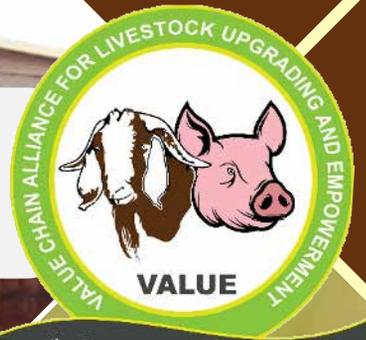




Zimbabwe
AGRICULTURAL
GROWTH
Programme



Promoting Zimbabwe's Goat and Pork Value Chains



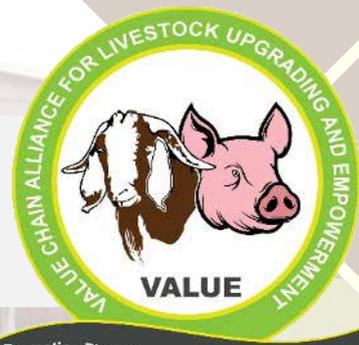
**Value Chain Alliance for Livestock Upgrading
and Empowerment**

GOAT BREEDING AND MANAGEMENT

TRAINING MANUAL



Funded by the European Union



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TABLE OF CONTENTS

1	INTRODUCTION	5
2	INFORMATION AND INSTRUCTIONS TO THE TRAINER	6
3	GOAT GENETICS, BREED SELECTION, BREEDING AND CARING OF BREEDING STOCK	7
3.1	BREEDS AND CHARACTERISTICS	7
	3.1.1 Matabele Goat	7
	3.1.2 The Small East African goat (Mashona)	8
	3.1.3 Boer Goat	8
	3.1.4 The Kalahari Red Goat	9
	3.1.5 Saanen Goat	9
3.2	TRAITS OF ECONOMIC IMPORTANCE	10
3.3	FACTORS TO CONSIDER WHEN BUYING BREEDING STOCK	11
3.4	GENETICS AND SELECTION OF BREEDING STOCK	12
	3.4.1 Selection of breeding doe/doeling	12
	3.4.2. Selection of breeding buck	13
3.5	BREEDING	14
	3.5.1 Heat Detection/ Heat Signs	14
	3.5.2 Mating	14
	a Random mating	14
	b. Controlled mating	15
	3.5.3 Pregnancy diagnosis	15
	3.5.4 Kidding	16
3.6	CARE AND MANAGEMENT OF BREEDING STOCK	17
	3.6.1 Bucks	17
	3.6.2 Female Does	20
	3.6.3 Female Doelings	21
	3.6.4 Kids	22
3.7	Breeding systems	23
	3.7.1 Pure-breeding	23
	3.7.2 Group breeding schemes	24
	3.7.3 Crossbreeding	25
3.8	CONCLUSION	26
3.9	REFERENCES	27
4	GLOSSARY	28

LIST OF FIGURES

Figure 3-1 Matabele breed	7
Figure 3-2 Small East African	8
Figure 3-3 Boer breed	8
Figure 3-4 Kalahari Red breed	9
Figure 3-5 Saanen breed	9
Figure 3-6 Factors to consider when buying breeding stock	11
Figure 3-7 Doe	12
Figure 3-8 Buck	13
Figure 3-9 Goat in heat	14
Figure 3-10 Random mating	14
Figure 3-11 Goats in paddocks under controlled mating	15
Figure 3-12 Pregnancy diagnosis Ultrasound scanne	16
Figure 3-13 Kidding positions	17
Figure 3-14 Goats kidding/parturition	18
Figure 3-15 Buck Managemen	19
Figure 3-16 Buck	20
Figure 3-17 Does	20
Figure 3-18 Doelings	21
Figure 3-19 Goat kids	23
Figure 3-20 Pure breeding	24
Figure 3-21 Group breeding schemes	25
Figure 3-22 Cross breeding	26

INTRODUCTION

In order to operate a successful goat production enterprise every goat should be managed in the most appropriate and productive way. Genetically inferior goats require the same inputs as those that are superior and therefore a key focus of a goat enterprise should be selecting and breeding the most productive animals available. Selection and breeding influences the genetic make-up of the goat flock, which, when done properly, enhances efficiency and the profitability of a goat enterprise. Improved goat genetics and breed selection will contribute to the overall growth and development of goat value chains in the country.

2

INFORMATION AND INSTRUCTIONS TO THE TRAINER

This manual should be used purely as a facilitator's guide. The sessions under each module are presented with an outcome(s) to facilitate the assessment of participants' understanding and depth of knowledge at the end of each session. Following the outcome(s) are the topics to be covered and facilitating methodology. However, the facilitator should feel free to adapt the methodology suggested to the needs of participants. To enhance a participatory learning process, some methods of presentation and the steps to follow are therefore outlined. The manual also provides some background information on each session. The information is also meant to aid the facilitator in the preparation for the session. Like all participatory methods, the involvement of the participants in all stages of the learning process is vital. However, all users of this manual must study and research into the content of each module before the presentation. Start each sub-topic and group activity by explaining the objective and learning outcomes expected of them, and ensure they are met. Though contents for each sub-topic are provided, lead the participants into giving their points, copy them in the flip chart/whiteboard/chalkboard. Some of their points will or may coincide with the contents in this Module, and then mention to them the items of sub-topics that were not pointed out by them.

The session should be interactive, participatory, lively and interesting. Let the participants express themselves in vernacular Language for them to understand the concepts. Encourage them to ask questions especially on concepts that they do not understand. Switch to either English or vernacular language when you find some or all of them do not understand you in one of the languages.

