Handling, Chemical Restraint, and Anesthesia in Field Settings

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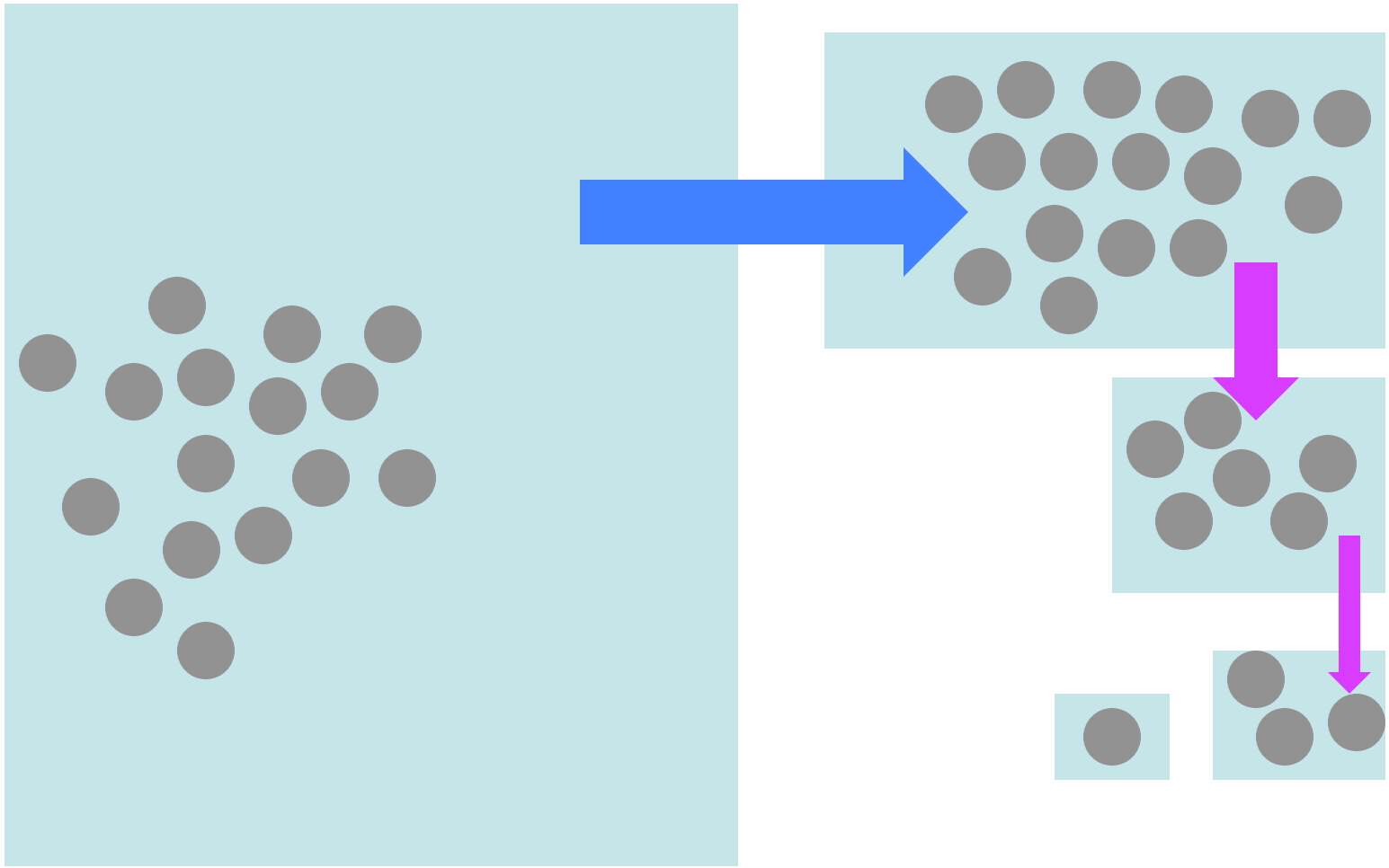
Camelid Behavior

