Artificial Insemination in Sheep and Goats

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Have you been thinking about using Artificial Insemination (AI) in your sheep or goat herd? AI has been widely used in other livestock species, but it is a relatively new technology for sheep and goats. Many factors must be considered before deciding whether it is right for your herd. We will start with a brief overview of the anatomy of the female reproductive tract and the importance it plays in conception. Then, we will discuss the two techniques available and the differences between them, including positive and negative aspects of each. Finally, we will describe the options for semen (sperm) and the impacts different storage options have on conception rates and herd dynamics. This will assist you determine whether using AI is appropriate AI for your herd.

The reproductive tract of the ewe/doe

Starting externally, the female reproductive tract begins with the vulva followed by the vagina. The vagina is where semen is deposited naturally by the sire. Following the vagina is the cervix, which is the muscular section of the uterus. The cervix is has multiple folds and acts as a natural barrier through which the sperm must move to reach the ovum (egg). The cervix releases mucus, which traps bacteria and prevents infections during breeding. Once the sperm makes its way through the cervix, it must travel through the uterine body and horns. The ova (eggs) are fertilized in the oviduct (also known as the fallopian tube) that connects the uterus to the ovaries.

AI techniques

There are two commonly used AI techniques: cervical and laparoscopic insemination. Each of these has its advantages and disadvantages, including the impacts on conception rates. The cervical insemination technique is the easier and less invasive of the two AI techniques used for goats. Using a speculum, an AI rod is inserted through the vagina and the three rings of the cervix. This allows the AI technician to deposit the semen at the cranial end of the cervix. If the AI rod cannot penetrate all of the rings, then the semen is deposited within the cervix (this reduces the conception rate). Producers can receive training in the cervical AI technique and be able to perform this themselves. Contact your semen sales representative, local Extension agent or Sheep and Goat Development Office for additional information.

Laparoscopic (intrauterine) insemination uses surgical techniques to insert the semen into the uterus close to the oviduct, which is the site of fertilization. By placing semen close to site of conception and bypassing the cervical barrier, this technique will yield better conception rates. One disadvantage to laparoscopic insemination is that the animal must be sedated for the procedure. This means the procedure has additional risks associated with anesthesia and the potential for scar tissue formation in the reproductive tract. In addition, the AI technician needs to be a skilled professional to perform the procedure. This means the laparoscopic technique has a higher cost due to the equipment, anesthesia, and necessary skilled professional. One advantage is that the conception rates are higher than cervical insemination although they are less than natural service. This technique is more commonly used in sheep than in goats.

Semen sources for AI

For either procedure, the semen used may be purchased fresh or frozen from commercial companies or private producers. Fresh semen is collected from the desired sire and evaluated for either use immediately or frozen storage. For frozen semen, it is processed, and placed into plastic straws that are stored in liquid nitrogen. Advantages of frozen semen are that lower quantities of semen may be used, and it may be stored for long periods of time (however, conception rates may be affected).

In herds that decide to strictly use AI in their breeding programs, one benefit is not having to manage a buck or ram. This means not having to deal with the smell or aggressive behavior. It also means the producer does not have to maintain separate pens for the males. However, because conception rates with AI are not 100%, most producers choose to keep a sire or ensure they have access to one, for "clean up" purposes to breed any females that did not conceive via AI. Another option after AI is to ultrasound the animals for openness. Any females that did not conceive could be taken to a sire for natural service or undergo another attempt at artificial breeding.

Buying semen from bucks or rams with superior genetics can produce higher quality kids or lambs. This can quickly improve genetics within your herd. In addition, semen can be purchased from multiple bucks to enhance genetic variation of the offspring. Semen prices will vary widely and range anywhere from $25-$500 (or more in some cases). Because the physical presence of the male is not required, proven sires that are deceased or owned in partnerships may be used for AI.

Advantages of using AI

In addition to eliminating the need to maintain and manage rams or bucks, another advantage of AI is the risk of exposure to diseases from outside your farm is reduced. Any time new sires are

brought into a location or animals leave the farm to be bred, biosecurity may be at risk. By not introducing new animals to your farm and not taking animals to other farms for natural service, diseases and parasites that may be transmissible are avoided.

Disadvantages of AI techniques

Artificial insemination comes with some disadvantages as well. You will want to consider the following before making a decision as to whether AI is right for your animals: lowered conception rates, expense of supplies and skilled personnel, and the health risks associated with the laparoscopic procedure (if chosen).

Heat detection may be difficult in the absence of a sire or teaser animal. Many times, producers will use synchronization techniques to manipulate hormone cycles. Heat synchronization may allow for AI to be timed, but does add to the costs of AI. With heat synchronization, hormone cycles are manipulated and allow AI to be done at a specific time. Timing allows convenience of multiple animals being in heat at the same time.

Conception rates vary considerably and depends on the techniques used and the individuals who perform the insemination. Neither technique is as effective as natural breeding. Since the cervix acts as a barrier and is still located at a relatively far distance from the site of fertilization, the cervical technique will naturally yield lower conception rates than laparoscopic insemination. As noted, if the intrauterine/laparoscopic technique is used, animals need to be sedated or put under anesthesia. Reactions or complications due to the drugs used may even cause death. Infections are also a risk with any surgical procedure.

Expense is also a major drawback. This is the biggest limiting factor for most producers. The expense consists of the cost of semen as well as the cost of having the procedure performed. As you would expect, having someone surgically inseminate your animals is much more expensive than the cervical technique. Finding someone skilled to perform, or to train you to perform, the technique will also likely involve travel expenses. As noted, training programs are available to teach producers how to AI their own animals, but this will require fees for the training and/or materials. In addition, if frozen semen will be purchased, an appropriate semen storage tank and a source of liquid nitrogen will be needed as well. This means the producer must pay not only the initial cost for the tank, but also maintenance costs to have nitrogen refilled on a regular basis.

Summary

The decision to utilize AI depends on the overall goals for your herd. If your goal is showing or improving herd genetics quickly, AI may be beneficial for you. Additionally, if you have a few animals as pets and would like them bred, but do not want a buck or ram, then AI may even be a cost-effective option. While AI is great for genetic diversification and herd improvement, it can often be cost-prohibitive and comes with a lower conception rate than natural breeding.

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