Use of meloxicam, buprenorphine, and Maxilene® to assess a multimodal approach for piglet pain management, part 2: tail-docking

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Abstract

Piglets on commercial pig farms are often tail-docked to reduce the incidence of tail-biting. While this is a painful procedure, piglets are often not provided analgesia or anaesthesia for pain relief. The objectives of this study were to assess a multimodal approach to managing tail-docking pain in piglets, using 0.4 mg kg⁻¹ meloxicam (MEL), 0.04 mg kg⁻¹ buprenorphine (BUP), and Maxilene® (MAX), a topical anaesthetic. The effectiveness of each drug and drug combination was evaluated using behavioural indicators, vocalisation, and facial grimace analysis. This study also assessed whether male and female piglets responded differently to pain or pain treatments. Piglets were randomly assigned to one of six possible treatments: MEL, BUP, MEL + BUP, MEL + BUP + MAX, no treatment (tail-docked control), or sham (non-tail-docked control). Vocalisations were recorded at initial handling, injection, and tail-docking. Piglets administered MEL + BUP and BUP demonstrated significantly fewer pain behaviours than piglets in the MEL and no treatment group. MEL + BUP + MAX and BUP piglets displayed significantly lower facial grimace scores than piglets in the no treatment group. There were no significant differences in emitted vocalisations between the analgesia-treated piglets and the no treatment group and both injection and tail-docking elicited piglet vocalisations of similar frequency, power, and energy. There were no significant differences in behaviour, facial grimacing or emitted vocalisations between male and female piglets. All treatment groups with buprenorphine were able to alleviate tail-docking-associated pain, suggesting that opioid administration is highly effective for managing piglet pain.

Keywords: analgesia, animal welfare, multimodal, pain assessment, piglet, tail-docking

Introduction

Piglets are commonly tail-docked on commercial farms in North America and the EU to minimise tail-biting (Sutherland et al 2008). This procedure is known to cause pain, based on behavioural changes and physiologic measures, including an increase in tail wagging, tail jamming (tucking the tail stump between the hind legs), increased blood cortisol levels, and high-frequency vocalisations (Noonan et al 1994; Sutherland et al 2008; Torrey et al 2009). Analgesia is not given routinely to alleviate pain; however, countries, such as Canada, are increasingly requiring analgesia administration to piglets prior to tail-docking in their animal care guidelines (National Farm Animal Care Council [NFACC] 2014). There is limited research regarding effective pain mitigation strategies for piglets, post-procedure (Sutherland 2015). Non-steroidal anti-inflammatory drugs (NSAIDs), such as meloxicam, when administered alone, have been unsuccessful in reducing post-surgical pain behaviours caused by tail-docking (Herskin et al 2016).Injecting a local anaesthetic into the base of the tail or applying a topical anaesthetic to the tail-docked wound were also insufficient in alleviating piglet pain post-procedure (Sutherland et al 2011). Buprenorphine was found to be effective at reducing surgical castration pain in piglets without causing any obvious side-effects (Viscardi & Turner 2018a). The analgesic capacity of buprenorphine to mitigate tail-docking pain alone, or in combination with an NSAID, has not been assessed. Multimodal analgesia is commonly used to alleviate post-operative pain in veterinary clinical practice, when tail-docking is carried out on dogs to maintain specific breed standards (Hewson et al 2006).

Sex-related differences in pain and analgesia sensitivity have been reported in mice, rats and humans (Mogil et al 2000; Craft 2003; Fillingim et al 2009). Females have largely been found to have greater sensitivity to procedural and post-operative pain (Fillingim et al 2009). Studies examining differences in pain and analgesia sensitivity between male and female piglets after tail-docking, beyond the immediate pain response, have been limited (Rutherford et al 2009). Understanding potential sex-related differences is important for proper administration of pain treatments and maintenance of good animal welfare on-farm.