Start the session with greetings, welcoming remarks, and introduce yourself. Ensure you have the necessary, materials, stationery and equipment for the trainees: projector, flip charts or whiteboard, whiteboard markers, marking pens, and handouts. Be time conscious as you facilitate the session.

This Manual is organised around the aspect of breeding and caring for breeding stock such as the selection of breeding stock, breeding soundness evaluation, breeding systems, mating systems, caring of buck and doe.

GOAT GENETICS, BREED SELECTION, BREEDING AND CARING OF BREEDING STOCK

3

LEARNING OUTCOMES

By the end of this module, farmers should be able to:

1. Explain the purpose and objectives breed selection.
2. Traits of economic importance in goats.
3. Describe the preferred breed of choice.
4. Explain the purpose and objectives of breeding.
5. Explain caring of breeding stock.
6. Describe the selection of breeding stock.
7. Explain breeding systems.

3.1 BREEDS AND CHARACTERISTICS

A goat breed is defined as a group of goats sharing a common ancestry that have distinguishable, fixed characteristics who when mated with a member of the same breed will produce offspring with the same characteristics. Genetics of a goat plays an important role in determining performance that is growth rate, feed conversion efficiency, carcass quality and yield.

3.1.1 Matabele Goat

- The Matabele goat is found in the South and Western part of Zimbabwe.
- The breed is large as compared to the Small East African goat.
- The Matabele goat is white, black, brown spotted and have ears that are long and lopped with turned up tips, but they are rarely horizontal.
- Mature bucks weigh up to 40- 65 kg and does up to 30-45 kg.
- The height at maturity is up to 70 cm at the shoulders for males and 65 cm for females.
- This breed survives well in dry climates.



Figure 3.1 Matabele breed

3.1.2 The Small East African goat (Mashona)

- The Small East African goats are found in East and Southern Africa.
- Coat colour range from pure white to pure black with various intermixes of roan and speckled brown.
- They have tassels (toggles) which occur in up to 30 % of the goats.
- Mature bucks weigh up to 30- 40 kg and does up to 25-30 kg.
- The height at maturity is up to 64 cm at the shoulders.
- Both sexes of the goat have horns that arc backwards and are regularly curled up at the end.
- Average birth weights of kids range from 1.5-3 kg.
- The breed is well adapted to most environments in Zimbabwe.



Figure 3.2 Small East African

3.1.3 Boer Goat

- The Boer goat is an improved imported breed with some infusion of European, Angora and Indian goat genes.
- It is primarily a meat goat.
- The breed is horned with long, pendulous, lop ears and a variety of color patterns mainly white and brown.
- The goat has good browsing ability.
- Boer goat doe is a low maintenance animal that produces milk which is adequate to rear an early maturing kid.
- Weaning rates are in excess of 160 %. They are very hardy and can adapt to different weather and climate.



Figure 3.3 Boer breed

- The breed is well-known for being fast growing and docile. A mature buck weighs about 110-135 kg and a mature doe weighs about 90-100 kg.

3.1.4 The Kalahari Red Goat

- The Kalahari Red goat is a meat breed with their name derived from the red coat and the Kalahari Desert.
- The breed has resemblances in appearances with the Boer goat although it has extra advantages to the original Boer goat.
- The Kalahari Red goat is enhanced in terms of survivability of the animal and produces tender meat.
- It is a large breed of goat with red colored coat (white or light shades of red are not desirable).
- Their skin is completely pigmented, which protects from heat.
- They have loose skin in their neck area and long, floppy ears.
- The horns are of moderate size and are slanted.
- The does have large and well attached udders and teats.
- The goat can be used for crossbreeding purposes in order to increase hardiness and carcass yield.
- Average mature body weight for bucks ranges from 110-120 and between 55-75 kg for does.



Figure 3.4 Kalahari Red breed

3.1.5 Saanen Goat

- The Saanen goat is a dairy breed, originating from Switzerland, in the Saanen Valley.
- The dominant coat color is white or light cream.
- The goats are sensitive to excessive sunlight hence, provision of shade is essential.
- An adult Saanen buck weighs between 70-90 kg and an adult doe weighs about 60-70 kg.
- Mature females have large udder capacities, produces about 4 liters of milk/ day with 3-4 % milk fat. They are a calm and easy to handle.



Figure 3.5 Saanen breed

3.2 TRAITS OF ECONOMIC IMPORTANCE

Traits of economic importance include the following;

- **Age at first kidding:** Age of a doe in days at the time of first kidding.
- **Kidding interval:** Number of days from the date of one kidding to the date of next kidding.
- **Incidence of multiple birth:** Number of multiple births (twins, triplets, quadruplets etc.) to the total number of births (total number of does kidded).
- **Birth weight:** Weight of a kid in kg at birth (weighed within 24 hours).
- **Weaning weight:** Weight of a kid in kg at 90 days of age (weaning).
- **Weight at market age:** Weight of a kid in kg at the market age of 180, 270 or 365 days.
- **Growth rate:** rate of weight gain measure(grams or kg) for a determined period (in days).
- ❖ **Pre-weaning growth rate:** Daily weight gain in grams from the date of birth to date of weaning = $(\text{Weaning weight (90th day)} - \text{Birth weight})/90$
- ❖ **Post-weaning growth rate:** Daily weight gain in grams from the date of weaning to date of marketing = $\text{Weight at market (180, 270 or 365 days)} - \text{Weaning weight} / \text{Age at market (180, 270 or 365 days)} - 90$.
 - Mortality percentage: losses due to deaths and measured as percentage of select class or flock over a select period of time(days)
- ❖ **Pre-weaning mortality:** Number of kids died from birth to 90th day (weaning) to the number of kids born alive.
- ❖ **Post-weaning mortality:** Number of kids died from weaning to 365 days to the total number of kids weaned.
- ❖ **Adult mortality:** Number of adult goats died during the year to the number at the beginning of the year.

