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Effects of analgesic use post-calving on cow welfare and production.

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Abstract

The aim of this study was to assess the welfare and production of cows given an analgesic drug (carprofen, 1.4 mg/kg i.v.) within 6 h after calving. The study was performed in a dairy farm with approximately 1,000 milking cows. Behavior, clinical indices, and production data (milk yield and fertility) of cows treated with carprofen (n = 19) or a placebo (n = 20) were compared. Additionally, differences related to parity (primiparous vs. multiparous) were analyzed. No significant differences were observed in the time of placental expulsion or incidence of clinical disease over the 3 d postpartum, but more animals from the analgesia group were observed eating during the first hours after calving. For unassisted calvings, the rectal temperature 24 h postpartum was lower in the cows given analgesic. Total lactation yields at 305 d in milk were higher in the primiparous cows treated with carprofen. Fewer cows were pregnant at 220 d postpartum in the treated group as the use of carprofen increased the time from calving to conception. This study suggests that pain management after parturition leads to earlier feed intake after calving and that this may lead to higher milk yield in first-lactation animals.

Providing analgesia to the postpartum cow is not a common intervention following an unassisted calving, but may be used

following dystocia and is commonly used following a cesarean (Huxley and Whay, 2006). Recent literature review shows that pain management after calving is probably underused and that further research on the use of nonsteroidal anti-inflammatory drugs in the postcalving cow is required (Laven et al., 2012).

Behavior, clinical, and production measures may all be used to indicate pain (Whay et al., 2003; Broom and Fraser, 2007). Pain management after calving may be economically beneficial as a cow that has a better appetite after calving is likely to produce more milk. Inflammation and pain are expected to be more common and severe in primiparous animals because of smaller pelvis area, slower calving, and incomplete vulva dilatation (Mee, 2004).

Research has been conducted on pain in cattle during certain procedures, such as castration and dehorning, and the beneficial effects of using analgesia for such procedures have been demonstrated (Milligan et al., 2004; Pang et al., 2006; Stilwell et al., 2008), but very few published studies have looked at analgesia after calving. Carprofen is an appropriate analgesic for painful procedures in cattle (Stilwell et al., 2008).

In a commercial dairy unit of approximately 1,000 Holstein milking cows in the Ribatejo region of Portugal, parturient cows were housed in a straw-yard, which they entered approximately 3 wk before expected parturition date. Food was distributed once per day in the form of a TMR. Food and water were always available.

During 1 mo, all 39 cows and heifers that calved were observed for as much of stage 2 of parturition as possible and for 8.8 ± 1.1 h (no difference between groups) after this stage was completed. There were no caesareans or complicated dystocia and all calves were born alive. Following parturition, each cow was allocated alternatively to either the analgesia group or the control group. Those in the analgesia group (n = 19) were given carprofen (Rimadyl, 50 mg/mL; Pfizer Animal Health, Dundee, UK) at a dose of 1.4 mg/kg i.v. immediately after parturition. Those in the control group (n = 20) did not receive any analgesia.

Observations were made live by the same person from the corridor between the maternity pens to minimize disturbance. The time spent attending the calf, eating or drinking, and pain-related behaviors, such as proportion of time spent standing or lying, the amount of time the whites of their eyes were visible, ear position, teeth grinding, kicking the abdomen, and vocalizing (Weary et al., 2006; Broom and Fraser, 2007; Mainau and Manteca, 2011; Barrier et al., 2012), were recorded continuously for 6 to 10 h of the calving period, after which cows were moved to a cubicle house. The time to placental expulsion was recorded as less than 6 h, between 6 and 12 h, and more than 12 h after parturition. For at least 3 d postpartum, cows were monitored for signs of clinical illness, such as metritis, mastitis, and abomasum displacement, and their rectal temperature was recorded daily. At 220 and 305 DIM, the total milk yield was recorded for each cow, as well as the number of inseminations and the pregnancy status. This study was approved by the Welfare and Ethics Committee of the Interdisciplinary Centre of Research in Animal Health of the Lisbon Veterinary Faculty (CIISA-FMV, Lisbon, Portugal).

Data were analyzed using the Mann-Whitney U test for the behavioral data and milk yield, Fisher's exact test for number of animals eating, the 2-sample *t*-test for the rectal temperatures, and the chi-squared test for clinical disease, placental expulsion, and fertility.

Statistical analysis showed that groups were balanced with regard to parity (9 multiparous and 10 primiparous received carprofen) and that no difference existed between groups in number of calvings needing assistance. Behavior results are summarized in Table 1. More animals from the analgesia group were seen eating during the observation period ($P < 0.05$) but no difference was observed in the proportion of time drinking or time spent attending to the calf. No differences were observed between the 2 groups for the other behavioral measures.

Table 2 shows the results of the clinical measures. If calvings were divided into unassisted and assisted, the rectal temperature at 24 h was lower in the unassisted animals that received analgesia ($P < 0.01$). No difference was observed between the groups in clinical disease incidence during the 3 d postpartum or delay before placental delivery.

At 305 DIM, heifers that were given carprofen had produced more milk than the control group but the total number of cows pregnant

The milk yield of first-lactation animals at 220 DIM tended to be higher in the analgesia group than the control group and was significantly higher at 305 DIM. A higher DMI postpartum is associated with a steep increase in milk yield, which will result in overall higher production (McCrae and Whitaker, 2004). Several studies have demonstrated that the use of carprofen alleviates pain and reduces inappetence associated with pain (Pang et al. 2006; Stilwell et al., 2008). This may have reduced the negative energy balance that commonly occurs in early lactation, reducing also the possibility of occurrence of subclinical ketosis and other diseases. Another explanation for the higher production in heifers is that carprofen may have reduced the cortisol response to pain and, thus, potentially reduced the levels of clinical and subclinical infectious diseases, such as mastitis.

The number of animals pregnant by 220 d postpartum was higher in the control group than in the analgesia group (11 vs. 6). Five cows in the control group and 2 in the analgesia group were never inseminated, being listed for culling at the end of lactation. Previous studies with flunixin-meglumine in pigs and cows have had conflicting conclusions regarding its effect on uterine involution and placental delivery (Odensvik and Fredriksson, 1993; Amiridis et al., 2001; Duffield et al., 2009). Further knowledge of the exact mechanism of action of carprofen and more detailed production data would allow a better understanding of this. It may be that because animals within the analgesia group had a higher milk yield, this delayed resumption of ovarian function (Walsh et al., 2007).

The general conclusion drawn from this small study is that a potential role for analgesia use exists in the postparturient cow, but that evidence from further studies is required before a recommendation can be made. Some of the trends in the behavioral, clinical, and production data suggest that analgesic use does have a positive effect on the welfare of postparturient cows and on milk yield from primiparous animals.

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Table 1. Behavioral data from the postpartum observation period

Table 2. Rectal temperature, time to placental expulsion, and incidence of clinical disease

Table 3. Total milk yield (mean ± SE) at 220 and 305 DIM and fertility data at 220 DIM

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