

Pain Control in Food Animals
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Pain control in companion animals has evolved tremendously in the past 20 years, with new drugs being introduced and the development of new modalities of pain control in companion species. In food animals, too, there has been increased awareness of the need to prevent or treat pain and associated distress. Unfortunately, the flood of new medications and modalities in companion animal medicine has not been accompanied by similar developments in food animal medicine in the United States.

What is pain? It has been defined as “an unpleasant sensory and emotional experience normally associated with tissue damage or described in terms of such damage”.¹ Pain is of particular concern when it is accompanied by distress, which has been defined as “physical or mental anguish or suffering”.² How do we know when an animal is in pain and/or distress? Sometimes there are behavioral signs of pain such as guarding an affected area, reactivity to touch, vocalization, or depression, but sometimes these signs are subtle, particularly in prey species such as cattle. The guideline accepted by most companion animal practitioners, and recommended by the United States Department of Agriculture in its oversight of research institutions, is that a procedure that would be painful for a human being must be assumed to be painful for other species, also. Neurological, endocrine, and behavioral evidence supports this assumption.

Why are we obliged to treat pain in animals? The first sentence of the Veterinarian’s Oath is: “Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health, the relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge.” As untreated pain of more than mild severity and longer than brief duration can be expected to cause distress and suffering, veterinarians have a moral obligation to treat pain in animals. Moreover, recent research has demonstrated beneficial effects on production in cattle with pneumonia or diarrhea treated with the non-steroidal anti-inflammatory drug meloxicam.^{3,4} Even without production benefits, however, the moral obligation to relieve animal pain remains.

Pain in production animals may result from illness, injury, surgical treatment, and some management practices. The most common morbidities in dairy cows, as reported by producers, and the percentage of cows affected by each condition in 2001 are: Mastitis 14.7%, Lameness 11.6%, Retained placenta 7.8%, and Milk Fever 5.2%.⁵ Mastitis is described as painful to very painful by women who have suffered from it, and lameness must be regarded as painful, judging by the behavior of affected animals. Retained placenta is associated with metritis in cattle; for humans a key symptom of metritis is pain. Milk fever that leads to recumbency may result in crushing and necrosis of muscular tissue, which is similar to “Compartment Syndrome” in humans. The American Association of Orthopedic Surgeons website makes this statement about Compartment Syndrome: “The pain may be intensely out of proportion to the injury”. In addition,

therapeutic surgeries such as abomasopexy and cesarean section, and management surgeries such as tail docking, castration, and dehorning, are expected to be painful to the animal, and analgesia should be provided.

In a recent survey of practitioners in Ontario, Canada, 96% of respondents agreed that cattle benefit from receiving analgesic drugs as part of their treatment.⁶ Interestingly, a survey in the United Kingdom found that 9% of veterinarians gave their cattle patients follow-up analgesia for lameness treatment, while 76% of the respondents did so for equine patients.⁷ In the Ontario survey, 46% of respondents agreed that analgesics may mask deterioration in an animal's condition, but there is not good evidence to support this concern. In fact, treatment of pain may remove a confounding factor in assessment of an animal's condition; if pain is well-controlled, signs such as tachycardia or decreased appetite can more confidently be attributed to deterioration in the animal's condition, instead of possibly being caused by pain or some other circumstance. Adverse effects of analgesic drugs are unlikely at approved dosages, and opioid and alpha-2 agonist drugs may be reversed if adverse effects occur.

In the United States, treatment of food animals with analgesic drugs is most constrained by the lack of approved drugs and the cost of their use. Analgesic drugs available and labeled for use in cattle include non-steroidal anti-inflammatory drugs (NSAIDs) and the local anesthetic drug lidocaine. Alpha-2 adrenergic drugs and opioids are commonly used in food animals in an off-label fashion.

Lidocaine is beneficial for short term relief when injected by local infusion, nerve block, or regional perfusion prior to performance of surgery or other therapeutic procedures. The effect of lidocaine is short-lived, however. Research investigating the use of local anesthetics for nerve blocks in calves undergoing dehorning suggests that the effect of lidocaine lasts for 2-3 hours in such circumstances, while bupivacaine is effective for up to 4 hours.⁸

Flunixin meglumine is the only NSAID approved for use in cattle in the United States. It is approved for control of fever associated with respiratory disease or mastitis, and for fever and inflammation associated with endotoxemia, but not specifically for relief of pain. Intravenous administration is recommended, as significant tissue reactions have occurred following intramuscular administration of flunixin meglumine. Administration of phenylbutazone is banned in dairy cattle over 20 months of age and discouraged in other food animals. Aspirin is not approved by the FDA for use in cattle; in order to meet the criteria for use under AMDUCA it must offer a therapeutic advantage when compared to flunixin meglumine.

Alpha-2 adrenergic drugs include xylazine and detomidine. These drugs are considered to provide analgesia, but their use is complicated somewhat by their sedative effect. Additionally, xylazine causes uterine contraction and may reduce oxygen delivery to the fetus in cows in late gestation.⁹

Reports of the analgesic efficacy of opioid drugs in cattle are mixed. Withdrawal from a thermal stimulus was retarded by intravenous administration of morphine up to a total dose of 0.4 mg/kg body weight in one study.¹⁰ Butorphanol is frequently mentioned as an opioid suitable for use in cattle. Neither drug has a long duration of effect; for both drugs, administration every four hours is recommended to provide continuous analgesia.¹¹ The controlled status of these drugs in the United States also makes their use less convenient than other classes.

Local anesthetics, opioids, and alpha-2 agonists have all been used epidurally to provide regional analgesia in cattle. Administration between the 2nd and 3rd caudal vertebrae provides analgesia to the perineum. Morphine may be administered every 12 hours using a 6 inch spinal needle between the 6th lumbar and 1st sacral vertebrae to provide analgesia to the rear limbs; this type of administration is not likely to be practical in a farm setting.¹¹ A local anesthetic drug such as lidocaine may be used for epidural administration; however, motor function may be impaired, the area of effect of a caudal epidural is limited to the perineal area, and the duration of effect is short (less than 90 minutes).¹² The addition of xylazine to lidocaine for caudal epidural administration may extend the duration of analgesia to approximately 4 hours.

A practitioner with the will to treat pain in food animal patients in the United States may be stymied by the expense and limited efficacy of drugs that may be used here, but still there is a moral obligation to relieve (and prevent, if possible) the pain and suffering of animals in our care. At least 3 NSAID drugs that are unapproved for use in cattle in the United States have been approved for use in cattle in the United Kingdom and Canada, and at least two of them may be effective with once-daily administration. One hopes that such drugs will one day be available here in the United States, too.

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