

1 **The Cats of the Large Animal World: How to Handle Individual Pigs in your Practice**

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2 **A Brief Bio**

- ▶ Graduated from Iowa State University with a B.S. in Microbiology
- ▶ Earned my DVM from Iowa State University
- ▶ Earned a MS in Population Sciences in Animal Health
- ▶ Mom to two little boys and a girl
- ▶ "Heifer-developer" herself

3 **Outline**

- ▶ Anesthesia
- ▶ A note on epidurals
- ▶ Surgical procedures
- ▶ GI stasis
- ▶ Gastrointestinal ulcers
- ▶ Vaccinations
- ▶ Parasitology
- ▶ Nutrition
- ▶

4 **Types of Individual Pigs in Practice**

5 **Anesthesia Tips**

- ▶ REVERSIBILITY IS KEY!
 - ▶ SHORT ACTING IF NOT REVERSIBLE
- ▶ WARM WARM WARM!
 - ▶But not too warm
- ▶ MALIGNANT HYPERTHERMIA
 - ▶ Don't be as afraid of Iso as you think
 - ▶ Monitor temperature every minute during induction then down to 5
- ▶ NPO 12 hours
 - ▶ Aspiration pneumonia
- ▶ GI stasis does happen quickly. Be prepared
- ▶ https://trace.tennessee.edu/cgi/viewcontent.cgi?article=1053&context=utk_largpubs. Great article to have for a reference

6 **Anesthesia**

- ▶ TKX- Telazol Ketamine, Xylazine
 - ▶ Most commonly used
 - ▶ Telazol- Dissociative/Benzodiazepine, Ketamine- Dissociative, Xylazine- Alpha 2 agonist
 - ▶ DOSE: IM or IV 1 bottle dry Telazol with 2.5 mL Ketamine (100mg/mL) and 2.5mL Xylazine (100 mg/mL)
 - ▶ 0.02-0.04 mL/kg or 1 mL/100 lbs.. or 0.1mL/10 lbs.
 - ▶ Additional dose: 1 bottle Telazol 4 mL Ketamine (100 mg/m) and 1 mL Xylazine (100 mg/mL) same dose as above
 - ▶ Duration: 20 to 30 minutes

- ▶ Risks:
 - ▶ Prolonged recovery time
 - ▶ Vomiting
 - ▶ GI stasis
 - ▶ hypoxia

7 Anesthesia

- 1 ▶ Midazolam: benzodiazepines
 - ▶ Dose: 0.2-0.5 mg/kg IM, IV, SC or IN
 - ▶ Duration: 15-20 minutes
 - ▶ Risks:
 - ▶ Hypothermia
 - ▶ Unpredictable anesthesia- when used alone
- 2 ▶ Ketamine: Dissociative
 - ▶ Don't use alone
 - ▶ Dose: 1-10 mg/kg IM, IV, SQ
 - ▶ Risks:
 - ▶ Tachycardia
 - ▶ Cardiac arrest
 - ▶ Respiratory arrest
 - ▶ Anaphylaxis

8 Anesthesia

- ▶ Butorphanol
 - ▶ Opioid
 - ▶ Mixed
 - ▶ Reversibility
 - ▶ Dose: 0.1-1.0 mg/kg IM/IV
 - ▶ Risk:
 - ▶ GI STASIS
 - ▶ Respiratory depression
 - ▶ Excitement

9 Anesthesia

- ▶ Isoflurane
 - ▶ Can be used as masked induction
 - ▶ However pre-medicating helps MAC sparing/hypotension risk
 - ▶ Relatively rapid recovery once off.
 - ▶ Dose 1-5% Induction 1-3% maintenance
 - ▶ Risks
 - ▶ Malignant Hyperthermia
 - ▶ Hypotension
 - ▶ Respiratory depression

10 Malignant Hyperthermia

- ▶ Genetic condition: PSS

- ▶ Can be PSS Negative but still occur
- ▶ Occurs under general anesthesia
- ▶ Clinical signs
 - ▶ Rapid rise in body temperature (4+* Temperature Jump in 30 seconds-minute)
 - ▶ Opisthotonos
 - ▶ Muscle fasciculations
- ▶ Pig breeds:
 - ▶ Heavy muscled, Landrace, Pietrain, Yorkshire, Hampshire, Poland China
- ▶ Dantrolene:
 - ▶ 2-5 mg/kg 6-8 hours prior to induction or 2-10 mg/kg IV at the onset of anesthesia

