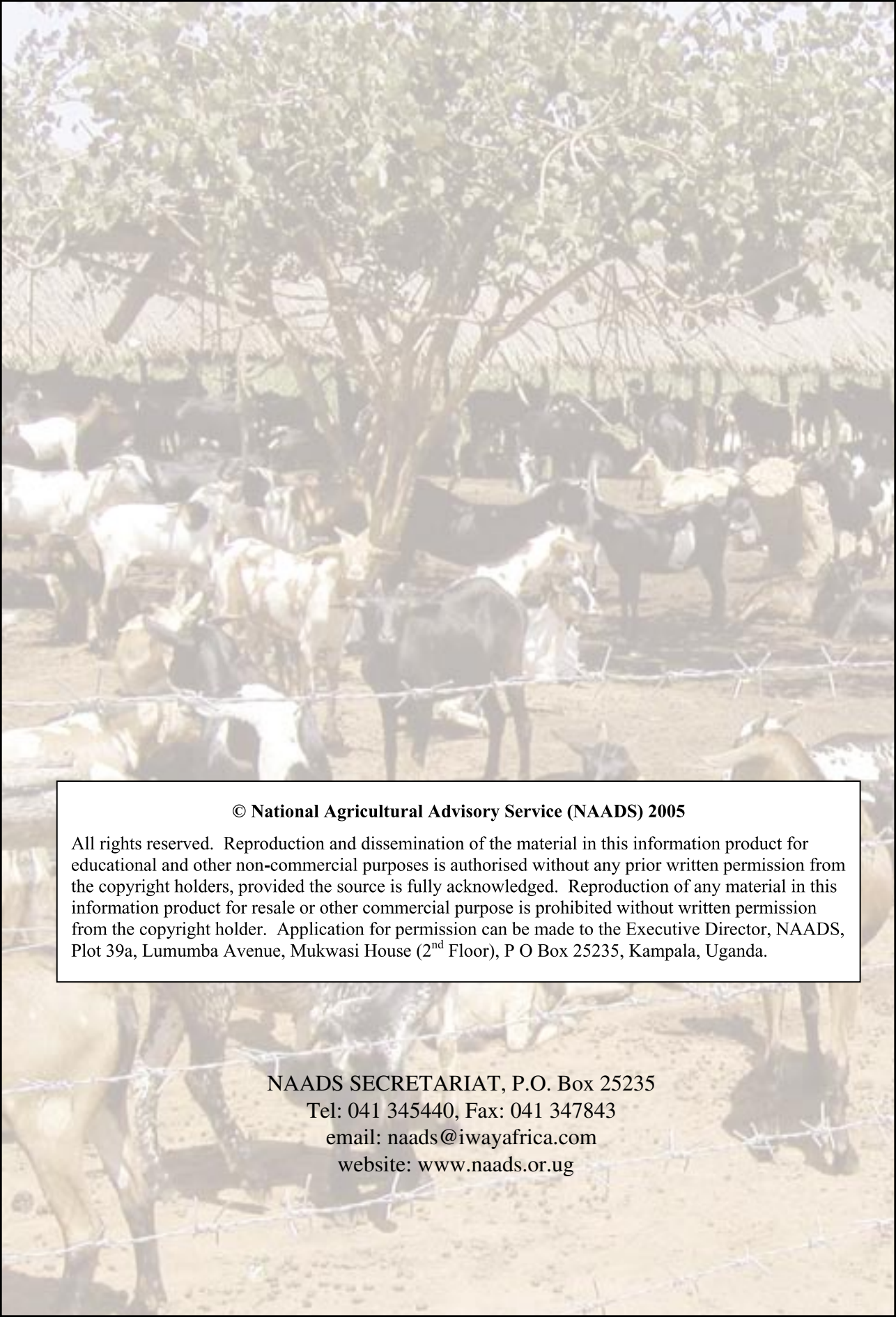
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For further information please see your Sub-County NAADS Coordinator or the District level Subject matter specialists or the District NAADS Coordinator. Other points of information include the persons and number below, as well as the different NARO research stations and international Institutes that have a livestock (goat) mandate.

Authors and their contacts

No.	Name of Contact	Organization & Dept	Telephone
1	Dr Azuba Rose	Makerere University, Faculty of Veterinary Medicine	077 500185
2.	Dr Hoona J. Jolly	Ministry of Agriculture, Animal Industry and Fisheries, Department of Animal Production and Marketing	041 320410/320864
3.	Ms Sandra Mwebaze	Ministry of Agriculture, Animal Industry and Fisheries, Department of Animal Production and Marketing	041 320410/320864



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NAADS SECRETARIAT, P.O. Box 25235

Tel: 041 345440, Fax: 041 347843

email: naads@iwayafrica.com

website: www.naads.or.ug