### Horses

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<td>CASTRATION (example 1)</td>
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<td><em>Multimodal analgesic therapy</em></td>
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<td></td>
<td>Premedication</td>
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<td>Smooth induction with good intraoperative muscle relaxation</td>
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<td></td>
<td>• Xylazine: 1.0 mg/kg, IV</td>
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<td>CASTRATION (example 2)</td>
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<td></td>
<td>Premedication</td>
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<td></td>
<td>Reliable preoperative sedation</td>
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<td></td>
<td>• Xylazine: 1.0 mg/kg, IV</td>
<td>• Butorphanol: 0.02-0.04 mg/kg, IV</td>
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<td>REPAIR OF INGUINAL OR UMBILICAL HERNIA</td>
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<td>Smooth induction with better intraoperative muscle relaxation</td>
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<tr>
<td></td>
<td>• Xylazine: 0.6-0.8 mg/kg, IV</td>
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<td>DENTISTRY WITH EXTRACTION OF MAXILLARY WOLF TEETH</td>
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<td>SEDATION</td>
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<td>Reliable sedation with significant muscle relaxation and ataxia</td>
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<tr>
<td></td>
<td>• Xylazine: 0.4-0.8 mg/kg, IV</td>
<td>• Butorphanol: 0.02-0.04 mg/kg, IV</td>
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<tr>
<td>REPAIR OF PERINEAL LACERATION (example 1)</td>
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<td><em>Multimodal analgesic therapy</em></td>
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<tr>
<td>SEDATION</td>
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<td></td>
<td></td>
<td>Profound sedation with significant muscle relaxation and ataxia</td>
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<td></td>
<td>• Detomidine: 0.01-0.02 mg/kg, IV</td>
<td>• Butorphanol: 0.02-0.04 mg/kg, IV</td>
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<td>REPAIR OF PERINEAL LACERATION (example 2)</td>
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<tr>
<td>SEDATION</td>
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<td></td>
<td>Reliable sedation with limited muscle relaxation and ataxia</td>
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<td></td>
<td>• Remifidine: 0.04-0.08 mg/kg, IV</td>
<td>• Butorphanol: 0.02-0.04 mg/kg, IV</td>
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*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**

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</table>
| **DEHORNING in calves under 6 months of age** | Sedation                | Cornual nerve block       | Ketoprofen               | • Multimodal analgesic therapy  
• This protocol can be used in older calves if the dose of xylazine is modified to provide adequate sedation |
|  &nbsp;  | Xylazine: 0.1-0.2 mg/kg, IM | 2.0% lidocaine: 3-5 mL/site. | 3.0 mg/kg, IM |  |
| **Castration in calves under 6 months of age** | Sedation                | Scrotal block             | Ketoprofen               | • Multimodal analgesic therapy  
• This protocol can be used in older calves if the dose of xylazine is modified to provide adequate sedation |
|  &nbsp;  | Xylazine: 0.1-0.2 mg/kg, IM | 2.0% lidocaine: 3-5 mL/site | 3.0 mg/kg, IM once daily for 1-3 days |  |
| **Repair of umbilical hernia in calves under 3 months of age (example 1)** | Sedation                | Epidural anaesthesia      | Ketoprofen               | • Multimodal analgesic therapy  
• Epidural administration of lidocaine may cause vasodilation and hypotension |
|  &nbsp;  | Xylazine: 0.1-0.2 mg/kg, IM | (lumbosacral space) 2.0% lidocaine: 1-2 mL/10 kg | 3.0 mg/kg, IM once daily for 1-3 days |  |
| **Repair of umbilical hernia in calves under 3 months of age (example 2)** | Premedication            | Induction                 | Flunixin                 | • Multimodal analgesic therapy  
• Placement of a cuffed endotracheal tube is required to prevent regurgitation and aspiration of rumen contents |
|  &nbsp;  | Xylazine: 0.05-0.1 mg/kg, IM | Diazepam: 0.1 mg/kg, IV  
Ketamine: 3.0 mg/kg, IV  
Isoflurane: 3.0%  
Maintenance  
Isoflurane: 1.0-2.0% | 2.0 mg/kg, IM once daily for 1-3 days |  |
| **Flank omentoectomy or rumenotomy (example 1)** | Sedation                | Proximal paravertebral nerve block | Ketoprofen               | • Multimodal analgesic therapy  
• Epidural anaesthesia limits straining and the tendency to lie down when the calf enters the birth canal |
|  &nbsp;  | Xylazine: 0.04-0.06 mg/kg, IM | (proximal branches of T13, L1, and L2) 2.0% lidocaine: 10-20 mL/site | 3.0 mg/kg, IM once daily for 3-5 days |  |
| **Flank omentoectomy or rumenotomy (example 2)** | Sedation                | Distal paravertebral nerve block | Flunixin                 | • Multimodal analgesic therapy  
• Epidural administration of lidocaine may cause vasodilation and hypotension |
|  &nbsp;  | Xylazine: 0.04-0.06 mg/kg, IM | (distal branches of T13, L1, and L2) 2.0% lidocaine: 10-20 mL/site | 2 mg/kg, IM once daily for 3-5 days |  |
| **Caesarean section in standing patients (example 1)** | Sedation                | Proximal paravertebral nerve block | Ketoprofen               | • Multimodal analgesic therapy  
• Epidural anaesthesia limits straining and the tendency to lie down when the calf enters the birth canal |
|  &nbsp;  | Xylazine: 0.04-0.06 mg/kg, IM | (proximal branches of T13, L1, and L2) 2.0% lidocaine: 10-20 mL/site | 3.0 mg/kg, IM once daily for 3-5 days |  |
| **Caesarean section in recumbent patients (example 2)** | Sedation                | Epidural anaesthesia      | Flunixin                 | • Multimodal analgesic therapy  
• Epidural administration of lidocaine may cause vasodilation and hypotension |
|  &nbsp;  | Xylazine: 0.04-0.06 mg/kg, IM | (lumbosacral space) 2.0% lidocaine: 1.0 mL/100 kg | 2 mg/kg, IM once daily for 3-5 days |  |

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

Dosage calculations are based on lean body weight

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.

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| 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 (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 vasodilatation 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 (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 vasodilatation and hypotension |