- Herd mentality
  - More similar to sheep than goats
    - Alpacas much more so than llamas
  - Approach and capture in non-threatening manner
    - Move from pasture to large pen to small pens
  - Move in groups whenever possible
    - Select out smaller and smaller groups

Group Confinement Method



Herd Behavior

Capture and Haltering

- Camelids generally do not like having their head approached, handled
  - Similar “pivot point” as cattle, sheep
    - Point of shoulder
  - Use pivot point to maneuver into small area
    - Obtain control of the neck
      - Outstretched arms
      - Loose rope or leadrope
    - Then place halter on head

Haltering

- Camelids are semi-obligate nasal breathers
- Camelids have cartilagenous nose, not a bony bridge to the nose
  - Halters should be fitted such that they can not slide down onto the cartilage and compress nares
  - Halters should not be left on the head when not in use because
    - risk of asphyxiation
    - Interference with breathing

Lead Line

Restraint for Procedures

- Manual restraint by halter
- Manual restraint by neck
- Manual restraint by neck and tail
- Manual restraint in recumbency
  - Cushed
  - Stretch rope
  - Shearing Table
- LESS IS MORE MOST OF THE TIME

Recumbent Restraint

Restraint for Procedures

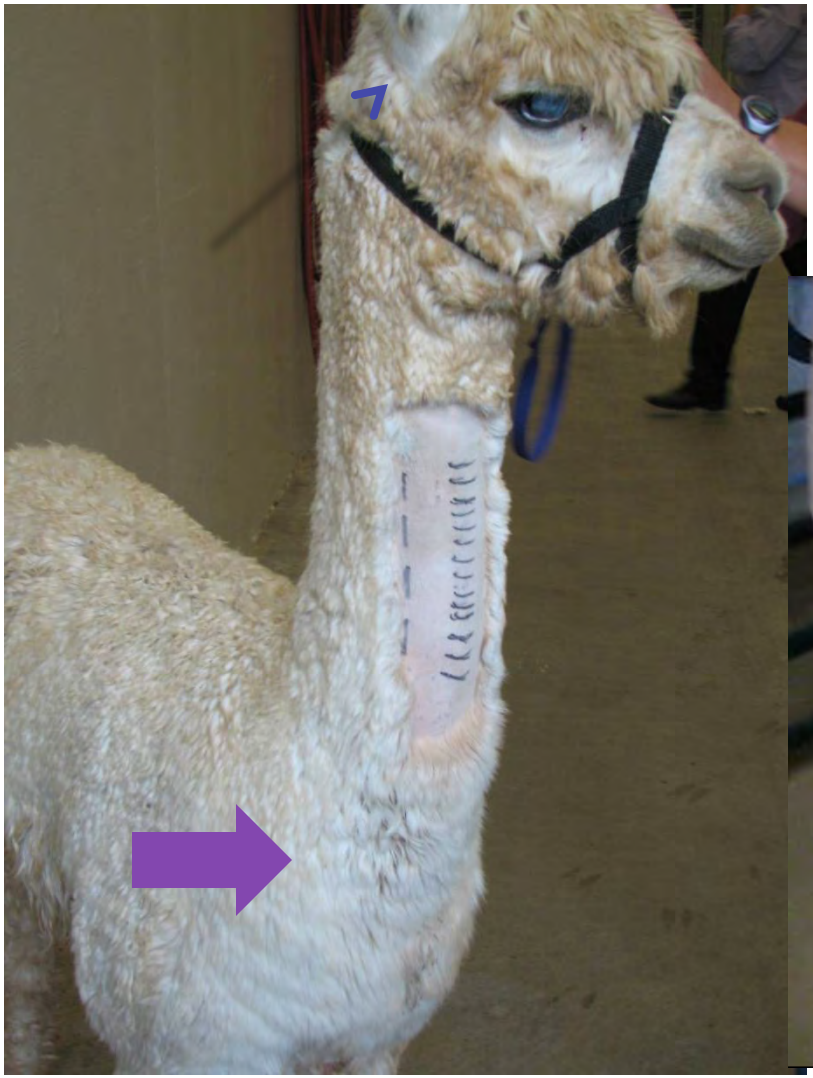
- Camelid Chute
  - Solid sides preferred for veterinary procedures
  - Shoulder brace
    - NOT a head catch!
  - Extension beyond shoulder brace
    - Secure head forward to protect neck
  - Back-up bar
  - Stand-up straps
    - Sternum only

