

Goat Producer's Newsletter

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Overview of Artificial Insemination of Kentucky Meat and Dairy Goats Terry Hutchens, Extension Associate University of Kentucky

General Prospective

Kentucky goat producers can make great strides in herd improvement through artificial insemination (AI). Producers should consider AI as a management option after developing a clear understanding of the requirements and capabilities of AI. Artificial insemination is not a viable alternative for all Kentucky goat farms.

1. Unless drugs are used to synchronize estrus, producers must observe the herd closely in the morning and afternoon for signs of standing heat. There is a 33% chance that any one doe would be in standing heat at any hour of observation during the breeding season.
2. Fifty percent success rates for pregnancy (one service) are common and would be considered acceptable for most goat AI endeavors. However, this percentage can be increased to 70-80% with practiced technique and improved heat detection. Restrained (caged) buck or teaser buck can assist

in heat detection.

3. Artificial insemination should be considered as a means of improving the genetic base of the herd. AI will allow a producer the opportunity to use a buck that is not available due to time, distance, death or cost.
4. Many does in the herd may not be good AI candidates. Does that are very young or old, in poor health, or too thin or fat may be difficult to breed artificially. Furthermore, clean-up bucks are needed to breed does that do not conceive following insemination. Replacement doelings should be selected from easy breeding mothers.
5. AI may be too expensive and time consuming for many producers. Economic benefits should be considered in advance of major investments in AI equipment. Therefore, a breeding plan and objective must be in place before beginning AI. Take an AI course and visit farmers who presently use the technique. Initial out-of-pocket cost of AI can be considerable. The drugs used in synchronization will range from \$3 to \$25 per doe.

Semen can be purchased at \$15 to \$225 per 1/2 cc straw. Semen costs for Boer goats is presently very expensive. Furthermore, overhead costs include a liquid nitrogen tank (\$200-\$1,000), an AI kit (\$150), and a suitable stanchion (\$200) for restraining the doe. (See Tables 1, 2 and 3 below for economic analysis)

Summary- AI is a viable means of improving the genetics of the goat herd. However if a producer's objective is to only impregnate the does, investment in a quality buck may be less costly and far less time consuming. If a producer wishes to AI his herd he must become proficient in the process of AI, estrus synchronization and heat detection. Employing a reliable technician is a good alternative for many part-time producers. It will be necessary for the producer to maintain a teaser buck for heat detection and a clean-up buck for non-breeders.

Artificial Insemination Primer **Why do goats come into heat?**

The single most important factor relating to reproduction in goats is daylight or photoperiod. This influence is more pronounced the farther north and/or south of the equator the animal is located, regardless of the breed type. Thus an equatorial breed such as Boer or Nubian may cycle year-round near the equator (if adequate nutrition is available) but will become more seasonal as the goat is moved away from the equator.

When these two breeds are compared with European dairy types, Alpine, Saanan and others, the equatorial breeds will cycle for a longer period (June-February). European breeds cycle for a shorter period of time, but heat

periods are more intense. Cycling starts in August and ending in January. Therefore the length of the breeding season is most influenced by photoperiod, breed type and nutrition levels ranging from too little or too much feed. Fat covered reproductive organs reduce reproductive efficacy and fertility.

Goats are seasonally polyestrous. That is, they will come into estrus when days get short and cycle into and out of estrus ever 18-21 days until the days become longer or pregnancy occurs. Puberty in goats is usually 6 to 8 months of age. Pubescent does should be 75% of their mature body weight before they are bred. Pregnancy success rates are higher for doelings reaching puberty early in the breeding season. This is one of many reasons for scheduling breeding periods to assure kidding early in the year.

An Assisted Breeding Technique for Goats

Artificial Insemination- should take place 12 to 24 hours after onset of estrus or standing heat. This is when cervical mucus changes from clear to slightly cloudy. Generally speaking, when estrus is seen in the morning, AI in the late afternoon. If double AI is desired AI again the following morning. When estrus is observed in the afternoon, AI the doe the following morning and again the following afternoon.



