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# Chapter 7

## Bucks and Breeding

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Producers should strive for the highest reproductive efficiency to accomplish at least these three primary purposes:

- perpetuation of the species
- maximum food output
- genetic improvement

The objective of this chapter is to provide the basic information to help producers improve reproductive efficiency in their operations. One way to do this is to have healthy pregnant does, such as the one shown in Figure 7-1.

### Female Goats (Does)

Female goats (does) reach puberty at seven to 10 months of age, depending on their breed and nutrition. Does should be at 60 to 75 percent of their adult weight at breeding to prevent difficulty in kidding. Does will have higher lifetime production and be more profitable if they are bred to kid as yearlings. Does should kid every year thereafter until at least the age of seven or eight, if they remain healthy.

Most goats are seasonal breeders, reacting to shorter days as a cue for breeding. Breeding season may be manipulated through the use of lights and hormone therapy. The presence of a buck (uncastrated male goat) stimulates the reproductive cycle

(estrus) and the behaviors of the does indicate they are in the fertile part of their cycle (in heat). The doe's estrous cycle normally occurs from August or September until January, with October to December being the peak time for breeding. The estrous cycle is normally 18 to 22 days long.

Does in estrus are at the proper stage for breeding; at this time, they will be receptive to the buck. Estrus lasts for 12 to 36 hours. Signs of heat include tail wagging, swollen vulva, mounting behavior, decrease in milk yield if lactating and a general increase in activity and bleating.

Kids are born about 150 days after breeding. Plan breeding so kids are born during the height of forage production in the spring, making efficient use of the pasture. Keeping accurate breeding records allows producers to know when kids are due and help them prepare for their arrival. Another decision to consider in a breeding season is to match the breeding season to a potential market outcome to take advantage of higher market prices or traditional cycles.

### Male Goats (Bucks)

The most important animal in the herd is the buck, shown in Figure 7-2. He provides half of the genetics of the herd, and using a sound, high-quality buck can make significant improvements to the herd.



**Figure 7-1. Pregnant doe.**



**Figure 7-2. Male goat (buck).**

Bucks reach puberty earlier than females and must either be separated from them by the age of four months or be castrated to prevent unwanted breeding. Buck kids can be used as herd sires at eight to 10 months, but should not be used as heavily as mature bucks. A veterinarian should conduct a breeding soundness exam to test bucks for fertility and soundness before the breeding season.

Also when selecting a buck, a veterinarian should perform a breeding soundness exam. A general physical exam can check the buck for structural soundness and abnormalities in the sex glands and organs. The scrotal circumference (at the widest point) should be measured, since this correlates with fertility and semen production. As a general rule, dairy bucks should measure 25 to 28 centimeters at 100 pounds, meat bucks should measure 26 to 29 centimeters at 100 pounds, and larger bucks should measure at least 34 to 36 centimeters (Mobini, 2003).

A semen sample should be taken and evaluated. A normal concentration is two billion sperm per cubic centimeter of semen, which 70 percent should be motile. The sperms' morphology should be evaluated to determine whether they are mature and if there are abnormalities. At least 80 percent of the sperm should be normal (Mobini, 2003).

Finally, the buck's libido should be monitored. A sound buck is of no use if he will not service does. A full-grown, healthy buck should easily service up to 50 does. As a rule, bucks should not be bred to their daughters; inbreeding tends to expose genetic problems and lead to weaker stock.

When bringing a new buck into the herd, producers should spend time and effort to locate a superior buck, one that has the traits the producer has identified as being important. A good buck is well worth the investment. A buck that has production records (has been on test or has relatives that have been on a production test) is the surest bet. At the very least, producers should observe both the herd and the parents of the buck.

In any mating system, certain production practices help with record-keeping to maintain selection decisions. One such practice is using visual markers to identify bred does. Animals can be fitted with a harness containing a crayon that will mark the females in heat when mounted. This procedure helps identify efficient females in the herd.

