

# Effects of a single transdermal Flunixin Meglumine treatment on health, milk yield, culling risk, and fertility of early postpartum Holstein Friesian dairy cows.

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## INTRODUCTION

Inflammation around parturition is initially a physiological reaction of the innate immune system in dairy cows and other mammals to calving associated stressors, such as social stress, pain, tissue lesions, and bacterial contamination of the uterus. In some individuals, however, the degree of inflammation and immune activation surpasses physiological limits to a pathologic extent, which can be detrimental to health and immunity. Reduction of inflammation with non-steroidal anti-inflammatory drugs (NSAID) has been studied in cows before, with promising but inconsistent results.

## OBJECTIVE

The objectives of this study were to assess the effects of a single transdermal application of Flunixin Meglumine (*Finadyne® Transdermal, MSD Animal Health*) 24 – 36 h p.p. in Holstein Friesian (HF) dairy cows on inflammatory and metabolic markers in blood, uterine health, milk yield, culling risk, and fertility in subsequent lactation. The hypothesis was that the treatment would alleviate pain, reduce inflammation, and enhance feed intake, thereby reducing metabolic disorders and improving health, milk yield, and fertility.

## MATERIALS AND METHODS

500 HF dairy cows (153 primiparous (PRIM) and 347 multiparous (MULT)) from 3 different commercial dairy farms in North Eastern Germany were included in the study. On these farms, a high prevalence of elevated haptoglobin (HP) values in early postpartum cows had been found before. On day 2 of lactation (24 – 36 h p.p.) a first clinical examination took place. In case of stillbirth, twin birth or dystocia, milk fever, retained fetal membranes or high fever (> 40 °C), cows were excluded. Tail position, back arching, rumen fill and locomotion were scored, rectal temperature (RT) was measured and a

blood sample was drawn from the coccygeal vessel. Cows were randomly assigned to one of two groups: 1) Treatment (N = 250): transdermal Flunixin Meglumine (FM) (3.33 mg/kg bodyweight); 2) Control (CON) (N = 250): transdermal placebo fluid. Blood serum levels of inflammatory and metabolic markers were analyzed on day 4 and 6 p.p., and clinical examinations were repeated up to day 15 p.p. The Metricheck™ device was used on day 8 and day 15 p.p. to evaluate the quality of vaginal discharge. Data on milk yield, culling, and fertility were collected up to 305 days in milk (DIM).

In dairy herds with higher prevalence of elevated Haptoglobin levels in blood of clinically healthy early postpartum cows, the transdermal administration of flunixin meglumine within 24 to 36 h after calving can be recommended only for primiparous cows as it improves their health, welfare and milk production.



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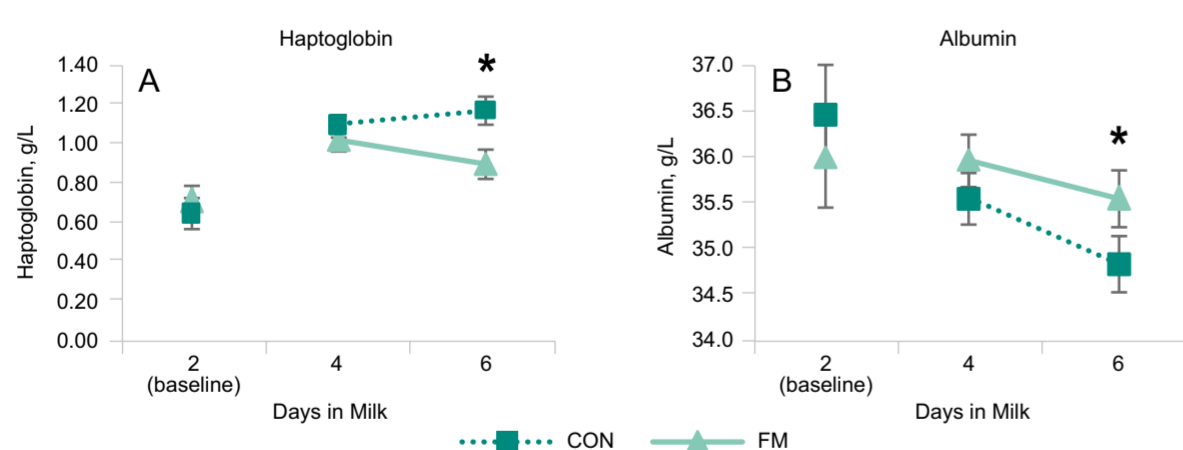
## RESULTS

Flunixin meglumine treated PRIM cows showed lower serum HP and higher Albumin (Alb) concentrations on day 6 p.p. (Fig. 1), and RT was lower throughout the study period compared with PRIM CON cows. Treated MULT cows had slightly lower serum BHB values on d 4 p.p. Treated PRIM cows had a lower risk for purulent vaginal discharge with or without a fever on day 8 and day 15 p.p. (Fig. 2). Treated animals were less likely to abduct their tail from their body or show an arched back on the day after treatment (day 3 p.p.; Fig. 3). Energy-corrected milk yield (ECM) from 8 monthly Dairy Herd Improvement (DHI)-equivalent tests was higher in PRIM cows and lower in MULT cows treated with FM compared with the respective CON group (Fig. 4). No differences in culling risk within 60 DIM and fertility within 200 DIM were observed.