AI clinic at Slatewood Nubian farm, Winchester, Kentucky October 2005



AI clinic participant using specula and light to locate the cervix. Marion Co. Kentucky, 2004

Estrus detection

1. Nervously bleating and tail flicking
2. Walking excessively and occasionally mounting pen-mates.
3. Doe is actively seeking buck or the doe actively seeks out "buck jar."
Make a buck jar by rubbing a cloth on an odor gland of an intact buck and by placing the cloth in a jar. Warm the jar over a heat source and open the jar in the presence of the breeding females.
4. Pen bucks near does so they can seek him out. Observe individuals who approaching the buck and rubbing them selves on the fence.
5. Vasectomized or teasers bucks are helpful in detecting estrus. Observe mounting (Male) and standing (female) behavior following turn-in of the teaser.

Estrus Synchronization

Synchronization of estrus is bring a group of goats or doelings into estrus at about the same time or bringing an individual goat or doeling into estrus at a predetermined time. Synchronization can be within a projected minimum number of hours following the

procedure or it may be a set-time synchronization that allows breeding to occur at a specific time. The first method is most commonly used because of the drug cost per breeding doe. Following synchronization, estrus detection is needed. Detection can be by visual observation of the female or male and female interaction.

The simplest synchronization method is the "Buck Effect". Buck effect is the showing of an exotic buck to a group of transitional does, that is transitioning to an estrus state form a anoestrus state (i.e. fall of the year). In general, cycling will begin within 10 days of the buck effect. This method is most useful for natural buck service. This method of synchronization may not be tight enough for a single session of AI breeding.

Using Hormones for Synchronization

Prostaglandin (PGF2 α) compounds are used to expel ova (eggs) as well as hormone-producing tissue located on the ovaries. This tissue is called the *corpus luteum* (CL) or more literally, yellow body. Once expelled, all treated does should begin forming ova and corpus luteum near the same time period. This tends to pull cycling does together.

Prostaglandin will not cause a synchronization effect when there is no CL present on the ovaries. This can be visualized by observing Graph 1, page 5. Absence of CL occurs on days 1-5 and 19-21 of the estrous cycle. PGF2 α will regress about 33% of CL on day 6 of the cycle and 66% of CL on day 7 of the estrous cycle. PGF2 α will regress most CL from days 8-16 of the estrous cycle (88%).

Progesterone keeps females from coming into heat by sending a chemical signal to the brain of the does indicating pregnancy. This increase in time before induction of heat allows all does to come to the same

place in the cycle before the progesterone source is removed and the herd comes into synchrony. Standing heat is usually observed in 24 to 48 hrs. There are many options for providing progesterone but most are not cleared for use in the United States.

Examples include:

1. **Intra-vaginal** progesterone impregnated sponges
2. **CIDR's** – progesterone impregnated silicone coated devices

The duration of progesterone administration varies depending on whether or not a prostaglandin is incorporated in the protocol. If it is not, then a 17-18 day administration period is required to allow all natural CL to regress in the doe. Following progesterone withdrawal, estrus is expected in 24-48 hours. However it is more appropriate to administer progesterone for 12-14 days and to give prostaglandin at the time of progesterone withdrawal. This is perhaps the most effective method of estrus manipulation for breeding purposes, all of which must be done with the guidance of a veterinarian because these products are off label for goats. There are many products and protocols to choose from and interested producers should explore the available alternatives.



Purchase a semen tank that is based on the amount of semen storage needed and the length of time needed between recharging with liquid nitrogen.

Tank price is primarily based tank sized and semen storage capacity.

**Table 1
Average Cost Estimates for Artificial Insemination of 25 Goat Females**

Activity	Start Up Costs \$	Annual Costs \$	Annual Costs / Doe \$
Synchronization Drugs		\$10	10
Semen 1 straw		\$75	75
Liquid nitrogen		\$120	5
AI kit, breeding stand	\$300	\$60*	2
Nitrogen tank	\$300	\$60*	2
Teaser buck (Optional)	\$175	\$58**	2
Clean up buck	\$650	\$217**	9
Feed and meds for buck and teaser		\$80 (\$40ea)	3
Labor 1.0 hrs/ doe @ \$6.50/ hrs.		\$163	7
	\$1425	\$843	\$115

=*5 yr depreciation schedule

= **3 year depreciation schedule

Table 1 is divided into three sections and starts with Start-Up Costs that includes an AI kit, a breeding stand, a used tank and the purchase cost of a teaser buck and a conservatively priced clean-up buck. Subtract or add items from this list when itemizing your personal cost budget. Hard start-up cost items are depreciated out over a 5 year period. While livestock is depreciated out in 3 years. Annual costs are start-up costs divided by years of depreciation and the cost per doe is the annual cost divided by 25 does.

