# GETTING STARTED IN THE MEAT GOAT BUSINESS

## Bulletin I, Vol. VIII

## Reproduction and Breeding Management of Goats and Sheep


By

**Angela McKenzie-Jakes**
**Extension Animal Science Specialist**

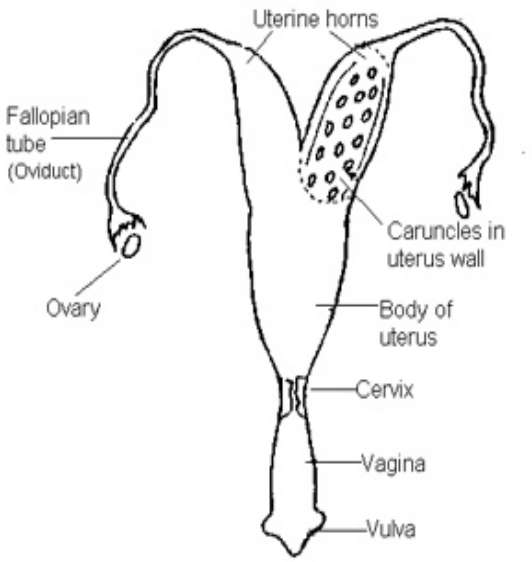
**Florida A&M University**
**College of Engineering Sciences, Technology and Agriculture**
**Research and Cooperative Extension Programs**

# Introduction

Reproduction and production efficiency is one of the most important economic traits in terms of livestock production. Maintaining good reproductive functions in the herd or flock is pivotal to the success of any livestock production system. Productivity and profitability is measured by ovulation rate, conception rate, the number of kids or lambs born, the number of kids or lambs weaned and the frequency in which they are produced. Reproduction is the propagation and continuation of a species through a sequence of events. This process involves the production of hormones (i.e., estrogen, testosterone) and the development of the reproductive system to carry out germ cell development, fertilization, pregnancy and eventually parturition.

## The Reproductive System of the Doe and Ewe

The reproductive system of the doe and ewe consists of the ovaries, infundibulum (funnel), oviducts (fallopian tubes), uterine horns, uterine body, cervix, vagina and vulva. The ovaries are the primary organs of reproduction in the doe and ewe. The ovaries have two primary functions which are 1.) to produce ova (eggs) and 2.) to produce and secrete the female hormones estrogen and progesterone. The infundibulum directs the ovulated egg into the oviduct. The oviduct is the site where fertilization (conception) and early embryonic development occurs. The uterine horn or body is where the conceptus grows and develops during gestation. The structure between the uterine body and vagina is the cervix which acts as a barrier to foreign material during pregnancy. Semen deposition may also occur here, or in the vagina which is the receptacle for the penis during mating and also an exit for urinary products. The vulva is the external portion of the reproductive tract.




## The Doe

The female goat is called a “doe” or “nanny.” When she is between the age of 6 to 12 months she is sometimes referred to as a “doeling.” The doe can reach puberty between 4 to 12 months of age. However, overfeeding or underfeeding the doe can hinder puberty as well as her reproductive performance. A lack of adequate nutrition will subsequently hinder lactation.

The genetic makeup of the animal also determines when puberty occurs in the female. Puberty is reach when the female exhibits her first heat and first ovulation.

Estrus or “heat” is the period in which the doe will stand and allow the buck to breed her. This phase of the reproductive cycle may last between 12 to 36 hours (duration of heat). 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 (21 days on average). Does that are in heat may exhibit signs of mucous discharge, swollen vulva, bleating, wagging their tail frequently and standing in heat which is a good indication that the doe is ready to mate.

The doe can be bred when she has reached at least 80 pounds of body weight or 60 to70% of the adult weight for her breed. Does that are bred to early may have difficulties during kidding (dystocia) or their future reproduction performance may be impaired.

Following ovulation, the egg(s) is released from the ovary and is directed by the infundibulum (funnel-like structure) into the oviduct where fertilization occurs. The egg will remain viable for 12 to 24 hours after ovulation. When the buck ejaculates, the sperm (viable for 48 hours after copulation) into the vagina they have to travel to the oviduct to fertilize the egg(s). The fertilized ova (embryo) travel to the uterus where it attaches to the uterine wall (implantation occurring 15 to 20 days after fertilization) for nourishment and removal of waste products throughout the duration of gestation (Wildeus, 2005).

The gestation period of the doe ranges between 145 to 152 days (150 days on average); and under normal circumstances, the doe can have multiple births.

## The Ewe

The female sheep is referred to as the “ewe” or it may be called a “yoe.” At 1 to 2 years of age she may be referred to as a yearling regardless of whether she has lambed or not. In most cases, ewes reach puberty between 5 to 12 months of age. Like the doe, puberty is influenced by genetics and environment. However, ewe lambs born in the spring tend to reach puberty earlier than ewe lambs born in the fall. The reason is simple; spring lambs tend to have heavier body weights and are older than those born in the fall. Another interesting fact is that ewe lambs that are born as singles, cycle earlier than ewe lambs born as twins or triplets and again this is because of their weight advantage. Single birth lambs are typically heavier at birth through weaning than multiple birth lambs.

Other influences on puberty include feeding and breed-type. Like the doe, overfeeding and/or underfeeding the lamb at pre-weaning (period between birth and weaning) and post-weaning (period between weaning and slaughtering) can delay the onset of puberty. Furthermore, wool sheep

(ewes) usually reaches maturity at a later age than meat sheep. The fiber breeds are commonly known to mature later. These breeds are the Katahdin, St. Croix and the Barbados Blackbelly however, the Finnsheep, the Romannov and their crosses tend to reach puberty earlier (Schoenian, 2005).

