**Drug Use in Open Castration procedure:**

**Ketamine stun (Xylazine/Ketamine)**

Administered intramuscularly in order to induce sedation in the animals and also for its analgesic effects. This eliminates the risk of the calf experiencing pain during the procedure, hence reducing the risk of potential harm being inflicted to itself and the attending surgeon. It has a rapid onset, taking effect after 2-3 minutes, with maximum effect being reached at around 5 minutes. It has a reasonable period of duration of 1 – 1½ hours.

**Banamine (Flunixin meglumine)**

This drug is used for pain relief, which lasts for approximately 1 hour post operation. Though temporary, it minimizes the level of pain the patient experienced post-procedure. It is given intravenously for a more rapid effect.

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**2% Lidocaine**

One of the most widely used anaesthetic drugs in veterinary medicine, it has a relatively short time of onset and a considerable period of duration (2-3hrs). It is used as a local anaesthetic agent in the scrotal area for this castration method.

**Penicillin-Streptomycin (Pen-Strep)**

This formulation contains two potent antibiotics that work to protect the patient against infections that may take place post-op. After it is given intramuscularly, it works systemically to prevent/minimize the action of Gram-negative and Gram-positive bacteria by impairing cell wall synthesis and protein synthesis respectively. It should be noted that cattle meant for human consumption should not be slaughtered within the 21 days of withdrawal time for Pen-Strep

The calculations for certain **emergency drugs** were also done in the event of a sudden medical emergency arises:

**Epinephrine**

Administered intravenously in the event of an anaphylactic episode during the operation, which is typically characterized by hypotension, tachycardia, syncope and involuntary voiding of faeces and urine.

**Atropine**

An anti-cholinergic agent, it works on the muscarinic receptors to prevent their overstimulation by acetylcholine (ACh) that may manifests into symptoms such as increased heart rate and blood pressure. These can prove to be detrimental during surgery.

**Tolazoline**

Reverses the effects of tolazoline, bringing patient out of its sedative state, reducing or eliminating the duration for post-op observation.