Reproduction and the Bottom Line
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Introduction
Reproductive efficiency probably affects the profitability of meat goat operations more than any other factor. It seems like reproduction should be the simple part of the goat management plan. After all we only have to let nature take its course, right? Remember that in nature all that is required is to reproduce efficiently enough to maintain the population, not show a profit. A better understanding of the reproductive physiology and some simple management tips can help producers manage to have more product to offset the expenses, and maybe even have a little black ink left over.

As I give talks on meat goat health and productivity I find that most of us are in this industry because we enjoy working with our goats. Most of the folks I visit with, however, tell me that they would enjoy it a lot more if they were taking some profits to the bank. Many producers don’t realize that although carcass quality and growth rate are important, it is reproduction performance that spells the difference between profit and loss. Today in Oklahoma, there is about a $5/cwt difference in the sale price of a number 1 or number 2 kid. On a 60 lb. kid, this translates to about $3.00 per goat. Obviously kids that reach market weight faster are more profitable. If however, your doe can wean twice as many kids, then the income is doubled, while the expense of maintaining the does is unchanged. This is important for commercial producers, but it is even more important for purebred breeders who are depreciating large investments for their breeding herd. The easiest and fastest way to increase profits is simply to have more kids to hop in the trailer when it is time to go!
Proceedings of the 25th Annual Goat Field Day, Langston University, April 24, 2010

Reproduction and the Bottom Line

Relative Economic Value of Traits

Produced
Growth
Reproductive Efficiency
$ The Profit Pyramid $

Male Reproductive System

The male continues to manufacture haploid cells, the sperm, throughout his life.

Female Reproductive Tract

The female is born with a predetermined number of haploid cells, the ova or egg cells, in her ovary and will never make any more.

Goat Estrous Cycle

- Anestrus
  - The time between breeding seasons when the doe is not coming into heat
- Estrus
  - The time the doe is "in heat"
- Metestrus
  - The time between heat periods when the doe is trying to become pregnant

Anestrus

- Goats are seasonal breeders. Anestrus is the part of the year when does are not cycling.
- All reproductive hormone levels are low.
- The onset and decline of the breeding season are controlled by day length and buck activities.
- Poorly influenced by drugs, but can be influenced by artificial lights and teaser bucks.
**Estrus**

- This is the period just before, during and just after the egg is released in the ovary.
- The dominant structure on the ovary is the follicle which releases estrogen as the dominant hormone in the system.
- The estrogen causes the doe to be receptive to the male.

**Metestrus**

- The part of the cycle between heat periods.
- The dominant structure on the ovary is the Corpus Luteum and the dominant hormone is progesterone.
- Under the influence of progesterone the doe rejects the buck and the reproductive tract undergoes changes to allow for attachment of the embryo and support of the pregnancy.
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How Big is Big Enough?

<table>
<thead>
<tr>
<th>Kid doe body weight at mating (lb)</th>
<th>First kidding%</th>
<th>Average lifetime kidding%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 40</td>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>40 - 44</td>
<td>21</td>
<td>70</td>
</tr>
<tr>
<td>44 - 51</td>
<td>32</td>
<td>72</td>
</tr>
<tr>
<td>51 - 55</td>
<td>55</td>
<td>79</td>
</tr>
<tr>
<td>55 - 60</td>
<td>75</td>
<td>82</td>
</tr>
<tr>
<td>60 - 70</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>Above 70</td>
<td>85</td>
<td>89</td>
</tr>
</tbody>
</table>

- Weaning Traits of Boer Does (3 Matings)

<table>
<thead>
<tr>
<th>Dam ID</th>
<th>Litter Size, n</th>
<th>Litter Wt, lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>220</td>
<td>2.33</td>
<td>100.27</td>
</tr>
<tr>
<td>217</td>
<td>2.00</td>
<td>90.93</td>
</tr>
<tr>
<td><strong>Herd Avg</strong></td>
<td><strong>1.48</strong></td>
<td><strong>58.00</strong></td>
</tr>
<tr>
<td><strong>Boer Avg</strong></td>
<td><strong>1.19</strong></td>
<td><strong>47.57</strong></td>
</tr>
<tr>
<td>247</td>
<td>1.00</td>
<td>35.48</td>
</tr>
<tr>
<td>207</td>
<td>1.00</td>
<td>34.20</td>
</tr>
</tbody>
</table>