11 Epidurals

- ▶ Lumbosacral is target
- ▶ Visual posterior paralysis within 5 minutes
- ▶ 0.5-1 mg/kg 2% Lidocaine +/- Epinephrine reported
- ▶ General Rule of thumb:
 - ▶ 1 mL for 10lb pig
 - ▶ 1.5 inch 18 g needle for 10 lb pig
 - ▶ 3 mL for 60 lb pig
 - ▶ 4 inch x 18 g
 - ▶ 6 mL for 300 lb sow
 - ▶ 10 inch x 18 g
- ▶ 1-1.5 hour of analgesia
 - ▶ Inguinal region and posterior
- ▶ Complications: Pithing leading to paralysis, too far cranial leads to respiratory distress
- ▶ Possible reduction of malignant hyperthermia incidence?
 - ▶
 - ▶

12 Inguinal/Scrotal Hernia

- ▶ "Rupture"
- ▶ Hereditary
 - ▶ Typically see it in crossbred show pigs (anecdotally)
- ▶ Soft tissue swelling (reducible) anterior to and or within the scrotum unilateral or bilateral
 - ▶ Bulge test
- ▶ Ideal age: 2-3 weeks
 - ▶ Still on mom
 - ▶ ~10-25 lbs.
- ▶ If left uncastrated intestinal strangulation may occur
- ▶ LEAVE NO PRISONERS BEHIND!
 - ▶
 - ▶

13 Procedure

- ▶ Epidural
- ▶ Prep (scrub) dorsal recumbency

- ▶ With a 10-hook blade scalpel, excise over the entire length of the hernia to the inguinal ring, just the skin
- ▶ Blunt dissect down to vaginal tunic
- ▶ Exteriorize testicle
- ▶ Milk intestines down and twist the spermatic cord
- ▶ Clamp
- ▶ Ligate using 2-0 monofilament or polydioxanone transfixation ligature below clamp do not cut suture
- ▶ Remove testicle
- ▶ Close inguinal ring/ subcutaneous tissue with attached suture using a simple continuous pattern
- ▶ Continuous Horizontal Mattress for the skin
- ▶ No prisoners left behind
- ▶

14 **Post-op**

- ▶ Plug in on Mom
- ▶ Flunixin Megulamine-s
 - ▶ 2 ml/100 lbs. single IM administration W/D 12 days
- ▶ +/- Swine Ceftiofur(s) or Ampicillin
 - ▶ 1 ml/44 lbs. IM, W/D 14 days

15 **Complications**

- ▶ Intestinal Strangulation
- ▶ Re-herniation
- ▶ Suture reaction
- ▶ Infection

16 **Cryptorchidism**

- 1 ▶ Retained testicle unilateral or bilateral Found during castration
 - ▶ "One nutter"
 - ▶ Client communication: do not castrate normal testicle
 - ▶ Hereditary
 - ▶ Ideal size: 30 lb pig
 - ▶ If left uncastrated or hemi-castrated boar taint occurs

17 **Procedure**

- ▶ Lumbosacral epidural
- ▶ Prep (scrub) dorsal recumbency
- ▶ Skin and abdominal muscle incision with 10 scalpel blade (TENT TENT TENT) paramedian/inguinal approach
 - ▶ 1-2 inches in length
- ▶ Blunt dissect peritoneal layer
- ▶ Brief abdominal explore
- ▶ Testicle typically retains: inguinal ring, medial ventral abdomen, or by kidney
- ▶ Ligate as far anterior as possible using 1-0 to 1 monofilament or polydioxanone transfixation ligature
- ▶ Remove testicle

- ▶ Abdominal muscle layer/inguinal ring simple continuous with 1-0 to 1 monofilament or polydioxanone Skin layer closed in continuous horizontal mattress.
- ▶ Leave no prisoner behind

18 **Post-op**

- ▶ Leave in pen alone or with a buddy that has undergone a procedure of the same size
- ▶ Swine Ceftiofur(s) or Ampicillin
- ▶ Flunixin Megulamine-s

19 **Complications**

- ▶ Herniation
- ▶ Suture reaction
- ▶ Infection

20 **Umbilical hernia**

1 ▶ "Belly bust"

