<table>
<thead>
<tr>
<th>Female</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of Puberty</strong></td>
<td>7-10 Months</td>
<td></td>
</tr>
<tr>
<td><strong>Breeding Weight</strong></td>
<td>60-75% of Adult Weight</td>
<td></td>
</tr>
<tr>
<td><strong>Estrous Cycle</strong></td>
<td>18-22 Days (Avg 20 days)</td>
<td></td>
</tr>
<tr>
<td><strong>Estrus Duration</strong></td>
<td>12-36 hrs (Avg 24 hrs)</td>
<td></td>
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<tr>
<td><strong>Ovulation</strong></td>
<td>12-36 hrs from onset (Avg 24 hrs)</td>
<td></td>
</tr>
<tr>
<td><strong>Gestation Length</strong></td>
<td>146-155 days (Avg 150 days)</td>
<td></td>
</tr>
<tr>
<td><strong>Signs of Estrus:</strong></td>
<td>Tail wagging, Mounting, Bleating</td>
<td></td>
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</tbody>
</table>
Reproduction Sheep

**Female**

<table>
<thead>
<tr>
<th>Trait</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of Puberty</td>
<td>5-12 Months</td>
</tr>
<tr>
<td>Breeding Weight</td>
<td>60-75% of Adult Weight</td>
</tr>
<tr>
<td>Estrous Cycle</td>
<td>14-20 Days (Avg 17 days)</td>
</tr>
<tr>
<td>Estrus Duration</td>
<td>20-42 hrs (Avg 30 hrs)</td>
</tr>
<tr>
<td>Ovulation</td>
<td>20-42 hrs from onset (Avg 30 hrs)</td>
</tr>
<tr>
<td>Gestation Length</td>
<td>144-152 days (Avg 148 days)</td>
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<td>Signs of Estrus:</td>
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</table>
Reproduction

Diagram showing the reproductive organs:
- Uterus
- Cervix
- Vagina
- Ovary
- Infundibulum
- Oviduct
- Uterine Horns
- Blind Pouch
- Vulva
- Bladder
- Clitoris
Uterine horns

Uterus

Oviduct

Ovary
Reproduction

Hormones

• **Estrogen** - Steroid hormone, Excitatory, follicles
• **Progesterone** - Steroid hormone, corpus luteum
• **Luteinizing Hormone (LH)** - stimulates ovulation and CL growth
• **Follicle Stimulating Hormone (FSH)** – follicular growth
• **Gonadotropin Releasing Hormone (GnRH)** – stimulates release of FSH & LH
• **Prostaglandins** - induces the regression of the corpus luteum; *lutalyse*
Hormone concentration

Day of cycle

LH + FSH

Ovulation

Prostaglandin

Luteolysis

Progesterone

Oestradiol

Oestrus

18 0 4 8 12 16 20 3

FSH

Oestrus
Reproduction

**Gestation period**

- The medium-wool and meat-type breeds - shorter gestation period than fine-wool breeds.
- High temperatures and high nutrition levels may shorten the gestation period two or three days.
- Ewes bred to white-faced, wool-breed rams may have a slightly longer gestation period than those bred to black-faced, meat-type rams.
Factors affecting Reproduction

- Heredity
- Age
- Photoperiod (seasonal)
- Temperature and humidity
- Nutrition and Exercise
- Parturition and lactation
- Disease and parasites
- Fertility of & assoc. with the ram
Reproduction

*Breeding ewe lambs*

- Ewe lambs that lamb as yearlings - greater lifetime production than ewes that lamb as 2 year olds.
- Onset of puberty depends largely upon body weight
  - Nutrition
  - Two-thirds of mature weight
Reproduction

• Ewes that lamb as yearlings
  – Separate from mature ewes
  – manage and feed
  – Reach potential size
  – shy breeders
  – breed them separate from older ewes
  – use rams of smaller breeds
  – lambing difficulties
Reproduction

Breeding Season

- **Melatonin**
- hormone that controls sheep breeding cycles
- produced during the hours of darkness
- In mid to northern latitudes breeding is strongly seasonal
- photoperiod - the determining factor
  - environmental temperature
  - nutritional status
  - social interactions
Reproduction

Natural system of controlling the breeding cycle

• ensures that the lambs are born at a time of year when there is an increasing availability of food resources
• ewes should be in good condition for mating as a result of the autumn flush of grass
• ewes lose condition during pregnancy and lactation
• recovery period between weaning and re-breeding
Reproduction

• daylight (<14 hrs/day), temp. ( <74 F or > 100)
• nutrition
• flushing
Reproduction

Lambing
• > 4 sq. ft. pen for ewes, clean & dry
• presentation of front legs
• orphan lambs is not uncommon
• 25% death loss is common
• No Grain for 24 hours
  – Hay
  – Water
• Introduce feed slowly
Pregnancy Testing

- Breeding Marks
- Ultrasonic Scanning - best detected between 30 & 40 days
- Bagging or Udder Palpation
- Blood Progesterone - at the time of the next expected heat
- PSPB - a protein called Pregnancy-Specific Protein B after day 21 of breeding
Reproduction

Insemination

• Natural- 3-5 billion sperm inseminated
• AI – vaginal approach – 200 million
• AI – trans-cervical approach- 100 million
• AI - Intrauterine insemination via laparoscopic surgery- 20 million
• Time of insemination – vaginal or cervical = 12 to 18 hrs after onset of estrus
• Synchronizing with CIDR should be 48-58 hrs after removal
Desirable traits for “Accelerated Lambing”

