



Examples of Sedative, Anaesthetic, and Pain Management Protocols for Healthy Horses, Cattle, and Swine

- Sedative, anaesthetic, and pain management protocols should be tailored to the needs of each animal or group of animals, and integrated into a single, seamless plan that minimizes anaesthetic risk and ensures effective pain management.
- A qualified veterinarian or veterinary technician should monitor animals closely throughout the perioperative period.
- Perioperative analgesic requirements vary considerably from animal to animal. Pain should be reassessed at frequent intervals and analgesic therapy adjusted accordingly. Response to therapy is a valid way to assess pain.
- Effective management of perioperative pain reduces the incidence of complications and improves outcome.
- Standard reference texts should be consulted to confirm doses and to provide more detailed explanations of specific anaesthetic protocols and techniques.

HORSES

SURGICAL PROCEDURE	PREOPERATIVE MANAGEMENT	INTRAOPERATIVE MANAGEMENT	POSTOPERATIVE MANAGEMENT	COMMENTS
CASTRATION (example 1)	Premedication • Xylazine: 1.0 mg/kg, IV	Induction • Diazepam: 0.04-0.06 mg/kg, IV • Ketamine: 2.0-2.5 mg/kg, IV Maintenance • Xylazine: 0.5 mg/kg, IV • Ketamine: 1.0 mg/kg, IV Spermatic cord or testicular block • 2.0% lidocaine: 10-15 mL/site	• Ketoprofen: 2.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • Smooth induction with good intraoperative muscle relaxation
CASTRATION (example 2)	Premedication • Xylazine: 1.0 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	Induction • Ketamine: 2.0-2.5 mg/kg, IV Maintenance • Xylazine: 0.5 mg/kg, IV • Ketamine: 1.0 mg/kg, IV Spermatic cord or testicular block 2.0% mepivacaine: 10-15 mL/site	• Flunixin: 1.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • Reliable preoperative sedation
REPAIR OF INGUINAL OR UMBILICAL HERNIA	Premedication • Xylazine: 0.6-0.8 mg/kg, IV	Induction • Diazepam: 0.04-0.06 mg/kg, IV • Ketamine: 2.0-2.5 mg/kg, IV • Isoflurane: 3.0% Maintenance • Isoflurane: 1.0-2.0%	• Xylazine: 0.3-0.4 mg/kg, IM immediately before recovery • Ketoprofen: 2.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • Smooth induction with better intraoperative muscle relaxation
DENTISTRY WITH EXTRACTION OF MAXILLARY WOLF TEETH	Sedation • Xylazine: 0.4-0.8 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	Infraorbital nerve block • 2.0% lidocaine: 3-5 mL/site	• Ketoprofen: 2.0 mg/kg, IM	• Multimodal analgesic therapy • Reliable sedation with significant muscle relaxation and ataxia
REPAIR OF PERINEAL LACERATION (example 1)	Sedation • Detomidine: 0.01-0.02 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	Epidural anaesthesia (first intercoccygeal space) • 2.0% lidocaine: 1.0 mL/100 kg	• Ketoprofen: 2.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • Profound sedation with significant muscle relaxation and ataxia
REPAIR OF PERINEAL LACERATION (example 2)	Sedation • Romifidine: 0.04-0.08 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	Epidural anaesthesia (first intercoccygeal space) 2.0% mepivacaine: 1.0 mL/100 kg	• Flunixin: 1.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • Reliable sedation with limited muscle relaxation and ataxia

SOME OF THESE DRUGS ARE NOT APPROVED FOR USE IN HORSES IN CANADA
Dosage calculations are based on lean body weight
Appropriate withdrawal times should be observed after administration of anaesthetic and analgesic drugs.

CATTLE

SURGICAL PROCEDURE	PREOPERATIVE MANAGEMENT	INTRAOPERATIVE MANAGEMENT	POSTOPERATIVE MANAGEMENT	COMMENTS
DEHORNING in calves under 6 months of age	Sedation • Xylazine: 0.1-0.2 mg/kg, IM	Cornual nerve block • 2.0% lidocaine: 3-5 mL/site.	• Ketoprofen: 3.0 mg/kg, IM	• Multimodal analgesic therapy • This protocol can be used in older calves if the dose of xylazine is modified to provide adequate sedation
CASTRATION in calves under 6 months of age	Sedation • Xylazine: 0.1-0.2 mg/kg, IM	Scrotal block • 2.0% lidocaine: 3-5 mL/site Spermatic cord or testicular block • 2.0% lidocaine: 5-10 mL/site	• Ketoprofen: 3.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • This protocol can be used in older calves if the dose of xylazine is modified to provide adequate sedation
REPAIR OF UMBILICAL HERNIA in calves under 3 months of age (example 1)	Sedation • Xylazine: 0.1-0.2 mg/kg, IM	Epidural anaesthesia (lumbosacral space) • 2.0% lidocaine: 1-2 mL/10 kg	• Ketoprofen: 3.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • Epidural administration of lidocaine may cause vasodilation and hypotension
REPAIR OF UMBILICAL HERNIA in calves under 3 months of age (example 2)	Premedication • Xylazine: 0.05-0.1 mg/kg, IM	Induction • Diazepam: 0.1 mg/kg, IV • Ketamine: 3.0 mg/kg, IV • Isoflurane: 3.0% Maintenance • Isoflurane: 1.0-2.0%	• Flunixin: 2.0 mg/kg, IM once daily for 1-3 days	• Multimodal analgesic therapy • Placement of a cuffed endotracheal tube is required to prevent regurgitation and aspiration of rumen contents
FLANK OMENTOPEXY OR RUMENOTOMY (example 1)	Sedation • Xylazine: 0.04-0.06 mg/kg, IM	Proximal paravertebral nerve block (proximal branches of T13, L1, and L2) • 2.0% lidocaine: 10-20 mL/site	• Ketoprofen: 3.0 mg/kg, IM once daily for 3-5 days	• Multimodal analgesic therapy
FLANK OMENTOPEXY OR RUMENOTOMY (example 2)	Sedation • Xylazine: 0.04-0.06 mg/kg, IM	Distal paravertebral nerve block (distal branches of T13, L1, and L2) • 2.0% lidocaine: 10-20 mL/site	• Flunixin: 2 mg/kg, IM once daily for 3-5 days	• Multimodal analgesic therapy
CAESAREAN SECTION in standing patients (example 1)	Sedation • Xylazine: 0.04-0.06 mg/kg, IM	Proximal paravertebral nerve block (proximal branches of T13, L1, and L2) • 2.0% lidocaine: 10-20 mL/site Epidural anaesthesia (first intercoccygeal space) • 2.0% lidocaine: 1.0 mL/100 kg	• Ketoprofen: 3.0 mg/kg, IM once daily for 3-5 days	• Multimodal analgesic therapy • Epidural anaesthesia limits straining and the tendency to lie down when the calf enters the birth canal
CAESAREAN SECTION in re-cumbent patients (example 2)	Sedation • Xylazine: 0.04-0.06 mg/kg, IM	Epidural anaesthesia (lumbosacral space) • 2.0% lidocaine: 6-8 mL/100 kg	• Flunixin: 2 mg/kg, IM once daily for 3-5 days	• Multimodal analgesic therapy • Epidural administration of lidocaine may cause vasodilation and hypotension

