

Working Safely with Goats

Many livestock producers have never stopped to consider why animals behave as they do, and more importantly, how this behavior may affect personal safety. Animal-handling practices are often acquired from watching others and from personal experience. Too often, this results in unsafe animal-handling and restraint practices.

According to the 1999 National Safety Council Report, agricultural accidents are the second leading cause of death in work-related accidents. Machinery accidents are first, while livestock accidents are second. Although most animal accidents are not fatal, many men, women, and children are needlessly injured each year because of a lack of safety awareness. Broken bones, crushed limbs, missed days of work and school, and unnecessary medical expenses are some of the results of animal-related accidents.

Individuals may work carefully around animals most of the time, but injuries involving animals occur because of preoccupation, haste, impatience, or anger. It is during these moments that a livestock handler really needs to understand animal behavior.

What Do I Need to Know?

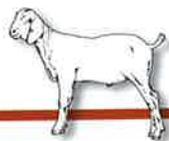
Swine, dairy does, and meat cattle are colorblind and have poor depth perception. Colorblindness causes extreme sensitivity to contrasts, which may cause an animal to balk at shadows, shiny objects, or rapid changes in light to dark. However, goats

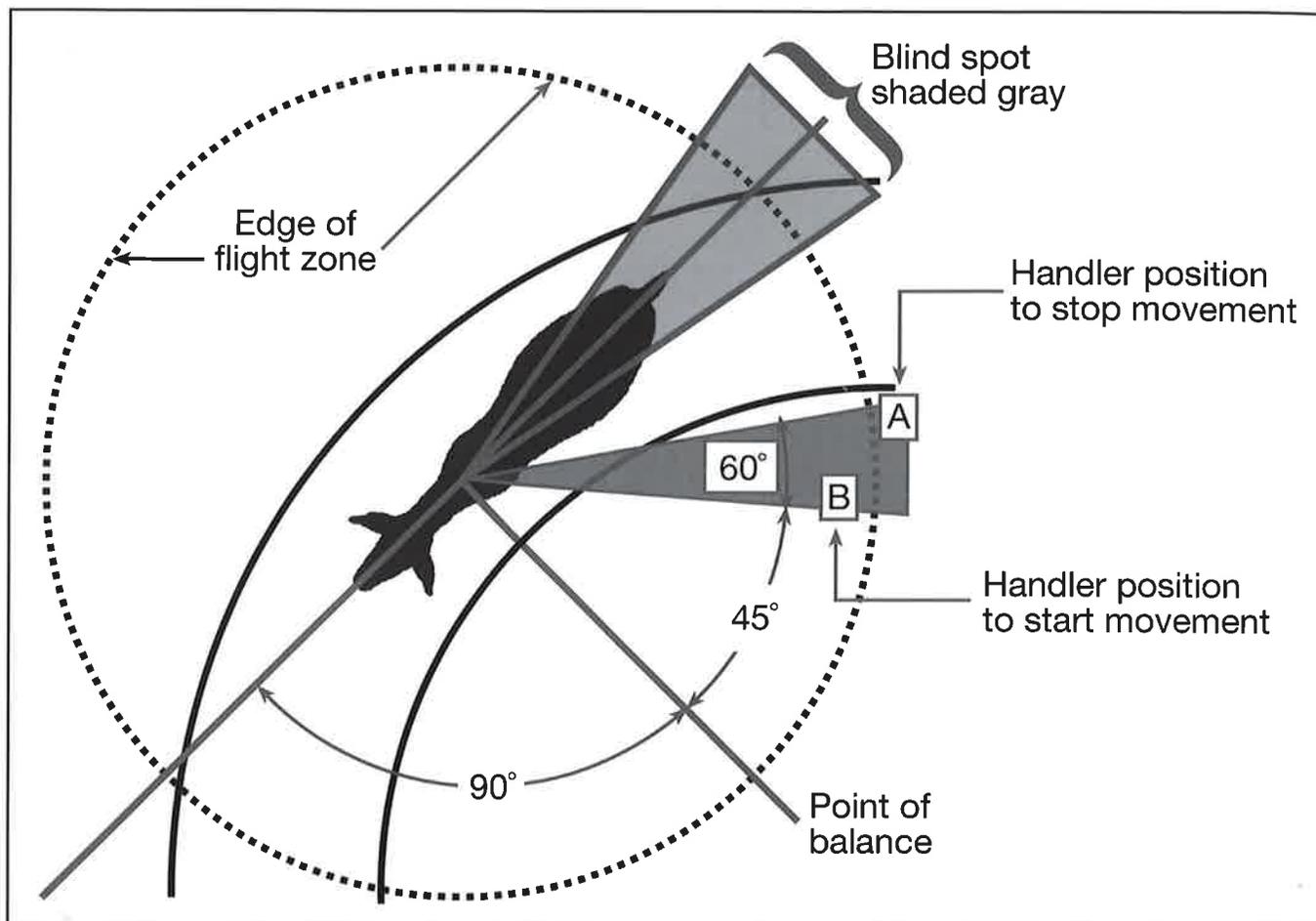
have good depth perception and good peripheral vision. This is because their pupils are horizontal instead of round like cattle and pigs. Goats still have difficulty seeing small details and faraway objects.

To be able to work safely and handle livestock, you must be aware of each animal's "comfort" or "flight" zone (see figure 3.1). Animals develop a distinctive, comfortable space around them. This may change and depend on how familiar the animal is with people or the person working with the animal. As a person starts to enter the zone, the animal becomes tense and may try to move away. The deeper a person enters the zone without allowing the animal time to adapt, the more severe the reaction may become.

Goats also have panoramic vision. This means that they can see everything around them except what is in their "blind spot." This is the area directly behind them. When someone enters this area, the animal cannot see the person and may be easily startled when it does see or hear someone. This can lead to the animal kicking or running. To keep from startling the animal, you should approach the animal from the side or front, giving it time to adapt to having a person enter its flight zone.

Handlers can use the flight zone and the point of balance to easily move animals. When you are in front of the point of balance (the shoulder) and enter the flight zone, the animal moves backwards. If you are behind the point of balance, the animal moves forward.





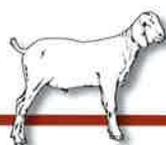
Adapted from Temple Grandin, *Livestock Handling Guide: Management Practices that Reduce Livestock Bruise and Injuries and Improve Handling Efficiency*.

Figure 3.1. Flight zone.