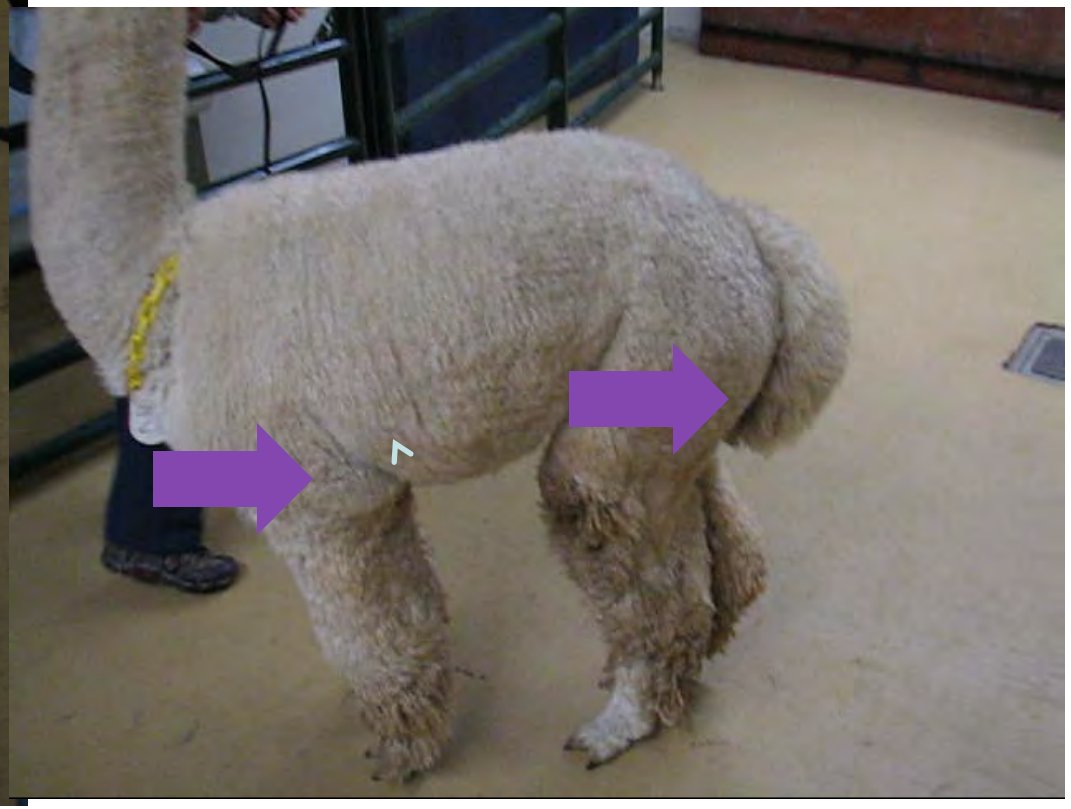
Injection Sites

- S.C.
  - Base of neck / in front of shoulder
  - Thoracic wall caudal to the elbow
  - Base of ear ?
  - Brisket ?
- IM
  - Semimembranosus/tendinosus muscle
  - Triceps m
  - Quadriceps ?