Annual costs also include the estimated cost of synchronization during a normal breeding season, *Boer semen* cost (dairy goat semen costs are substantially less), liquid nitrogen maintenance cost, feed and medical supplies for the bucks and labor costs for doe synchronization, estrus detection and AI. Finally the estimated annual cost per breeding doe is \$115.

Table 2 provides some opportunity for comparative analysis for the per doe cost of AI verses the per doe cost of natural breeding. Initial buck cost start at \$1,000 up to \$12,000 per breeding buck. Each buck is depreciated out over three years, assigned a feed and medical cost of \$40 per year and an opportunity cost of \$0.025 is multiplied to the purchase cost and added to the total annual cost. Opportunity cost is the cost of potential use of the money if not use for buck purchase.

Table 2
Estimated Cost of Natural Breeding for a 25 Doe Herd

	Initial Buck Cost	Yrly Cost*	Cost/Doe**
Buck Costs	\$1,000	\$408	\$16
	\$3,000	\$1125	\$45
	\$6,000	\$2200	\$88
	\$9,000	\$3275	\$131
	\$12,000	\$4350	\$174
= * Cost of buck/3 yrs feed, medication and 0.025 opportunity cost **Yrly Cost/25 does			

Table 3 provides a reference to the extreme cost of Boer semen. Presently, semen costs make up as much as 71% of the total cost of AI.

Table 3

Cost Estimates for Artificial Insemination as a Function of Semen Costs

Semen Cost \$	\$100	\$75	\$50	\$25
Other Cost \$	\$40	\$40	\$40	\$40
Total \$ / Doe	\$140	\$115	\$90	\$65
Semen Cost as % Total Cost	71%	65	56%	38%
Costs based on table 1 data for a goat herd of 25 does				

Once Boer semen costs become more reasonable, AI will be come a less costly tool for genetic improvement.

Planning Your Winter Feeding Program
By: Dr. Ken Andries
Kentucky State University
Land Grant Program.

As the trees start to turn and the weather starts to get cold, we all know winter is on its way. As goat producers we must consider the needs of our animals, and plan for these needs before severe weather hits. The most important of thing for the continued productivity of your animals is to prepare for winter feeding. We all know that feed is the number one cost of a livestock operation, so proper planning can help keep this under control. the place to start is by looking closely at your forage situation, including stored and stockpiled forages.

Stockpiled fescue or other cool season forages can help reduce the days you need to feed hay. In a drought year this forage may be shorter than normal, and we

may not get much late growth on our fescue this year. We also need to realize that the quality may not be as high as normal due to the drought conditions. The final thing to consider when grazing stockpiled forage is that if the weather is warm enough you may still get parasite infections. This happened last year. Continue to check your goats for parasites and treat as needed.

At some point we will need to feed stored forages to our goats. Plan now by taking an inventory of the amount of hay you have available and have a forage quality test conducted on this hay. You should expect your animals to consume 2 to 4 pounds of hay per head per day during the winter feeding time. Based on this formula you will need between 360 and 720 pounds of hay per head to feed for 180 days. This does not include the amount of hay that the animals will waste during the feeding period. Also remember that this is an average number based on the size of the average goat. Your animals may consume more hay than this so you will need to have even more available. Because of the drought conditions through much of the state, the hay crop was short this year so prices, especially late in the season, are expected to be high. Now is the time to make sure you have enough hay on hand.

You need to have your hay tested for quality to properly plan for winter feeding. This year it is even more important. Because of the weather conditions, hay was put up at later stages of maturity than normal in many areas. Forage quality decreases with maturity and drought stress also reduces hay quality. In Kentucky we have a very easy and simple method for getting our hay tested.

The Kentucky Department of Agriculture has a forage testing program. The staff will come out to your farm, collect the samples and do the analysis. All you have to do is give them a call at 800-248-4628 and for \$10 a sample the testing program staff will do all the work for you. Each "lot" of hay needs to be sampled. A "lot" is a field or cutting that would be of similar forage mix and quality. Best results the KDA staff can help you determine how many "lots" you have and how best to sample them.