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SWINE

SURGICAL PROCEDURE	PREOPERATIVE MANAGEMENT	INTRAOPERATIVE MANAGEMENT	POSTOPERATIVE MANAGEMENT	COMMENTS
CRYPTORCHID CASTRATION AND INGUINAL HERNIA REPAIR in pigs between 2 and 4 weeks of age (example 1)	Premedication • Azaperone: 1.0-2.0 mg/kg, IM	Induction • Thiopental: 8-12 mg/kg, IV to effect Inguinal block • 2.0% lidocaine: 0.4-0.6 mL/site	• Ketoprofen: 3.0 mg/kg, IM • Pigs should be isolated and kept warm and dry until they are alert and able to nurse	• Multimodal analgesic therapy • Perivascular administration of thiopental causes severe tissue irritation • The total dose of lidocaine should not exceed 10 mg/kg • These drugs are approved for use in swine
CRYPTORCHID CASTRATION AND INGUINAL HERNIA REPAIR in pigs between 2 and 4 weeks of age (example 2)	Premedication • Midazolam: 0.2-0.4 mg/kg, IM • Butorphanol: 0.2-0.4 mg/kg, IM	Induction • Ketamine: 10-20 mg/kg, IM Inguinal block • 2.0% lidocaine: 0.4-0.6 mL/site	• Ketoprofen: 3.0 mg/kg, IM • Pigs should be isolated and kept warm and dry until they are alert and able to nurse	• Multimodal analgesic therapy • Low-dose ketamine (10 mg/kg) produces immobilization, and high-dose ketamine (20 mg/kg) produces anaesthesia • The total dose of lidocaine should not exceed 10 mg/kg
BOAR CASTRATION (example 1)	Premedication • Azaperone: 0.5-1.0 mg/kg, IM	Induction • Thiopental: 4-6 mg/kg, IV to effect Spermatic cord or testicular block • 2.0% lidocaine: 10-15 mL/site	• Ketoprofen: 3.0 mg/kg, IM	• Multimodal analgesic therapy • Perivascular administration of thiopental causes severe tissue irritation • These drugs are approved for use in swine
BOAR CASTRATION (example 2)	Premedication • Medetomidine: 0.02-0.04 mg/kg, IM • Butorphanol: 0.1-0.2 mg/kg, IM	Induction • Ketamine: 5-10 mg/kg, IM Spermatic cord or testicular block • 2.0% lidocaine: 10-15 mL/site	• Ketoprofen: 3.0 mg/kg, IM	• Multimodal analgesic therapy • Low-dose ketamine (5 mg/kg) produces immobilization, and high-dose ketamine (10 mg/kg) produces anaesthesia
CAESAREAN SECTION (example 1)	Premedication • Azaperone: 0.5-1.0 mg/kg, IM	Induction • Thiopental: 4-6 mg/kg, IV to effect Epidural anaesthesia (lumbosacral space) • 2.0% lidocaine: 8-10 mL/100 kg	• Ketoprofen: 3.0 mg/kg, IM once daily for 3-5 days	• Multimodal analgesic therapy • Perivascular administration of thiopental causes severe tissue irritation • Epidural administration of lidocaine may cause vasodilation and hypotension • These drugs are approved for use in swine
CAESAREAN SECTION (example 2)	Premedication • Midazolam: 0.1-0.2 mg/kg, IM • Butorphanol: 0.1-0.2 mg/kg, IM	Induction • Ketamine: 5-10 mg/kg, IM Epidural anaesthesia (lumbosacral space) • 2.0% lidocaine: 8-10 mL/100 kg	• Ketoprofen: 3.0 mg/kg, IM once daily for 3-5 days	• Multimodal analgesic therapy • Low-dose ketamine (5 mg/kg) produces immobilization, and high-dose ketamine (10 mg/kg) produces anaesthesia • Epidural administration of lidocaine may cause vasodilation and hypotension

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