- Ewes can breed year round
- Lamb more than one time per year
  - Gestation 5 mo., Nurse 3 mo., Open 4 months
- Ewes that can mate while lactating
- Ewes that have a good lambing rate (i.e. twinning)
- Sires that produce a desirable market lamb and have the libido and fertility for conception year round

  *Increased Feed, Labor; Decreased Productive Life*
Reproduction

Out-of-Season Lambing

• Early weaned Lambs
• Hormone treatment
• 2 milligrams of estradiol two days prior to progesterone treatment
• progesterone administered for 10 to 12 days
• 500 to 750 IU gonadotropin on Day 13, and 16 days later
• expect some loss in reproductive efficiency
Reproduction

Anestrous period (*reproductive inactivity*).

- period when ewes normally do not demonstrate estrous/estrus
- Three types of anestrous are observed in ewes:
  - seasonal (influenced by length of day)
  - lactation (influenced by the sucking stimulus of lambs)
  - postpartum
Reproduction

Effects of Environment

• Estrus increases as day length decreases
• September, October, or November
  – highest percentage of multiple births.
• Fall Lambing, High temperatures are detrimental to:
  – Fertility (conception rate)
  – embryo survival
  – fetal development
  – Small at birth
• http://faculty.tarleton.edu/morgan/
Reproduction

Effect of Nutrition
• direct effect on reproductive performance
• Flushing – weight gain before and during the breeding season
• Ewes in acceptable condition produce more lambs if they are flushed
• flushed with rested pastures or by supplementation.
• Begin three weeks before breeding
• continue through the first cycle
• Flushing is most effective when mated early in the breeding season. Since ovulation rate is near a maximum during the middle of the season, flushing at this time is not as beneficial.
• Less effect on ewes that are already on a high level of nutrition
Reproduction

Effect of Nutrition

• Nutrition affects total lifetime productivity by influencing mature size.
• Well-developed ewes consistently have higher lamb crop percentages than smaller ewes.
• Fat ewes are typically less fertile
  – do not respond to flushing
  – may experience more embryonic death loss.
• Ewes grazed on legume pastures, such as alfalfa and clover, may at times be less fertile.
• the estrogen content of these legumes is related to reproductive disorders
• Breeding dates may be delayed
• conception rate reduced
• the estrogen content of legumes declines during the later stages of maturity.
Reproduction

Effect of Lambing and Lactation
• Both lambing and lactation suppress estrous
• the postpartum anestrous period lasts through lactation
• Involution - two to three weeks after lambing
• Most ewes that lamb in late winter or spring do not exhibit estrus until the following breeding season.
• Ewes that lamb in the fall usually exhibit a fertile heat four to eight weeks after lambing, or approximately two weeks after weaning.
Reproduction

Effect of Disease and Parasites

• Internal parasites reduce body condition and reproductive performance
• To minimize negative effects, follow a regular parasite control program and vaccination schedule. A local veterinarian should be able to provide sufficient information to develop a flock health program.
Reproduction

• Males (rams)
• fertile year round
• 1 ram to 15 to 50 ewes
• The selection processes has resulted in breeds that are weakly-photoperiod-responsive
  – greater control over the timing of breeding
• Target markets
Factors affecting the Reproduction in the Ram

• Breeding soundness exam
• Palpation of the testicles, epididymis, and penis and visual appraisal of feet, legs, eyes and jaws.
• Semen evaluation
• Disease prevention
• Heat stress
Reproduction

Effect of Ram

- Infertile
- Diseased
- Disinterested
- = poor lambing rates
Reproduction

Effect of Ram

- well-matured ram lambs, 15 to 30 ewes
- yearlings to five-year-old rams, 25 to 50 ewes
  - Rates depend upon:
  - Season
  - Temperature
  - sex drive
  - body condition.

- Rams vary in their sexual behavior. Some rams mate repeatedly with the same ewes, even though several other ewes in heat are present. Some rams prefer black-faced or white-faced ewes when both groups are in the same flock.
Semen Collection

- Components - seminal fluid and sperm
- Quality of sperm – morphology and viability (percent live)
- Methods - artificial vagina and electroejaculation
- Semen handling - dilution characteristics: glucose or fructose, egg yolk, citrate or phosphate, antibiotics, glycerol
Reproduction

Semen Quality
• Effected by:
• Temperature
  – lower fertility during late summer
  – >90°F for an extended period, especially if the humidity is high, fertility of most rams is reduced.
• Physical condition
• Malnutrition
• Internal parasites
• Disease
Reproduction

Semen Quality
• The formation and development of sperm requires six to seven weeks
• A single dominant infertile ram in a large flock incorporating several rams can prevent fertile rams from mating
• Fertility test rams, particularly in one-sire flocks
• marking harness
  – If several of the ewes return to heat, it may be necessary to substitute another ram.
Reproduction

Teaser Buck
Psychologically Stimulate
• Induce estrous activity
• Introduce 40 days prior to breeding
• Remove 10 to 14 days prior to breeding
• Then Introduce rested fertile rams
• *stimulation does not occur when rams are placed with ewes earlier, or left with the ewes continuously*

Surgically Sterilized
• Penile deviation
• Vasectomized

Marking Harness