- ▶ Presents: as a soft protruding mass in the umbilical region
 - ▶ Ddx: umbilical hernia vs abscess vs. preputial diverticulitis
 - ▶ Herniation is typically soft, reducible, not warm, and can digitally palpate a opening in the abdomen through the skin. Could ultrasound for confirmation
- ▶ Hereditary/weight increase
- ▶ Ideal weight: 30 lbs.
- ▶ Not fixed: intestinal strangulation recommend cull market roaster pig
- ▶

21 **Procedure**

1 ▶ Mask down with isoflurane (temperature checks q. 5 min)

- ▶ Pre-Med if needed
- ▶ Prep (scrub) dorsal recumbency
- ▶ Lidocaine line block around hernia
- ▶ Elliptical incision around the skin using 10 scalpel blade
- ▶ Blunt dissect until hernia is reached (do not open peritoneal sack!)
- ▶ Reduce hernia into the abdomen
- ▶ Freshen edges (scratch to make them bleed) 0 or 2 depending on size suture continuous, interrupted, or vest over pants
- ▶ Skin layer 1-0 to 1 monofilament or polydioxanone continuous horizontal mattress
- ▶
- ▶
- ▶

22 **Post-op**

- ▶ Oxygen until awake
- ▶ Reversal if needed
- ▶ Swine Ceftiofur(s) or Ampicillin
- ▶ Flunixin Megulamine-s
- ▶ Keep in pen by itself for at least 7 days ideal
- ▶ Limit feed for two weeks



23 **Complications**

- ▶ Failure to close hernia
- ▶ Re-herniation
- ▶ Anesthetic death
- ▶ Infection
- ▶ Suture reaction

24 **Preputial Diverticulectomy**

1

- ▶ "Piss Pocket"
- ▶ Preputial diverticulum
 - ▶ Masturbation pocket in male +/- intact
- ▶ Can cause an infection if not expressing appropriately
- ▶ DDX: Preputial diverticulitis vs. abscess vs. herniation
 - ▶ Preputial diverticulitis: soft swelling above the prepuce, expressible with brown to green malodorous sludge
- ▶ Ideal size: 50-60 lbs.



25 **Procedure – "Open Method"**

1

- ▶ Mask down with isoflurane (temperature checks q. 5 min)
 - ▶ pre med
- ▶ Lavage and express prepuce/diverticulum with dilute iodine (tea color)
- ▶ Prep (scrub) dorsal recumbency
- ▶ Line block dorsal to preputial orifice
- ▶ Distend preputial diverticulum with dilute iodine
- ▶ Excise skin only over distended preputial diverticulum (more dorsal than ventral)
- ▶ Visualize distended preputial diverticulum
- ▶ Blunt dissect around preputial diverticulum separating connective tissue
- ▶ Transfixation ligature around neck of preputial diverticulum 1-0 monofilament or polydioxanone
 - 1-0 monofilament or polydioxanone simple continuous subcutaneous tissue
- ▶ 1-0 monofilament or polydioxanone Continuous horizontal mattress



26 **Procedure – "Closed Method"**

- ▶ Mask down with isoflurane (temperature checks q. 5 min)
 - ▶ pre med
- ▶ Lavage and express prepuce/diverticulum with dilute iodine (tea color)
- ▶ Prep (scrub) dorsal recumbency
- ▶ Distend preputial diverticulum with dilute iodine
- ▶ Place curved hemostat into preputial opening and into the diverticulum, clamp
- ▶ Apply slow gentle traction with multiple clamps until diverticulum is completely removed
- ▶ Place ligature 1-0 monofilament or polydioxanone at the base of it and remove it

- ▶ Replace it.

- ▶

27 **Post-op**

- ▶ Oxygen until awake
- ▶ Reversal if needed
- ▶ +/- Swine Ceftiofur(s) or Ampicillin
- ▶ Flunixin Megulamine-s
- ▶ Keep isolated for at least 7 days

28 **Complications**

- ▶ Incontinence
- ▶ Infection
- ▶ Anesthetic death
- ▶ Suture reaction

29 **Cesarean Section**

- ▶ Indications:
 - ▶ Retained piglet palpable
 - ▶ More than an hour interval
 - ▶ Prolapse vaginally
 - ▶ Historical (littermate bred same had issues)
 - ▶ Client education is HUGE!!
 - ▶ Call quickly on onset or pre-schedule
 - ▶ Expectations
 - ▶ Post operative
 - ▶ Goal: save piglets, get colostrum, and get cull sow price
- ▶

