



STANDARD OPERATING PROCEDURE 104 SMALL RUMINANT ANALGESIA

1. PURPOSE

This Standard Operating Procedure (SOP) intends to describe methods of assessing pain in ruminants and mitigating pain by administering analgesic medications.

2. RESPONSIBILITY

Principal investigator (PI) and their research staff.

3. GENERAL CONSIDERATIONS

- 3.1. A procedure expected to be painful in humans is considered painful in animals.
 - 3.2. When there is a question of whether a procedure is painful, the animal should benefit from analgesia.
 - 3.3. Analgesia should be provided at an appropriate dose and frequency to control pain.
 - 3.4. Any deviation from this procedure must be justified by the investigator and approved by the BGU ethical committee.
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4. PAIN RECOGNITION AND ASSESSMENT

- 4.1. Adapt the observation frequency to the procedure's invasiveness (minimum once a day).
 - 4.2. Start by observing the animal from a distance, so the observer's presence does not alter the animal's behavior. Then proceed to observe the animal more closely.
 - 4.3. Look for any changes in the behavior. Report animals that appear to be in pain to the vets.
 - 4.4. Common clinical signs indicative of pain or distress include (but are not limited to): avoidance, vocalization, aggressiveness, low spontaneous activity, isolation from the social group, lying down more frequently, immobile, apathy, depression, altered gait, lameness, increased respiratory rate (abdominal pain), cessation of rumination, teeth grinding, loss of appetite (partially or totally) and weight loss.
 - 4.5. **Note:** *The most reliable signs of pain and distress are changes in behavior.*
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5. ANALGESIA PLAN

- 5.1. Specify the analgesia plan in your animal protocol.

- 5.2. Whenever possible, provide analgesia just before the painful stimulus, as it is more effective in preventing pain (e.g., give analgesic before surgery).
- 5.3. Use a combination of analgesics, often more effective than a single agent.
- 5.4. Extend analgesia from pre-op to 72 hours post-op for surgical procedures unless specified otherwise in the Animal Use protocol and approved by the BGU Ethical committee.

6. LOCAL ANALGESIA

- 6.1. Infiltrate or apply local analgesics to areas where a painful stimulus may be induced. Repeat the application of local agents at specified intervals to maintain analgesia. In some cases, a sedative is recommended when using local analgesia.

Analgesic	Dose	Route	Duration	Note
Lidocaine	< 2 mg/kg	SC, Infiltration of surgical wounds	30–60 min.	Use lidocaine HCl 2% (20mg/ml) injectable solution. Because this drug is acidic, it is recommended to dilute it 3:1 with sodium bicarbonate injectable solution (at 5 or 8.4%). Dilution must be prepared immediately before use and should not be stored. A diluted solution is as effective, but induction of analgesia is slightly prolonged. *Dilution with sodium bicarbonate is unnecessary if lidocaine is administered to an anesthetized animal.
EMLA cream	Thick spread	Topical	30–60 min.	Apply only to intact skin. Shave or pluck the fur. Ideally, 10 minutes before the painful procedure.
Localine	Thick spread			Apply only to intact skin. Shave or pluck the fur. Ideally, 10 minutes before the painful procedure.
Eye drops	1-2 drops	Ocular	30-60min	
Bupivacaine	< 2 mg/kg	Epidural SC, Infiltration of surgical wounds	3–4 hrs.	Mercaine heavy solution Use bupivacaine HCl 0.50% (5mg/ml) injectable solution. Same comment as for lidocaine.

7. GENERAL ANALGESIA

7.1. Administration of non-steroidal anti-inflammatory drugs (NSAIDs):

- 7.1.1. NSAIDs include carprofen, ketoprofen, meloxicam, and dipyrone.
- 7.1.2. Ensure good water intake and monitor hydration status during the treatment period.
- 7.1.3. Suspend water restriction before administration of NSAIDs.
- 7.1.4. Do not administer NSAIDs to neonatal rodents.

Sheep/Goat

Analgesic	Dose	Route	Frequency	Note
Buprenorphine	0.1 mg/kg	SC, IP	4–8 hrs.	Mild to moderate pain. Controlled drug.
Ketamine	0.1-1.0 mg/kg	SC, IM, IV	-	After the initial bolus, a constant rate infusion of 0.1-0.3 mg/kg/hr. Controlled drug.
Ketoprofen	1–2 mg/kg	SC, IM	12–24 hr.	Mild to moderate pain.
Flunixin				

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Approved by the BGU Animal Policy and Welfare Oversight Committee