

Routine Procedures of Small Ruminants in the Field



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Outline

- Procedure, anesthesia, post procedure care:
 - Physical exam and the client
 - Castration
 - Vasectomy
 - Epididymectomy
 - Disbudding



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Physical exam and the client

- Body condition score
- Parasite control
- Ensure vaccination status

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Sedation protocols

- Xylazine & ketamine (short term anesthesia)
 - Xylazine
 - 0.1-0.2 mg/kg IV or IM
 - IM must wait ~ 10 minutes before administering ketamine
 - Ketamine
 - 2-3 mg/kg IV or 6.6-11 mg/kg IM
- Xylazine & Midazolam (10-15minutes)
 - Xylazine
 - 0.05-0.2 mg/kg IV
 - Midazolam
 - 0.2-0.3 mg/kg IV

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Sedation protocols

- Midazolam (15-20 minutes sedation)
 - 0.25-0.5 mg/kg IV
- Ketamine
 - 4 – 7.5 mg/kg IV
 - +/- Butorphanol 0.2-0.4 mg/kg IV
- Surgical anesthesia
 - Ketamine
 - 2 mg/kg IV
 - Medetomidine
 - 0.02 mg/kg

Lin H, 2022: Field anesthesia



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Castration



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Castration

- When can I castrate him? He's driving me CRAZY
 - **Ismail et al. 2007
 - 3 months versus 5 months
- Production animals
 - Meat animals destined for slaughter
- Ensure vaccination status

**Ismail et al., 2007, Effects of castration on penile and urethral development in Awassi lambs



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Castration: Procedure options

- Surgical Castration
 - Manual extraction
 - Henderson
 - Pinhole castration
- Bloodless
 - Banding
 - Burdizzo emasculatome
 - Pinhole



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Surgical Castration

- Identify both testicles are descended
- Local analgesia
- Incision of the distal 1/3 of scrotum
 - Allowing drainage
 - Scalpel
 - Horizontal incision
 - Vaginal tunic remains in place
 - No tissue flaps remaining
 - Newberry
 - Vertical incision
 - Incises lateral walls and median septum
 - Must ensure equal parts of scrotal skin included
 - ~~Avoid pocket formation~~

**Edmondson, Shipley 2021; Baird, Wolfe 1999



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Surgical Castration

- Exposure of both testes
- Closed castration
- Stripping up of fascia and pulling down on testicle
 - * both ME method and Henderson require some level of exteriorization*
- Pull method
 - Strip up fascia and pull ventrally on testicle
 - Want testicle to break proximal to pampiniform plexus
 - Long ductus deferens
 - Increased risk of herniation possible**
 - Place pressure on inguinal ring area

**Edmondson, Shipley 2021



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Surgical Castration

- Henderson tool method
 - “Bloodless” castration
 - Concave side proximal to testicle
 - Slowly begin to twist testicle
 - Twisting cranial to pampiniform plexus create hemostasis



Photo: Courtesy of Jenna Stockler

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Surgical Castration: Complications

- Post operative infection
 - Most common with large amounts of fat in the incision
 - Myiasis
- Inguinal herniation
- Hemorrhage
 - Depending on method utilized
 - Pampiniform plexus
- Tetanus
 - Clostridium tetani
- Incomplete castration
- Penile involvement

**Baird, Wolfe 1999

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Banding

- Necrosis of tissue → sloughs
 - 7-10 days
- Young animals
 - < 1 week age lambs and kids
 - No > 3-4 months of age
 - Testicles maybe too large for the band
- Restraint
 - Wheelbarrow
 - Lateral with limbs restrained

**Edmondson, Shipley 2021



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Banding

- Procedure
 - Ensure 2 testicles present
 - Identify the penis
 - Avoid inclusion
 - Must ensure both spermatic cords are included in band
 - Testes distal to band
- Advantage
 - No advanced training to perform
 - Inexpensive



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Banding

• Complications

- Only 1 testicle
 - Serosus cord/ necrosing scrotum with 1 semi-intact testicle
 - Male like behaviors if testicle still intact
 - +/- fertility
- If penile inclusion
 - Penile amputation
- Band too loose
 - Edema of scrotum
 - Partial occlusion of blood and lymph
 - Pain

**Edmondson, Shipley 2021



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Banding

Advantages

- No advanced training to perform
- Inexpensive

Disadvantages

- 7-10 days to slough off
- Necrotic tissue
 - Tetanus
 - Flies
 - Infection



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Burdizzo

- Atrophy of testes with an intact scrotum
- Procedure
 - 2 testicles identified
 - Each testis pulled ventrally into apex of scrotum
 - Spermatic cord manipulated laterally
 - 2 crushing sides on each spermatic cord
 - 10 second crush time
 - Proximal and distal crushing zone
 - No not include median raphe

**Edmondson, Shipley 2021



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Burdizzo

- Complications
 - Inclusion of median raphe
 - Necrosis and sloughing of scrotal skin
 - Fail to crush the spermatic cord
 - Penile inclusion

