EFFICACY OF AN *Escherichia coli* J5 MASTITIS VACCINE IN AN EXPERIMENTAL CHALLENGE TRIAL.

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OBJECTIVE

The aim of the present study was to demonstrate the efficacy of a new mastitis vaccine against an *E. coli* challenge in pregnant heifers.

MATERIALS AND METHODS

Twenty-four clinically healthy pregnant heifers were used. All the cows were free of detectable udder infection and had SCCs lower than $3x10^5$cells/ml. The vaccine (Startvac®) is a commercially available inactivated vaccine against bovine mastitis caused by *S. aureus*, coliforms and coagulase-negative staphylococci. One group of 10 heifers was immunized by deep intramuscular route in the neck muscles at 45 days before the expected calving date and re-vaccinated 35 days later. Another group of 14 heifers received a placebo following the same administration programme. The *E. coli* strain P4, serotype 032 was used for challenge. Milk yield was measured daily throughout the entire lactation period in the trial. Body temperature and local clinical signs of mastitis from quarter milk samples were closely observed before challenge and up to 14 days after. Milk bacterial count (CFU/ml) was determined. SCC was determined using the Fossomatic method. Blood and milk samples were assayed for IgG specific antibodies to *E. coli* J5 whole-cell antigens using a non-commercial indirect ELISA. The Factorial Mixed Model for repeated measures and regression analysis were used for statistical evaluation.

RESULTS

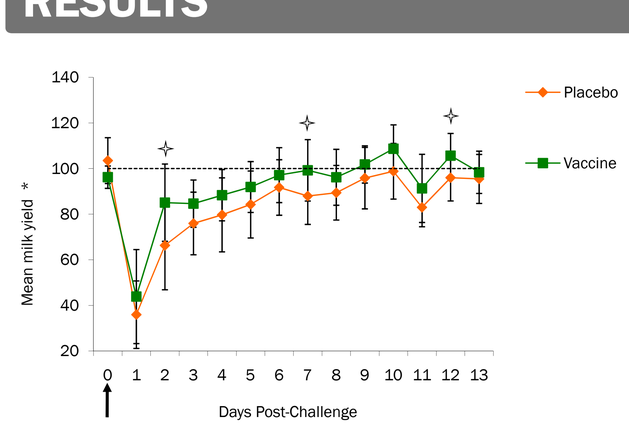

Figure 1. Percentage of milk yield with respect the pre-challange level in each group of heifers at days post-challenge.

*Mean milk yield expressed as percentage of the pre-challenge level. The ✧ indicated significant differences between groups ($P < 0.05$).

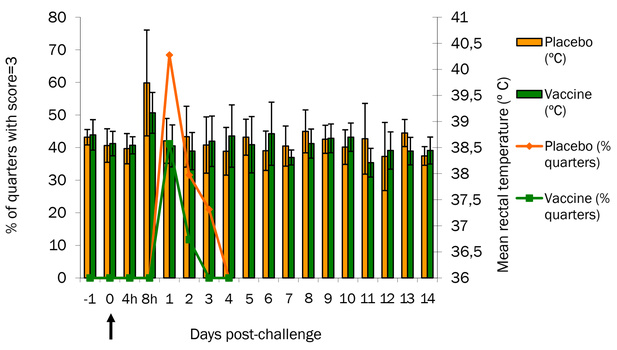

Figure 2. Percentage of challenged quarters showing severe clinical signs of mastitis (clinical score equal to 3) and body temperature at days post-challenge.

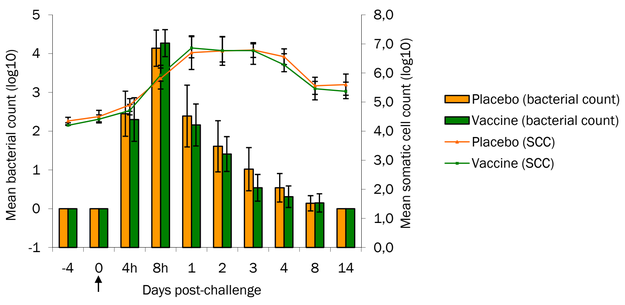

Figure 3. Bacterial count and SCC in the infected quarters at days post-challenge.

The arrow indicates the challenge and error bars represent the CI at 95% level.