- You Can't Afford Singles

- The average meat goat doe eats about 1 ton of "something" per year!!
- First time does have a higher percentage of singles.
- Second pregnancies tend to be singles if first time was twins.
- Higher percentage of singles in mature does following triplets in prior year.
- Does above the age of 6 years have a higher percentage of singles.
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**Does Bred Early or Late Have More Singles**

<table>
<thead>
<tr>
<th>Kids Born/ Doe Kidding</th>
<th>Surviving Kids per Doe Kidding</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
</table>

**Teaser Bucks Can Help!**

- Teasers are intact vasectomized males used to stimulate the does.
- Teasers stimulate does to cycle but cannot cause a pregnancy.
- When herd sires are introduced the doe is more fertile than on her first cycle of the season.
- Quality or size is not a concern but teasers should be tough, vigorous and trouble free.

**Nutrition and Reproduction**

- **Flushing** – Increasing nutritional plane by adding .5 lbs of corn or protein supplement for 2 weeks before and 2 weeks after breeding increases pregnancy rate and litter size at birth.
- Does in good body condition at breeding deliver more kids and have better kid survival rates.
- Pregnancy toxemia

**Pregnancy Toxemia**

- Inadequate carbohydrates in diet in last trimester causes mother to metabolize her body fat.
- By product is ketones which build up to toxic levels.
- Doe carrying twins, carbo requirement increases to 180%, with triplets 240%.
- Doe should gain ½ lb. day last trimester.

**Pregnancy Diagnosis**

- Can reduce costs, increase income, and maximize returns on available inputs.
- Several possibilities, each with advantages and disadvantages.
  - Doppler Ultrasound
  - "A Mode" Ultrasound
  - Blood Hormone Assay
**Doppler Ultrasound**

- Expensive to purchase.
- Delicate and only somewhat portable.
- Requires extensive training and practice to use accurately.
- Accurate and early results.
- Use with multiple species and multiple functions.
- May show number of fetuses.
- Slower to operate accurately.

**Ultrasound of 55 day Pregnancy**

**"A Mode" Ultrasound**

- Inexpensive to purchase and operate.
- Purchase preset for one type of animal.
- Quickly operate successfully.
- Accurate at 30 to 40 days.
- Audio tones. Can not tell how many kids are present.
- Tough and easily portable.

**Blood Chemical Assay**

- BicPRYN – Measures the amount of a very specific protein, released from the placenta, present in the maternal blood.
  - Accurate at 26 days
  - 95% accurate
  - Samples received in lab by Wednesday are reported Friday
  - Cost is $7.50/test + supplies and shipping

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**Assisted Reproduction**

- Artificial Insemination

- Embryo Transfer

Valuable tools for increasing the impact of outstanding genetics, but also require increased management, cost, and risk.

**Artificial Insemination**

- Bucks are collected via:
  - Artificial Vagina and estrus doe
  - Electro-syringe
  - Semen is examined, extended, and frozen.
- Semen is placed inside the cervix by means of a glass speculum and pipette.
- Typical conception rates are 30-50% for one insemination or 60-80% with 2 or three inseminations.
- May get 2 or 3 straws with one certificate.
- Laparoscopic A.I. increases the success rate but also the danger to doe and the cost.
Embryo Transfer
High value doe is synchronized with lower value does, super-ovulated, and bred to high value buck. At about 1 week of pregnancy the fertile embryos are flushed from the donor doe and introduced surgically into heat synchronized recipient does.
- Typically harvest from 0 to 20 fertile embryos from donor.
- Very expensive and management intensive, must have strong market for high value kids.
- Difficult to do legally in goats due to restrictions on drugs used in the procedure.

Buck Breeding Soundness Examination
- Not so much to identify sterile males as to identify marginally fertile males.
- Late kidding, low conception rates and small litter sizes cost big dollars. (Especially since goats are seasonal breeders and goat markets are seasonal)

Breeding Soundness Exam
- Evaluation of semen sample
  - Semen volume and concentration
  - Correct morphology
  - Motility
- Physical examination for ability to breed
  - Reproductive system
  - Musculoskeletal system
- Libido determination must be made from observations over time.

Your local veterinarian can help you identify problems before they are problems.

Oklahoma Veterinary Medical Association
www.okvma.org
American Association of Small Ruminant Practitioners
www.aasrp.org

Questions?