

# HORSES

SURGICAL PROCEDURE	PREOPERATIVE MANAGEMENT	INTRAOPERATIVE MANAGEMENT	POSTOPERATIVE MANAGEMENT	COMMENTS
<b>CASTRATION (example 1)</b>	<b>Premedication</b> • Xylazine: 1.0 mg/kg, IV	<b>Induction</b> • Diazepam: 0.04-0.06 mg/kg, IV • Ketamine: 2.0-2.5 mg/kg, IV <b>Maintenance</b> • Xylazine: 0.5 mg/kg, IV • Ketamine: 1.0 mg/kg, IV <b>Spermatic cord or testicular block</b> • 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
<b>CASTRATION (example 2)</b>	<b>Premedication</b> • Xylazine: 1.0 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	<b>Induction</b> • Ketamine: 2.0-2.5 mg/kg, IV <b>Maintenance</b> • Xylazine: 0.5 mg/kg, IV • Ketamine: 1.0 mg/kg, IV <b>Spermatic cord or testicular block</b> 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
<b>REPAIR OF INGUINAL OR UMBILICAL HERNIA</b>	<b>Premedication</b> • Xylazine: 0.6-0.8 mg/kg, IV	<b>Induction</b> • Diazepam: 0.04-0.06 mg/kg, IV • Ketamine: 2.0-2.5 mg/kg, IV • Isoflurane: 3.0% <b>Maintenance</b> • 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
<b>DENTISTRY WITH EXTRACTION OF MAXILLARY WOLF TEETH</b>	<b>Sedation</b> • Xylazine: 0.4-0.8 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	<b>Infraorbital nerve block</b> • 2.0% lidocaine: 3-5 mL/site	• Ketoprofen: 2.0 mg/kg, IM	• Multimodal analgesic therapy • Reliable sedation with significant muscle relaxation and ataxia
<b>REPAIR OF PERINEAL LACERATION (example 1)</b>	<b>Sedation</b> • Detomidine: 0.01-0.02 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	<b>Epidural anaesthesia (first intercocygeal space)</b> • 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
<b>REPAIR OF PERINEAL LACERATION (example 2)</b>	<b>Sedation</b> • Romifidine: 0.04-0.08 mg/kg, IV • Butorphanol: 0.02-0.04 mg/kg, IV	<b>Epidural anaesthesia (first intercocygeal space)</b> 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

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

## CATTLE

SURGICAL PROCEDURE	PREOPERATIVE MANAGEMENT	INTRAOPERATIVE MANAGEMENT	POSTOPERATIVE MANAGEMENT	COMMENTS
<b>DEHORNING in calves under 6 months of age</b>	<b>Sedation</b> • Xylazine: 0.1-0.2 mg/kg, IM	<b>Cornual nerve block</b> • 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
<b>CASTRATION in calves under 6 months of age</b>	<b>Sedation</b> • Xylazine: 0.1-0.2 mg/kg, IM	<b>Scrotal block</b> • 2.0% lidocaine: 3-5 mL/site <b>Spermatic cord or testicular block</b> • 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
<b>REPAIR OF UMBILICAL HERNIA in calves under 3 months of age (example 1)</b>	<b>Sedation</b> • Xylazine: 0.1-0.2 mg/kg, IM	<b>Epidural anaesthesia</b> (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
<b>REPAIR OF UMBILICAL HERNIA in calves under 3 months of age (example 2)</b>	<b>Premedication</b> • Xylazine: 0.05-0.1 mg/kg, IM	<b>Induction</b> • Diazepam: 0.1 mg/kg, IV • Ketamine: 3.0 mg/kg, IV • Isoflurane: 3.0% <b>Maintenance</b> • 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
<b>FLANK OMENTOPEXY OR RUMENOTOMY (example 1)</b>	<b>Sedation</b> • Xylazine: 0.04-0.06 mg/kg, IM	<b>Proximal paravertebral nerve block</b> (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
<b>FLANK OMENTOPEXY OR RUMENOTOMY (example 2)</b>	<b>Sedation</b> • Xylazine: 0.04-0.06 mg/kg, IM	<b>Distal paravertebral nerve block</b> (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
<b>CAESAREAN SECTION in standing patients (example 1)</b>	<b>Sedation</b> • Xylazine: 0.04-0.06 mg/kg, IM	<b>Proximal paravertebral nerve block</b> (proximal branches of T13, L1, and L2) • 2.0% lidocaine: 10-20 mL/site <b>Epidural anaesthesia</b> (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
<b>CAESAREAN SECTION in recumbent patients (example 2)</b>	<b>Sedation</b> • Xylazine: 0.04-0.06 mg/kg, IM	<b>Epidural anaesthesia</b> (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

SOME OF THESE DRUGS ARE NOT APPROVED FOR USE IN CATTLE IN CANADA

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Appropriate withdrawal times should be observed after administration of anaesthetic and analgesic drugs

- 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.



SURGICAL PROCEDURE	PREOPERATIVE MANAGEMENT	INTRAOPERATIVE MANAGEMENT	POSTOPERATIVE MANAGEMENT	COMMENTS
<b>CRYPTORCHID CASTRATION AND INGUINAL HERNIA REPAIR in pigs between 2 and 4 weeks of age (example 1)</b>	<b>Premedication</b> • Azaperone: 1.0-2.0 mg/kg, IM	<b>Induction</b> • Thiopental: 8-12 mg/kg, IV to effect <b>Inguinal block</b> • 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 • <b>These drugs are approved for use in swine</b>
<b>CRYPTORCHID CASTRATION AND INGUINAL HERNIA REPAIR in pigs between 2 and 4 weeks of age (example 2)</b>	<b>Premedication</b> • Midazolam: 0.2-0.4 mg/kg, IM • Butorphanol: 0.2-0.4 mg/kg, IM	<b>Induction</b> • Ketamine: 10-20 mg/kg, IM <b>Inguinal block</b> • 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
<b>BOAR CASTRATION (example 1)</b>	<b>Premedication</b> • Azaperone: 0.5-1.0 mg/kg, IM	<b>Induction</b> • Thiopental: 4-6 mg/kg, IV to effect <b>Spermatic cord or testicular block</b> • 2.0% lidocaine: 10-15 mL/site	• Ketoprofen: 3.0 mg/kg, IM	• Multimodal analgesic therapy • Perivascular administration of thiopental causes severe tissue irritation • <b>These drugs are approved for use in swine</b>
<b>BOAR CASTRATION (example 2)</b>	<b>Premedication</b> • Medetomidine: 0.02-0.04 mg/kg, IM • Butorphanol: 0.1-0.2 mg/kg, IM	<b>Induction</b> • Ketamine: 5-10 mg/kg, IM <b>Spermatic cord or testicular block</b> • 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
<b>CAESAREAN SECTION (example 1)</b>	<b>Premedication</b> • Azaperone: 0.5-1.0 mg/kg, IM	<b>Induction</b> • Thiopental: 4-6 mg/kg, IV to effect <b>Epidural anaesthesia</b> (lumbo-sacral 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 • <b>These drugs are approved for use in swine</b>
<b>CAESAREAN SECTION (example 2)</b>	<b>Premedication</b> • Midazolam: 0.1-0.2 mg/kg, IM • Butorphanol: 0.1-0.2 mg/kg, IM	<b>Induction</b> • Ketamine: 5-10 mg/kg, IM <b>Epidural anaesthesia</b> (lumbo-sacral 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

SOME OF THESE DRUGS ARE NOT APPROVED FOR USE IN SWINE IN CANADA

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Appropriate withdrawal times should be observed after administration of anaesthetic and analgesic drugs