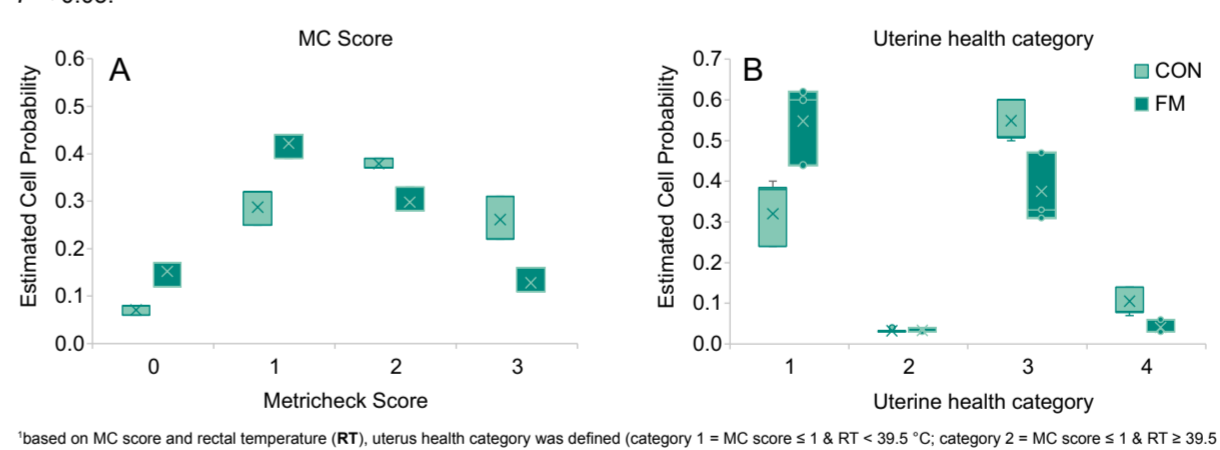
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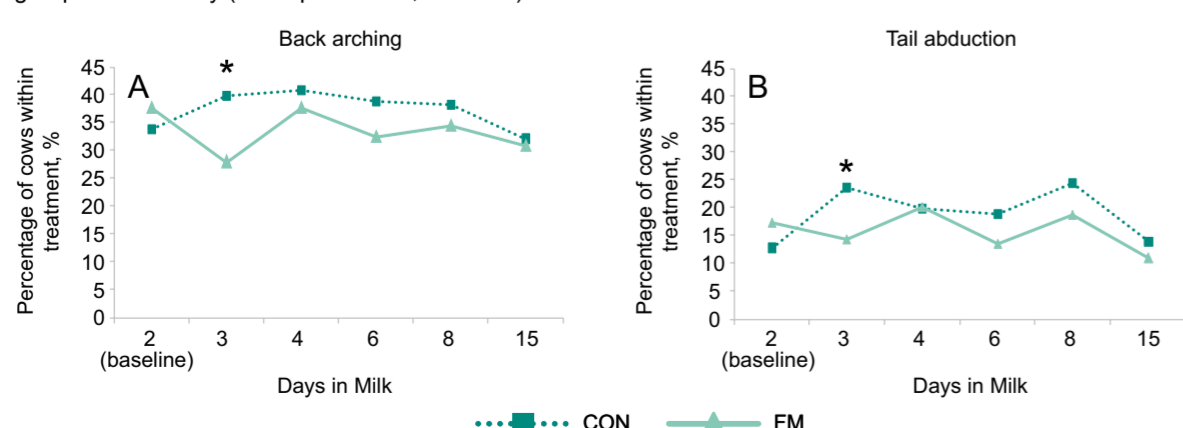
**FIGURE 1.** Serum concentrations of Haptoglobin (A) and Albumin (B) in primiparous cows treated on d 2 of lactation (24 – 36 h p.p.) with either a placebo (CON) or Flunixin Meglumine (FM), respectively. The metabolite's serum concentration on day 2, immediately before treatment (baseline value), was included in the respective model as covariate. \* indicates a significant difference between treatment groups within a day (generalized linear mixed model with repeated measurements;  $P < 0.05$ ). Data are presented as mean  $\pm$  SEM.



**FIGURE 2.** Boxplots showing estimated cell probability values derived from an ordinal regression model assessing the effect of flunixin meglumine (FM) treatment (N = 75 vs. a control group (CON): N = 78) in primiparous cows on d 15 postpartum on the Metricheck™ (MC) score (A; score 0 = clear, mucoid discharge; score 1 = mucopurulent discharge with 50% of pus; score 3 = brownish-reddish, watery, foul-smelling discharge) and uterine health category (B). \* indicates a significant difference between treatment groups within a category,  $P < 0.05$ .



**FIGURE 3.** Raw percentages of cows within treatment that showed an arched back (A) or abducted the tail from their body (B). Treatment was performed on d 2 postpartum and consisted of a placebo (CON, N = 250) and flunixin meglumine (FM, N = 250), respectively. \* represents a significant difference between treatment groups within a day (Chi-squared test;  $P < 0.05$ ).



**FIGURE 4.** Energy-corrected milk (ECM) yield over 8 monthly DHI-equivalent tests after calving from primiparous (PRIM) (A) and multiparous (MULT) (B) cows treated with either placebo (CON, N = 78 PRIM, N = 172 MULT) and Flunixin Meglumine (FM, N = 75 PRIM, N = 175 MULT), respectively. † = tendency for a difference ( $P < 0.10$ ), \* = significant difference between treatment groups ( $P < 0.05$ ). Data are presented as mean  $\pm$  SEM.