3.3 FACTORS TO CONSIDER WHEN BUYING BREEDING STOCK

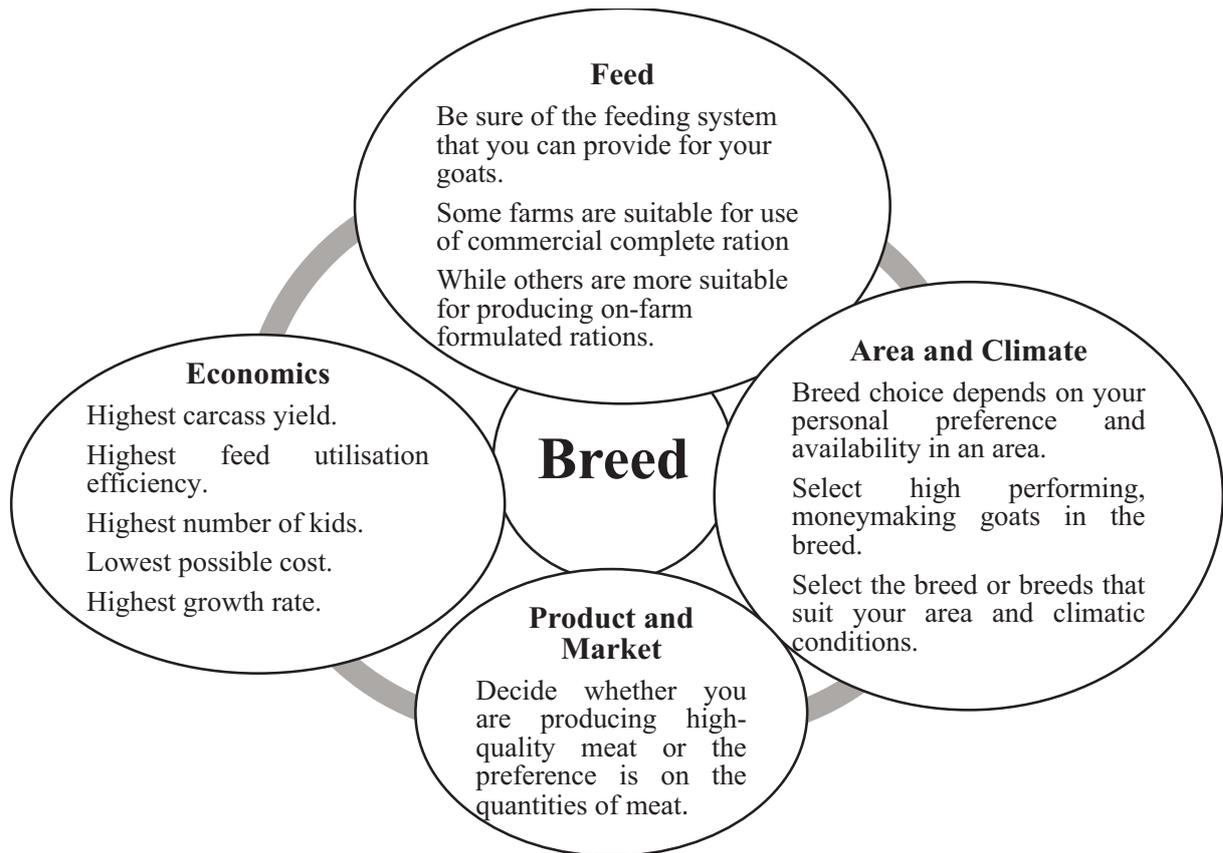


Figure 3.6 Factors to consider when buying breeding stock

3.4 GENETICS AND SELECTION OF BREEDING STOCK

3.4.1 Selection of breeding doe/doeling



Figure 3.7 Doe

- A doe must be feminine, which includes good structural conformation including good feet and legs.
- Limping does should be removed from the breeding flock.
- The vulva must not be small with a tuft of hair which is a sign of intersexuality.
- The length of the upper jaw should be equal with the lower teeth touching the superior dental pad.
- Mouth malformation will provoke bad bites and will prevent the animal from eating efficiently.
- This genetic defect can also be transmitted to the offspring.
- The goat must have a higher average daily weight gain during development in comparison to their contemporary group.
- Remove does that fail to maintain adequate body condition.
- It is essential to keep does that kid every year, have udders that are firm and well-shaped. Cull does with poor conformation of the udder and teats.
- Does with poor conformation of the udder and teats prevent kids from suckling adequately.
- Does infected by mastitis, an inflammation of the mammary gland should be sold or culled.
- Eliminate does that have poor or lower milk production and are incapable of rearing kids to weaning unassisted.
- Cull does with poor fertility rates, such as older does and those that require several services per conception.

