Advanced Reproductive Techniques in Small Ruminants

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“Expert”

• 1. Very skillful; having much training and knowledge in some special field.
• 2. A guy far away from home with a box of slides.
• 3. A “person” far away from home with a computer and a projector.
• 4. My wife is not present
Topics

• Artificial Insemination
  – Transcervical (TCI)
  – Anterior vagina
  – Surgical: laproscopic assisted
• Semen collection
  – Frozen
  – Fresh
  – Epididymal
• Embryo transfer
  – Transcervical
  – Surgical
  – Laproscopic assisted
• Intracytoplasmic Sperm Injection (ICSI)
• Cloning
• In vitro fertilization (IVF)

Artificial Insemination

• TCI:
  – Sheep
    • Guelph System
    • Low pregnancy rates
    • Fresh semen
    • Frozen semen
  – Goats
    • Fresh semen
    • Frozen semen
    • Increased success rates
• Anterior vagina
  – Fresh
  – Frozen
  – “shot-in-the-dark”
  – Poor pregnancy rates
  – Dose related

• Surgical
  – Laproscopic
    • Equipment
    • Expertise
    • Pregnancy rates increased
    • Fresh
    • Frozen
Laproscopic AI

- Disadvantages
  - Cost
  - Time
  - Surgery
- Advantages
  - Puts semen in the uterus
  - Decrease dose?
  - Pregnancy rate increased?

Semen Collection

- Chute for wapita, anesthesia WTD, restraint/light sedation sheep/goat
- Working table/area
- Handling facility
- Sedation
- Anesthesia
  - No working facility/chute
  - Safety
  - Oxygen/intubate??
Semen collection

- Lab equipment
  - Microscope
  - Slide warmer
  - Thermometer
  - Straws
  - Hemocytometer
  - Insulated container
  - canes

Semen processing

Automated filler with vacuum

Processing done inside cooler

Freezing

- Concentration: 50 million/straw WTD, elk, 80-120 million sheep/goat ??????
- Automatic/Programmable
Freeze-O-Matic with test tube rack

Highly calibrated Liquid Nitrogen marks

Straws

- ½ ml or ¼ ml
- Preprint
- Label
  - Date
  - Name
  - Where frozen?
  - Owner?

Semen collection

- Lab Equipment cont:
  - Collection cones/tubes
  - Rubber bands
  - Sharpie: ultrafine point
  - Insulated collection tube
  - Pipettes
  - Slides
  - Coverslips
  - Other???
Semen Collection

- Electroejaculator
  - Ram probe
  - Bull probe
  - Programmable/manual

Semen Collection

- Extender
  - One step
  - Two step
  - “Ovine”
  - Eggs
    - Fresh
    - Salmonella

They kick really hard!!
Epididymal Sperm Harvest
1. Ship on ice
2. Layer paper towels between ice and testicles
3. Overnight
4. Good up to 30-36 hours?
Process at room temp

1. Extender
2. Blunt needle
3. Straws
4. Instruments
5. Non spermicidal syringe

6. Flush with extender
7. Do total count
8. Dilute if necessary
9. Cool
10. Fill straws
11. Freeze

Embryo Transfer

- Superovulation Programs
  - Long
  - Short
  - Seasonality
  - Progesterone
  - Prostaglandins
  - FSH, PMSG, PG600
  - Recovery rates
  - Pregnancy rates?
Procedure for ET

• Flush
• Freeze embryos
• Synchronize recipients
• Transfer fresh/frozen embryos
  – Laparoscopic assisted
  – Transcervical
  – Surgical
Other Associated Technologies

• IVF: in vitro fertilization
  – Remove eggs from donor
    • Laparoscopic
    • Superovulation
    • Prepubertal
    • Out of season
      • Unlimited number of times (2X / wk in cattle)
  – Fertilize in the lab
  – Transfer embryos to recipient
  – Freeze embryos for later use

Other Associated Technologies

• Cloning
  – Save or bank tissue
  – Commercial companies
• ICSI: intra cytoplasmic sperm injection
  – From limited semen supply
  – Poor quality semen
• Sexed semen
• Embryo splitting
Alliance, Nebraska Sunset