Behavioural evaluation of analgesic efficacy for pain mitigation in lame sows

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Abstract

Lameness in breeding swine has a large negative economic impact and is a welfare concern. Pain-related behaviour, such as postural changes, may be used to evaluate the presence and severity of pain in animals. The objective of this work was to determine the effects of flunixin meglumine (FM) and meloxicam (M) on postural changes in lame sows. Lameness was induced in 24 mature sows (Sus scrofa) using a chemical synovitis model. Three treatments were compared: FM (2.2 mg kg⁻¹; n = 24, intramuscular [IM]), M (1.0 mg kg⁻¹; n = 24, by mouth [PO]) and sterile saline (equivalent volume to FM; n = 24 [IM]), administered approximately 28 and 52 h after lameness induction. Behavioural data were collected in the home pen during 12-h periods and quantified using 15-min scan sampling on the day prior to (−24 h; Day −1) through +168 h post lameness induction. Frequency of behaviour was analysed by day using generalised linear mixed model methods. The frequency of standing postures significantly decreased and lying postures increased 24–72 h post lameness induction relative to baseline day. All postures returned to baseline frequencies by +168 h. Meloxicam-treated sows demonstrated lower frequencies of lying postures +48 and +72 h after lameness induction compared to saline-treated sows. Flunixin-treated sows did not differ in lying behaviours compared to saline-treated sows. No differences were noted in standing or sitting postures between treatments. The results of this study suggest that meloxicam mitigates pain sensitivity as demonstrated by higher frequency of standing and lower frequency of lying compared to saline-treated sows.

Keywords: animal welfare, behaviour, flunixin meglumine, lameness, meloxicam, swine

Introduction

Lameness is a major factor when culling females from the swine breeding herd (Engblom et al. 2008; Anil et al. 2009; Knauer et al. 2012). Lameness was ranked as the third most common reason for culling sows, comprising 15% of culled sows marketed in the United States (Schenk et al. 2010) with parity one to three sows (Sus scrofa) representing 10.5–14.9% of that population (Knauer et al. 2012). Lameness prevalence in Finland, Denmark and England ranges from 8.8–16.9% (Bonde et al. 2004; Heinonen et al. 2006; Kilbride et al. 2009). Lameness in breeding-aged swine has a large negative economic impact on livestock producers (Wells 1984) because it increases labour and veterinary costs (Pluym et al. 2013) and shortens total sow productive lifetime (Stalder et al. 2003). Lameness is recognised as a welfare concern because it is associated with the negative affective state of pain and has been identified as an animal-based measurement in The European Welfare Quality® (2011) and Pork Quality Assurance Plus® programmes (NPB 2013).

Lameness pain can be attributed to several aetiologies, including neurological deficits, hoof or limb lesions, mechanical-structural conformation, trauma, or metabolic and infectious disease (Wells 1984; Smith 1988; Main et al. 2000). Dependent on the aetiology, pain associated with lameness can be severe, thus, appropriate pain management resulting from lameness is critical until a definitive diagnosis can be reached (Haley 2010). Changes to an animal’s behavioural repertoire have been used to assess pain sensitivity in a variety of species including dairy cattle (Bos taurus) (O’Callaghan et al. 2003; Ito et al. 2010; Heinrich et al. 2010; Blackie et al. 2011; Alsaaad et al. 2012; Shearer et al. 2013; Higginson et al. in press), swine (Gregoire et al. 2013), sheep (Ovis aries) (Stubsjoen et al. 2009) and broiler chickens (Gallus gallus) (Weeks et al. 2000).

Behaviour commonly associated with lameness pain in swine include vocalisations, abnormal standing posture and/or gait, reluctance to move, decreased appetite and increased inactivity (Underwood 2002; Anil et al. 2009).