3.4.2 Selection of breeding buck

- A herd buck is the most important animal in the flock because it contributes 50 % of the genetic makeup of every kid born and determines overall pregnancy rate of the flock.
- A replacement herd buckling can be selected from the group at weaning (3-4 months of age) based on weaning weight and post-weaning growth (6 to 8 months of age).
- A good buck must present masculinity, adequate muscling, conformation of the head and neck, and standard buck vocalization.
- Breeding soundness evaluation on the buck should reflect firm consistency, elasticity at palpation, good mobility in the scrotal sac, and have oval-shaped testicles.
- Castrate buckling from the flock that displays poor conformation such as cryptorchidism, a genetic malformation where only one or no testicles descends in the scrotum.
- Mature bucks should have a scrotal circumference of 34 cm from 18 months of age.
- A buckling with hypoplasia or undeveloped testicles should be eliminated.
- Bucks with good feet and legs should be selected.
- Limping bucks should be culled.
- A buck must be dominant and display mating behavior, including a good libido or sexual interest throughout the breeding season.
- Bucks with abnormalities of the mouth such as jaw defects should be removed from the breeding herd.
- Eliminate bucks that display an abnormal penis and prepuce.



Figure 3.8 Buck

3.5 BREEDING

3.5.1 Heat Detection/ Heat Signs

Heat is the period when the doe is receptive to the buck. This phase of the reproductive cycle may last between 12-36 hours. The period from one heat cycle to the next is referred to as the estrous cycle. In goats, the estrous cycle occurs every 18 to 24 days, or 21 days on average.

Heat signs

- Swollen and reddened vulva
- Mucous discharge
- Tail wagging
- Mounting other animals
- Seeking buck
- Continuous bleating.

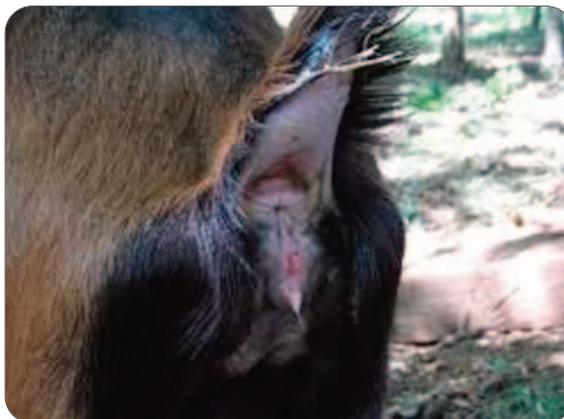


Figure 3.9 Goat in heat

3.5.2 Mating

- Farmers in Zimbabwe mainly use natural mating.
- A mature buck can be given 20-30 does, whilst a juvenile buck requires less does.
- However, the effectiveness of both male and females depends on their body condition at mating.

a. Random mating

- This system is whereby several bucks are allowed to run with a flock of females uncontrolled.
- The buck will serve any doe on heat.
- Random mating is simple, cheap; kidding happens at any time and goats can kid any time; hence a farmer can market any time.
- However, there is high risk of inbreeding and spread of diseases.
- This is used by most farmers in Zimbabwe.
- The buck and the does stay together all the time.
- Fertility and conception rates are higher with natural mating due to better heat detection



Figure 3.10 Random mating

- More accurate timing of mating and increased semen dose and longer life span of semen.
- Less labor required.

b. Controlled mating

- In this mating system the bucks and does are reared separately and the bucks are only allowed to cover does during the breeding season.
- A buck is allowed to run with females for 36-42 days.
- The reason being that a female which misses mating or coming into heat has a second chance within 42 days.
- It is an expensive mating system in the communal areas.
- The controlled mating system allows efficient management of the flock and marketing of animals.
- Controlled mating utilizes the breeding calendar.
- It is important to take good care of kids to reduce mortalities and improve kid growth rate.
- A reduction in kid mortality translates into an increase in flock size and consequently the increase in offtake.
- Kidding should coincide with times of abundant feed availability so that the does will be producing enough milk for the survival of the kid.
- This is usually November to February period; thus, the recommended breeding period will be from June to August in Zimbabwe.
- It is important to avoid goats kidding when the feed availability is low and range condition is poor.



Figure 3.11 Goats in paddocks under controlled mating

3.5.3 Pregnancy diagnosis

- Daily observation of physiological and behavioral signs of heat of the doe when a buck is present, particularly at 18-24 days post-mating.
- Kits-** goat pregnancy rapid test kits utilizes the hormonal analysis (progesterone and estrone sulfate assays) which can easily identify the concentration and presence of it.

This kit shall be used to test goat urine, which shall be collected within 23 to 32 days after mating.

- iii. **Ultrasound machines-** goats can be scanned for pregnancy with the ultrasound scanners 25 days after service but it is much more effective to scan them at 28 days.



Figure 3.12 Pregnancy diagnosis Ultrasound scanner

3.5.4 Kidding

- The late pregnant doe needs to be separated from the rest of the flock to ensure an undisturbed birth process and creates good bonding between the doe and kid.
- Therefore, a kidding area is required on a farm.
- Kidding area should be clean with dry bedding (straw or hay).
- The doe may be kept in the kidding area for a few days before kidding.

3.5.4.1 Signs of approaching parturition/kidding

- One to six weeks before kidding the udder will enlarge and begin to fill with milk.
- About 2 weeks prior to kidding the doe may appear hollow on both sides.
- The muscles and ligaments on both sides of the doe's tail will begin to soften and relax.
- The kid can be felt and seen moving around on the doe's right side.
- Three to four days before kidding the mammary gland will appear relatively large.
- One to two days before kidding the doe will begin to show signs of nervousness, pawing at the ground, restlessness and lying down.
- The doe will also expel a thin mucous discharge from the vulva which will gradually become thicker as kidding approaches.