Animals experience hunger, thirst, fear, sickness, injury, and strong maternal instincts, similar to what humans experience. Livestock in these conditions are usually more defensive and can be difficult to handle. When possible, let the young stay close to the adult when handling. This makes them more comfortable. They also develop individual behaviors, such as kicking, biting, and head-butting. The handler should be aware of these behaviors and take necessary precautions. Safety precautions include using personal protective equipment, such as safety glasses, gloves, long trousers, steel-toed shoes or boots, shin guards, and a hard hat, depending on the activity and type of livestock being handled.

The majority of goats also have a strong territorial instinct and develop a sense of “homeland” in their pens, barn lots, and pastures. They develop a very distinctive, comfortable attachment to these areas. You may notice this when they escape from their enclosures and stay close to familiar surroundings. Other examples of this homeland instinct are the well-worn paths they make from the barn to their pastures, watering areas, or feed bunks. Forceful removal from a homeland area can cause a goat to react unexpectedly.

Considering these animal traits, it is easy to understand why animals often hesitate when going through unfamiliar gates, barn doors, and handling and loading



chutes. In addition, shadows, yelling, and rapid changes in lighting can further excite animals and make their behavior unpredictable. Similar problems occur when animals are moved away from feed, separated from the herd, or approached by an unfamiliar person. When moving animals, it is best to have your facilities set up ahead of time to move the animals. To move your goats, it may be best to put a collar or a halter on them and lead them where you want them to go.

Most animals are extremely sensitive to noise and are easily frightened or spooked. In their attempts to move away from the direction or source of the noise, they may crash into or through objects, including people. Be cautious around animals that are blind or deaf on one side. They tend to favor that side and can suddenly swing around to investigate disturbances. If standing too close, a person could easily be knocked down and trampled.

Young farm animals can form relationships simultaneously with other animals and with their human handlers. Animals respond to the way they are treated and draw upon past experiences when reacting to a situation. For example, a newborn raised on a bottle or a bucket may develop a very strong attraction for the person feeding it and feel comfortable around people. However, animals that are isolated from people or chased, kicked, hit, or frightened when young naturally fear being approached. Goats raised around people are usually very friendly, to the point of being almost dog-like, and relate well with their handlers if treated kindly.

Animals are often said to be “stubborn” because they balk or refuse to enter an unfamiliar area. Once this has happened, the animal is likely to refuse the next

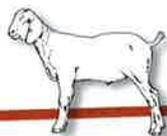
several times, as well as becoming a little excited and dangerous with each refusal. It is important to take time to prepare for moving animals. Many farmers are tempted to move animals without the necessary planning and often end up in a battle with the animal that could lead to an injury. Carefully plan how to move your animals. If young stock will be entering into the milking herd soon, it may be helpful to get them comfortable to the milking area and some milking equipment and procedures before they freshen so that they are familiar with those surroundings when they start to milk.

Another risk to be concerned about is **zoonotic diseases**, which are illnesses that can be transmitted between humans and animals. Some of the diseases to be concerned about are leptospirosis, rabies, brucellosis, salmonellosis, and ringworm. A person can contract these diseases by being bitten by the animal, handling an infected animal, or disposing of infected tissues. To reduce the chance of contracting a disease, use good hygiene and sanitation procedures, which include prompt and adequate treatment or disposal of infected animals.

Proper cleaning of contaminated sites and proper use of personal protective equipment are also important.

Facilities and Safety

Facilities play a major role in safety and accident prevention on the farm. Good facilities provide a means of controlling animals while allowing easy access for routine chores—all in a safe environment. To help prevent accidents, keep walkways and work areas properly lit and clear of debris and obstructions. Give workers and animals slip-resistant footing to reduce the



risk of slipping and falling. Make sure that all pens, chutes, gates, fences, and loading ramps are strong and working properly. An escape route should always be available to easily get away from an animal in case of an emergency.

Make sure that properly designed treatment areas and appropriate animal restraint equipment and facilities are available during animal examination, treatment, hoof trimming, dehorning, and artificial insemination. The majority of accidents involving livestock on farms come from inadequate restraint equipment.

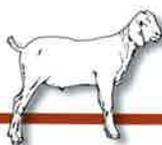
Most animal-related accidents are the result of “people-problems.” Poor judgment and lack of understanding are major causes of accidents involving animals. Plan ahead to allow plenty of time to move animals so there is no need to hurry. Do not try to handle animals when you are angry. Some handlers may exhibit a feeling of

superiority over animals, but remember, there are times that you are handling an animal that is much larger and stronger than you are. Other common problems, such as horseplay, improper lifting of young animals, prodding an animal that has no place to go, tying an animal to a person, attempting a task without enough help, not having the proper and safe facilities, and not wearing personal protective equipment, should be avoided.

What can you as a livestock producer do to increase the level of safety when handling animals? Although there is no magic formula, common sense is a key ingredient.

Remember—to minimize accident or illness from livestock:

1. Understand animal behavior
2. Provide proper and safe facilities
3. Protect against zoonotic diseases
4. Wear personal protective equipment



Chapter 4

Reproduction

Reproduction is the process by which animals produce young or offspring. Successful reproduction in goats requires proper function of the reproductive systems in both the male (buck) and female (doe). Knowledge of the organs of the reproductive systems and their functions in goats, as well as an understanding of useful reproductive management tools, helps you successfully care for your animal.

Female Reproductive System

Parts of the Female Reproductive System

The female reproductive system has two major roles: (1) to produce eggs (also known as gametes or ova), and (2) to provide a place for development and nourishment of kids before birth.

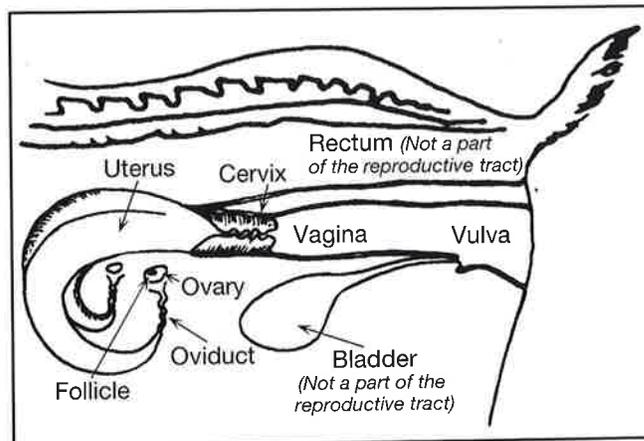
The major organs of the female reproductive system include the ovaries, oviducts, uterus, cervix, and vagina (see figure 4.1). Each female reproductive organ has a unique function:

- Ovaries
 - Produce eggs in small blister-like structures called follicles
 - Produce the hormones estrogen and progesterone
- Oviducts
 - Small tubes leading from each ovary to the uterus
 - Site of fertilization
- Uterus
 - Site of growth and development of kids
- Cervix
 - Part of the birth canal
 - Helps to protect the uterus
- Vagina
 - Part of the birth canal
 - Site where sperm are deposited during natural mating

Hormones of the Female

Chemical compounds released into the blood by various organs control the reproductive systems of both does and bucks. These chemical compounds are called hormones. Examples of hormones important in controlling reproduction in goats are progesterone, gonadotropin releasing hormone (GnRH), and testosterone. Control of the reproductive system begins in a portion of the brain called the hypothalamus. The hypothalamus makes GnRH. The GnRH causes release of additional hormones called luteinizing hormone (LH) and follicle-stimulating hormone (FSH). The pituitary gland produces LH and FSH. These hormones are responsible for sperm and follicular development in bucks and does, respectively.

The primary hormones involved in the female reproductive system are described in table 4.1.



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Figure 4.1. Female reproductive system.

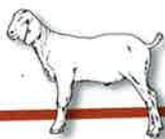


Table 4.1. Hormones of the female goat.

Hormone	Site of Production	Hormone Function in Does
Estrogen	Ovarian follicles	Causes estrus (heat)
Progesterone	Corpus luteum (on ovary)	Quiets reproductive tract Necessary for maintaining pregnancy
Luteinizing hormone (LH)	Pituitary gland	Causes ovulation and formation of a corpus luteum
Follicle stimulating hormone (FSH)	Pituitary gland	Stimulates development of ovarian follicles
Prostaglandin	Uterus	Restarts the estrous cycle by destroying the corpus luteum
Gonadotropin releasing hormone (GnRH)	Hypothalamus	Causes release of LH and FSH
Oxytocin	Pituitary gland	Stimulates contraction of muscles of the mammary gland and uterus, causing milk let-down and aiding in the birthing process
Melatonin	Pineal gland	Stimulates release of GnRH

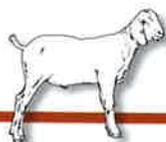
Estrus and the Estrous Cycle

Changes in the concentration of different reproductive hormones that stimulate changes in structures on the ovaries cause a repeated pattern called an estrous cycle. The estrous cycle is usually characterized by development of follicles, the bursting of the follicles (ovulation) to release the eggs, and the formation of corpora lutea (CL) from the follicular tissue. An estrous cycle typically occurs every 21 days and begins and ends with the doe showing estrus (heat). Estrus is the period of time when the doe is receptive to mating and is in a standing heat. Does are typically in estrus for 24 to 36 hours. Approximately 18 hours after the beginning of estrus, ovulation occurs, meaning that an egg is released from the ovary and travels into the oviduct for the possibility of fertilization. If the egg is not fertilized by sperm, the doe comes into estrus 21 days later and starts the cycle over again.

Seasonality

In general, goats are seasonal breeders, meaning that they show estrous cycles during a specific season of the year. The estrous cycles of goats are stimulated to begin when the days are becoming shorter in the late summer and fall. The typical breeding season of does occurs from late August through late winter.

Day length is perceived by the eye through the optic nerve. The optic nerve affects function of the pineal gland and its secretion of the hormone, melatonin. Melatonin is produced and released during hours of darkness and stimulates the release of GnRH from the hypothalamus. As a result, when day length is shorter during fall months, more melatonin is released. As more melatonin is released, GnRH release is also stimulated. With increasing GnRH, the estrous cycle is resumed and the doe exhibits estrus.



Goat breeds vary in their degree of seasonality. Boer and Pygmy goats, for example, exhibit extended breeding seasons as compared with Saanen or American Alpine breeds. Estrous cycles may be induced “out of season” by controlling artificial lights to simulate decreasing length of daylight.

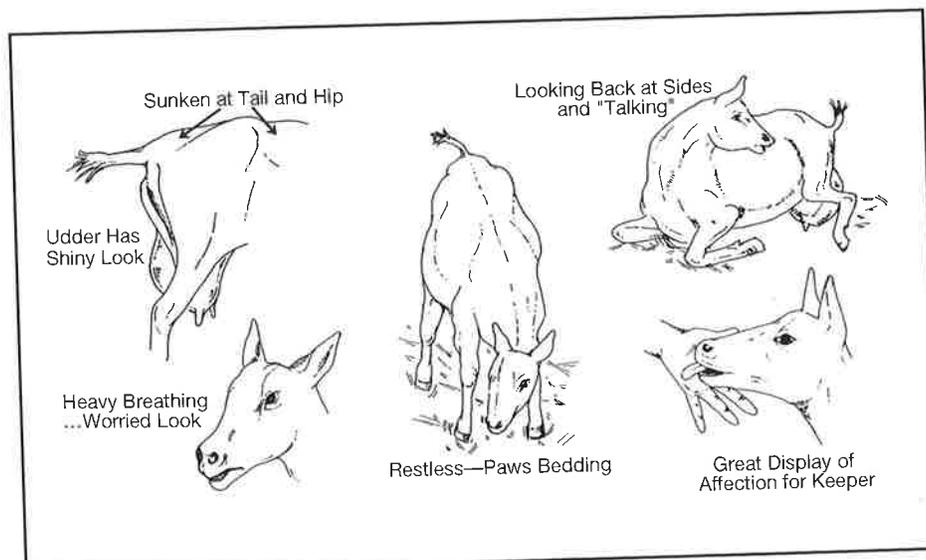
Conception and Birth

Fertilization is the union of an egg and a sperm. Fertilization occurs in the oviduct and results in the formation of a single-celled organism called a zygote. As pregnancy progresses, the cells continue to divide, forming an embryo, which eventually develops into the kid. The embryo travels from the oviduct into the uterus of the doe. Approximately 20 days after ovulation, the embryo attaches itself to the wall of the uterus where it grows throughout pregnancy. *Corpora lutea* that form on the ovaries produce progesterone and help maintain the doe’s pregnancy. Progesterone also prevents other follicles from ovulating so that the doe cannot get pregnant while carrying the kids. Gestation (pregnancy)

usually lasts between 148 and 152 days or 5 months, with slight variations across different breeds.