**Edmondson, Shipley 2021



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Burdizzo

Advantages

- No advanced training to perform
- Inexpensive
- Decreased stressed & pain in older animals

Disadvantages

- Failure if done improperly



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Pinhole Castration

Pinhole Castration: A Novel Minimally Invasive Technique for In Situ Spermatic Cord Ligation

KOMBAIRAJU S. PONVIJAY, MSc

Evaluation of pinhole castration technique in rams

M.R. Fazili^{a,*}, H.K. Bhattacharyya^a, B.A. Buchoo^a, M.A. Kirmani^b, M.M. Darzi^c, I. Khan^d

• Pinhole

- Described by Ponvijay, 2007
 - Calves
- Rams: Fazili et al. 2009

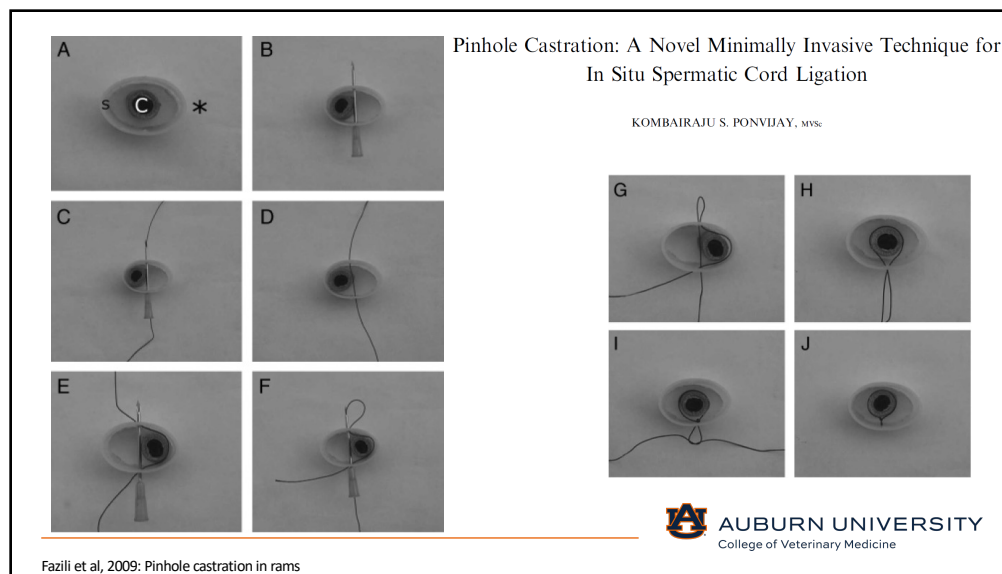
• Procedure

- Ring block at proximal 1/3 scrotal neck
- Hypodermic needle placed medially
 - Suture put through
- Needle removed and cord moved laterally
- Needle replaced thorough original hole
- Suture fed through needle and knots placed in subcutaneous tissue



Fazili et al, 2009: Pinhole castration in rams

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Castration: Post Operative Care

- NSAID
 - Banamine (labeled)
 - 1.1 mg/kg - 2.2 mg/kg
 - Intravenous route
 - Q 12- 24 hours
 - Meloxicam (extra label)
 - 0.5-1 mg/kg
 - In conjunction with local anesthetics

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Castration: Local anesthesia

- 2% lidocaine
 - Young: Dilute to 0.5 - 1% final concentration
 - 1:1 ratio
 - Dose: 6-7 mg/kg*
- Spermatic cord
 - Each cord (cremaster muscle)
- Spermatic neck
 - Reported in large ruminant
- Scrotal incision line block

*Venkatachalam, D. Toxicity and pharmacokinetic studies of lidocaine and its active metabolite, monoethylglycinexylidide, in goat kids. 2018



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Castration: Anesthesia

- IV, IM, Intratesticular
- Sedation
 - Surgeon preference
 - Midazolam
 - 0.2-0.4 mg/kg IV
 - Xylazine
 - 0.05-2 mg/kg IV



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Vasectomy

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Vasectomy

- Teaser male
- Ligation of the ductus deferens
- Time to post op utilization
 - 1- 2 weeks

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Vasectomy: Procedure

- Aseptic preparation
- Positioning of animal
 - Rump
 - Right lateral recumbency
- Identify both spermatic cords
 - Ductus deferens readily palpable just distal to teats
 - Firm structure in spermatic cord
- Incision
 - Cranial
 - Proximal near teats



**Edmondson, Shipley 2021

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Vasectomy: Procedure

- Incision
 - Over ductus deferens 3-4 cm incision
 - Incise through skin and vaginal tunic
 - Ductus deferens is then elevated and exposed
 - Ligations placed proximal and distal 6 cm apart
 - 6 cm is excised
 - Tunic and skin closed routinely
 - Repeat on remaining side
- Confirm DD was taken
 - Histopathology
 - Spermogram from DD
- Tag/Identify the teaser male



