Factors Affecting Profitable Reproduction of Goats

Genetics and Breeding
Nutrition
- (browse, pasture, minerals, supplementation)

Management (health, facilities)
Environment (climate, topography)

$$ \text{REPRODUCTIVE EFFICIENCY} $$

- Fertility and prolificy
- Motherability and milkability
- Maintain body condition score
- Longevity
- Free from dystocia
- Disposition
Improve Reproductive Efficiency

Reproduction

Longevity
Female Reproductive Tract

Estrous Cycle

Dr. Stephan Wildeus – Virginia State University

Reproductive Characteristics (DOE)

- Cycle (estrus) length (days)  
  Average: 20 - 21  
  Range: 17 - 24
- Duration of (heat) estrus (hours)  
  Average: 30  
  Range: 16 - 50
- Ovulation after (heat) estrus (hours)  
  Average: 33  
  Range: 30 - 36
- Gestation length (days)  
  Average: 150  
  Range: 144 - 155
- Ovulated egg viability (hours)  
  Average: 12 - 24
- Offspring  
  Average: 2  
  Range: 1 - 4
Fertilization

- Fertilization occurs in the oviduct and requires the proper timing of insemination and ovulation
- Fusion of the sperm cell with the egg will prevent penetration of other spermatozoa
- Fertilized eggs move towards the uterus and initiate cell divisions within 24 hours

Pregnancy

- Uterus requires priming with progesterone for attachment of the embryo and membrane development to occur
- In goats the corpus luteum is the primary source of progesterone throughout gestation

Pregnancy

Placenta - exchange between the maternal and fetal circulation (rapid growth between 90 to 100 days)

Last trimester - exponential fetal growth

Length of pregnancy influenced by breed and sex of fetus

- Increases with doe age
- Decreases with litter size
Parturition

- Initiated by regression of the CL about 24 hours before delivery and an increase in estrogen
- Physical changes in the doe
  - Pelvic ligaments begin to relax - tailhead
  - Vulva becomes swollen and pink
  - Uterine contractions - oxytocin
  - Placental membranes rupture
- Kids are born within 2 to 3 hours

Male Reproductive Tract

Spermatogenesis:
- Takes place in the testis

Sperm maturation:
- Spermatozoa released from testis germinal epithelium and passes to the epididymis
- Fluid removed and sperm suspension is concentrated in head of epididymis
- Sperm stored in dormant state prior to ejaculation in tail of epididymis
Reproductive Characteristics (BUCK)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily sperm production (billions/)</td>
<td>6.0</td>
<td>4.8 - 7.2</td>
</tr>
<tr>
<td>Ejaculate volume (ml)</td>
<td>1.0</td>
<td>0.5 - 1.5</td>
</tr>
<tr>
<td>Ejaculate concentration (billion/ml)</td>
<td>3.0</td>
<td>1.5 - 5.0</td>
</tr>
<tr>
<td>Spermatozoa viability in the doe (hours)</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Scrotal circumference (cm)</td>
<td>24</td>
<td>20 - 28</td>
</tr>
</tbody>
</table>

Reproductive Considerations

- Puberty – stage of sexual maturity
- Onset of Puberty
  - Influenced by breed / nutrition / season
- Seasonal Breeding – breed on photoperiodic cues
- Effect of season on pregnancy rate
- Record keeping – records you can use

Reproduction Health Maintenance

- **Strategic Vaccinations**
  - Leptospirosis – (3 weeks pre-breeding)
  - Clostridium perfringens C&D with tetanus (3 weeks pre-kidding)
- **Fecal Analysis**
  - 
  - 
  - 
  - 
  -
### Causes of Reproductive Failure

- Nutrition and Environmental
- Reproductive Diseases
- Stress and Trauma
- Toxic plants (estrogenic compounds)
- Dewormers – levamisole, valbazen
- Drugs – dexamethasone, prostaglandin
- Immunological factors
- Heritable factors

### Causes of Reproductive Failure

- Vibriosis – embryonic mortality, early abortion
- Leptospirosis – abortion last trimester, weak kids, infertility
- Brucellosis (melitensis) – abortion
- Listeriosis – late abortion, retained placenta, metritis
- Toxoplasmosis – late abortions, weak young, stillbirths, retained placenta

### Causes of Reproductive Failure

- Akabane virus – abortion, stillborns, death soon after birth
- Chlamydiosis – abortion 2 days to 2 months of pregnancy
- Q-fever – brought on by stress, poor nutrition and then the doe aborts
- Border disease – (BVD) – abortion, abnormal fetus
Causes of Reproductive Failure
(the male)