3.5.4.2 Parturition/kidding

- In the last 12 hours before giving birth the doe will make continuous bleating sounds.
- Her tail may be straight out or slightly elevated.
- The kid should be right side up with the front feet first and the head lying between the knees and pasterns in a normal delivery.
- If there is any variation in the presentation of the normal delivery of the kid, it is considered as an abnormal delivery.
- It recommended calling a specialist for assistance.
- After the water sac has broken, the doe should start to give birth within 30 minutes to one hour.
- If the doe has not progressed within an hour, a specialist may be required to assist.

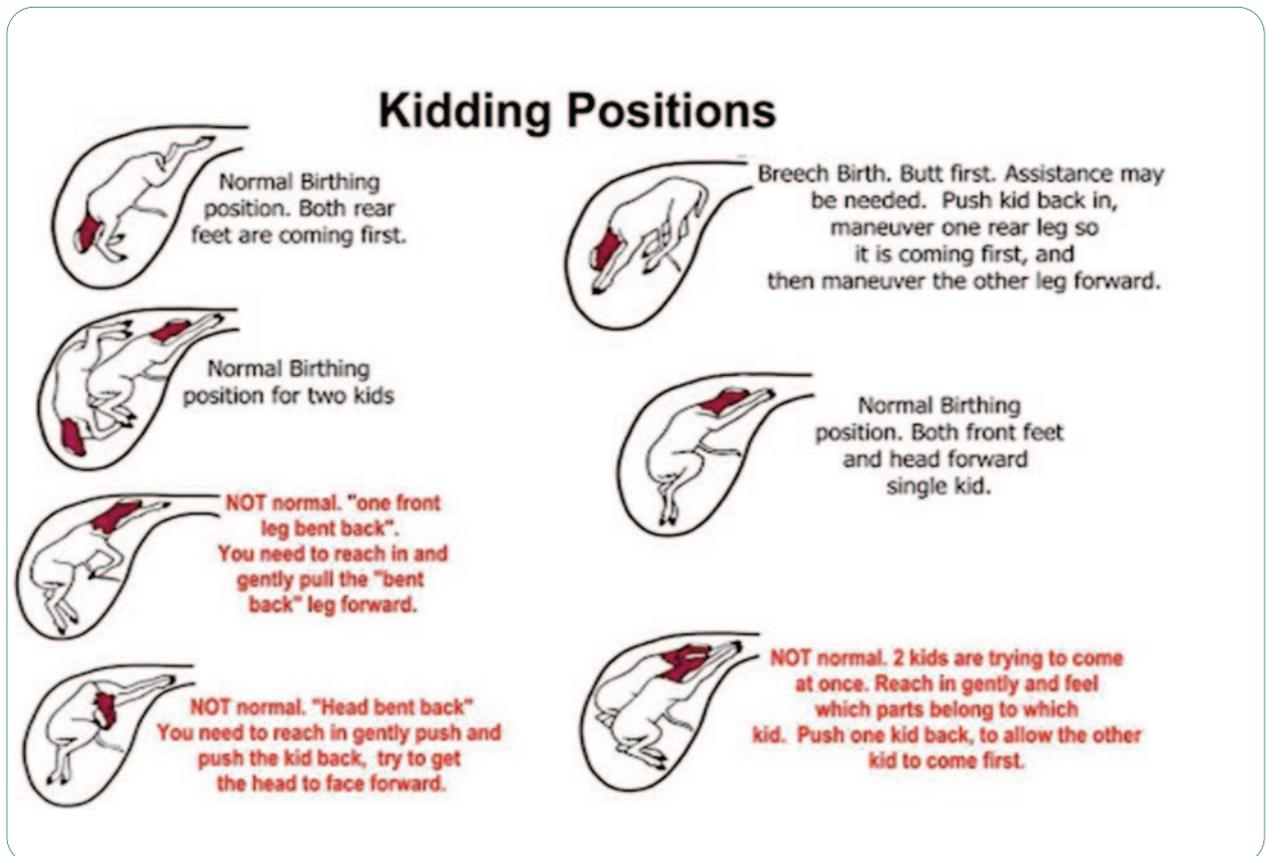


Figure 3.13 Kidding positions

3.5.4.3 After parturition/kidding

- After birth to allow bonding the doe must clean and groom her kids and remain undisturbed for two to four hours.
- The doe should pass her afterbirth within 24 hours after delivering all her kids.
- Kidding can be assisted when there is mal-presentation or difficulties in kidding, when the kid is having problems in breathing or not bleating because of the presence of membranes over the nostrils.



Figure 3.14 Goats kidding/parturition

3.6 CARE AND MANAGEMENT OF BREEDING STOCK

3.6.1 Bucks



Figure 3.15 Buck Management

- Bucks are known to be fertile at an earlier age than does.
- It is critical to raise bucks separately from females to avoid unplanned mating.
- Bucks must be kept in good condition and supplementing feed is always important.
- Bucks for breeding purposes must have horns to avoid hermaphroditism which comes with the use of polled bucks.
- A male kid born weighing at least 2.5 kg should be selected for future breeding.
- Heavier and fast-growing bucks from twin births should be selected.
- Males not suitable for breeding should be castrated.
- Bucks need high quality forage to maintain their body weight.
- A mixed grass and legume pasture or a complete ration will allow bucks to gain weight and go into breeding season in good condition.
- When bucks are kept separate a buck pen is required.
- A buck pen should be strong, have a roof, dry and well ventilated.
- Trim hooves most appropriately after the rain season.
- Placing a buck in a stanchion makes it easier to hoof trim.