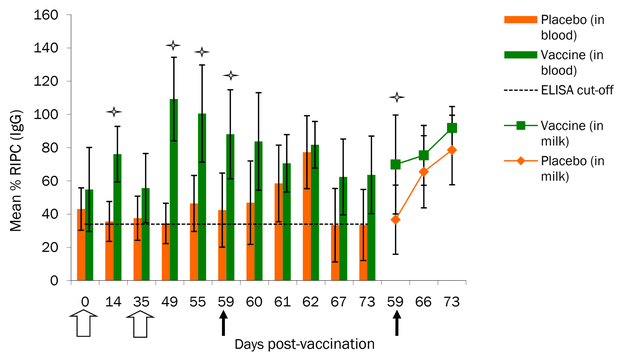

Figure 4. Anti-*E. coli* antibody response (IgG) in blood and milk after vaccination.

RIPC: Relative Index Percentage. Data are expressed as mean relative index percent (RIPC) and error bars represent the confidence interval at 95% level. The dotted line indicates the positive cut-off (RIPC ≥ 34) for blood sera. Significant differences between groups ($P < 0.05$) are indicated by the star symbol . White arrows indicate days of vaccination and black arrow indicates the challenge.

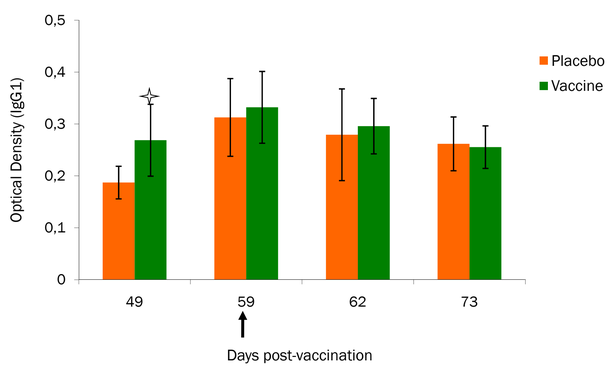

Figure 5. Anti-*E. coli* antibody response (IgG1) in blood after vaccination.

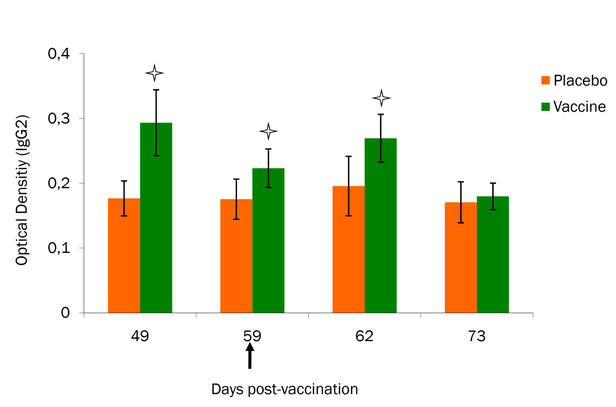

Figure 6. Anti- *E. coli* antibody response (IgG2) in blood after vaccination.

Error bars represent the confidence interval at 95% level. Significant differences between groups ($P < 0.05$) are indicated by the star symbol. The arrow indicates the challenge.

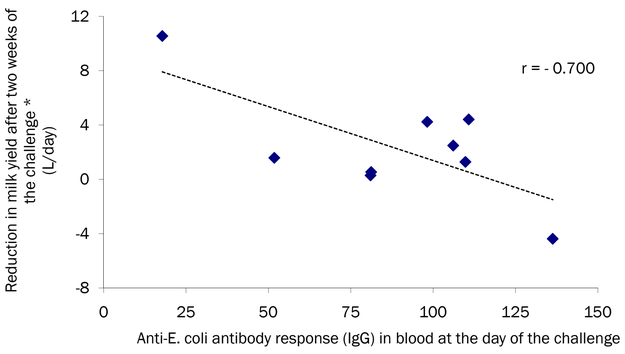

Figure 7. Correlation between the anti-*E.coli* antibody response in blood and the reduction in milk yield in the vaccinated heifers.

* Difference in milk yield with respect to the pre-challenge values for each vaccinated heifer. The correlation is significant at 95% level ($P < 0.05$).

CONCLUSIONS

The vaccine reduces the severity of an experimental coliform mastitis by reducing the drop in milk production, as well as by eliciting a positive effect on general and local clinical signs of mastitis, bacterial clearance from challenged quarters and SCC. The vaccine increases the anti-*E. coli*-specific antibody response in blood and milk.

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