Injection Sites - Crias

Injection Sites - Adults

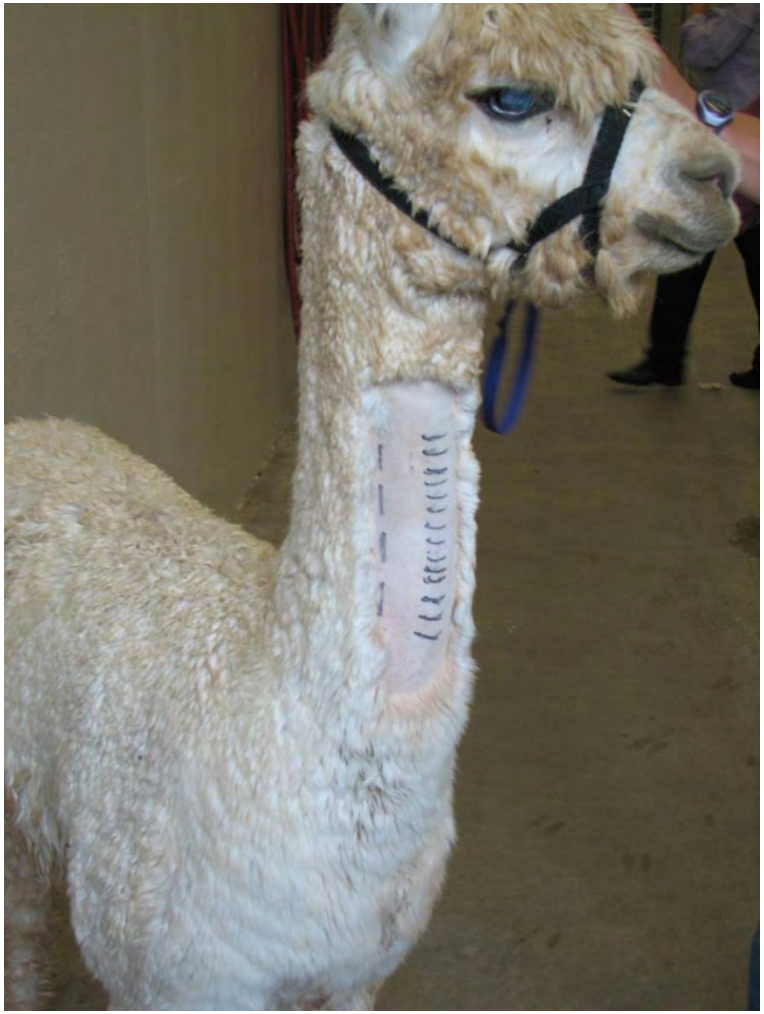




IV Access

- Jugular
- Auricular
- Cephalic
- Saphenous
- Lateral Thoracic

Jugular Catheterization



Jugular Catheterization

Jugular Catheterization

Chemical Restraint

- Occasionally sedation is required
  - Can increase safety of the procedure
  - Can increase efficiency of the procedure
- Important considerations
  - Bloat
  - Regurgitation
  - Airway protection
  - Cardiovascular
  - Pulmonary

Xylazine

- Camelids are fairly resistant to xylazine
  - Mid-way between horses and cattle
- Effectiveness varies
  - Route
  - Dose
  - Species and breed
    - Alpaca vs llama
    - Huacaya vs Suri
- Side effects
    - cardiopulmonary depression
    - decreased gastrointestinal motility

Xylazine

- Route
  - IV
    - Most consistent clinical effect
    - Risk of intra-arterial injection
    - Perivascular injection decreases clinical response
  - IM
    - Much less predictable results unless used in combination

Xylazine

- Dose
  - Higher doses in Alpacas vs Llamas

    - **Alpacas**
      - **IV 0.2 - 0.4 mg/kg**
      - **IM 0.3 - 0.5 mg/kg**
      - **Suris usually dosed at higher end of range**