**Edmondson, Shipley 2021, Baird, Wolfe 1999

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Vasectomy: Complications

- Sperm granulomas
 - ~80 rams
 - No apparent clinical concern
 - Gouletsou et al. 2008
- Post operative infection



**Edmondson, Shipley 2021, Gouletsou et al, 2008

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Vasectomy: Local anesthesia

- Local anesthesia
 - 2% lidocaine
 - Line block at sight of incision
- Lumbosacral epidural
 - Fractious animals
- Sedation



**Edmondson, Shipley 2021

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Epididymectomy

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Epididymectomy: Procedure

- Sedation
 - Surgeon preference
- Time to post op utilization
 - 2-3 weeks

**Edmondson, Shipley 2021, Wolfe 1999

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Epididymectomy: Procedure

- Sedation
- Distal 1/3 scrotum aseptically prepped
- Anesthesia
 - Lumbosacral epidural
 - Local
 - Skin covering tail of epididymis



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Epididymectomy: Procedure

- Incise through skin and ventral tunic
 - cranial to caudal ventrally over tail of epididymis
- Incision length should allow protrusion of epididymis through the skin
 - ~2.5 cm
 - Pressure placed on testicle to assist in exteriorization of the epididymis
- Retract the epididymis from incision
 - Towel clamp
- Adequate exteriorization
- Hemostats placed on proximal and distal
- Sharp excision of the epididymis



**Edmondson, Shipley 2021, Wolfe 1999

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Epididymectomy: Procedure

- Closure
 - Second intention
 - Preferred*
 - Skin suture



**Edmondson, Shipley 2021, Wolfe 1999

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Epididymectomy: Complications

- Hemorrhage
 - If tunica albuginea is incised
 - Avoid when excising the epididymis
- Infection
 - Especially with excess hemorrhage and second intention
 - Abscess formation



**Edmondson, Shipley 2021, Wolfe 1999

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Disbudding

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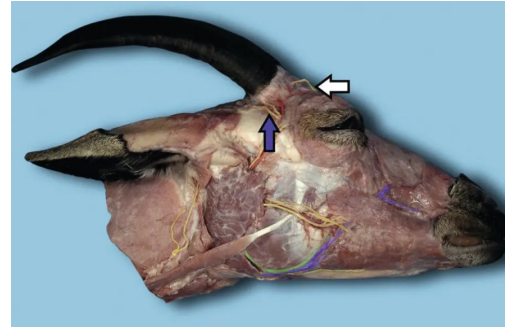
Disbudding

- < 2 weeks of age
- Permanent removal of the horn and germinal epithelium
- If germinal epithelium is not appropriately removed abnormal horn growth can occur
 - Scur formation

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Disbudding: Analgesia

- Cornual block
 - Cornual branch of lacrimal duct
 - Small depression below zygomatic arch
 - $\frac{1}{2}$ way between lateral canthus and horn base
- Infratrochlear
 - Cornual branch of the infratrochlear branch
 - Small divot can be palpated
 - $\frac{1}{2}$ way between medial canthus and horn base



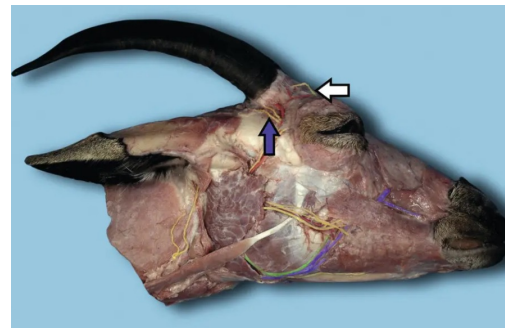
White arrow: Cornual branch of the infratrochlear nerve
Blue arrow: Cornual branch of the lacrimal nerve

Photo: Rush and Stockler, 2022

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Disbudding: Analgesia

- Line block
 - Caudal horn base (usually larger animals)
- Ring block
 - Circumferential around the horn base



White arrow: Cornual branch of the infratrochlear nerve
Blue arrow: Cornual branch of the lacrimal nerve

Photo: Rush and Stockler, 2022

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Disbudding: Procedure

- Sedation
- Clip hair surrounding horn bases
- Local analgesia
- Electric dehorning iron is rocked on the horn bud
 - NO MORE THAN 2 SECONDS
 - Cerebral necrosis
- The horn bud will be removed
- Continue burning until copper color

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Disbudding: Complications

- Heat induced meningitis and malacia
 - Neurologic signs
 - Blindness
 - Rarely reversable
 - Treatment includes:
 - Dexamethasone 1-2 mg/kg IV, mannitol 0.25-1 mg/kg IV over 5 minutes
- Retention of germinal epithelium
 - Scur formation



**Baird, Shipley 2021

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Disbudding: Other options

- Surgical dehorn
 - Clip hair, sedation, prep, local analgesia
 - Circumferential incision around the horn base removing horn bud and germinal epithelium
 - Burn incision for hemostasis
- Caustic paste
 - Clip hair around horns and place petroleum jelly around eyes
 - Do not allow to nurse and keep put of rain for at least 6 hours



**Baird, Shipley 2021

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