PAIN MANAGEMENT: CAMELIDS, SMALL RUMINANTS, AND PET PIGS

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Several conditions affecting farm animals are known to cause pain. Pain can sometimes lead to decrease food intake, ileus, inability to stand or ambulate, and several other complications. Therefore, it is very important to control pain to increase the chances of a positive outcome and also from a welfare standpoint. Pain can also be present as a result of veterinary interventions (castration, dehorning, schedule surgery, etc.) in which case pain management can be planned and implemented before conducting the procedure.

Recognizing the presence and the level of pain can be a challenge since different animal species, and different animals within the same species manifest signs of pain differently. In general, goats tend to display more obvious clinical signs associated with pain. Signs of severe pain include vocalization, abnormal stance, and inappetance. Recognizing pain in sheep and camelids can be challenging because they tend to be more stoic but most animals will stop eating or have a poor appetite if they are experiencing pain. Most pet pigs will stop eating or be more selective with their food and will lay down and become less interactive, sometimes they hide under straw or blankets. Lameness is a common source of pain in potbelly pigs. When appropriate, lame pigs should be forced to get up and walk to better assess the degree of lameness, if they are lame, and potential response to pain management strategies so that adjustments can be made as necessary.

Most of the drugs that are used for pain control in these species are not labeled for such use so adherence to AMDUCA regulations will be necessary.

Local anesthesia:
The use of local anesthesia is recommended, and in some countries reinforced, to manage pain during and shortly after the performance of routine surgical procedures such as dehorning, tail docking, and castration. It is also used as a diagnostic lameness tool (as regional limb perfusion) or to prevent discomfort while performing painful procedures in the distal limb. The recommendation is not to exceed a total dose of 10 mg/Kg when using lidocaine. It can also be used as a low-dose CRI to provide systemic analgesia. In camelids a loading dose of 1mg/Kg IV can be followed by a 3 mg/Kg/hour dose.
Alpha-2 Agonists:

**Xylazine**: More commonly used for its sedative effect but it also has analgesic properties. Ruminants and camelids are more sensitive to alpha-2 agonists than other species so the 20mg/ml formulation is preferred. The analgesic effects are short lasting when used IV and estimated to last about 1 hour when used intramuscularly. A transient hyperglycemia can be seen after a IM injection that can result in diuresis in ruminants making it a poor drug choice for camlids and small ruminants with a urinary obstruction. This would be a good drug to use in healthy patients undergoing a routine procedure such as dehorning or castration. However, other analgesics with a longer lasting effect to be used in combination may be needed. Alpha 2 agonists can be reversed with yohimbine or tolazoline but the practitioner should be aware of the fact that both, the sedative and the analgesic properties will be reversed.

NSAIDS:

NSAIDs inhibit synthesis of prostaglandin by blocking the COX pathway. They offer good analgesia for patients with mild to moderate pain. Prostaglandins are known to increase blood flow to the glomerulus, decrease gastric acid secretion and increase gastric mucus secretion having a protective effect on the kidneys and gastric mucosa. Therefore, NSAIDs should be avoided in cases of renal disease or when GI ulceration is suspected.

- **Flunixin meglumine** is labeled for IV use in cattle. The IM route should be avoided since it can predispose to clostridial myositis. This is a good alternative to treat visceral pain. It is recommended not to exceed a daily dose of 2.2 mg/Kg.

- **Meloxicam** is a good alternative when the oral route is preferred. In camelids, dosing is recommended every 24 hours when a 0.5 mg/Kg dose is used or every 48-72 hours when a 1 mg/Kg dose is used.
  - Sheep: Bioavailability is 72%. Recommended dose: 1mg/Kg PO q 24 hours[1].
  - Goats: Bioavailability is 79%. Recommended dose is 0.5 to 1 mg/Kg PO q 24 hours[2].
  - Llamas: Bioavailability is 76%. Recommended dose is 1 mg/kg PO q 48 - 72 hours[3].
  - Pigs: Bioavailability is 87%. Recommended dose 0.3 - 0.5 mg/Kg PO q 24 hours[4]

Steroids:

Steroidal anti-inflammatories are not routinely used for their analgesic properties in the species discussed here but they can be a good resource in patients that show little or no response to other analgesics. A good example would be pigs or elderly camelids suffering from severe arthritis. Prednisone and prednisolone are available as oral formulations. Pharmacokinetic studies in small ruminants are not available to date. The author has observed clinical response when using prednisone at 1mg/kg orally every 24 hours and no consistent complications were observed.
**Opioids:**

Opioids offer potent analgesic activity, especially for visceral pain. Some of the side effects include reduced GI motility and appetite, and some animals may become depressed or hyperexitable. Pigs seem to be prone to ileus so one should be cautious and monitor fecal output when medicating with opioids.

**Morphine:** not as potent as some of the other ones but most cost effective. The analgesic effects will last about 4-6 hours after an IM administration. It can also be used as an epidural to provide longer lasting analgesia to the hind legs.

Llamas and alpacas: 0.1 mg – 0.25 mg/Kg IM q 4 hours [5, 6]

**Fentanyl:** more potent than morphine. The dermal patch offers the advantage of long duration (48 – 72 hours) without the need to re-dose. It should be applied to an area where the animal cannot reach to minimize risk of patch removal or ingestion. The area should be clipped. It is also very important to clean the skin before patch placement to facilitate patch adherence and consequently, transdermal drug absorption. One study in sheep recommended a dose of 0.2 mg/Kg. In this study therapeutic concentrations were not reached until 12 hours after placement of the patch suggesting other pain control alternatives should be implemented if the patch was not placed in a timely manner.

**Butorphanol:** the analgesic properties are more potent than morphine and it has fewer side effects. Butorphanol can be combined with ketamine and xylazine for chemical restraint. It can be used intravenously or intramuscularly:

- Llamas and Alpacas: 0.05 – 0.1 mg/Kg IV or IM [5]