    - **Llamas**
      - **IV 0.1 - 0.3 mg/kg**
      - **IM 0.2 - 0.4 mg/kg**

Xylazine

- Duration of effect
  - Approximately 20 minutes of recumbency and sedation
    - Light level of analgesia
  - Useful for short diagnostic or therapeutic procedures
  - Sufficient to tolerate mild noxious stimuli
    - NOT provide surgical analgesia when used by itself

Xylazine Reversal

- Yohimbine
  - Can be administered IV or IM
  - Moderate in regard to potency
  - Effective to increase alertness but less effective in severe cases
- Tolazoline
  - Should not be used IV unless can administer SLOWLY
    - Can cause sinus arrest, severe hypotension
  - Prefer to administer IM or S.C.
  - Extremely potent
  - Effective to regain ambulation
- Doxapram
  - Extremely mild
  - Primarily useful to stimulate respiration
    - Overdose → respiratory depression

Xylazine Reversal

- Yohimbine 0.125 mg/kg
- Tolazoline 1-2 mg/kg
- Atipamezole 0.1 mg/kg
- doxapram 0.5-1.0 mg/kg

- We often reduce dose by <u>at least</u> 50% and evaluate response

Ketamine Stun

Produces sedation, analgesia, and disassociation without general anesthesia

- Combination of
  - Butorphenol 0.05 – 0.1 mg/kg
  - xylazine 0.1-0.2 mg/kg
  - ketamine 0.2-0.4 mg/kg

- Administered IM
  - Onset time is 5 minutes
  - Patient will typically assume sternal or lateral recumbency
  - Maintains consciousness, pharyngeal responses

Ketamine Stun

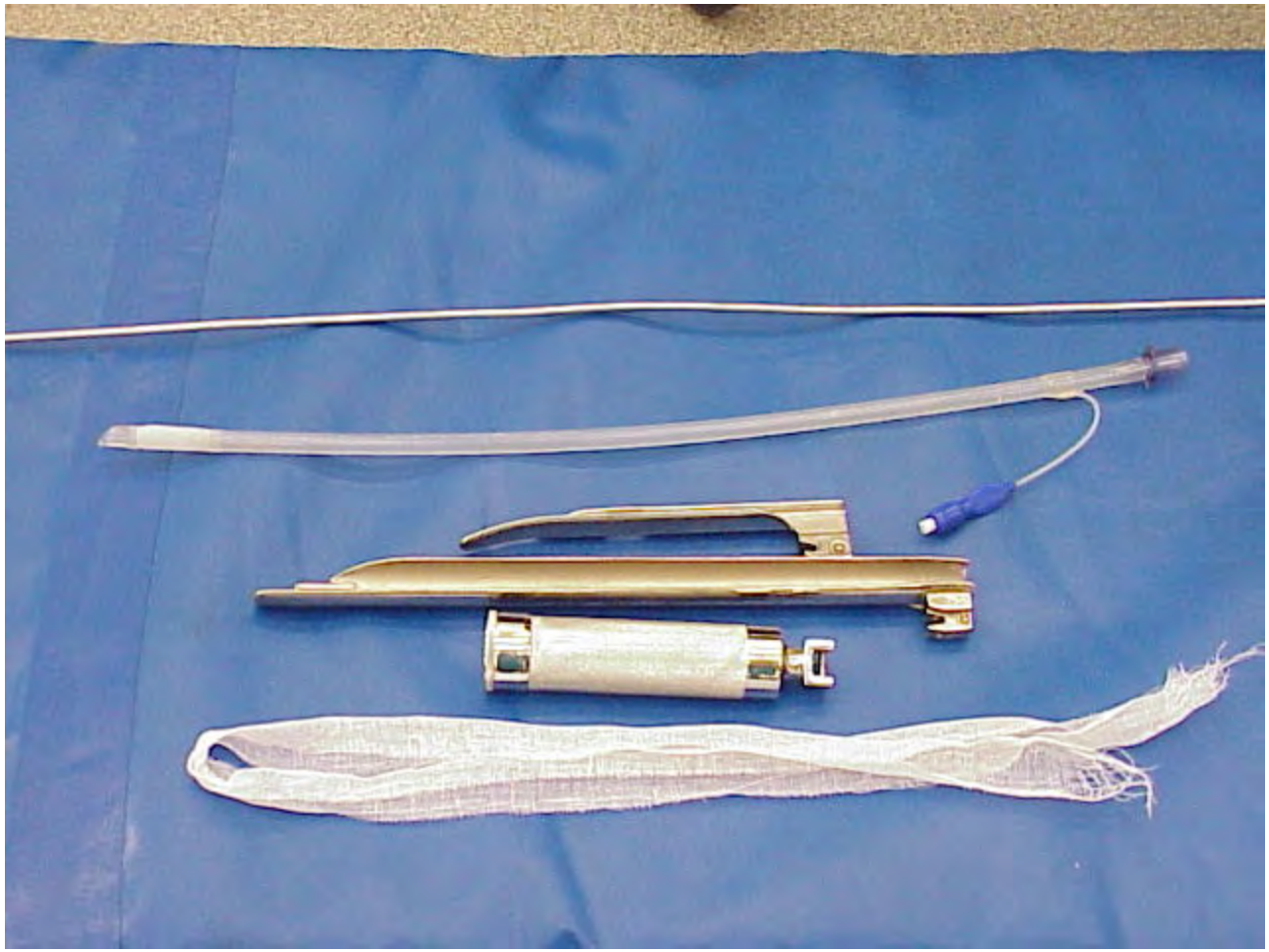
- Mild to moderately noxious stimuli
- Duration
  - 20 minutes after IV
  - 45-60 minutes after IM
- Re-dosing ?