30 **Procedure**

- ▶ Epidural
- ▶ Prep (scrub) Place in lateral recumbency (right or left)
- ▶ Lidocaine line block paramedian dorsal to the mammary chain
- ▶ Excise 10 scalpel blade skin, subcutaneous fat, and abdominal muscle layer
- ▶ Blunt dissect peritoneum (observe peritoneal fluid)
- ▶ Locate uterus and excise over piglet close to uterine bifurcation
- ▶ Go fishing (Cords snapped=hand off, Excise=clamp/knot)
- ▶ Utrecht pattern close uterus with 2 PDS and rinse incision with sterile saline
- ▶ Check birthing canal before closure
- ▶ Simple continuous 3 PDS abdominal muscles and subcutaneous tissue
- ▶ Running horizontal mattress with 3 PDS

31 **Post-op**

- ▶ +/- Oxytocin 1-2 mL
- ▶ Swine Ceftiofur(s) or Ampicillin
- ▶ Flunixin Megulamine-s
 - ▶ Pain control is key!

- ▶ GET HER TO EAT!!!!!!
- ▶ BELLY RUBS!

32 **Complications**

- ▶ Infection/Dehiscence
- ▶ Anorexia
- ▶ Incontinence
- ▶ Unable to milk
- ▶ Unwilling to let pigs nurse
- ▶ Hypovolemia???

33 **Signs to Move to a Terminal C-section**

- ▶ "Been at 'er for 4+ hours doc with the help of my neighbor, wife, brother, sisters cousins uncle... We got one but it was a hard pull"
- ▶ Sow attitude
- ▶ Torn uterus on vaginal exam (friable/spiderweb)
- ▶ Uterine fluid observed with peritoneal fluid
- ▶ Friable uterus on suturing
- ▶
- ▶
- ▶

34 **Ovariohysterectomy, Why?!**

- ▶ Pet pigs
- ▶ Older pigs can develop ovarian tumors
 - ▶ Clinical presentation: vaginal discharge
- ▶ Pyometras also but not as common
- ▶ Hormonal behaviors
- ▶ Mixed gender groups

35 **Ovariohysterectomy**

- 1 ▶ General anesthesia
- ▶ Dorsal recumbency
- ▶ Incise ventral midline between caudal 1st- 3rd teat
- ▶ TENT TENT TENT
- ▶ Spay hook for uterus
- ▶ There is no ligament to break down
- ▶ Ligate each ovarian pedicle close to broad ligament as possible (monofilament or polydioxanone)
 - ▶ Can also be done with a Ligasure
- ▶ Ligate utero-ovarian artery
 - ▶ And any other blood vessel you question.
- ▶ Ligate uterine body and uterine artery separately!!
- ▶ Close using muscle layers (monofilament or polydioxanone) simple continuous and Continuous Horizontal Mattress (monofilament or Polydioxanone)

36 **Complications**

- ▶ GI Stasis
- ▶ Dehiscence
- ▶ Internal Hemorrhage
- ▶ Seroma
- ▶ Herniation
- ▶

37 **Castration-Show pig/Conventional**

- 1 Show pig
- 2 ▶ Prescrotal incision
 - ▶ Blunt dissect down to spermatic cord
 - ▶ Exteriorize testicle
 - ▶ Excise if small
 - ▶ Ligate/excise if greater than 30 lbs.
- 3 Conventional
- 4 ▶ Scrotal incision
 - ▶ Exteriorize testicles
 - ▶ Pull if small

38 **Neuter**

- ▶ General anesthesia or lumbosacral epidural
- ▶ Dorsal recumbency
- ▶ Pre-scrotal incision
- ▶ Exteriorize testicles
- ▶ Place ligature around each testicular cord
- ▶ Palpate inguinal ring and close if open
- ▶ Close: subcutaneous dead space (monofilament or polydioxanone) simple continuous and skin horizontal continuous mattress (monofilament or polydioxanone)
- ▶

39 **Complications**

- ▶ Herniation
- ▶ "Serous" cord
- ▶ Urinary retention
- ▶

40 **Odds and ends Requiring Anesthesia/Analgesia**

- ▶ Foot trim
- ▶ Third dew claw removal

41 **GI Stasis**

42 **Intestinal ileus**

- ▶ Initial complaint
 - ▶ Vocalizing when defecating
 - ▶ Straining to defecate
 - ▶ Small hard pebbles

