

FIELD TRIAL TO EVALUATE EFFICACY OF A NOVEL VACCINE AGAINST BIOFILM FORMATION  
BY STAPHYLOCOCCI, IN PROTECTING EWES AGAINST STAPHYLOCOCCAL MASTITIS

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Ovine mastitis is a significant production-limiting disease and the most important welfare problem of sheep, across all production types and all management systems. Control is based in a combination of management techniques, with little evidence available regarding applied immunoprotective measures. Objective of the present field trial was to evaluate the efficacy of a novel vaccine for protection of ewes against staphylococcal mastitis. The vaccine induces antibodies against the poly-*N*-acetyl β-1,6 glucosamine exopolysaccharide, the main component of the extracellular biofilm matrix of staphylococci, and acts in preventing slime production and consequently biofilm formation by these organisms, which are a principal causal agent of ovine mastitis.

MATERIALS AND METHODS

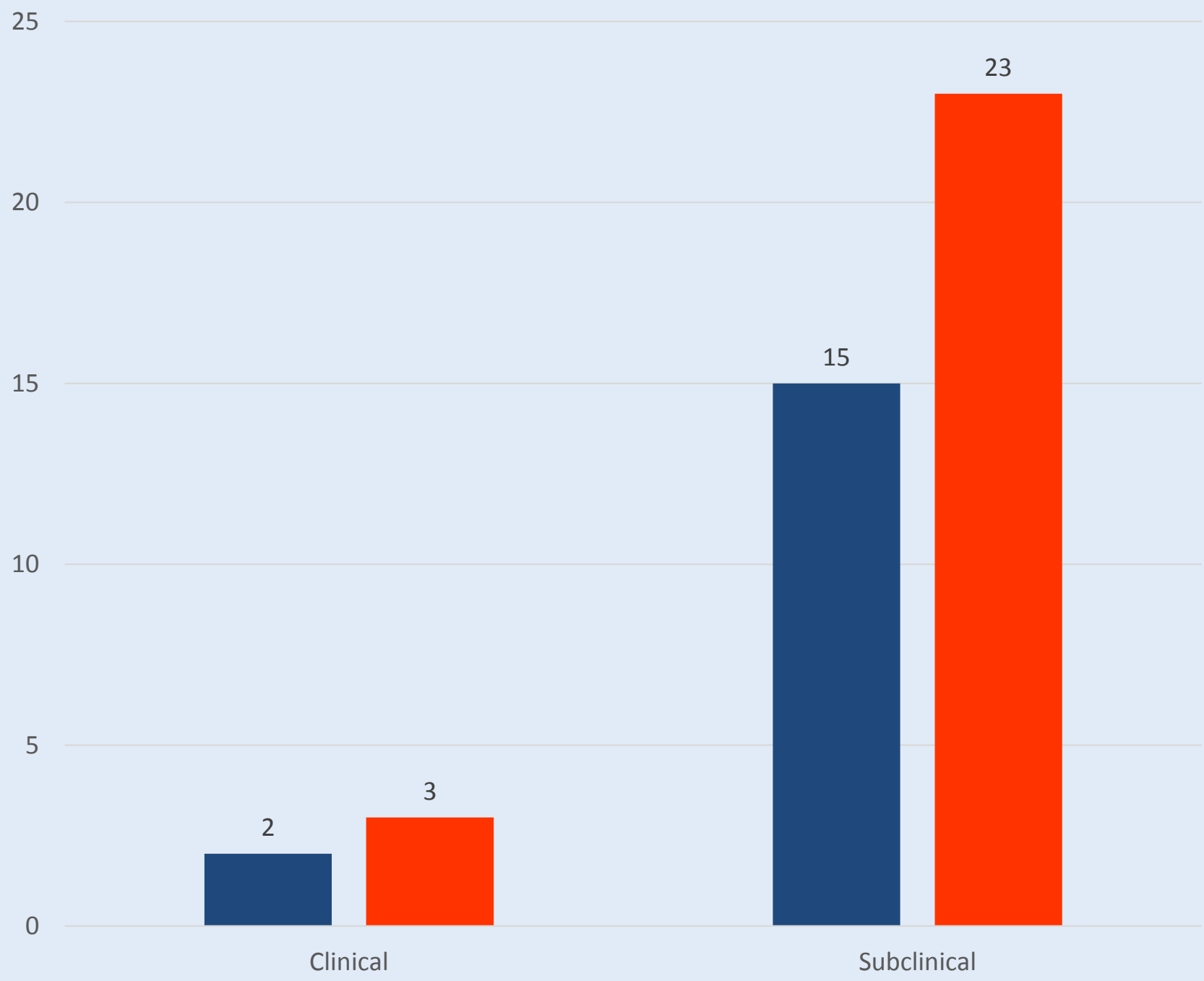
The trial was performed in an intensively-managed dairy sheep farm in Greece. In total, 150 ewes were enrolled in the study: 76 vaccinated (group V) and 74 unvaccinated