Sexual maturity in ewes is between the age of 6 to 8 months of age. The length of the estrous cycle is between 13 to 19-days (17 days is the average) and the duration of estrus or heat is between 18 to 48 hours (30 hours is the average). The signs of heat in ewes are not as obvious as it is in the doe. The mature ewe sometimes wags her tail, or may stand to be mounted by the ram, or try to mount the ram.

The ewe should not be bred until she reaches at least 70% of the adult weight for her breed. Pregnancy length for the ewe may vary between 138 to 159-days and they typically give birth to singles and twins, but triplets are not uncommon.

## Seasonality of the Doe and Ewe

The annual change in day length (photoperiod) definitely has an affect on the initiation and termination of the breeding season in goats and sheep. Because the eye is the sensory organ in mammals, it can detect changes in environmental lighting (Bearden and Furquay, 1984). The nerve impulses resulting from the photic signals to the eye gland produces melatonin, a hormone that is secreted from the pituitary gland of the brain. Melatonin secretion promotes cyclicity, the induction of the reproductive processes in goats and sheep.

Goats and sheep that are raised in the temperate zones of the U.S., are reproductively active when they are exposed to long periods of darkness such as in the fall and winter but, some females may still be able to breed out-of-season. In most instances, does that are managed in tropical climates will cycle year-round because they are exposed to equal lengths of day light and night year-round and this holds true for ewes. Therefore, the normal breeding season for goats in the U.S. starts in late August through late January.

Sheep are technically described as seasonally polyestrous in their breeding behavior. In other words, they will cycle (come into heat) many times during a set season (Neary,1992). Thus, most sheep breed only in the fall and winter months because many breeds were established in the northern regions and the ratio of light to dark has a control over the physiological responses in reproduction in ewes. Therefore the breeding season for sheep in the U.S. is typically in the fall (Oct. to Nov.) (Schoenian, 2005). However, the length of the breeding season will also vary with the breed of the animal.

Some breeds of sheep may cycle late in the summer until midwinter. The breeds that have a long breeding season are the Rambouillet, the Merino

and the Dorset. These breeds are likely to have three lambing crops every two years. The Southdown, Cheviot and the Shrophire do not start cycling until early fall and cease cycling at the end of the fall season. However, the closer (Florida vs. Washington) the goat and sheep species are to the equator, the longer they will cycle. However, when they exhibits a period of sexual inactivity, this period is called anestrus (absence of heat).

Seasonality is also influenced by nutrition, management level and health of the animal. In recent years, however, estrus synchronization has become a valuable reproductive tool for controlling and inducing heat or estrus in the doe and ewe.

## Altering Reproductive Processes in the Doe and Ewe

Researchers have recognized that certain reproductive processes in the doe and ewe can be altered to the advantage of the farmer. Although these techniques are not new, they have been used extensively in dairy and beef cattle for years. Artificial insemination (AI) and embryo transfer (ET) are examples of how tremendous improvements can be made in both genetics and reproductive management of goats and sheep by using synchronization methods.

## Synchronization Methods

Synchronization of estrus allows the producer to shorten the breeding season of his herd or flock by bringing all of his does or ewes into heat around the same time so, they will kid or lamb around the same time. Other advantages of this technique includes reducing the time required to check heat, reducing the time required for intensive care of the herd or flock and pregnancy can be shifted to coincide with favorable marketing patterns.

### Pharmaceutical and Non-Pharmaceutical Control

Some synchronizing techniques that have been utilized to induce heat, with ovulation (release of the egg) occurring within 2 to 3 days of stimulation, involves exposing the female to an intact male (not castrated), exposing the female to a castrated male treated with the androgen testosterone, or exposing the female to a vasectomized male to stimulate estrus.

The response to the male stimulus can be quite variable and is generally influenced by the breed of the animal, prior isolation, the depth of anestrus (without heat), the stage of postpartum in the female and the nutrition, health of the animals in question.

There are also several pharmalogical methods that has been developed and evaluated under research condition, to manipulate the reproductive cycle in females. The synchronization agents are essentially progestins and gonadotrophin treatments that are normally used in cattle.

Some of the pharamaceutical treatments available include intravaginal sponges, implanted with 45 to 60 mg of synthetic progesterone, or intravaginal pessaries treated with 30 mg of natural progesterone. Sponges are used widely either in combination with pregnant mare serum gonadotrophin (PMSG), follicular stimulating hormone (FSH) or prostaglandin (PGF2@) to synchronize heat. After breeding, the offspring should be born around the same time.

CIDR-G®, a popular progesterone that was developed for goats and sheep in New Zealand, releases a continuous supply of exogenous progesterone and has been shown to induce heat in 100% of the does treated with this drug. This device has been used by many breeders in the U.S. for synchronizing goats and sheep that were AI or donor recipient goats for ET procedures.

Melengestrol acetate or otherwise known as MGA is an orally-active, synthetic progesterone that was developed for use in cattle. MGA in conjunction with zeranol and PMSG are used to induce heat in cattle and goats under research conditions. Prostatglandin is also widely used to stimulate heat in cattle, but the results are variable in goats (Whitley, 2004).