Kidding time is a busy and important time for you and the doe. Most importantly, be alert that kidding time is coming so that you are on hand to give the doe assistance if needed, to take care of the kid and see that it is all right, and to do whatever else you need to do at that critical time. At approximately day 150 of gestation, the kids start to send signals to the doe that initiate the birthing process. The hormones oxytocin and relaxin increase. These two hormones are responsible for helping the doe deliver the kids. Oxytocin stimulates muscular contractions of the uterus, which help push the kids out of the uterus and into the birth canal (cervix and vagina). Relaxin causes important tissues in the birth canal to relax so that the kids can be born more easily.

When the doe is about to kid, she should be watched carefully for any signs of trouble or distress. Some signs that a doe is ready to give birth are shown in figure 4.2.



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Figure 4.2. Signs that a doe will soon give birth.



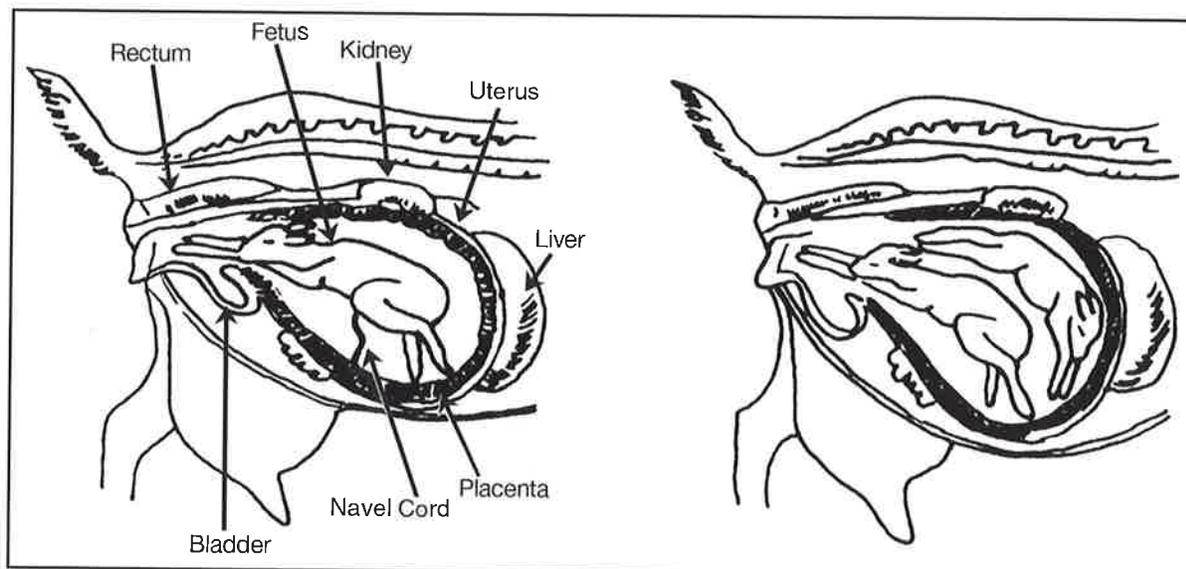


Figure 4.3. Anatomy of a pregnant doe.

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Multiple births are very common in goats. This means that a doe often has more than one kid at a time. Normally, a kid is born with the front feet on each side of the head or with both back feet coming out first. If only the kid's head can be seen or if only the head and one leg are visible, the doe should be examined immediately, as she may need help. Possible birthing positions are shown in figure 4.3.

Once the kid is born, several things must be done to get the kid off to a healthy start. First, clear the nostrils and mouth of mucous to make sure normal breathing can take place. Also, disinfect the kid's navel with an iodine solution.

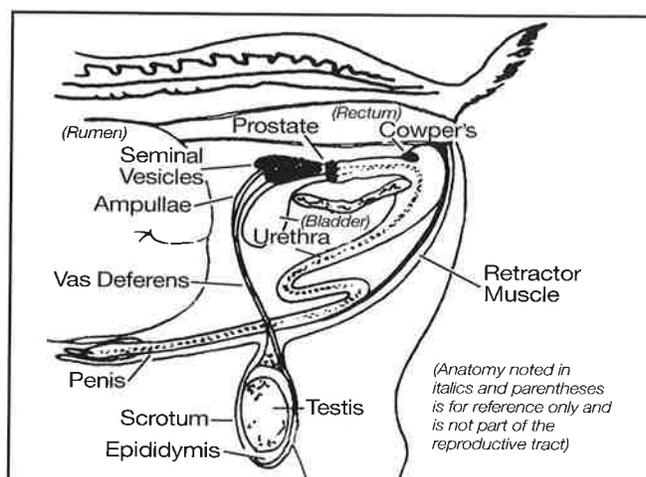
The first milk produced by the doe after kidding is called colostrum. It is important that kids receive colostrum within the first few hours of life because it contains antibodies important for disease protection. Colostrum is also rich in fat, protein, and vitamins that are important for a strong, healthy start in life.

Male Reproductive System

Parts of the Male Reproductive System

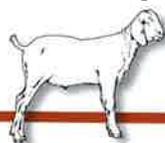
The primary function of the male reproductive system is to produce sperm (also known as gametes).

The major organs of the male reproductive system include the testicles, epididymis, vas deferens, the urethra, the accessory glands, and the penis. Each male reproductive organ has a unique function:



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Figure 4.4. Male reproductive system.



- Testicles — Also referred to as the testes (singular = testis)
— Paired organs that produce sperm and secrete the hormone testosterone
- Epididymes — Lie next to the testes
— Site of temporary storage and maturation of sperm (singular = epididymis)
- Vas deferens — Small tubes leading from each epididymis to the urethra
— Transport sperm when mating occurs
- Urethra — Tube inside the penis that transports both sperm and urine
— Receives sperm from the vas deferens and urine from the bladder
- Accessory glands — The prostate gland, the two seminal vesicles, and the bulbourethral (Cowper's) gland
— Add fluid, nutrients, and buffers to the sperm to help transport them into the female and to help the sperm survive
- Penis — Delivers the sperm into the female during mating

Hormones of the Male

The primary hormones involved in the male's reproductive system are described in table 4.2.

During mating, the retractor muscle in the male relaxes and allows the penis to be extended to deposit semen in the vagina of the female reproductive tract. Approximately 2 to 5 billion sperm are deposited, although only one is needed for fertilization of each egg.

