PHARMACOLOGY AND TOXICOLOGY

Effect of additional prednisolone in intramammary treatment of naturally occurring clinical mastitis

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INTRODUCTION

Intramammary (IMM) antibiotic combined with prednisolone to treat clinical mastitis (CM) are popular where these products are registered, although field trials confirming the additional effect of IMM prednisolone are scarce.

OBJECTIVE

Because automated milking systems (AMS) are increasingly installed in the EU and allow for objective and frequent clinical measurements, our objective was to compare the effect of IMM prednisolone and antibiotic to antibiotic alone on the outcome of naturally occurring mild and moderate CM cases, using AMS installed milk and cow monitoring sensors.

MATERIALS AND METHODS

- Seven French dairy farms with HF cows in free stalls, selected on capabilities and willingness to participate, milking in a Lely A4 or A5 AMS, having HRLDn milk and cow sensors installed, were included. SCR milk sensors were used to collect data on milk production, milk color, temperature, SCC and conductivity at quarter level, and SCR cow monitoring sensors attached to the neck collar were used to monitor a 24h rolling average on rumination and activity.
- CM was detected using the AMS Report 12 and 23 and/or a high conductivity and/or a high cell count in the T4C or Horizon software. These alerts were checked at least 2x/day, the clinical mastitis confirmed, before calling the local veterinarian for clinical examination, sampling milk for bacteriology and apply the first treatment within 2 hours. Only mild and moderate mastitis was included.
- Three subsequent treatments were performed by the farmer with 12h intervals. Treatment was randomly performed by either 300 mg of cefapirin with 20 mg of prednisolone (P), Mastiplan LC, MSD Animal Health), or only 300 mg of cefapirin (no prednisolone: NP). The farmer and veterinarian were blinded to treatment.
- Immediately before treatment and 14 +/- 2 days later, the veterinarian took a milk sample for bacteriology. At each treatment, the farmer scored the CM case clinically and took a milk sample for cortisol measurement. Milk and cow sensor data were collected at 14 days before and after the CM occurrence.

This is the first study looking at the effect of additional IMM prednisolone to treat mild and moderate clinical mastitis in the field.

Additional IMM prednisolone treatment significantly improved milk quality and animal welfare by reducing SCC and cortisol levels in milk and increasing activity. However, no significant effect was found on rumination and milk production.

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RESULTS

- The most frequently isolated pathogens in group NP (n=35) and group P (n=36) were CNS; 34% and 25%, negative culture; 26% and 22%, Enterobacteriaceae, 3% and 28%, and *Streptococcus uberis*, 17% and 11%, respectively. Overall bacteriological cure rate was 77.3% and 82.6% in group NP and P, respectively, and not significantly different (Chi-square: P = 0.66) between the treatment groups. **Table 1.**
- Cortisol concentration in milk at the 4 treatment moments and 14 days after the first treatment are shown in **Figure 1.** Time-to-treatment effect was significantly different between the first and the second treatment (P = 0.002) which disappeared afterwards. There is a significant effect of prednisolone treatment at the second treatment (P = 0.0016). At the other treatment points, the differences were not significant. P-values for treatment 1, 2, 3, 4, and at day 14 after the first treatment are P = 0.44, P = 0.002, P = 0.25, P = 0.10, P = 0.06, respectively.
- The effect of additional prednisolone treatment on quarter SCC is shown in **Figure 2.** The time to return to below 200,000 cells/mL was significantly faster for the P group compared to the NP group (P = 0.03).
- The area under the curve (AUC) of sensor derived activity measurement from D -14 until D -4, when activity decline associated with the clinical mastitis started, was not different between treatment groups. After the first treatment (D0) until 14 days later, the AUC of the activity of cows treated with P was significantly higher than the cows treated with NP (*P*=0.006) **Figure 3.**
- No significant difference between the 2 treatment groups were found in quarter level milk conductivity, cow level milk production, and 24 h rolling average of rumination frequency (data not shown).

TABLE 1. Bacteriological cure rate of cows with mild or moderate clinical mastitis treated with either Cefapirin alone (NP) or Cefapirin and Prednisolone (P). Bacteriological cure was not difference between the treatment groups (Chi-square, P=0.66)

Cure	NP (N=35)	P (N=36)	Total (N=71)	Chi-square
No	5 (22.7%)	4 (17.4%)	9 (20.0%)	P=0.66
Yes	17 (77.3%)	19 (82.6%)	36 (80.0%)	

Cure: bacteria found at D0 not present at D14

FIGURE 1. Cortisol concentrations in milk (n=65) at the 4 intramammary treatments with a 12 h interval of Cefapirin only, no prednisolone (NP) or Cefapirin and prednisolone (P) from samples taken just before treatment of the quarter showing clinical mastitis. Open circles are datapoints of each clinical mastitis quarter case superimposed on the mean value indicated by the line.