- Epididymitis - infection/trauma
- Urolithiasis - calcium phosphorus imbalance

Breeding Soundness Evaluation

- Evaluate 3-4 weeks before breeding
- Conformation / Stature
- Testis (scrotal circumference) and firm
- Artificial vagina collection / hand ejaculate or doe in estrus to check semen quality

Nutrition

- Environment / Weather
- Breed
- Stage of production
- Quality of diet
- Age and Sex of goats
- Body weight and Body condition
- Activity and exercise
**Energy Physiological Priorities**

Energy - the number ONE effect on reproduction

- Basal metabolism
- Activity
- Growth
- Energy reserves
- Pregnancy
- Lactation
- Energy reserves (milk fat)
- Estrus cycle / Initiation of pregnancy

**Forage Quality & Goat Requirements**

(Total Digestible Nutrients - TDN)

<table>
<thead>
<tr>
<th>TDN %</th>
<th>Pasture Veget.</th>
<th>Pasture Mature</th>
<th>Pasture Dead</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Weaning
- Does in Early Gestation
- Yearlings
- Dry & Early Pregnant Does

**PROTEIN**

- The major component of muscle, hair, hooves, skin, internal organs and body chemicals
- Composed of smaller units, Amino Acids
- Goat rations balanced for protein rather than individual amino acids
- Rumen microbes digest most of protein and change it to microbial protein
Stage of Production Nutrition

- Pregnant

  1) First trimester
     - Nutrition levels can be lower but maintain a BCS 4-5
     - Mineral / vitamin mix and kelp meal

  2) Second trimester
     - Moderate energy & protein levels to elevate BCS to 5
     - Fetal development progressing
     - Mineral / vitamin mix and kelp meal

Stage of Production Nutrition

3) Third trimester
   - 80% of fetal growth occurs
   - Positive weight gain to a BCS 6
   - Maintain a low level of stress
     - Low milk production
     - Low birth weight of kids
     - Abortion
     - Immune system suppressed
   - Mineral and vitamin mix / kelp meal
Stage of Production Nutrition

- Post-kidding
  - High energy and protein level requirements
  - 
  - 
- Dry does
  - Lowest nutrient requirements
  - Mineral and vitamin mix / kelp meal

Nutrition Management Tips

- Shorten kidding season (natural heat-synchronization)
- Manage bred does separate
- Timely care of gestating does (first/second/third trimester, post-kidding, dry does)
- Mineral / vitamin balance and kelp meal
- Maintain body condition score

Breeding Plan

- Shorten the breeding season
- Grow out young replacements
- Extend the time after parturition
- Increase and maintain body weight
- Elevate body condition score
- Cull before the breeding season
- Ultrasound does / Semen test bucks
- Correct buck:doe ratio (based on age)
ENVIROMENTAL STRESS

- Heat and Cold
- Weather (precipitation and humidity)
- Nutrient density
- Quality of feed on offer
- Predation
- Travel (activity)
- Topography

BEHAVIOR
(lambsquarters)

MATING SYSTEM OPTIONS

- Annual fall breeding
  - optimum reproductive performance
- Annual spring breeding
  - improved lamb/kid marketing options
- Continuous mating
- Accelerated mating - 3X’s in 2 years
  - increased efficiency of production
Presentation at Birth

Health

Body Condition Score (BCS)

**BCS 2**
- Extremely thin
- Spine and ribs visible
- Sternum protruding
- Skin on bone
- "V" cavity at tailhead

**BCS 7**
- Spinous processes not visible
- Frame not visible
- Sternum covered
- Hooks and pins rounded
- Flat between hooks

(source: Clell Bagley, Utah State University)
MANAGEMENT

- Genetics and Breeding
- Reproduction
- Nutrition – browse/pasture/supplementation
- Fencing / Facilities
- Health (disease prevention, biosecurity, internal parasites)
- Environment
- Dogs – guardian / herding
- Behavior / Stress

• Browse and graze native vegetation
• Navigate long distances across rugged topography
• Body capacity
  - Rumen (cellulose and lignin)
  - Fetuses (twins)
  - Chest capacity (lungs)
• Poor motherability
• Poor milkability
• Unsound udder conformation
• Hard to regain body condition score

CULL – RUTHLESSLY

KEEP AGRICULTURE SUSTAINABLE