## Ram and Buck Effect

When non-cycling does or ewes are exposed to the buck or ram and they come into heat this is considered the “buck” or “ram” effect. This process is caused by a chemical substance called pheromones. The substance produces an odor that stimulates the onset of estrus in the female. However, when the animals are in constant contact with each other, heat is less effectively induced. This technique works best in animals that are less seasonal and during the transitional breeding season (July through August) when the doe or ewe haven’t started to cycle (Gimenez, 2007).

Non-cycling females will ovulate 3 to 4 days after exposure to the ram or buck. However, the first ovulation may be a “silent heat” virtually undetectable by the ram in the case of the ewe.

## Light Control

Controlling the amount of light the doe or ewe is exposed to can be used to induce estrus in the females. Goats and sheep are considered short-day breeders because they breed in the fall and when they are exposed to short periods of day light they are more receptive to breeding. Because of this unique breeding behavior they can be programmed to cycle if they are kept

in a building where the amount of day light they are exposed to is controlled. The amount of light the females are exposed to can be reduced gradually over an 8 to 12 week period. The males can be exposed to the same lighting regiment which should improve their sperm production, libido, semen quality and fertility (Schoenian, 2005; Gimenez, 2007).

## Out-of-Season-Breeding

Some of the synchronization treatments that are used for does and ewes during the normal breeding season can also be used in anestrus or out-of-season females to induce heat. According to Wideus, (date unknown), estrus response to synchronization methods and subsequent pregnancies for out-of-season does are similar to that reported for does during the normal breeding season when using intravaginal sponges. CIDR-G® in combination with other gonadotropin hormones has also shown promise in its ability to induce heat in out-of-season does and ewes.

## Artificial Insemination

Synchronized females may be inseminated following observed estrus or they may be inseminated by fixed time in which high quality semen is placed in the reproductive tract of the female. This technique requires a trained technician or producer. The benefits of AI include: 1.) The producer can make genetic improvement in his livestock faster, 2.) This procedure reduces the possibility of spreading venereal diseases between the male and the female, 3.) The producer will not incur the cost of maintaining a male and 4.) The producer can predict when his kids or lambs will be born. Some disadvantages include: 1.) The cost of hiring a technician and 2.) The male is better in detecting heat than man.

## Embryo Transfer

Another reproductive technique that can be utilized following the onset of heat is embryo transfer. Embryo transfer has been used extensively in beef and dairy cattle for years. In this technique, the doe and ewe is first synchronized and later administered a superovulatory hormone which causes the doe or ewe to ovulate more eggs at one time than usual. This process is called *"superovulation."* The eggs are fertilized by means of AI or natural service and at the appropriate time they are flushed out of the reproductive tract of the donor female and then transferred to recipient females. The recipient females are also synchronized on the same day as the donor doe or ewe. The advantages of this technology include: 1.) It increases the genetic improvement in herd or flock significantly, 2.) It provides an additional source of income to a producer who has superior breeding stock, 3.) Frozen

embryos from superior stock can be shipped to other farms to aid in improving the genetics of the goat herds or sheep flocks around the U.S., and 4.) Reduces the spread of venereal diseases from the male to the females. The disadvantages of ET are: 1.) The cost of ET is expensive, 2.) The response to the hormone treatments may be erratic, and 3.) It is hard to find a skilled technician that can perform this procedure in small ruminants.

## The Reproductive System of the Buck and the Ram

The reproductive system of the buck includes the testes, which produces sperm (spermatozoa), the epididymis, the vas deferens, the accessory sex glands, the ampulla and the penis.

## The Buck

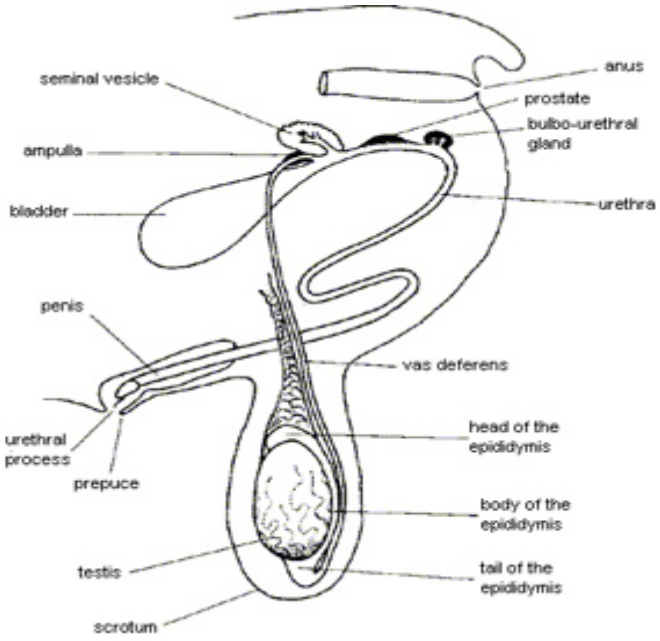
The male goat is called a “buck” or “billy.” If he is castrated he is called a wether. When male goats are between six to twelve months of age they are sometimes referred to as “bucklings.”

Male goats can weigh anywhere between 27 to 350 pounds, depending on their breed, health and nutritional status. The earliest age the buck should be used for breeding is one year of age. The number of does the buck can service at one time is referred to as “Buck Power” (Noble, 2004). Therefore, at one year of age, the buck should not be pressed no more than 10 does at one time. When he is two, he should be allowed to service 25 does at one time (during the breeding season or per month). At the age of 3 and older he can breed up to 40 does at one time, providing his health and nutritional needs have been met. The number of does a buck can service at one time is also dependent upon the type of mating system (hand or pasture) he is managed in and the terrain of the land. The buck has the greatest genetic impact on the herd and should not be neglected at any time.