3.6.2 Female Does

- Adequate nutrition promotes faster growth rate and prepares animals for mating.
- It also increases fertility and chances of twinning.
- If doelings are mated when they are very young (less than 8 months and less than 60% mature body weight) they will remain stunted and will have poor reproductive performance.
- A well-managed female can produce kids for about eight years.
- Pregnancy in goats lasts between 145 –150 days (five months).
- A mature doe can only mate when on heat.
- The presence of the buck in the flock triggers heat.
- However, coming on heat also depends on the body score condition of the does.
- Before mating from four to six weeks provide zinc and manganese if required to improve fertility.
- Immunize the does against enzootic abortion and enterotoxemia, and dose them against internal parasites like roundworm and nose-worm.
- Inoculate the does against gangrene of the uterus 8-12 weeks before kidding.
- The does are pregnant for five months.
- Provide enough feed to gain 7-9kg during the last six weeks of pregnancy.
- If does are not fed properly during pregnancy, the kids will be born small and weak and the doe will not have enough milk for them.



Figure 3.16 Buck



Figure 3.17 Does

3.6.3 Female Doelings

- Doelings reach puberty or sexual maturity at 5-9 months of age under good management and production.
- The doelings are not allowed to be served until they are 12 months of age otherwise their growth will be stunted.
- Breeding should be delayed until the animal has attained 60-70% of its mature body weight.
- For indigenous goats, mature does weigh on average 35 kg, so they should not be mated until they weigh 22 kg.
- Therefore, if possible, keep weaned female kids away from the bucks to prevent early mating (this may not be practical for many farmers in communal areas).
- Doelings with good traits need to be kept as replacements while those with poor characteristics should be sold.



Figure 3.18 Doelings

3.6.3.1 Flushing

- Flushing is feeding of extra concentrate to does and doelings prior to onset of breeding season, normally starting 3-4 weeks before breeding.
- Flushing increases the ovulation rate of does, thus, increasing the number of twins and triplets.
- Flushing will have effect only if the does were in deteriorating phase of nutritional availability.
- Does in better body condition will produce more kids thus the flushing of leaner does will increase the fertility by increasing incident of oestrus, increase ovulation rate and decreases the early embryonic mortality by strengthening the fetal membrane integrity.
- Flushing can be done by supplementing 250 g of concentrate daily or 500 g of good quality legume hay per head per day.
- Flushing increases the kidding rate by 10-20%.

3.6.3.2 Pregnant does and doelings

- Pregnant does and doelings should not be handled frequently.
- The does and doelings in advanced stage of pregnancy should be separated from the flock and effective care should be taken in their feeding.
- Extra feed 3-4 weeks before parturition will be beneficial for the condition of the pre-parturient does and doelings which will help in improving milk production of does and doelings and birth weight and growth of kids.
- Inadequate and poor nutrition in pregnant does and doelings may result in pregnancy toxemia, abortion and premature birth of weak kids.
- Does and doelings in advanced stage of pregnancy should be kept in a separate kidding shed 4-6 days before partition and maximum comfort like clean bedding should be provided.
- The pregnant does and doelings should be protected from harsh weather condition.

3.6.4 Kids

- Immediately after birth, checking for breathing problems and in case of difficulties press and let go the rib cage.
- Dry the kid with towel or supplying heat.
- Dip the navel in 20% iodine solution (disinfectant).
- Check for abnormalities (umbilical hernia, abnormal teats, convex pallet).
- Newly born kids should have access to the colostrum within the first six hours of birth.
- Colostrum is rich in antibodies that increase the immunity of the kid.
- Where possible forced-nursing is recommended to ascertain the kid receives adequate colostrum.
- If the doe is not producing enough milk for her kid, fostering or bottle feeding (cow's milk) is recommended.
- Fresh water and highly nutritious solid feed should be introduced in the second week after birth.
- From approximately 3 weeks of age kids start nibbling grass and leaves.
- Early introduction of solid feed stimulates rumen development.
- They should be given access to browse/graze from no later than one month.
- Optimal rumen functional is established between 6-7 week hence, effective grazing and browsing.
- Buck kids should be weaned at 12-15 weeks and female kids and wethers (castrated bucks) at 15-18 weeks.
- In order to breed the kids as easily and cheaply as possible provide feed (grazing, supplementation) for at least three months after weaning.
- However, the kids will not gain much weight during the first 10 days after weaning.
- To make them gain weight, creep feed should be provided from three weeks.



Figure 3.18 Doelings

3.7 BREEDING SYSTEMS

- The breeding system is an important aspect of goat production in terms of meat and milk production.
- It has a significant influence on immediate and long-term flock productivity.
- In order to improve performance choosing the animals with desirable characteristics to be parents of the next generation is paramount in goat production.
- Therefore, it is important to remove unproductive animals (old goats, animals with poor mothering abilities, poor reproductive performance, and animals with chronic sicknesses) from the flock.

3.7.1 Pure-breeding

- Purebred female does are mated with purebred bucks to maintain the desired traits (size, meat and milk qualities) of that particular breed.
- Unrelated goats should be mated to prevent inbreeding depression that is reduction in performance.