- ▶ Vomiting
- ▶ History
 - ▶ "Was in the trash"
 - ▶ "New toy"
 - ▶ "New environment" "New Food"
 - ▶ "Surgery" "Pain" "Injury"
 - ▶ "I blinked at it wrong"
- ▶ Differential: True intestinal ileus vs. obstruction
 - ▶

43 Intestinal ileus

- ▶ Radiograph!!!!!!!
- ▶ +/- Blood work
- ▶ If obstructed: surgery
- ▶ If ileus/obstipated:
 - ▶ Stool softeners, MiraLAX, pumpkin, isotonic oral fluids
 - ▶ Enema
 - ▶ Metoclopramide 0.4mg/kg PO for three days

44 Gastric Ulcers

45 Gastric Ulcers

- 1 ▶ Rapid feed changes
- ▶ Prolonged NSAID/Steroidal Use
- ▶ Diagnostics:
 - ▶ Fecal occult test
 - ▶ Blood work
 - ▶ GI scope
- ▶ Treatment:
 - ▶ Bland large particle diet, a slow transition back to a normal diet
 - ▶ Repair perforated ulcer If caught in time/value
 - ▶ Omeprazole 40 mg/pig PO

46 Vaccinations

47 Note on Vaccinations

- ▶ Assume the worst
- ▶ Goal is shared exposure: show pigs
- ▶ Vaccinate per label instructions

48 Pot-Belly/Pet Pigs-Core

- ▶ Can add leptos/Parvo if breeding stock and administer pre-breeding
 - ▶ Leptospirosis and Parvovirus
- ▶ Rabies (extra label) dependent on State requirements if exposure in Iowa still would be Euthanized.

49 Show Pigs-Core

- ▶ Influenza type A
 - ▶ Based on Show Requirements
- ▶ PRRSv
 - ▶ Porcine respiratory and Reproductive Virus
 - ▶ At weaning or at purchase +/- mid summer booster
- ▶ Lepto (6 way)
 - ▶ Leptospirosis
 - ▶ Check show requirements

50 **Other Vaccinations**

- ▶ Lawsonia intracellularis
- ▶ Haemophilus parasuis
- ▶ Salmonella
- ▶ Streptococcus suis,
- ▶ E.coli
- ▶ Rota/Coronavirus

51 **Parasites**

52 **Parasite Control**

- ▶ There is no one size fits all
- ▶ No prescription required
 - ▶ But veterinary insight can be warranted on strategy
- ▶ Must be used in conjunction with clean environment, proper nutrition, etc.
- ▶ Fecal samples helpful for diagnosis and targeted therapy
- ▶ Follow labeled directions
 - ▶ EPA vs. FDA
 - ▶ Topicals=EPA, FDA=injectable/oral products
 - ▶ Animal vs. Barn
- ▶

53

54 **Parasite Control**

- ▶ Internal or "De-worming" schedule
 - ▶ Outdoor pigs have an increased risk compared to indoor conventional
 - ▶ Adult pigs (non-gestating) - every 6 months
 - ▶ Gestating adult pigs- 2-3 weeks prior to farrowing
 - ▶ Growing pig (8+ weeks)- Once every 2 months
- ▶
- ▶ Follow label instructions
- ▶

55

56 **Parasite Control**

- ▶ External Parasite control schedule

- ▶ On arrival
- ▶ As needed
- ▶ Follow label Instructions

57 **Nutrition**

58 **Nutrition**

- ▶ Balance is key!
- ▶ Slow gradual changes
- ▶ Particle size
 - ▶ 700 microns minimum
- ▶ Consult a Nutritionist!!

59 **Nutrition-pet pig**

- ▶ Neonatal:
 - ▶ Commercial milk replacer or 2%/Whole milk
 - ▶ 1 ounce every 4-6 hours from a bottle
- ▶ Conversion to feed takes 14 days
- ▶ Growing pig <8 months of age
 - ▶ Growing pig-formulated POT BELLY Pig Diet
- ▶ Adult pig >8 months of age
 - ▶ Maintenance pot belly pig diet
- ▶ Snacks include
 - ▶ Lettuce, various vegetables, grass, grass hay
- ▶ Treats include
 - ▶ Fruit
- ▶ Remember NO GARBAGE FEEDING

60 **Citations**

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61 **Questions**

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