Like the doe, day length also has an effect on the reproductive processes in the buck. The bucks have the highest libido, fertility, semen quality and volume in late summer and fall which is directly correlated to the seasonal breeding pattern of does (Senger 1984; Wildeus, date unknown). As the photoperiod lengthens, sperm production is reduced and more abnormal spermatozoa (the mature male gamete or sex cell) are present in the ejaculate. During the fall, the endocrine system also increased levels of testosterone and luteinizing hormone (Ritar, 1990).

## The Ram

The male sheep is called a ram which is often the most neglected animal in the flock. Often producers place more emphasis on the management of the ewe and her offspring, but very little on the male which is unfortunate. The ram has the greatest genetic impact on the flock, since 1 male can father up to 100 offspring in one breeding season far exceeding the ewe's capacity. Rams that enter the breeding season under-conditioned or sickly can severely reduce fertility rates in the flock.




The ram like the buck if castrated he is referred to as a "wether." The male lamb (ram lamb) will reach puberty from 5 to 7 months of age and weigh as little as 90 (Barbados Black Belly) pounds to as much as 350 pounds (Columbia) at maturity depending on his breed. Rams generally reach puberty about a month earlier than the ewes or when they have reached 50 to 60% of their mature weight. Puberty is greatly influenced by breed, nutrition, genetics, date of birth and health.

Sexual maturity is also influenced by these factors. Ram lambs are capable of breeding up to 30 (1 ram: 15 ewes or 1 ram : 30 ewes) ewes, whereas mature rams may be able to service as many as 50 (1 ram: 35 ewes or 1 ram: 50 ewes) ewes at one time (Schoenian, 2005).

## Breeding Soundness Exams for Rams and Bucks

To achieve maximum fertility, the buck or ram should be physically examined for reproductive fitness to detect any abnormalities that may limit his breeding capabilities. This can be done by given the buck or ram a breed soundness examination at least 6 to 8 weeks before the breeding season starts to identify defective males. Remember the males has the greatest impact on the farm and a male that has reproductive, health or physical issues can severely affect the profitability of your farm enterprise if he can not reproduce.

A breed soundness examination should include a thorough physical examination of the male with particular attention given to the reproductive organs and an evaluation of the semen. The scrotum and its contents and the penis and prepuce must be carefully examined. The size and symmetry

of both testes and epididymis should be assessed, and both testes should be firmly palpated for consistency and resilience. Any lesions that can be felt, particularly in the epididymis, should be considered potentially contagious (Mereck Veterinary Manual, 2008). This examination can be done by a veterinarian.

## Semen Evaluation

It takes approximately 40 to 60 days for sperm to be produced in the ram and buck. Good quality semen should be milky white or creamy in color. Poor semen quality can be attributed to heat stress and several other factors. If the buck or ram has poor quality semen it is advisable to take a second sample 30 days later to see if there has been a change in semen quality. The normal semen parameter's of the mature buck or ram is shown in the table below (Gimenez, 2007).

**Table 1.** Normal Semen Parameters in the Mature Ram and Buck

| Species | Ram | Buck |
|---|---|---|
| Volume (mL) | 1 (0.8 to 1.2) | 0.8 (0.5 to 1.0) |
| Sperm concentration (billion and ml) | 2.5 (1 to 6) | 2.4 (2 to 5) |
| Morphological normal sperm (%) | 90 (80 to 95) | 90 (75 to 95) |
| Motile sperm (%) | 75 (60 to 80) | 80 (70 to 90) |

Adapted from Gimenez, 2007

## Scrotal Circumference

The circumference of the scrotum is a good indicator of the sperm producing capabilities of the male. Scrotal circumference can be assessed by measuring the width of the testicles at the widest point. The size of scrotal circumference will vary with the changes of the season and vary with the condition of the animal. Research has shown that scrotal circumference is strongly correlated to semen quality and quantity and fertility rates. Rams or bucks with large scrotal circumferences generally have offspring that reach puberty at a younger age. Table 2 shows the minimum recommended scrotal circumference by the age of the ram and buck. (Schoenian, 2006; Gimenez, 2007).

**Table 2.** Minimum Recommended Scrotal Circumference by Age in Rams and Bucks

| Age | Minimum circumference |
|---|---|
| 5 to 6 months | 29 centimeters |
| 6 to 8 months | 30 centimeters |
| 8 to 10 months | 31 centimeters |
| 10 to 12 months | 32 centimeters |
| 12 to 18 months | 33 centimeters |
| 18 + months | 34 centimeters |

Adapted from Gimenez, 2007

## BCS and its Impact on Performance

Body condition score (BCS) refers to the amount of fat covering the body. External fat can be measured by palpating the spine, ribs and hip bone area. Meat goats are then assigned a numeric value between 1 (thin) and 9 (obese) to determine fat density while sheep and dairy goats are assigned a numeric value between 1 (thin) and 5 (obese). BCS are a good indicator of the nutritional status and the general health of the animal. Scoring is based on feeling the level of muscling and fat deposition over and around the vertebrae in the loin region. In addition to the central spinal column, loin vertebrae have a vertical bone protrusion (spinous process) and a short horizontal protrusion on each side (transverse process). Both of these protrusions are felt and is used to assess an individual body condition score.