controls (group C). The vaccine that was evaluated, is licenced in the European Union (Vimco®; HIPRA.) and contains an inactivated slime-producing, biofilm forming *Staphylococcus aureus* strain. Initial vaccination of ewes was performed 6 to 5 weeks before expected lambing date, followed by a repeat vaccination 3 weeks later. Ewes were examined initially during the first 15 days after lambing and then at monthly intervals up to the end of a 165 day-long lactation period. At each examination, milk samples were collected for bacteriological and cytological examination, which were performed by using established techniques. Blood samples were collected before start of vaccination, as well as 3 and 21 weeks after completion of the full vaccination program from 10 ewes into each group; serum was tested for anti-staphylococcal slime antibodies by means of an ELISA assay. Staphylococcal mastitis was defined as the simultaneous isolation of staphylococci (*S. aureus* or coagulase-negative staphylococci) from a milk sample and presence of either clinical signs (clinical disease) or increased cell content in the sample (subclinical disease). Incidence of staphylococcal mastitis was calculated for the total lactation period. Risk ratios were calculated for that period, as well as for the periods 1-90 and 91-165 days post-lambing.



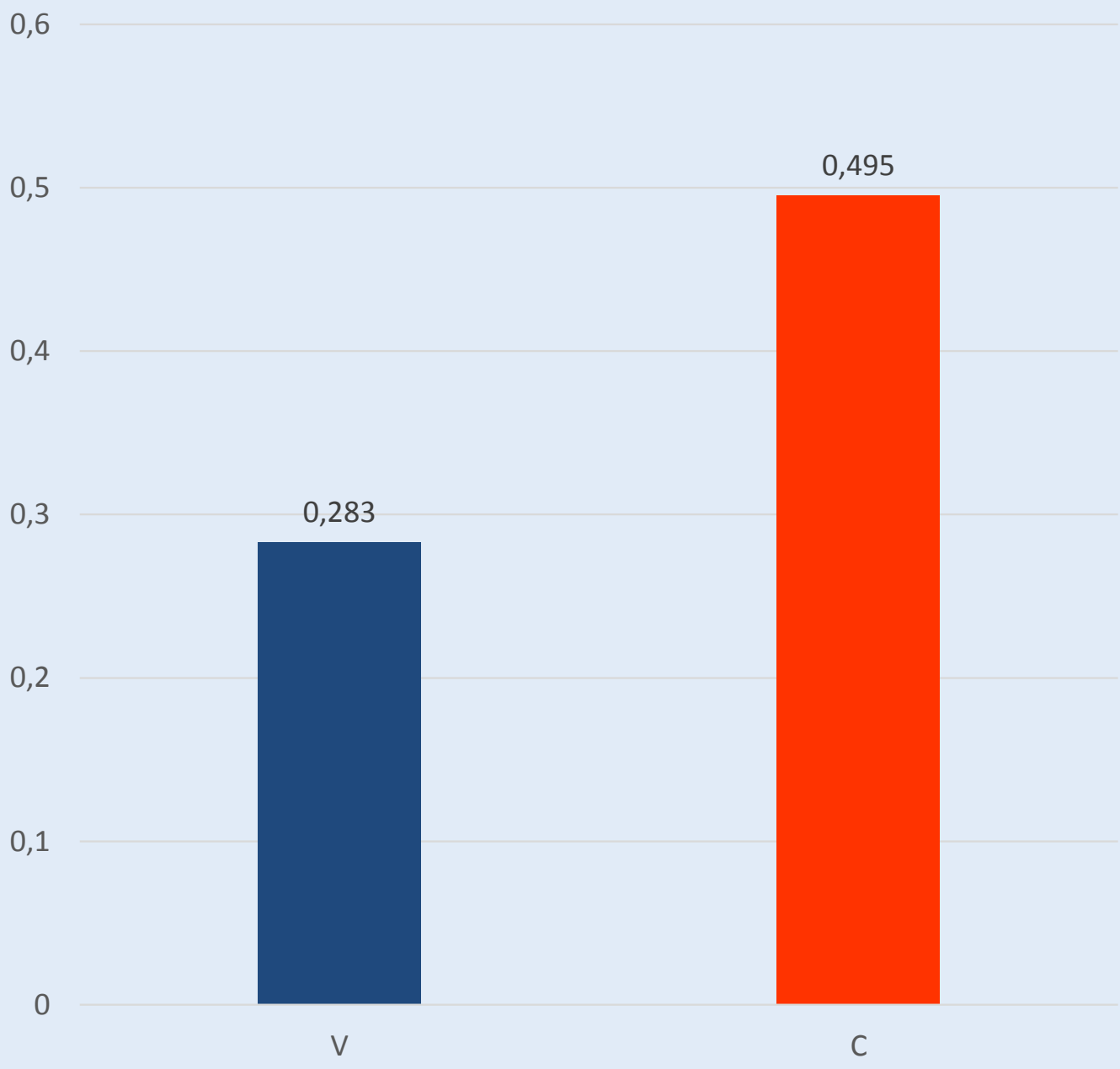
RESULTS

There was clear evidence that in vaccinated animals there was a significant protection against development of mastitis. Results of the various parameters that were employed for evaluation of disease development in the flock are shown in the adjacent graphs (control animals // vaccinated animals). Differences were also recorded in titres of anti-staphylococcal slime antibodies between the two groups. In