The importance of hay testing is that it will allow you to better plan the rest of your feeding program. I have personally seen situations where people have been able to cut their grain bill in half by knowing the quality of their hay. In other situations people have been able to purchase their supplements early, at lower cost, and saved three to four times the cost of the analysis. I generally see more nutritional problems during years similar to this one because people think they can save money by not testing. The calls start to come in about two months into winter or when the does start to kid. The people cannot understand why the does are losing so much weight. We then get a forage test, and the protein is below 12% on the hay while their feeding program was based on 14% protein hay. I have known several producers that have lost animals because they tried to save a little and not have their forage tested. Please have your forage tested. Variations between fields and cuttings, even in a normal year are greater than you think.

The UK cooperative Extension Service has a publication titled "Interpreting Forage Quality Reports," pub number ID-101, that will help you better understand the information provided by the analysis.

Finally, you need to plan your supplementation program. The first step here stage of production. Then by knowing

Table 4

Nutrient	<95d preg.	>95 d preg.	2 wk Lac.
Mcal Met. Energy	2.99	3.63	5.78
Pounds of Met. Protein	2.99	3.63	5.78
Grams Calcium	5.45	7.45	12.16
Grams Phosphorus	4.36	5.76	9.06

is to know what the nutritional requirements of your animals are at various stages of production. By knowing what your hay is providing, you can plan and purchase the protein or energy supplements you need for your animals.

Table 4, above, provides some basic information on feed requirements for Boer goats at different stages of production. To determine the requirements for your animals. I recommend that you go to the Langston University Nutritional Requirement Calculator online at :

www.luresext.edu/goats/index.htm.

As you can see from table 4, the nutritional requirements change based on the stage of production of the animal. We must plan for these changes and supplement to meet these changing needs.

Finally, we need to remember that when our does are heavy breed they cannot consume the amount of hay necessary to meet their needs. We must plan to supplement them to make sure they do not develop pregnancy toxemia late in gestation. We must also remember that when the temperature drops, our animals need more energy to keep warm so supplement them with energy in cold weather. Don't forget that water is a vital nutrient, and your animals need access to liquid water every day. Ice and snow are not enough. Use frost free water sources

to make sure your animals do not get problems associated with low water consumption.

Adding Value to Kentucky Products by Feeding Distillers Dried Grains (Report Summer 2005)

**Charles D. Smith, Producer,
Glasgow, KY
Terry Hutchens, UK**

A common buzzword of the day is "added value." When value is added to a commodity such as corn, soybean, vegetables, or meat goats, the locally produced raw product is further refined within the state and marketed as a finished, end-user product. This is the ultimate goal for Kentucky-produced agricultural products.

This was true for this case study conducted at Charles Smith's farm near Glasgow, Kentucky. The original objective was to graze 75-80 slaughter buck kids weighing 40 lbs each on a sorghum sudan hybrid and supplement them by grazing soybeans allotted at 1.5% of body weight. However, this growing season was not conducive to this objective. Due to dry weather, only a few of the soybeans emerged and the sorghum sudan was at best a 50% stand. Within a few weeks, due to slow growth and lack of shading, the Johnsongrass filled the voids between the sudan plants.

Not to be undone, we chose to graze the sudan/Johnsongrass

as a smorgasbord pasture and to provide daily protein and energy supplementation. The goats were grazed on the mixture in 4 grazing paddocks and rotated as the growth and regrowth dictated at 7-10 day rotations. Furthermore, the goats were hand-fed (.8 to 1.0 lbs) of supplement one time each day.

The supplement was a commercially available general nutrition pellet and distillers dried grains (DDG). DDG is a by-product feed produced and donated to this project by Commonwealth Agri-Energy (ethanol plant), 4895 Pembroke Rd. Hopkinsville, Kentucky. DDG is a by-product produced in significant quantity in Kentucky from the production of ethanol and bourbon whiskeys.