The body condition scores for breeding does (meat goats) should be between 5 or 6 and 3 to 3.5 in breeding ewes and dairy goats. Does with BCS below 4 may require several weeks of intensive management to get back into the proper condition. This will also hold true for ewes and dairy goats with BCS below 3. Females that are in good condition should have good milk production, good colostrum quality, and high pregnancy and twining rates. Animals that are bred in poor condition may have increased incidents of morbidity, the kids/lambs may be born weak and unthrifty, the does/ewes may abort their fetuses, the doe/ewe may have low milk production or the doe/ewe may produce kids/lambs with low birth rates (Adapted from Noble, R.C. 2004). Therefore, it is of the utmost importance that your animals are in optimum condition prior to starting the breeding season.

The effects of BCS on performance of late pregnant does and ewes, is shown in table 3 and should be taken under consideration when planning the breeding program for your animals.

**Table 3.** Effect of Condition Scores on Late Pregnancy Does and Sheep Subsequent Performances

Thin (BCS= 1-3) Kidding Does/ Thin (BCS = 1-2) in Lambing Sheep

- Low Milk Production
- Poor Colostrum Quality
- Small, thin weak kids
- High mortality rates
- Slow growth rates of nursing kids
- Small weaning weight of kids & litter
- High frequency of single births and single weaned kids.
- Long rebreeding intervals
- Difficult kidding

Moderate (BCS=4-6) Kidding Does/ Moderate (BCS = 2.5-3.5) in Lambing Sheep

- Good milk production
- Good quality colostrum
- Heavy to average weight kids
- Good growth rates and weaning weights of kids/litter.
- High twinning rates
- Quick rebreeding intervals

Fat (BCS = 7-9) Kidding Does/ Fat (BCS = 4-5) in Lambing Sheep

- High milk production
- Good quality colostrum
- Heavy birth weight
- Low morbidity and mortality rates
- Excellent multiple birth (twins & triplets)
- Quick rebreeding interval
- Increase dystocia (difficult births)
- Increase metabolic disorders (Pregnancy Toxemia and Milk Fever).

Adapted from R.C. Noble- Tuskegee University (2004)

## Breeding Program

Since most goats and sheep in general are seasonal breeders in the U.S., the breeding program should be designed in such a way that the offspring are born and weaned in time for markets (i.e., Ramadan, Easter, Christmas) that will bring the highest economic returns. Once you have identified your market, it is time to prepare your animals for the breeding season.

## Preparing for the Breeding Season

Below are some suggested management practices:

Does and Ewes Management:

1.) Flush (provide additional feed) does and ewes one to two months prior to the breeding season. Supplement the females with ½ pound of

concentrate or grain per head per day to improve body condition and ovulation rates. Note: If the doe body condition score is above 5 or if the ewe/dairy goats BCS is higher than 3.5 they may not require the additional supplement.

2.) Check the does or ewes body condition score, FAMACHA score or fecal egg counts bi-weekly (optional) to monitor the nutrition and health status of the animals.

3.) Two to three weeks prior to the breeding season:

- Deworm the does or ewes.
- Vaccinate the females with C&D tetanus toxoid.
- Check and trim the goat's or ewe's hooves if needed.
- Give the does or ewes an injection of vitamin E/Se to aid in ovulation (optional).
- Record all production and financial data.

4.) Breeding Day:

- Breed does with BCS between 5 and 6 or ewes/dairy goats with BCS between 3 to 3.5.
- Place the buck with the does for 2 estrous cycles (42 days). If you have sheep follow the same procedure. After 42 days remove the buck or ram from the pen.

- Record breeding date, breeding weight (optional), FAMACHA scores and BCS.

5.) Mid-Pregnancy:

- Continue to monitor BCS and FAMACHA scores bi-weekly.

- Monitor does and ewes for signs of abortions (bloody discharge around the vulva area).

8.) Last Six Weeks of Pregnancy;

- Vaccinate the does and ewes with C&D tetanus toxoid to pass the immunity onto the unborn fetuses.

- Increase feed (if BCS are below 5 for the doe or 3 in the ewe), during the last 2 to 4 weeks of pregnancy, since 70% of the fetal growth occurs during this period. However, don't over condition your animals

at this time. Females that are too fat or obese during this period of gestation may have difficulty in kidding/lambing or they may become susceptible to pregnancy toxemia.

- Give a second injection of vitamin E/Se to aid in embryonic development (optional).

- Try not to handle the does or ewes that are over 3 months of pregnancy to reduce stress.

Other Suggestions:

- Take monthly fecal samples to monitor parasite loads, except during late gestation.
- Take monthly body condition scores or body weights, except during late gestation.
- Observe females periodically for signs of abortions.
- Check the color of the gums periodically to assess the FAMACHA score.
- Keep records on all activities with the female.
- Check for signs of illness in the herd.
- Observe the animals daily.
- Don't overstock your goat or sheep areas.
- Be around during kidding/lambing.

Females that are in good condition prior to parturition should be able to produce offspring that are healthy, have good stamina and have good growth potential. The does and ewes should also be able to produce high quality colostrums (in the milk), a large quantity of milk and they should be able to breed back quickly.

Buck and Ram Management

1.) Make sure the buck or ram is in an isolated pen to provide a period of rest prior to the initiation of the breeding season.

2.) If the buck BCS is below 5 or the ram is below 3 provide extra feed to to increase the BCS. Also, have a breed soundness exam for your males 6 to 8 weeks prior to the breeding season to determine his health and semen quality (optional), if a testing facility is accessible to you (Fort Valley State University has a facility in Fort Valley, Georgia).

3.) Check the ram's or buck's BCS and FAMACHA scores bi-weekly (optional) to monitor the nutritional and health status of the male(s). Research has

also shown that improving nutritional intake during the two-month period before breeding can increase testicle size and subsequent sperm production up to 100 percent (Schoenian, 2005).

