

## Drug Chart for Castration Procedure

<b>Drug</b>	<b>Concentration</b>	<b>Dose (mg/kg)</b>	<b>Dosage (example calculation Weight of animal 200kg)</b>	<b>Indication</b>	<b>Withdrawal time</b>
Lidocaine	20mg/ ml (2%)	2mg/kg	$2 \times 200 / 20 = 20$ mls / 4 = 5 mls per site	100% nerve block. Short acting local anesthetic. Used as an injection for spermatic cord & testicles and as an epidural block Effective for 45 to 90 minutes Do not exceed 10 mg/kg	Meat or milk - 24 hrs
Xylazine (Alpha-2 agonist)	20mg/ ml (2%)	0.05mg/kg	$0.05 \times 200 / 20 = 0.5$ mls	Preanesthetic medication given IV or IM Provides analgesia for a few hours	Meat - 14 d Milk - 48 hrs
Ketamine	100mg/mg (10%)	1mg/kg	$1 \times 200 / 100 = 2$ mls	Sedation given IV or IM	Meat - 3d Milk - 24 hrs
Tolazoline	100mg/ml	0.1mg/kg	$0.1 \times 200 / 100 = 0.2$ ml	Reversal agent for Xylazine	-
Penstrep	200,000IU	20,000IU	$2 \times 200 / 20 = 5$ mls	Antibiotic given IM to prevent infection	30 d
Flunixin meglumine	50mg/ml	1.1mg/kg	$1.1 \times 200 / 50 = 4.4$ mls	NSAID Given IV for fever and inflammation associated with endotoxemia	Meat - 4 d Milk - 72 hrs
Ketoprofen	100mg/ml	3mg/kg	$3 \times 200 / 100 = 6$ mls	NSAID	Meat - 24 hrs

				Given IV or IM for fever, pain and inflammation	
Meloxicam	120mg/ml	0.5mg/kg	$0.5 \times 200 / 20 = 5$ mls	NSAID Given SC or IV for pain relief and inflammation	Meat - 15 days Milk - 5 days

### Combination drugs that are used:

- ❖ Anesthetic drugs.
  - An anesthetic drug blocks all sensation, so the animal feels no pain.
  - There is local and general anesthetics.
  - Anaesthetics should be injected 5 to 20 minutes before the onset of castration surgery. This gives the drug time to take effect and the animal feels no pain or discomfort during the surgery.
  - Postoperative pain management for several hours is achieved with this.
  - Eg. Lidocaine
  
- ❖ Analgesic drugs.
  - An analgesic drug eliminates pain temporarily but other sensations are still felt.
  - Should be given before the surgery
  - Lasts longer than anesthetics and gives pain relief for roughly 4 days after the surgery
  - Eg. NSAISs such as Meloxicam
  
- ❖ Therefore a combination of both anaesthesia and analgesia allows for the best form of pain management intra and postoperatively. The following are some combinations:
  - Lidocaine + Flunixin meglumine
    - For analgesia
  
  - Xylazine epidural + IV Flunixin meglumine
    - For caudal epidurals
  
  - IV Xylazine + Ketamine
    - For sedation.
    - This reduces stress and serum cortisol concentrations after castration
  
  - Ketoprofen + local anesthetic (Xylazine)
    - For analgesia.

- This allows for prolonged postoperative analgesia and a decreased level of cortisol once it is given preoperatively.
- Sodium salicylate + sedation drugs (Xylazine, Ketamine, Butorphanol given IM)
  - For analgesia.
  - This reduces the cortisol response observed with castration
- Meloxicam (NSAID) + Local anesthetic
  - For pain mitigation and stress

## **References**

- 1) Welfare Implications of Castration of Cattle [Internet]. American Veterinary Medical Association. [cited 2020Oct11]. Available from: <https://www.avma.org/resources-tools/literature-reviews/welfare-implications-castration-cattle>
- 2) Pain Mitigation [Internet]. Pain Mitigation - Beef Cattle Research Council. [cited 2020Oct12]. Available from: [http://www.beefresearch.ca/research-topic.cfm/pain-mitigation-81?utm\\_source=beefresearch.ca/pain&utm\\_medium=redirect&utm\\_campaign=Pain%20Mitigation#drugstable](http://www.beefresearch.ca/research-topic.cfm/pain-mitigation-81?utm_source=beefresearch.ca/pain&utm_medium=redirect&utm_campaign=Pain%20Mitigation#drugstable)
- 3) VetFolio. [cited 2020Oct12]. Available from: <https://www.vetfolio.com/learn/article/pharmacokinetics-of-intravenous-and-oral-meloxicam-in-ruminant-calves>