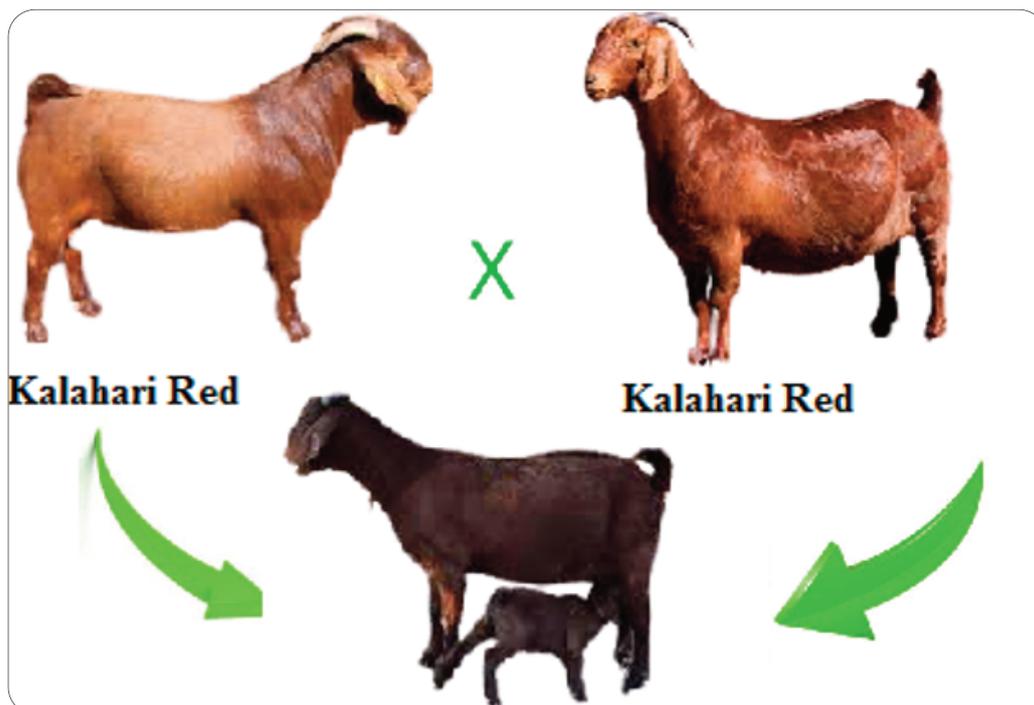


Figure 3.20 Pure breeding

3.7.2 Group breeding schemes

- Group breeding schemes are perceived to be very efficient and sustainable in rural communities where flock sizes are small and implementation of recording schemes is almost impossible.
- This usually follows these important steps:
 1. definition of breeding objectives,
 2. development of selection criteria,
 3. genetic evaluations,
 4. selection of animals,
 5. design of appropriate mating systems and strategies for dissemination of superior genetics and
 6. establishing a monitoring and evaluation framework.
- The principle of establishing a group breeding system from which top breeding males are selected and disseminated within the community.
- These males undergo rotational exchange while new ones are continuously selected to replace old ones.
- The system utilizes both pure- and crossbreeding as indicated by the picture below.