Some goat producers use artificial insemination (AI) for breeding. This requires excellent heat

detection skills and is more labor-intensive than natural service, but AI allows the economical use of outstanding sires. The American Dairy Goat Association (ADGA) offers a booklet about AI. AI classes are offered by Langston University in Langston, OK., and sometimes by goat associations. AI technicians may be available in some areas of the country. For more information, contact the local county Extension educator.

Breeding goats can involve different strategies. Each of these strategies will have different consequences for the herd, and wise producers will pick a strategy that fits their own philosophies and goals. No single strategy fits all situations, but each strategy is a wise choice for certain goals and production systems.

## Pregnancy Diagnosis

While not of immediate concern in extensive goat operations that utilize extended natural mating, the early determination of pregnancy can be a useful management tool with more intensive production conditions or when AI and embryo transfer are employed. Pregnancy diagnosis will identify the females that require repeat breeding or insemination and/or will allow the separation of pregnant and open females for different management. When fetal numbers can be determined as part of the pregnancy diagnosis, different feeding regimes can be applied to single and multiple litter-bearing females.

To be most useful to the producer, pregnant animals need to be identified as early as possible in gestation and provide an estimate of fetal numbers. Techniques have either focused on the detection of physical changes resulting from pregnancy (fluid accumulation and presence of a detectable fetus) through palpation and ultrasound. Techniques also have been concerned with identifying maternal and fetal physiological signals (progesterone or uterine proteins) associated with pregnancy.

The most promising technique currently available for pregnancy diagnosis is the use of real-time ultrasound scanning. Real-time ultrasound through the skin allows reliable pregnancy diagnosis as early as 35 days into gestation.

Techniques using pregnancy-specific protein B, is now available for use in small ruminants. Does can be tested for pregnancy at 30 days or later using a simple blood test.

## Breeding Systems

One concept, regardless of breeding strategy, is selection. Selection simply means using some goats for reproduction and some for food. Selection ensures more desirable goats produce more offspring than the less desirable goats. Other concepts include these breeding strategies: inbreeding, line breeding, line crossing and crossbreeding. These strategies have slightly different definitions, but the important thing is the pairing of animals for reproduction can have varying outcomes, depending on the relationship of the animals mated.

Table 7-1 shows the comparisons of inbreeding/line breeding and crossbreeding traits and potential consequences.

### Line breeding/inbreeding

One breeding strategy is line breeding, which is different from inbreeding just in degree. Both of these strategies involve mating related animals. Inbreeding can be arbitrarily set as the mating of first-degree relatives (offspring and parents, or siblings), although this is only one possible definition among many. Line breeding can then be considered as the mating of related animals, but of close relationship less than first degree.

Line breeding (or inbreeding) results in uniformity of offspring, especially if adopted as a long-term strategy with appropriate selection. Since parents are related, line bred animals increases genetic, appearance and performance uniformity. A very important historic note is that line breeding and inbreeding are the usual strategies for the establishment of breeds. Predictability is the major attribute of breeds that breeders find useful. The predictability and consistency of any breed is why most breeders choose it; they want a specific type of goat producing a specific product.

Potential problems of line breeding (and these are more common with inbreeding) include loss of general vigor and especially loss of reproductive performance. Obviously, selection can help offset these. As a result, many line bred and inbred resources are indeed productive, vigorous and reproductively sound.

### Line crossing

Line crossing is the crossing of different lines within a breed, and while it has some of the same consequences as crossbreeding, it does contain this within a single breed. As a result, the variability is not as great as a cross between breeds, so the boost from hybrid vigor is not as great. With line crossing, the benefits of crossbreeding can be achieved without loss of breed character and type. Consistency of production is still diminished, and each individual situation will indicate whether this is a good tradeoff or not.

The phenomena associated with crossbreeding and line crossing is going to have differing consequences for different breeders, largely due to differences in the breeders' philosophies. That is, what do they want and how do they want to get there? These questions are essential for all goat breeders, but are not frequently asked. In the absence of a guiding philosophy and set of goals, breeding programs fail to make the progress possible with such guidance.