After a bit of trial and error, the following feed ration emerged, 2 parts pelleted feed to 1 part DDG was found to be palatable and acceptable to lightweight slaughter goats. Supplement cost / head / day was \$0.08. The supplement was feed at 1.5% of live body weight. While, the cost of the sorghum sudan hybrid / Johnsongrass smorgasbord pasture was \$0.06/ head /day based on a yield of 4000 lbs of dry matter and a consumption rate of 3.5% of live body weight. The establishment and nitrogen cost for 1 acre of sorghum sudan is \$110 / acre. The feed cost per head for the 60 day period was \$8.60 with a \$0.66 cost per pound of gain. Gains in the first 28 day period was well below desirable gain due to extreme heat and dry weather. Heat appears to have a tremendous detrimental affect on lightweight kids, even though adequate shade, fresh water and minerals were provided. The last 28 days reflect a favorable increase in weight gain and are more within

Table 5	Begin- ning Wts.	1st 28 Day Wts	Last 28 Day Wts.
Ave Number of Goats on Pasture #	Lbs	Lbs	Lbs
65 goats	47	51	63
Total Wt. Gain		240	675
Average Gain / goat		4	13
Stock Rate / Ac	22		
Lbs of goat gain / Ac		80	225
Total Grazing Days	5850		

expected rates of gain. Even though conditions were not ideal, Charles Smith commented that if he had not cooperated in this project he would have fed approximately \$1000 in hay by the end of August due to little or no pasture.

We will continue to explore ways of feeding goats that reduce feed costs and provide safe grazing environments by using traditional and non-tradition forages and by-product feeds.



Charles Smith loading trailer with distiller dried grains.



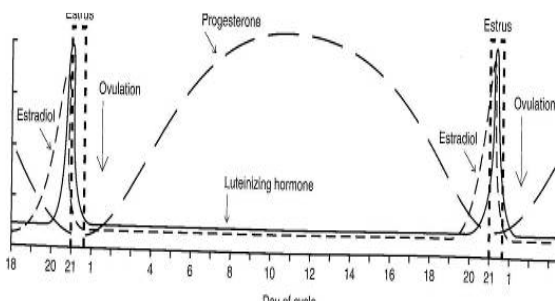
Slaughter goats at feed trough August, 2005

**Kentucky Goat Identification Program for 2006
Terry Hutchens, UK**

How do you spell relief? No-Goat-E-ID. The Kentucky State Veterinarian Office has adopted a simple and more painless method for compliance with the national animal identification program for goats.

In order to comply with the National Livestock Identification Program, Kentucky goat producers need only to enroll in the Voluntary Scrapie Flock/ Herd Certification Program or have legible registry tattoos and papers. Because the incidence of scrapie in goats is extremely low, and sampling at slaughter is not considered cost

Graph 1



effective at this time, different requirements have been put in place for goats. Goats in slaughter channels will not be required to carry individual identification numbers when they are moving into interstate commerce unless they are scrapie-positive, considered high-risk, have been exposed or originate from scrapie infected or source herd.

Who dose not need identification?

Commercial, low-risk goats:

- raised for fiber and meat
- are not registered or exhibited
- Have not been in contact with sheep
- Are not scrapie positive, high-risk, or exposed animals
- Are not from an infected or source herd

Who must have identification?

- Sexually intact goats used for exhibitions such as fairs, shows, demonstrations, petting zoos or are registered.
- These goats will be required to carry individual identification numbers and have health certificates to cross state lines.
- Goats with legible registry tattoos and accompanied by a copy of their registry certificate are not required any additional identification.

Who must participate in the Scrapie Program?

- If goats are used in the ways described in the last statement are not accompanied by a legible tattoo and registry papers, those herds must participate in the Voluntary Scrapie Program. Furthermore, these farms must have a premise number.

In addition to official identification, each breeding sheep or goat crossing state lines or entering into interstate commerce must be accompanied by an official Certificate of Veterinary Inspection, or health certificate issued by an accredited veteri-

Who must have a Health Certificates for Intestate Movement

- In addition to official identification, each breeding sheep or goat crossing state lines or entering into interstate commerce must be accompanied by an official Certificate of Veterinary Inspection, or health certificate issued by an accredited veterinarian.



Goats grazing sorghum sudan and Johnsongrass pasture smorgasbord in Barren Co. Kentucky.



Watts Farm field day in September 2005 featured detail of goats grazing a pasture smorgasbord made up of forage chicory, lespedeza and tall fescue. Details of this study will be presented in the next Goat Producer's Newsletter.

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