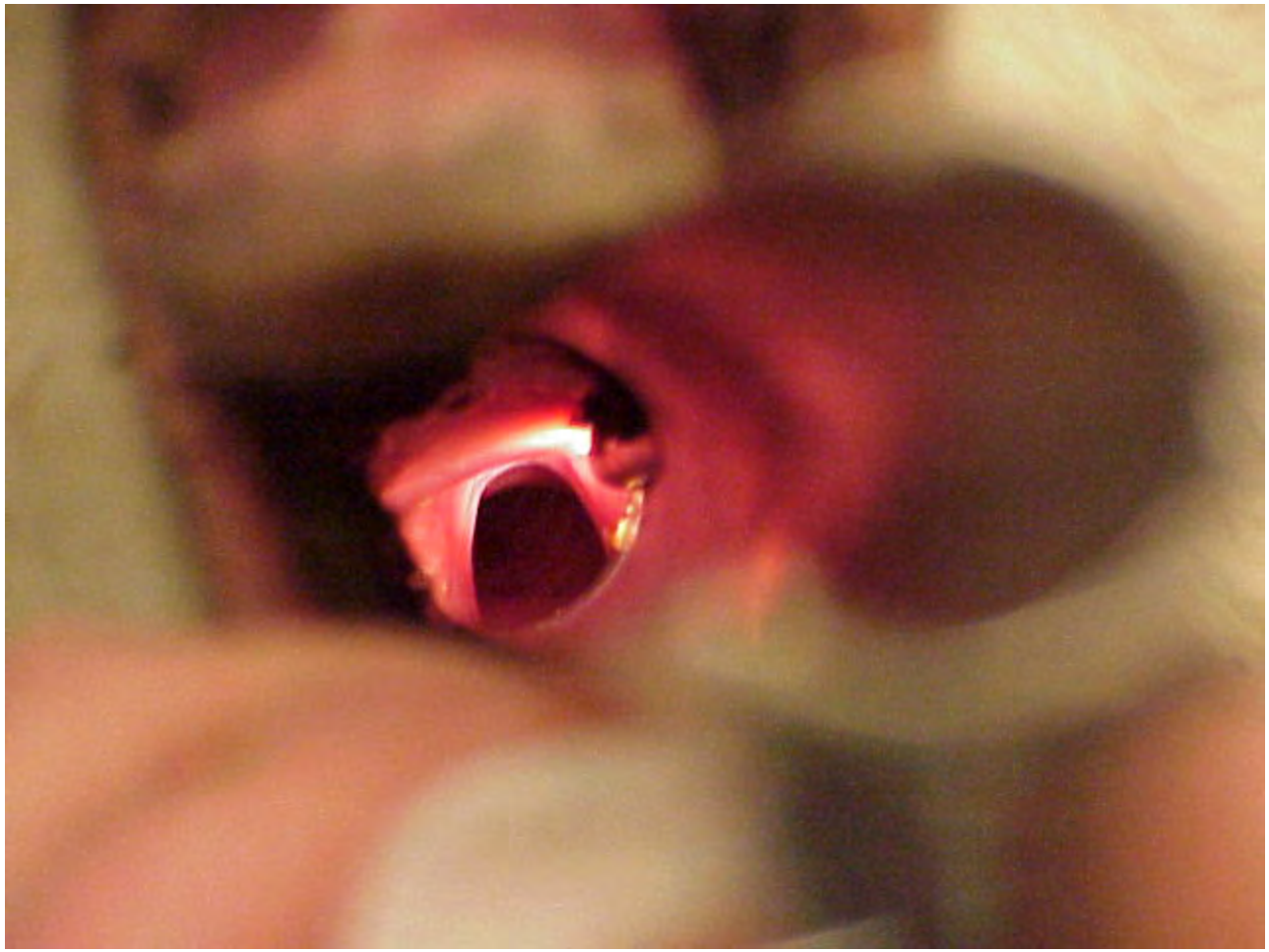
GENERAL ANESTHESIA IN FIELD OR PRACTICE

Important Considerations

- When the head can not be positioned to facilitate saliva egress or the procedure is expected to produce a significant amount of blood or other material that could enter the airway endotracheal intubation should be strongly considered

Endotracheal Intubation





Important Considerations

- Generally the IV or IM bolus techniques presented should provide approximately 15-25 minutes of useful work time

- Expect results to vary considerably from patient to patient

Important Considerations

- Doses deliberately conservative
  - increase patient safety in the field setting
    - limited patient evaluation prior to anesthesia
    - limited monitoring capability
    - limited trained help in many instances

B-X-K

- The safest and most widely used general anesthestic protocol used in field settings
  - B = butorphenol
  - X = xylazine
  - K = ketamine
- Does have some variability in consistency of effect