4.) Two to three weeks prior to the breeding season:

- Deworm the ram or buck.
- Vaccinate the buck or ram with C&D tetanus toxoid.
- Check and trim the hooves if needed.

5.) Place the male with the females for 2 estrous cycles.

Other Suggestions:

- Take monthly fecal samples to monitor parasite loads.
- Take monthly body condition scores or body weights.
- Check the color of the gums periodically to assess the FAMACHA score.
- Keep records on all activities of the males.
- Check for signs of illness.
- Observe the animals daily.

## Pregnancy Determination

There are several procedures that can be used to determine if the doe or ewe is pregnant. The absence of heat/non-return rate is a simple inexpensive technique that anyone can learn. All it will require is your time. You should check your does every 21-days and the ewes every 17-days from the date you first saw them in standing heat. If they are in heat, they are not pregnant. Observing the external signs on the doe can also indicate whether an animal is pregnant or not. Does that are in late termed pregnancy, generally, have large udders and/or an enlarged abdomen and vulva area.

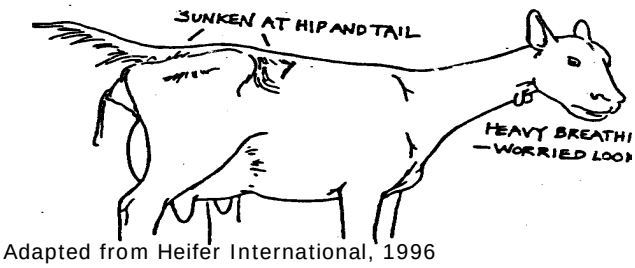
An ultrasound is expensive and will require the skills of a trained technician or veterinarian. The technology enables you to detect the early stages of pregnancy in the animal, identify the number of offspring each doe or ewe is carrying, the sex of the offspring and the viability of each offspring.

Other methods for determining pregnancy rates is by collecting a sample of blood or milk and sending it to a diagnostic laboratory to measure progesterone concentrations. This procedure can be quite expensive ($25/sample) if you have several does or ewes that require sampling or if you need the assistance from a veterinarian to collect the blood samples.

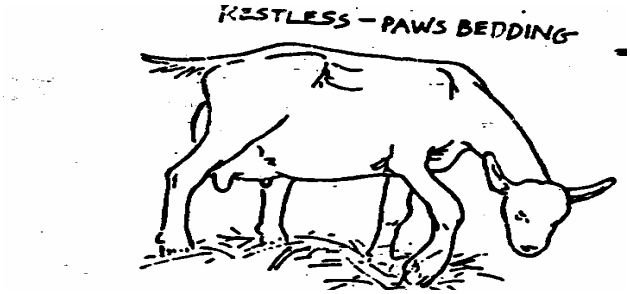
## Preparing For Kidding/Lambing

Prior to kidding/lambing, provide the does or ewes with a clean, dry, well-ventilated shelter and try to be around in case your animals should require assistance. Hay, straw or pine shavings can be used for bedding, if desired.

Some of the signs you may see when parturition (kidding/lambing) is near, include enlargement of the udder which begins to fill with milk. The process will begin one to six weeks prior to kidding/lambing. At two weeks, the muscles of the ligaments on both sides of the doe will begin to soften and relax. During the last three to four days before labor, the udder will appear quite large. Does that kid for the first time may not show this development until 2 weeks or more after kidding. One to two days before labor, the does 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 parturition approaches.



Adapted from Heifer International, 1996

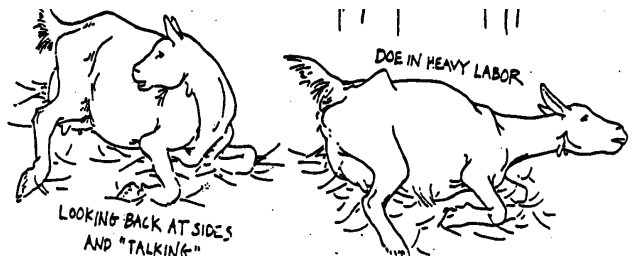


Adapted from Heifer International, 1996

The last 12 hours of labor consist of continuous bleating sounds in the doe. The tail may be straight out or slightly elevated. The first several vertebrates of the spine in front of the tail head may appear to stand higher and taller than usual.

A normal delivery usually takes 5 hours. Cervix dilation usually requires 4 hours and then 1 hour is required for the delivery of the offspring. For normal delivery the kid (name for baby goat) or lamb (name for a baby sheep) should be right side up with the front feet first and the head lying between the knees and pasterns. After the water sac breaks, the doe/ewe should start to give birth within 30 minutes to 1 hour. If the doe or ewe has not progress within the hour, you may need to contact your veterinarian for further assistance.