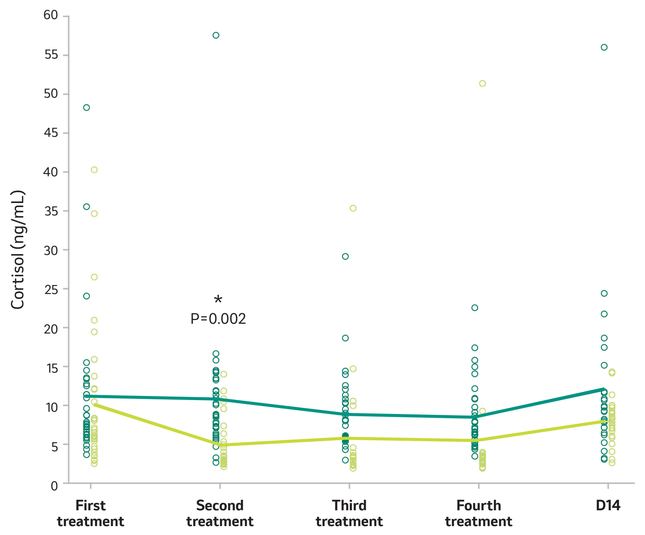


FIGURE 2. Kaplan Meier survival curve of return to normal (< 200,000 cells/ml) of SCC in quarters with clinical mastitis (n=80) treated with either Cefapirin only, no prednisolone (NP, dark green line) or Cefapirin and with prednisolone (P, light green line) from samples taken just before treatment, during the day of the clinical mastitis detection (=D0) until 14 days afterwards (D14). The line is based on events to return SCC to below 200,000 cells/ml.

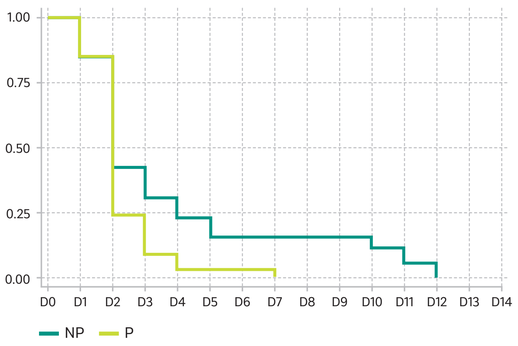
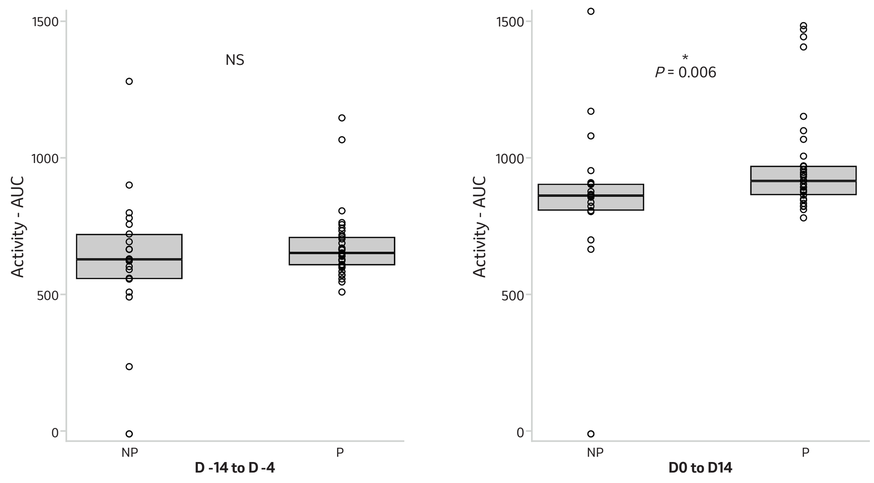


FIGURE 3. Activity of cows (AUC) treated with cefapirin only (NP) or with cefapirin and prednisolone (P) from D -14 until D -4, when the decrease associated to the clinical mastitis started, and from D 0 (clinical mastitis detection and treatment) until 14 days afterwards (D 14).



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