Reproductive Management

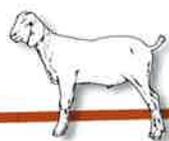
When to Breed

Doelings that are healthy and well managed nutritionally can be bred when they are 7 to 10 months of age. Regardless of age, a doeling should weigh 60 percent of her expected adult weight when first bred. A doeling that is small or thin at breeding time may not show estrus or conceive, whereas a doeling that is too fat may have difficulty kidding and/or have lower milk production due to excess fat deposits in the udder.

Depending on the individual owner's needs or interests, doelings may also be bred at an older age the following fall to kid at approximately two years of age.

Table 4.2. Hormones of the male goat.

Hormone	Site of Production	Hormone Function in Bucks
Testosterone	Testicles	Necessary for sperm production
Luteinizing hormone (LH)	Pituitary gland	Stimulates testosterone production
Follicle stimulating hormone (FSH)	Pituitary gland	Stimulates cells of the testicles that support sperm production
Gonadotropin releasing hormone (GnRH)	Hypothalamus	Causes release of LH and FSH



Artificial Insemination

Artificial insemination (AI) is the practice of the introduction of sperm into the reproductive tract of the female other than by natural mating. This management practice is not as common in goats as compared with other livestock, but its use is certainly increasing. Females can be inseminated with either fresh or frozen semen. AI is used by some goat producers, primarily because it enables more extensive use of genetically superior bucks. With AI, semen from the best bucks can be used by more than a few producers. Secondary benefits of the use of AI include limiting spread of reproductive diseases because bucks are not in physical contact with females, and the ability to use dead or injured sires because semen can be frozen and stored indefinitely.

Semen collected from a goat can be processed (extended) and used within 48 hours or frozen in plastic straws for later use. Semen extension includes dilution of sperm so that one ejaculate can be used to inseminate many females. Does can be artificially inseminated using one of two methods: (1) intra-uterine insemination: in this case, a small incision is made in the abdominal cavity and uterus so that the semen can be deposited directly into the uterus, or (2) trans-cervical insemination: an insemination pipette is inserted through the vagina and cervix, and semen is placed at the junction of the cervix and uterus. Goats should be inseminated 12 to 18 hours after the onset of heat.

Detection of Estrus (Heat)

A successful reproductive program in a goat herd requires managers to properly detect estrus and understand the appropriate time to inseminate or breed animals. The

most obvious signs of estrus include the following:

1. Standing to be mounted by herd mates
2. Flaggging (rapid tail wagging)
3. Attempting to mount other goats
4. Excited behavior, such as walking fences, bleating, and frequent urination
5. Clear mucous discharge from the vulva
6. A swollen, red, or wet vulva

Important considerations for maximizing efficiency of estrus detection:

- Watch! Watch! Watch! Frequency of observation of does is important. Watch does for at least ½ hour in the morning, afternoon, and at night when they are not eating or waiting to be milked (in the case of dairy goats).
- Use heat detection aids, such as a teaser wether or vasectomized buck. A vasectomized buck is sterile because the ability of sperm to be ejaculated is hindered. The buck or teaser wether can be outfitted with a marking harness so the doe's back is marked with crayon when she is mounted.

Estrous Synchronization

Estrous synchronization is the manipulation of estrous cycles so that many does exhibit estrus or "heat" within a few days. Synchronization of estrous cycles can shorten breeding and kidding seasons and the time and labor associated with them. It also makes the use of artificial insemination easier because females are in estrus at a specific time.

Unfortunately, products effective in synchronizing estrus in goats are not approved for use in the United States. Advances continue to be made in developing

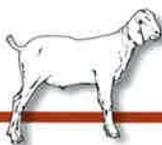


Table 4.3. Estrous synchronization products approved for goats other than in the United States.

Estrous Synchronization Products	Trade Names of Products	Function
Prostaglandin—PGF ₂ α	Lutalyse®, Estrumate®	Destroys the corpus luteum; estrus will occur in 2 to 3 days
Intravaginal progestogen inserts	CIDR-G (controlled internal drug-release)	Progestogen acts like progesterone and thus prevents ovulation until removal
Pregnant mare serum gonadotropin (PMSG)	None	Stimulates ovulation
Intravaginal progestogen sponges	Cronogest 45, Repromap, and Veramix are the progestogen compounds contained in the sponges	Progestogen acts like progesterone and thus prevents ovulation until removal
Norgestomet	SynchroMate-B	Acts like progesterone and thus prevents ovulation until removal

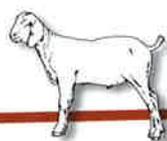
estrous synchronization programs and are likely to become available for widespread use in the future. Estrous synchronization programs used in other countries typically rely on a variety of compounds in combination that affect the estrous cycle of the goat in different ways. Examples of estrous synchronization products manufactured for use in goats in other countries are described in table 4.3.

Embryo Transfer

Embryo transfer is the practice of removing (flushing) embryos from one female (donor) and placing those embryos into another female (recipient) for the remainder of development. Embryo transfer is performed in conjunction with superovulation and artificial insemination of the donor females so that several eggs are ovulated and fertilized at one time, thus resulting in

the production of several embryos. Follicle stimulating hormone (FSH) is the key reproductive hormone used to stimulate the growth of multiple follicles (containing eggs) on the ovaries. After ovulation and insemination, embryos are flushed from a donor female at about seven days of age. Each embryo can either be transferred directly into a recipient female or may be frozen and then transferred later.

While use of embryo transfer is increasing as techniques become more refined in goats, it is currently used on a very limited basis. Use of embryo transfer is beneficial because it enables production of many kids in a short period of time from genetically superior females. The valuable genetics of a donor doe can be more readily realized in the industry with the production of more than two or three kids per year.