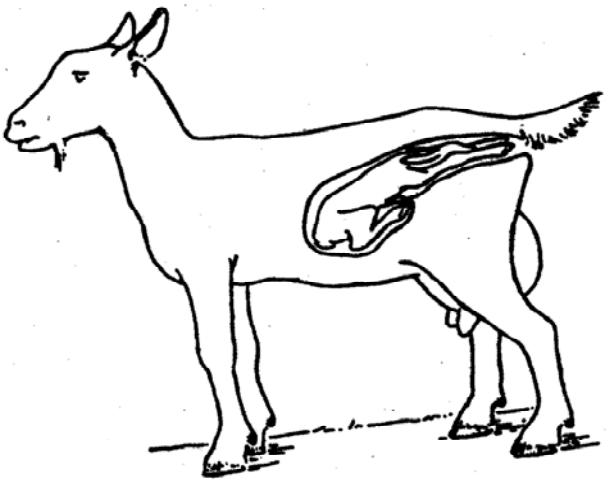
If the doe/ewe has kidded/lambed, make sure the doe/ewe has shed her placenta and contact the veterinarian if it has not detached after 12 to 18 hours. If there is any variation in the presentation of the kid/lamb then the delivery will not be normal. Abnormal presentations



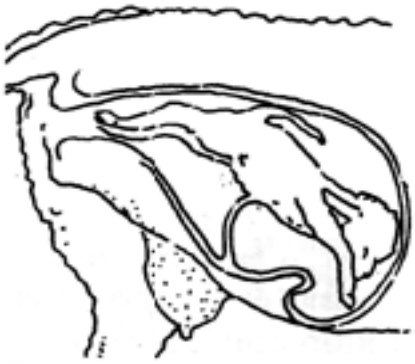
Adapted from Heifer International, 1996

will include the kid/lamb position is full breeched where the buttocks or back feet appears first.

Another abnormal position may include the head presenting itself with or one foot and head are visible with the doe/ewe straining unproductively.



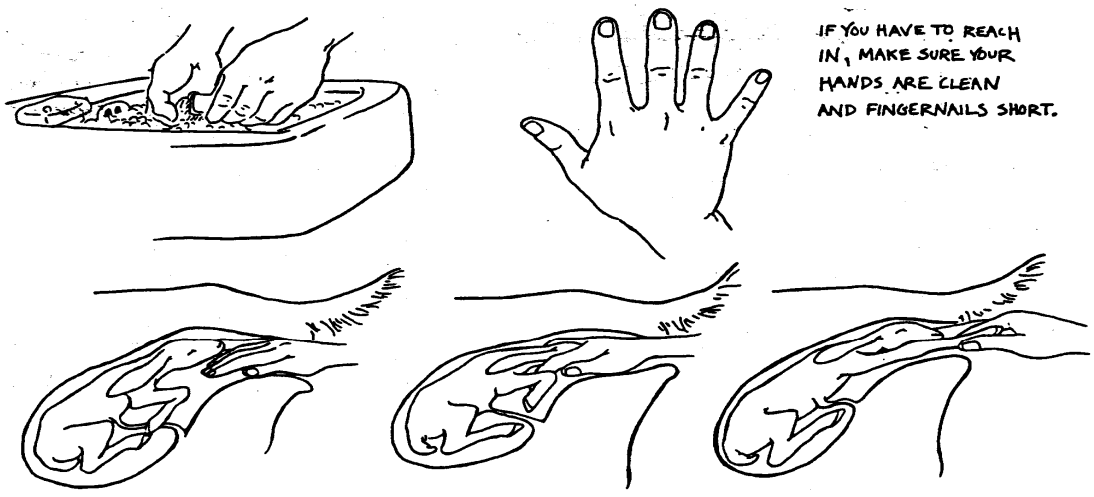
Normal Presentation, Battaglia, 1998



Abnormal Presentation, Gimenez, 2007

If your doe/ewe will require assistance, first trim your nails if needed, remove your jewelry and slip on a pair or latex gloves or wash your hands. Try letting the cord break naturally and if the sac is not broken try breaking it for the doe or ewe. If the animal appears lifeless, swing it back and forth by its hind legs. Place a straw up the nose which will trigger a sneezing reaction and help clear the air ways.

Give it short hits with your fingers in the middle of the heart until the kid or lamb cries.




Heifer International, 1996

## Neonatal Care

After birth, clean the mucous away from the nose, mouth and throat, weigh the kid/lamb, tag the ear and dip the navel cord in 7% iodine to prevent navel joint disease. Make sure the kids or lamb receives its mother's first milk within the first 24-hours after birth. The "first milk" is rich in colostrum which contains lots of antibodies which helps the kid or lamb fight against diseases. The sooner the kid or lamb nurses the more antibodies the animal can absorb. After 3 days the kid's and lamb's ability to absorb antibodies is minimal.

Dipping the Navel Cord. Battaglia, 1998

If you have orphans, try bottle feeding them will milk replacement that has colostrum in it or provide the orphan with milk from another doe or ewe who has also just given birth. You may also want to try forcing a doe/ewe that has given birth to a single kid/lamb to adopt the orphan. Although the adoption process between animals will require less paper work, this process may not be as easy as it seems.

First try isolating the adopting parent in a small pen with the orphan. Hold or securely tie the animal to a post and allow the kid/lamb to nurse the doe/ewe for several times during the day. Hopefully, after 7 to 10 days the doe/ewe will think the kid/lamb is hers and decide to keep the orphan as her own.

If this process does not work, stick with bottle feeding. If you have several orphans purchase a lamb feeder which can service up to 10 orphan kids/lambs at one time.

In small ruminants, neonatal deaths usually occurs when the doe or ewe is in poor condition during the last third of pregnancy (50 days) and the kids or lambs receive inadequate consumption of colostrums during the first six hours of life. Neonatal deaths are also higher during extreme weather conditions.

Lamb Feeder. Battaglia, 1998

## Post-natal care

Next, introduce the kids or lambs to solids within the first three weeks of life to stimulate the rumen development and for early weaning and forage consumption. Provide feed with 14 to 16% crude protein "free choice." Some producers do not creep feed because of the inconvenience, the added expense or their females are able to produce acceptable offspring for their market.

