

Research Paper Summary

Effects of routine treatment with nonsteroidal anti-inflammatory drugs at calving and when lame on the future probability of lameness and culling in dairy cows: A randomized controlled trial

Short title: NSAIDs for lameness

Key words: calving; claw horn lesion; dairy; lameness; nonsteroidal anti-inflammatory drug

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Practical point

Claw horn lesions (CHL) are the most reported cause of lameness in intensive dairying systems, yet mechanisms behind CHL and preventative strategies are poorly understood. It is thought that managing inflammation in the cow from first calving may have long-term benefits and reduce disease incidence. This study found that treatment of animals with anti-inflammatory drugs in comparison to a control group (only therapeutic trimming as needed) reduced the likelihood of animals becoming lame or severely lame and reduced the risk of culling.

Background

Lameness presents a substantial challenge to the sustainability and resilience of the global dairy industry, causing financial losses, reduced fertility, increased culling risk and negatively affecting cow welfare. Claw horn lesions (CHL) are the most common reported cause of lameness, including sole hemorrhage (SH), sole ulceration (SU), and white line disease (WLD).

Inflammation during the transition period has been proposed as a potential mechanism for poor health outcomes in dairy cows. It is thought that all

cows experience some level of systemic (whole body) inflammation post-calving, and that the extent of this inflammation might have an impact on future disease risk. Low level systemic inflammation around calving may affect processes in the hoof, leading to increased risk of CHL. Therefore, it thought that the use of nonsteroidal anti-inflammatory drugs (NSAID) at the time of calving could limit this inflammation and reduce the probability of lameness.

It has been shown that NSAIDs can improve the rate at which CHL cure, suggesting they have a beneficial role in both treatment and prevention of lameness. Once cows become lame, they are more likely to be lame throughout their life, and this lameness may be influenced by inflammation. Therefore, it is possible that ongoing use of NSAID during lameness treatment could reduce possibility of lameness in later life.

Work undertaken

This research investigated the effects of routine, long-term treatment with NSAID at first and subsequent calvings and during treatment for lameness on the probability of future lameness and culling. This was tested over 34 months with dairy heifers enrolled at first calving and randomly allocated to one of 4 groups. To assess effect on future lameness, lameness score over time was used, and to assess effect on culling, time to culling was used.

Herd Management

All milking and dry cows were continuously housed with access to rubber matted stalls with sawdust and lime bedding. Animals were TMR fed with additional parlour concentrate. Flooring throughout the shed was grooved concrete, cleaned by scraping with a tractor twice daily. Dry cows within 3 weeks of expected calving were housed in 2 identical deep straw-bedded yards. All cows were milked 3 times daily through a rotary parlour, and the mean 305-d milk yield was ~11,600 kg.

All cows received a routine maintenance hoof trim at each dry-off. This was completed for each treatment group, with all animals receiving the same procedure. Milking cows were walked through an automated hoof bath containing 2% formalin at each milking to control digital dermatitis.

Study Design

Animals were grouped into fours based on expected calving date and within each group, randomly allocated one of 4 treatments. Animals remained in the study until culling, or the study ended.

Lameness scoring for identification of animals requiring treatment was carried out by one of 2 trained technicians. Animals were allocated a lameness score as they exited the parlour on a flat and level concrete surface for any number of strides or time required for the visual assessment of their locomotion.

Treatment were as follows:

- Group 1 animals (n=111) received a therapeutic trim, and a wooden hoof block was applied to the sound claw, if necessary, every time they were identified and treated for lameness.
- Group 2 (n=117) animals received a therapeutic trim, a wooden hoof block if deemed necessary, and a 3-d course of the NSAID ketoprofen (single dose administered daily) each time they were identified and treated for lameness.
- Group 3 (n=100) animals received a therapeutic trim, a wooden hoof block if deemed necessary, and a 3d course of the NSAID ketoprofen (single dose administered daily) every time they were identified and treated for lameness. In addition, animals in this group, received a 3-d course of the NSAID ketoprofen after each calving event (first dose administered 24–36 h after calving, with 2 further doses 24 and 48 h after the first dose).
- Group 4 (n=110) animals received a 3-d course of the NSAID ketoprofen (single dose administered daily) every time they were identified with lameness. No therapeutic trim or hoof block was administered unless they were scored as severely lame.

All study animals were scored for lameness on a 14 d (± 48 h) interval throughout the study, by one of 2 trained lameness scorers (i.e., during each 2-wk period, scored twice by different observers, once to identify animals for treatment and once as an outcome measure for the study).

Study animals received 973 lameness treatments (271 in group 1, 254 in group 2, 151 in group 3, and 297 in group 4). From treatment records, 99 cases of lameness were associated with infectious causes (e.g., digital dermatitis), 675 with CHL and 27 from other causes (e.g., musculoskeletal injury). In 172 cases no visible claw lesion was present, and the cause of the lameness was unknown.

Results of this study showed that compared with animals treated by conventional best practice methods (group 1), it would be expected that animals receiving the group 3 treatment protocol would see an overall reduction in the prevalence of lameness of approximately 10%, if both groups started with a similar level of lameness. This suggests that administration of NSAID at first and subsequent calvings, alongside lameness events (in conjunction with therapeutic trimming and appropriate application of hoof blocks), would result in one in 10 fewer cows being identified lame when scored. This treatment also reduced the risk of these animals being culled.

Conclusions

This study showed a significant benefit when NSAID were routinely administered at first and subsequent calvings and every time animals were treated for lameness. If the results of this study were applied to the wider dairy population, use of NSAID could substantially reduce the overall prevalence of lameness in a dairy herd by 10% (i.e., 10 in 100 fewer cows would be lame on any day of assessment), and the prevalence of severe lameness by 3% (i.e., 3 in 100 fewer cows would be severely lame on any day of assessment). Given the known, and considerable, welfare implications of lameness and the high prevalence of lameness globally, authors suggest the potential benefits of this intervention are considerable.

Reference

J.P. Wilson, M.J. Green, L.V. Randall, C.S. Rutland, N.J. Bell, H. Hemingway-Arnold, J.S. Thompson, N.J. Bollard, J.N. Huxley. 2022. Effects of routine treatment with nonsteroidal anti-inflammatory drugs at calving and when lame on the future probability of lameness and culling in dairy cows: A randomized controlled trial. *Journal of Dairy Science*, 105 (7): 6041-6054

The image used as a thumbnail shows a deep sole bruise with an orthopaedic block attached. This cow received three days of ketoprofen. Image – J.P. Wilson

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