Line crossing takes time and commitment, while crossbreeding can be a quick fix and is a tempting strategy for a variety of reasons. One outcome of crossbreeding is initial phenomenal results, especially if the parents are intelligently selected.

### Crossbreeding

Crossbreeding is a philosophic and biological opposite to line breeding and involves the mating of animals of two different breeds. Crossbreeding is a fascinating phenomenon, partly because different

**Table 7-1. Comparisons of inbreeding/line breeding and crossbreeding.**

<i>Trait</i>	<i>Inbreeding/line breeding</i>	<i>Crossbreeding</i>
Uniformity	Good	Poor
Fertility	Poor (to good with selection)	Good
Growth	Poor (to good with selection)	Good
Predictability	Good	Poor
Overall vigor	Poor (to good with selection)	Good
Longevity	Moderate	Good

things happen depending on which stage of crossbreeding is considered.

The first stage is the initial cross. A useful example comes from cattle. When Angus and Hereford cattle are crossed, the initial result is a very uniform crop of black baldy calves, which have benefited from the specific combination of the genetic array of the parental breeds. Each calf gets half from each breed. Since each parental breed is uniform, and each calf gets half from each breed, every calf is pretty much like the next. This first calf crop is reaping the benefits of homogeneous parental breeds.

If these calves are in turn used for reproduction, variability then increases since these calves are half one thing, half another. Using only color as the marker, these calves (when interbred) would produce black, black baldy, red and Hereford pattern calves. The initial consistency is gone, and the result is a variable group of calves.

Variability is not all bad, and if combined with selection, the excellent goats can be skimmed off the herd and used for advantages in shows and other situations. They may indeed have excellent type and performance. What they lack, though, is the ability to consistently pass along this excellence to the next generation.

Many of the advantages of crossbreeding, such as increased vigor and reproductive efficiency, are somewhat the disadvantages of line breeding. Conversely, the disadvantages of crossbreeding, such as lack of consistency and predictability, are the advantages of line breeding.

## Summary

The result of this discussion is that crossbreeding does not make sense if the goal is consistent production generation to generation. Crossbreeding does make sense in many circumstances, one of which is the production of show animals. While

something of an extreme, a potential cross of a terminal sire (meat goat breed or meat goat producing system) would be mated with some sort of small, fertile, line-bred maternal female. All of the kids should be reasonably uniform, making an appealing lot for sale. While they may not in their own turn produce uniform offspring, they themselves are uniform and the clever breeder can take advantage of that fact.

Every breed can benefit from several breeders using slightly different strategies, philosophies and methods. It is healthy for a breed to have some breeder's line breeding and others line crossing. This strategy allows for successful combinations to be developed in a variety of locations and conditions, and all of this is good for goat breeds and goat breeders. A single program and philosophy will not fit all situations, and breeders need to encourage some diversity of approaches and techniques.

Table 7-2 gives a summary of the breeding strategy choices for different producer's goals.

### Resources

American Dairy Goat Association  
209 West Main Street  
P.O. Box 865  
Spindale, NC 28160  
828-286-3801  
<http://www.adga.org>

Langston University Agricultural  
Research and Extension  
P.O. Box 730  
Langston, OK 73050  
405-466-3836  
<http://www.luresext.edu/goats/index.htm>

### References

Mobini, Seyedmehdi. 2003. Georgia Small Ruminant Research and Extension Center, Fort Valley State University. Proceedings from an unpublished presentation at the American Dairy Goat Association National Convention, October 2003.

**Table 7-2. Summary of some choices of breeding strategy for different producer goals.**

<i>Goal</i>	<i>Inbreeding/line breeding</i>	<i>Crossbreeding</i>
Uniform kid crop	Good choice with selection	Good in first cross, then poor
Supreme show goats	Poor in most cases	Good if nonuniform goats
Rapid growth meat kids	Moderate at best	Good to excellent