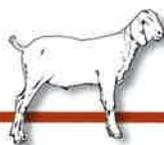
Reproductive Problems

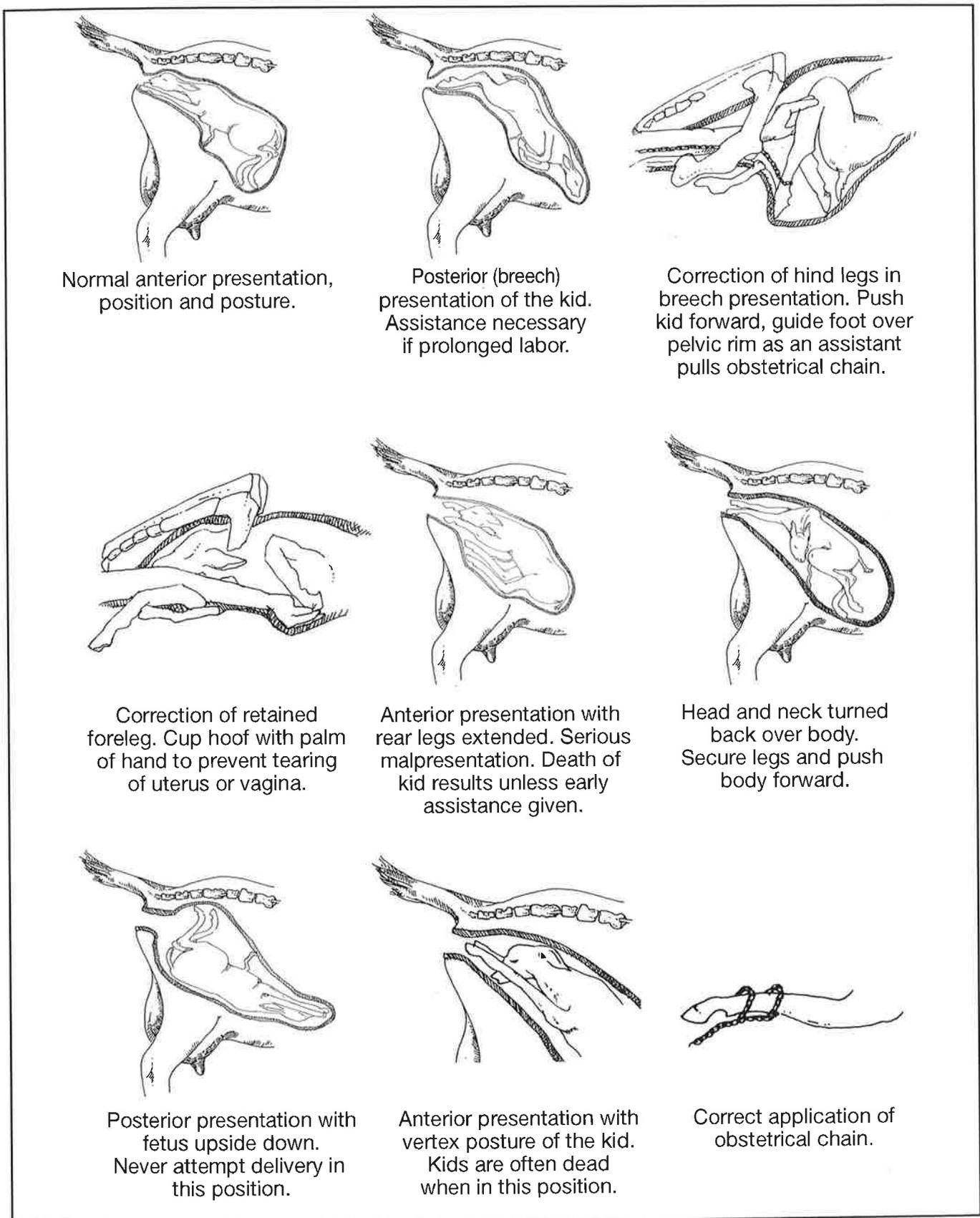
Maximizing fertility in a goat herd can be a challenging goal but certainly is achievable in a herd that has proper health, nutrition, and breeding management. Poor fertility or failure of a female to become pregnant within a reasonable time after puberty or kidding can be caused by a variety of factors. Inability to properly detect heat and/or inseminate at the proper time in the case of using AI are common causes of reproductive failure. Dystocia (difficulty

giving birth) may also be an underlying cause of other reproductive problems related to the inability of the reproductive tract to repair itself in a timely manner for rebreeding. Dystocia is more prevalent in yearlings. Infectious and noninfectious causes of reproductive problems are shown in table 4.4. Figure 4.5 shows various birthing positions that can cause dystocia and what to do when they occur. If you need an obstetrical chain, purchase one from an obstetrical supply company. Other chain you may have is not appropriate.

Table 4.4. Reproductive disorders of goats.

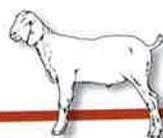
Reproductive Disorder	Causes	Symptoms	Prevention/Treatment
Cystic ovarian disease	Unknown	Infertility; lack of estrus	Not cured but may be overcome by estrous synchronization treatments using GnRH
Uterine infections (endometritis or metritis)	Bacterial infections	Abnormal vaginal discharge; unable to detect estrus	Minimize dystocia; cleanliness of kidding pens and equipment
Leptospirosis	Bacterial infection	Abortion	Vaccination
Vibriosis	Bacterial infection	Abortion	Vaccination





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Figure 4.5. Various birthing positions.



Genetics

Genetics is a branch of biology that deals with inherited characteristics and how they vary.

Each goat is made up of many, many cells. Each cell contains 60 chromosomes or 30 pairs of chromosomes, with half of each chromosome coming from each parent. Chromosomes are then made up of many different genes. These genes are responsible for each animal's physical appearance, performance (growth and/or milk production), and behavior.

The ovaries of the female and testes of the male contain eggs and sperm, respectively. Each egg and sperm contains one-half of the parent's complete genetic material. At fertilization, when the egg and the sperm join, the embryo that is formed contains the complete genetic material for a new animal, with half coming from the mother and half coming from the father. The single-celled embryo then divides into two identical cells, then into four, then 8, 16, 32, and so on until thousands of cells are made. As the embryo develops, cells start to differentiate, with some forming the heart, some the brain, some the skin, and so on. The genes in each cell control this whole development process.

So what is a gene? A **gene** consists of a specific sequence of deoxyribonucleic acid (DNA), the genetic material that controls a trait. Some traits are controlled by more than one gene. An example of an inherited trait in goats that is controlled by one gene is polled (without horns) versus horned. Most goats are born with horns and are dehorned at an early age, but some are born polled.

Genes that control some physical traits are either dominant or recessive, depending on how they are expressed in that species. For

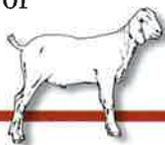
example, being polled in goats is a dominant trait. Genes occur in pairs, with one-half of each pair coming from each parent. Dominant genes are denoted with a capital letter and recessive genes are denoted with a lowercase letter. For example, the dominant polled gene is denoted as a "P" and the recessive horned gene is denoted as a "p". To be expressed, a recessive condition, such as being horned, requires two recessive genes (pp), one from each parent. A dominant trait requires only one gene for that condition to be expressed. That is why it is called a dominant trait. An animal that has a phenotype of polled has a genotype of either "PP" or "Pp", while the horned phenotype has a genotype of "pp".

Genotype describes the gene pair.