At 30 and 60 days of age, vaccinate the kids or lambs with C&D tetanus toxoid. If you plan on selling wethers, castrate them at least by 45 days old. Don't wait too long to castrate your males because it may be more painful to the animal especially if open castration procedures are done. If the males are not castrated, wean them and remove them from the females before they reached 4 months of age to prevent accidental pregnancies.

## Criteria for Culling (Removing the Animal from your Farm)
## Does or Ewes

- Has a single birth more than once.
- Had kids or lambs with the lowest weaning weights in the herd or flock.
- Produces unthrifty kids or lambs.
- Poor mothering ability
- Produces kids or lamb with birth defects
- Doesn't produce enough milk to wean her kids or lambs.
- Reoccurring health problems
- Gets pregnant late in the breeding season
- Has structural anomalies that prevents her from properly nursing her kids or lambs.
- Can't maintain her condition.
- Reproduction performance is declining overtime.
- Always sick

## Criteria for Selecting Replacements

To make genetic improvements in your breeding stock, you should replace 10% of the lowest performers with better quality animals annually.

Does or ewes selected for replacements should have the following characteristics:

- Have high average daily gains (ADG) and weaning weights.
- The dam is an easy keeper
- The dam replacements are easy to handle
- Previous litters are worth a high value.
- Litter weight is 100% of the dam's body weight
- Structurally sound
- No serious or consistently health problems.
- Born from multiple births that are born early in the lambing/kidding season.
- Triplet ewe lambs. When they get into production they will usually have twins.
- Replacements that have a high lifetime productivity in your environment.
- Replacements from ewes that are less seasonal in their breeding ability. Don't keep replacements from rams that are infertile during hot weather.
- Females from males that have large, well developed, problem free testicles.
- Not polled (goats only).

Adapted from R.C. Noble, 2004.

The buck or ram should be replaced in the herd or flock every three years to prevent inbreeding and to make genetic improvements in the breeding stock. Other reasons for culling will include low kidding/lambing crops, low libido or consistent health issues. Select replacement bucks or rams that are born from twins, healthy, reproductively sound (BSE), structurally sound, has a large scrotal circumference (high fertility rates), have high ADG, weaning weights and not so difficult to manage.

## A Final Note

One of the most important factors in determining profitability of a goat or sheep enterprise is production rate. Productivity in the goat herd is a direct reflection of reproductive efficiency. Regardless of the genetic merit, structural correctness or value of the animal, if it can not reproduce the animal is worthless for breeding stock. There are several management strategies that were discussed in this module that can be used on the farm to increase your chances of producing healthy and productive animals. These strategies should include developing a sound breeding program to ensure the herd or flock receive optimum care as well as providing good neonatal and post natal care for the females and their offspring. Always remember that the male has the greatest genetic impact on the herd or flock as well as greatest economic impact on your business. If he is managed improperly you may feel the repercussions of your actions for several years to come.

# References


Battaglia, R.A. 2001. Handbook of Livestock Management, 3rd Edition. pgs.- 432 – 436. Prentice Hall, Inc.

Bearden, J.E. and J. Fuquay. 1984. Applied Animal Reproduction. pp. 40-130. Reston Publishing Company, Inc. A Prentice-Hall Company, Reston, Virginia.

Gimenez, D. 2007. Reproductive Management of Goats and Sheep. Alabama Cooperative Extension System. Bulletin ANR-1316.

Mereck Veterinary Manual, 2008. http://www.merckvetmanual.com/mvm/index.jsp

Neary, M. 1992. Sheep and Their Sex Life. Purdue University, Sheep Extension. http://ag.ansc.purdue.edu/sheep/articles/sheepsex.html

Noble, R.C., 2004. Effect of Condition Scores on Late Pregnancy Does Subsequent Performances. Reproduction Management of Beef Cattle and Goats. Goat Workshop. Florida A&M University.

Ritar AJ., 1990. Artificial Insemination of Cashmere Goats- Effects on Fertility and Fecundity of intravaginal treatment , method and time of insemination, semen freezing process,number of motile spermatozoa and Age of Females. Reprod. Fertil. Develop.2:377-384.

Sinn R., Raising Goats for Meat and Milk. 1986. Heifer International Training Manual.

Schoenian. 2005. Reproduction in the Ewe. In: Sheep 201 A Beginners Guide to Raising Sheep.http://www.sheep101.info/201/ewerepro.html

Schoenian. 2005. Reproduction in the Ram. In: Sheep 201 A Beginners Guide to Raising Sheep.http://www.sheep101.info/201/ramrepro.html

Wildeus, S. and G.A. Moore. 1995a. Age and Gonadotropin Effects on Estrus and Ovulation Response to Norgestomet Synchronization in Spanish Does. J. of Anim. Sci. 73 (Suppl.1:343)

Wildeus, S. and G.A. Moore. 1995b. Response of Three Meat-Type Breeds of Goats to Two Methods of Estrus Synchronization. VA J. Sci. 46:80

Wildeus, S. 2005. Goat Reproduction. Virginia State University. http://www.luresext.edu/goats/training/reproduction.html

Wildeus, S. Date unknown. Reproductive Management of Meat Goats. http://www.goatworld.com/articles/pregnancy/reproductivemanagement.html

Whitley, N.C. and D. J. Jackson. 2004. An update on estrus synchronization in goats: A minor species. J. Anim. Sci. 2004. 82:E270-E276.Department of Agriculture, University of Maryland Eastern Shore, Princess Anne 21853