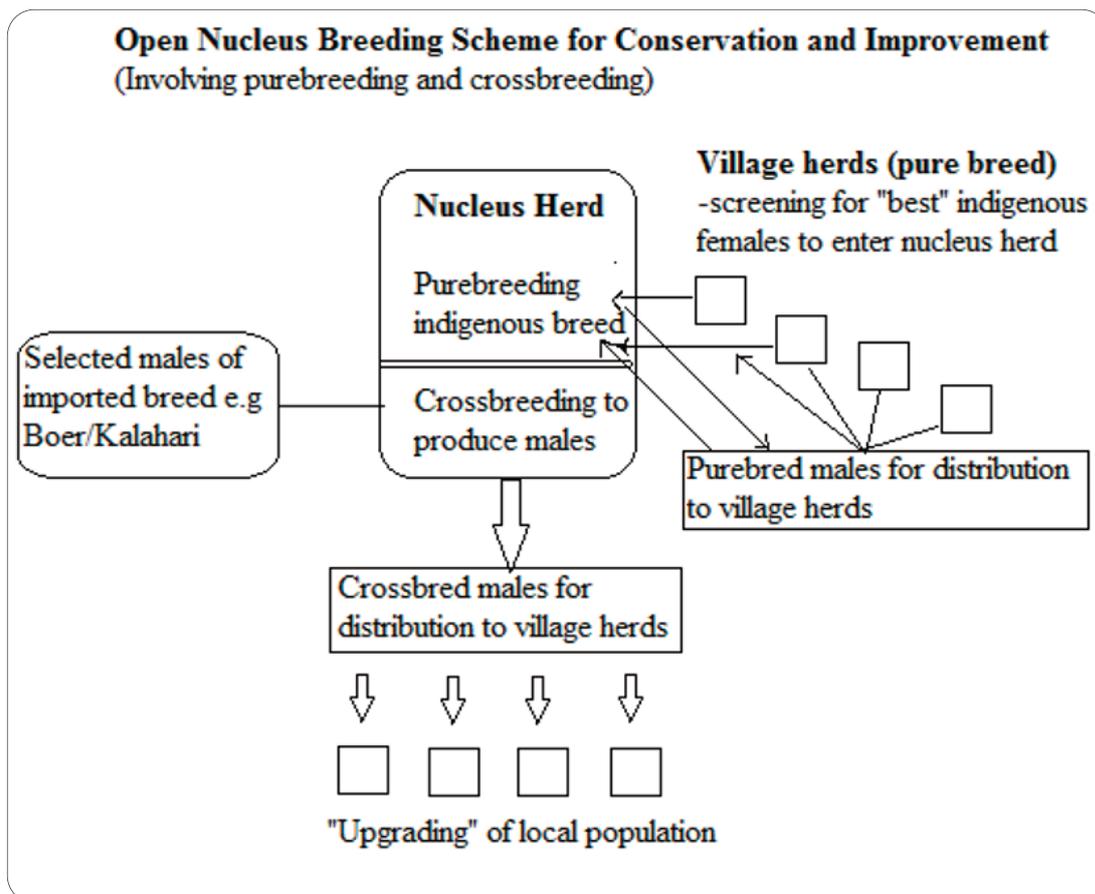


Figure 3.21 Group breeding schemes

3.7.3 Crossbreeding

- Mating two individuals from different breeds thus introducing into the progeny a gene combination that is different from that existing in either parent or the breed of either parent.
- Crossbreeding can involve two or more breeds, depending on the desired result.
- The sole purpose of cross-breeding is to take advantage of the observed improvement in the performance of the progeny above that of either parent - hybrid vigour or heterosis.
- As a result, the offspring performs better than both parents.
- Crossbreeding is one of the methods used in meat and milk production.
- A Kalahari Red buck can be successfully mated with Boer doe to produce offspring with traits from both breeds.

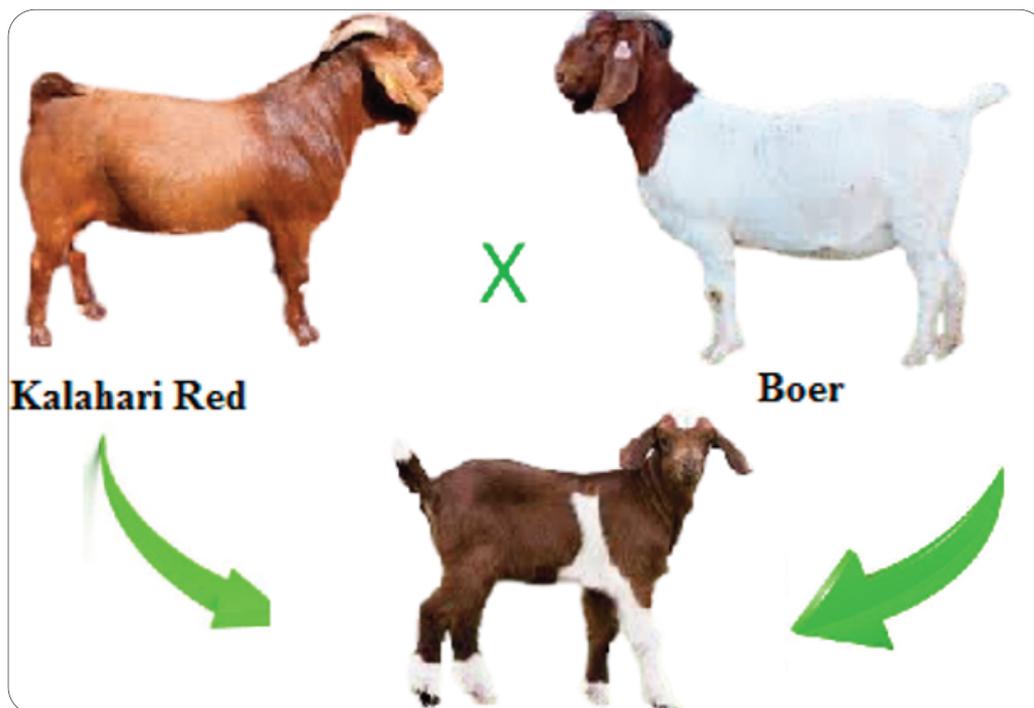


Figure 3.22 Cross breeding

Exercise

1. At what age will a doeling first show signs of heat?
2. What are the signs of heat in goats?
3. At what age should a doeling be allowed to mate?
4. Discuss mating systems in goats and ways to improve performance in your trip.
5. Discuss the reasons why farmers keep goats (each participant should state reasons for raising goats and in his/her area). Create a list that ranks the reasons from the most important to the least important.
6. Each participant should describe the climatic conditions in his/her area and name breed(s) that can do well under such climatic conditions.
7. Discuss other traits of economic importance in goat production and ways of improving them.

3.8 CONCLUSION

At the end of the training, the facilitator is expected to highlight the most important factors on breeding, mating plans and the actual management of breeding stock for commercialisation. It is important to also assess if the participants have understood and assist in where they need clarification. This is also the point where they can ask questions related to the training which may not have been mentioned.

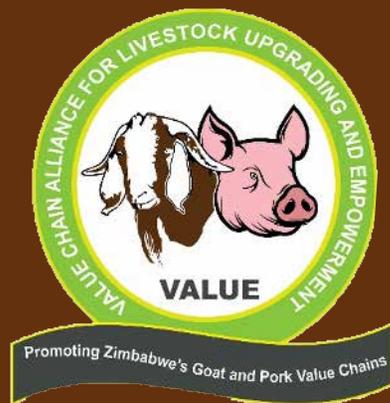
3.9 REFERENCES

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4

Glossary

Doe –	Female Goat
Doeling –	A baby female goat
Yearling –	A one year old goat
Buck –	Male Goat
Buckling –	A baby male goat
Wether –	Castrated male goat
Kid –	Baby goat, either male or female
Kidding –	Giving birth
Parturition –	Giving birth
Polled –	When a goat is naturally born without horns
Scours –	Diarrhea that is usually caused from incorrect milk feeding
Estrus –	The period of time when the female is sexually receptive to the male. Also known as being in “heat”.
Teat –	The protuberance through which milk is drawn from an udder.
Udder –	The mammary system of a ruminant, produces and stores the milk. The proper term for a goat’s mammary glands.
Flushing –	Is feeding of extra concentrate to does and doelings prior to onset of breeding season, normally starting 3-4 weeks before breeding.



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