Dominant versus frequent. Even though being polled (without horns) is the dominant trait in goats, more goats are born with horns. This is because so few goats actually carry the dominant gene. In this way, a recessive gene, such as horned, can appear more frequently among a population.

Genotypes can either be **homozygous**, meaning the two genes are the same (pp or PP) or **heterozygous**, meaning the genes are different (Pp). Phenotype describes the result or expression of the gene pair. If you know the parents' genotypes, you can predict the phenotype of the offspring.

Some traits are more complex than horns. Some traits, such as milk production, are controlled by more than one gene pair and are influenced by many different factors besides genetics. Milk production is affected by genetics and by conditions such as environment, management, and nutrition. That is why we look at genetics and pedigrees of animals to try to help breed a more productive animal.



Polled or Horned?

The buck has horns and has a homozygous genotype “pp” and the doe is polled and has a heterozygous genotype “Pp”. What percentage of their offspring are likely to be horned and what percentage are likely to be polled?

An easy way to determine this is by doing a *Punnett Square*:

	p	p	Father
P	Pp	Pp	
p	pp	pp	
Mother			

50% of the offspring are likely to be horned (pp) and 50% of the offspring are likely to be polled (Pp).

If both parents are heterozygous polled (Pp), the results would look like this:

	P	p	Father
P	Pp	Pp	
p	Pp	pp	
Mother			

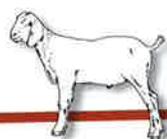
In this example, 75% of the offspring are likely to be polled and 25% of the offspring are likely to be horned.

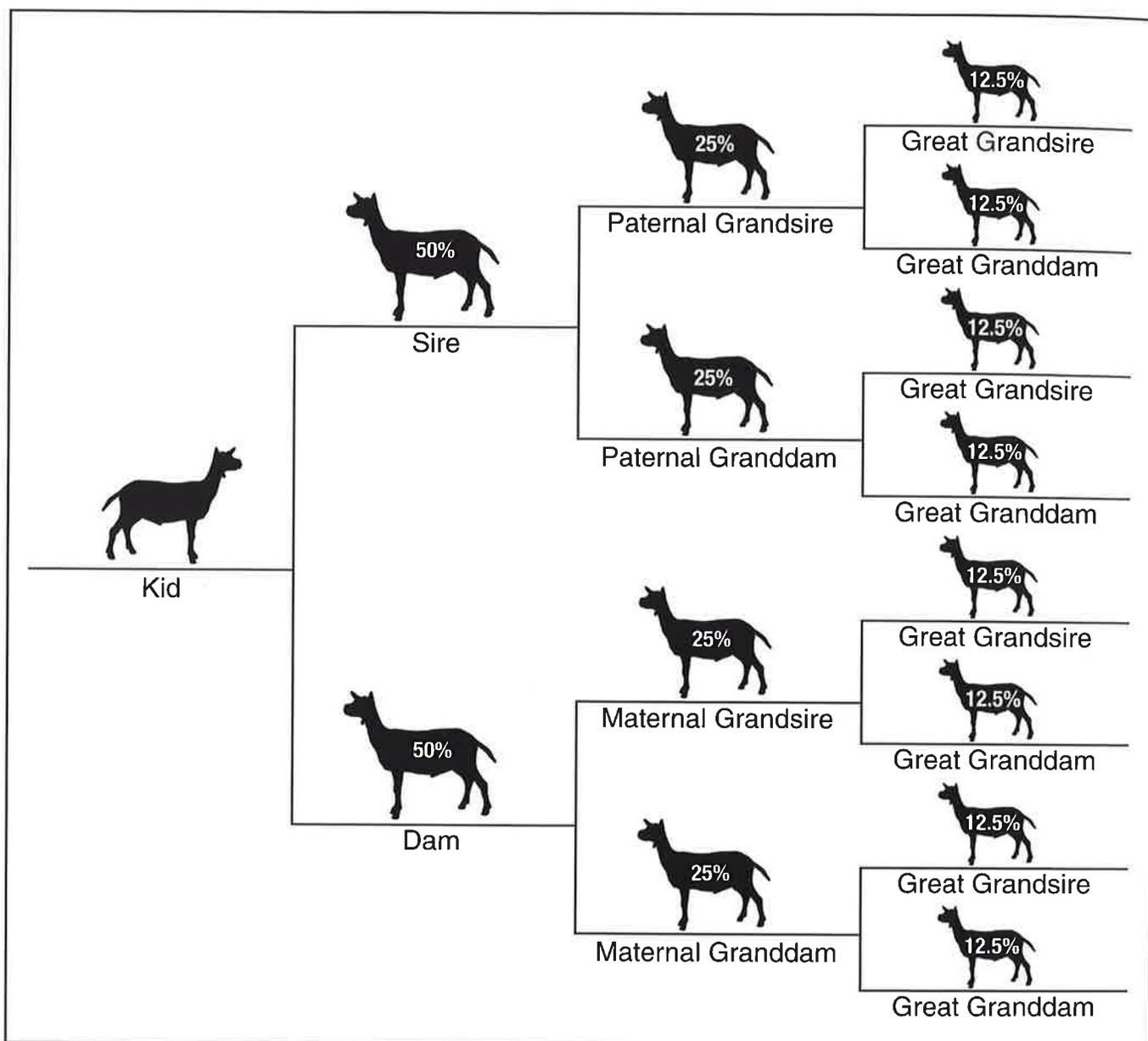
You can examine your animal’s parents and grandparents by writing out a family tree.

As you can see in figure 4.6, an animal gets one-half of its genes from its parents, one-quarter from each grandparent, and only one-eighth from each great grandparent. Many goat breeders study pedigrees to see if they can predict the offspring’s potential. Today, that effort is enhanced by the use of computers and statistical programs that determine an animal’s predicted transmitting ability (PTA) and estimated transmitting ability (ETA). PTA is a measure of either yield or type evaluations for selecting the best animals for breeding programs. The higher the number, the more likely improvements will take place by using those genetics. Yield and type also can be combined into a single production/type index

(PTI). ETA is an index that predicts the genetic potential of an offspring; the higher the index, the higher the genetic potential.

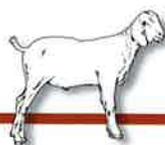
The United States Department of Agriculture (USDA) compiles this information for dairy goats by using DHIA records from the animal and its relatives. The reliability of the PTA is also calculated and, of course, the higher the reliability the better. The reliability of the PTA will depend on how much information is available on that animal. The PTA is usually a better gauge of an animal’s genetic capability than the animal’s actual performance. This is because so many environmental factors can affect production. An excellent genetic goat managed poorly is likely to produce poorly.