Patient Preparation

- Hold off feed 12 to 24 hours
  - No longer
  - “Off feed” means ANY AND ALL FOOD
- Quiet environment
- Sufficient help and positioning

Butorphanol-Ketamine-Xylazine (BXK)

- BXK is made by adding
  - 10 mg of butorphanol (1 mL)
  - 100mg xylazine (1 mL)
  - To 1000 mg (10 mL) vial of ketamine

Butorphanol-Ketamine-Xylazine (BXK)

- Administer IM
  - 1 mL/40 lbs. in Alpacas
    - Add 0.5 ml for adult males and Suris
  - 1 mL/50 lbs. in Llama
    - Add 1 ml for adult males
- Patient should be recumbent within 3 to 8 minutes with a surgical plane of anesthesia lasting up to 20-25 minutes

BXK

- IM Dosing:
  - Alpacas
    - B = 0.04 mg/kg
    - X = 0.4 mg/kg
    - K = 4 mg/kg
  - Llamas
    - B = 0.03 mg/kg
    - X = 0.3 mg/kg
    - K = 3 mg/kg

General Anesthesia

- What if you need > 45 minutes
  - Triple drip or Double drip
  - Consider endotracheal intubation
    - GAS anesthesia
      - Halothane
      - Isoflurane
      - Sevoflurane

QUESTIONS ?