Ohio State University Extension.

Figure 4.6. Simplified pedigree for a dairy goat.



Some basic information on how to read the official pedigree shown in figure 4.7 is given:

Pedigreed Goat

Name of the goat = Kastdemur's Slice of Life

*B = breed leader record

Registration number = L1373224, thus "L" indicates that breed is LaMancha

Date of birth = April 22, 2006

Sex = Buck, disbudded

Tattoo = right tail "KJD", breeder/member identification assigned by ADGA; left tail "W63", 63rd kid born in the herd during 2006 (W = 2006)

Sire of the Goat

Name = Elm*Glen Brazil

Registration number = AL1336307, thus "AL" indicates breed is Alpine and LaMancha; breed leader record

Estimated Transmitting Ability (ETA) = 25 or 27 (two alternative methods for calculation; the higher the number the better)

Dam of the Goat

Name = Kastdemur's Slice

Registration number = L1167141, thus breed is LaMancha

3*M = the dam has received awards 3 times for milk production

SGCH = ?

Production/type index (PTI) = 134 for production weighted over type and 102 for type weighed over production

Date of birth = 05/05/93

EEEE = dam was classified at "Excellent" for General Appearance, Dairy Character, Body Capacity, and Mammary System

PTA for milk = 201 lb

PTA for fat = 5 lb

PTA for protein = 4 lb

PTA for type = 0.30

Deviations for milk, fat and protein are 621, 16, and 14 lb, respectively

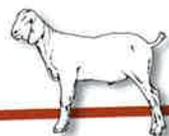
PTA\$ for fat and protein are 23 and 19, respectively, with 56% reliability (R)

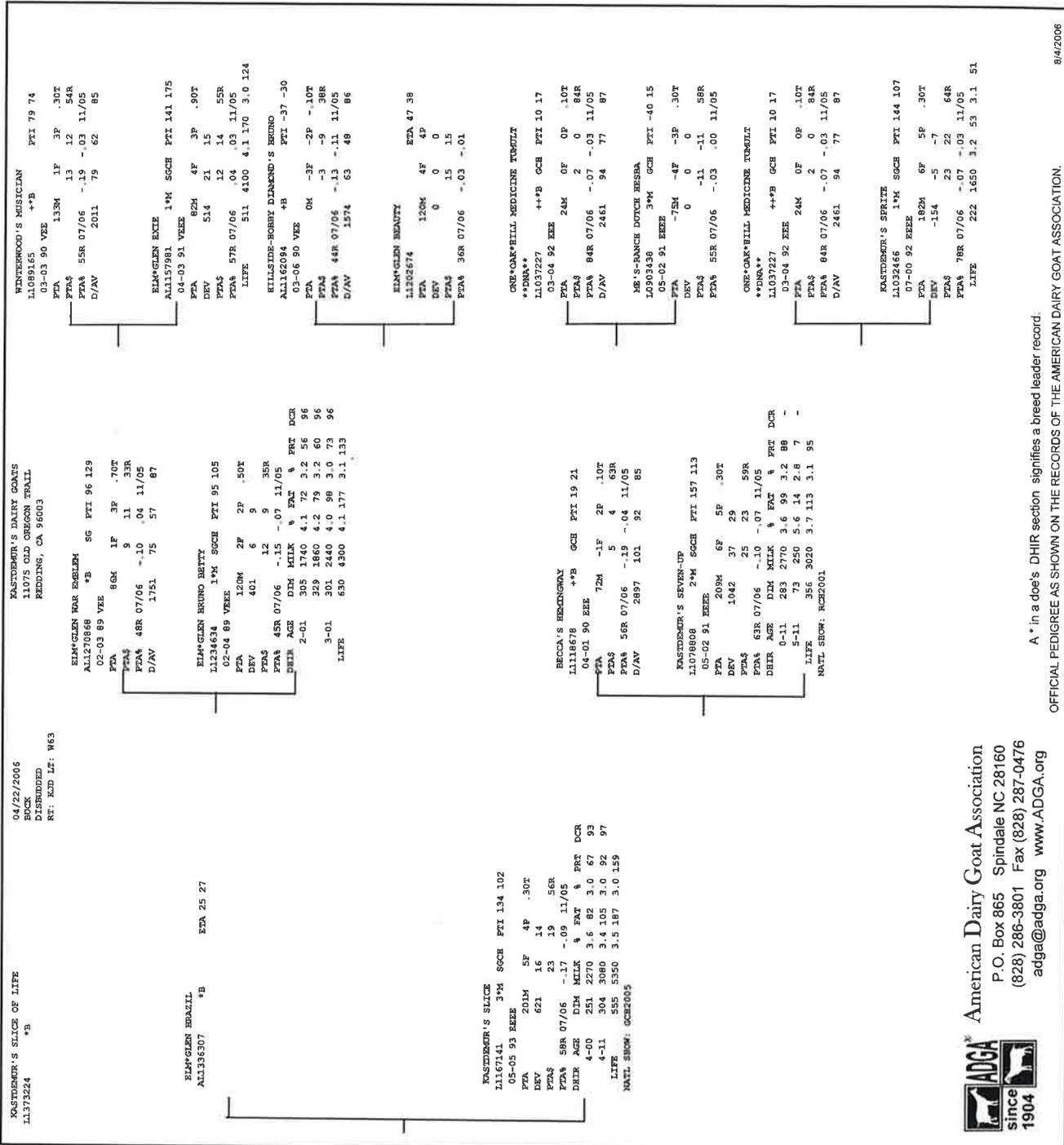
PTA% with 58% R calculated on July 2006 were -0.17 and -0.09 for fat and protein, respectively, as compared to calculations in November 2005

Dairy Herd Improvement Registry (DHIR) production information at 4 years of age (4-00) included 251 days in milk (DIM), 2270 lb milk, 3.6% fat, 82 lb fat, 3.0% protein, 67 lb protein, and (DCR) = 93

Lifetime production to date from 555 DIM is 5350 lb milk, 187 lb fat (3.6% fat), and 150 lb protein (3.0% protein)

The animal placed Grand Champion in 2005 at the National Show.





A * in a doe's DHR section signifies a breed leader record.
 OFFICIAL PEDIGREE AS SHOWN ON THE RECORDS OF THE AMERICAN DAIRY GOAT ASSOCIATION.

8/4/2006



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Figure 4.7. Actual pedigree.