cases of significant differences (*P*<0.02) between the two groups, the legend of the respective parameter has been highlighted in green; otherwise differences were not significant (*P*>0.1).

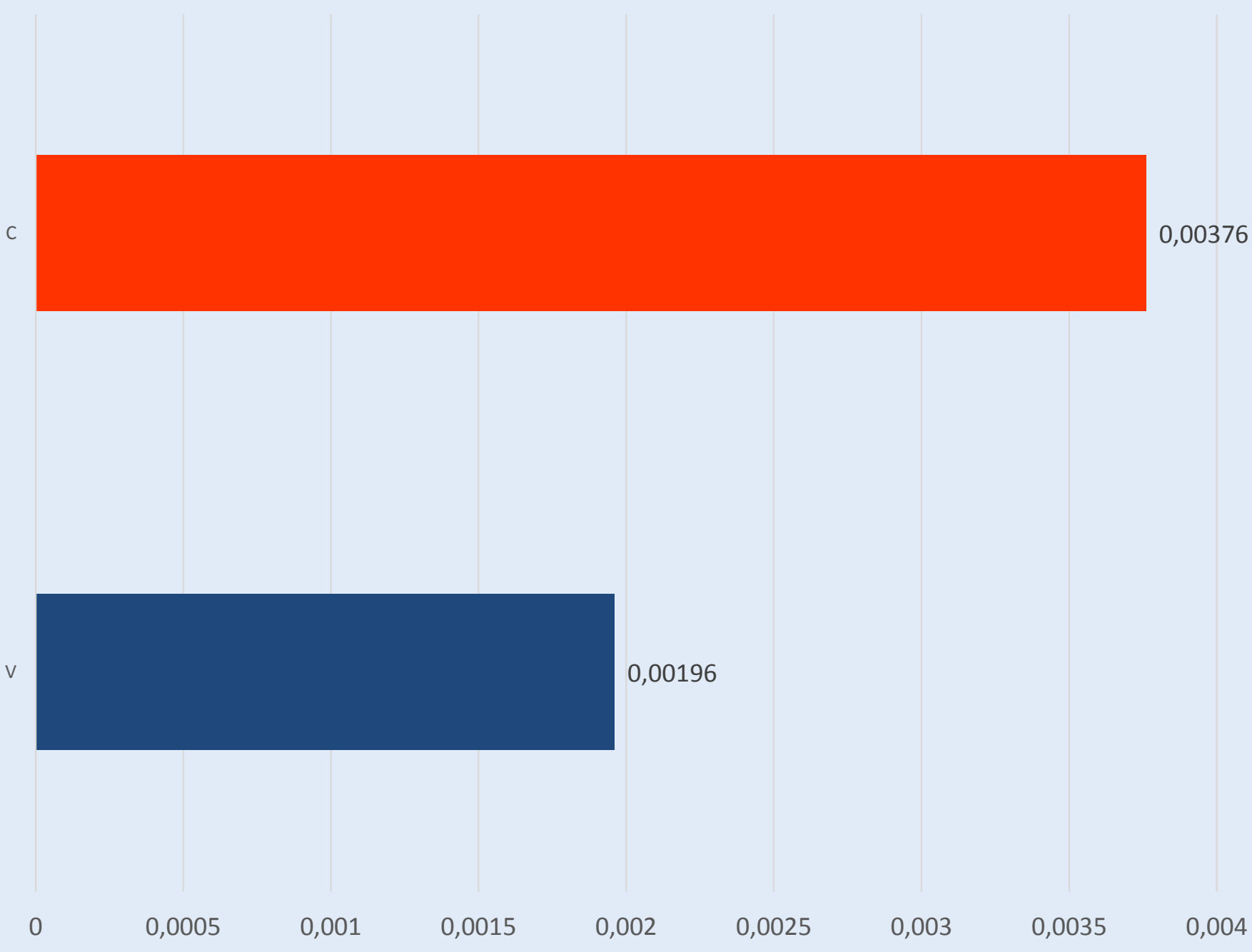
Mastitis cases throughout the trial



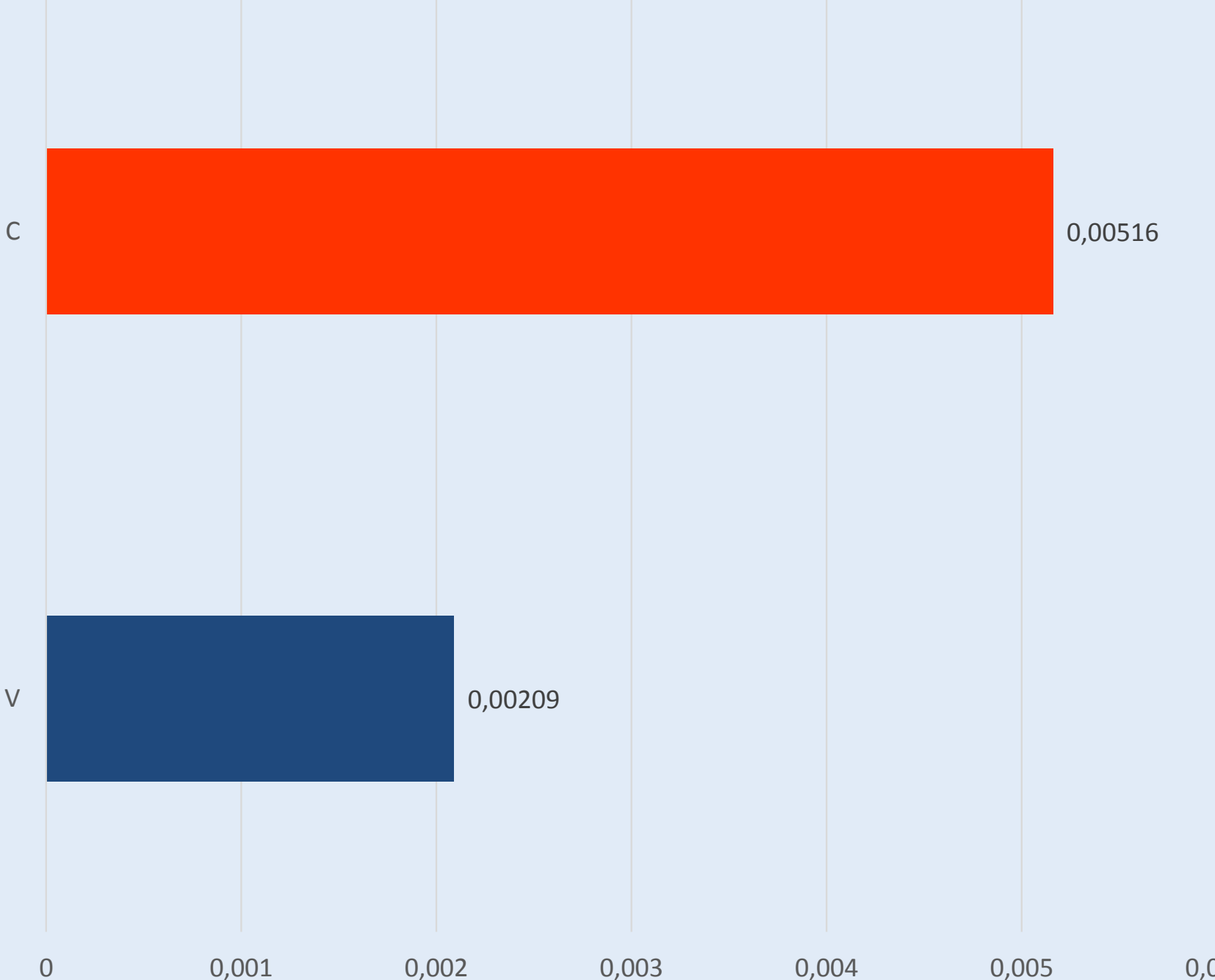
Incidence risk of mastitis throughout the trial



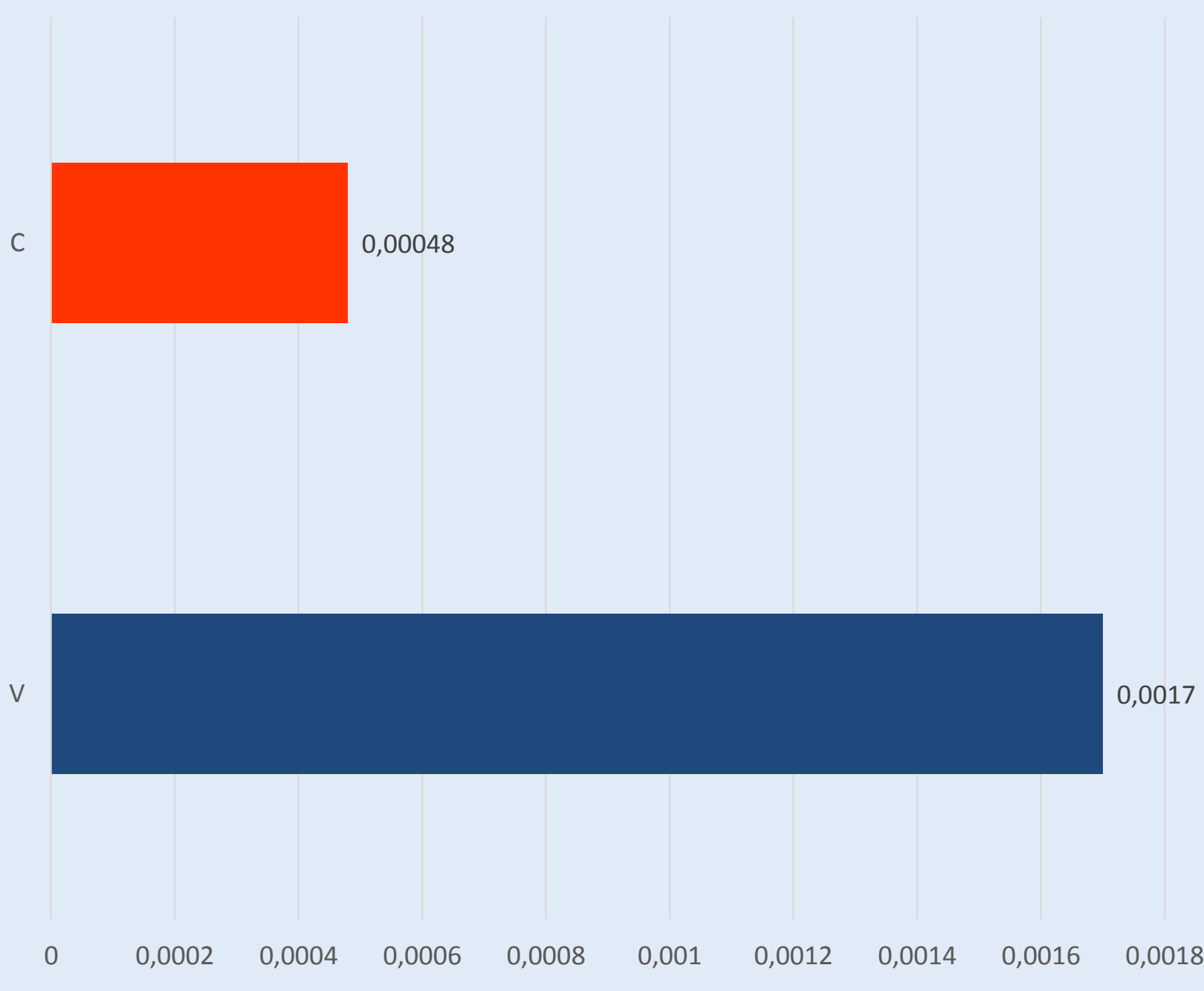
Cases of mastitis per animal per day at risk throughout the trial



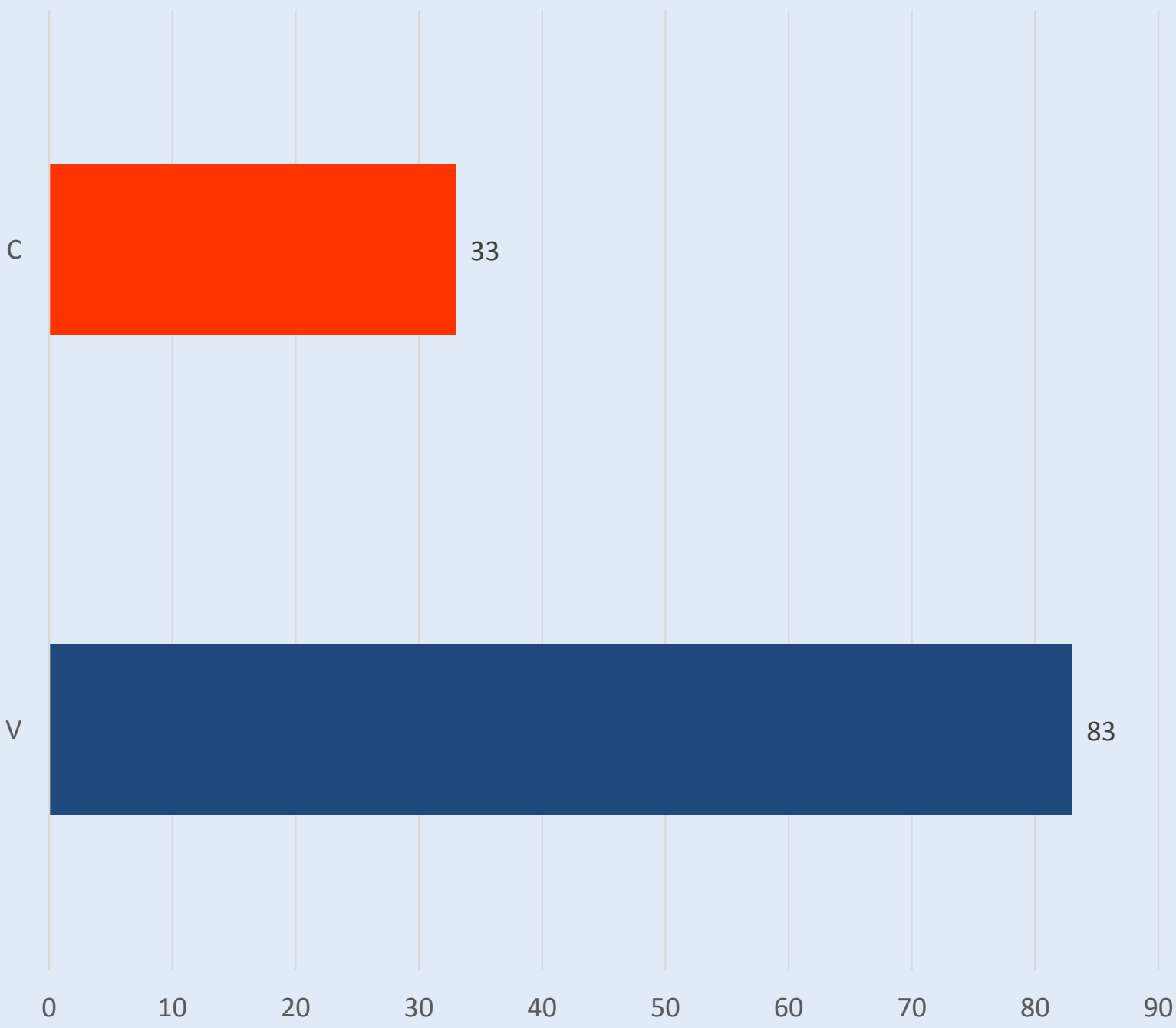
Cases of mastitis per animal per day at risk up to 90<sup>th</sup> day post-lambing



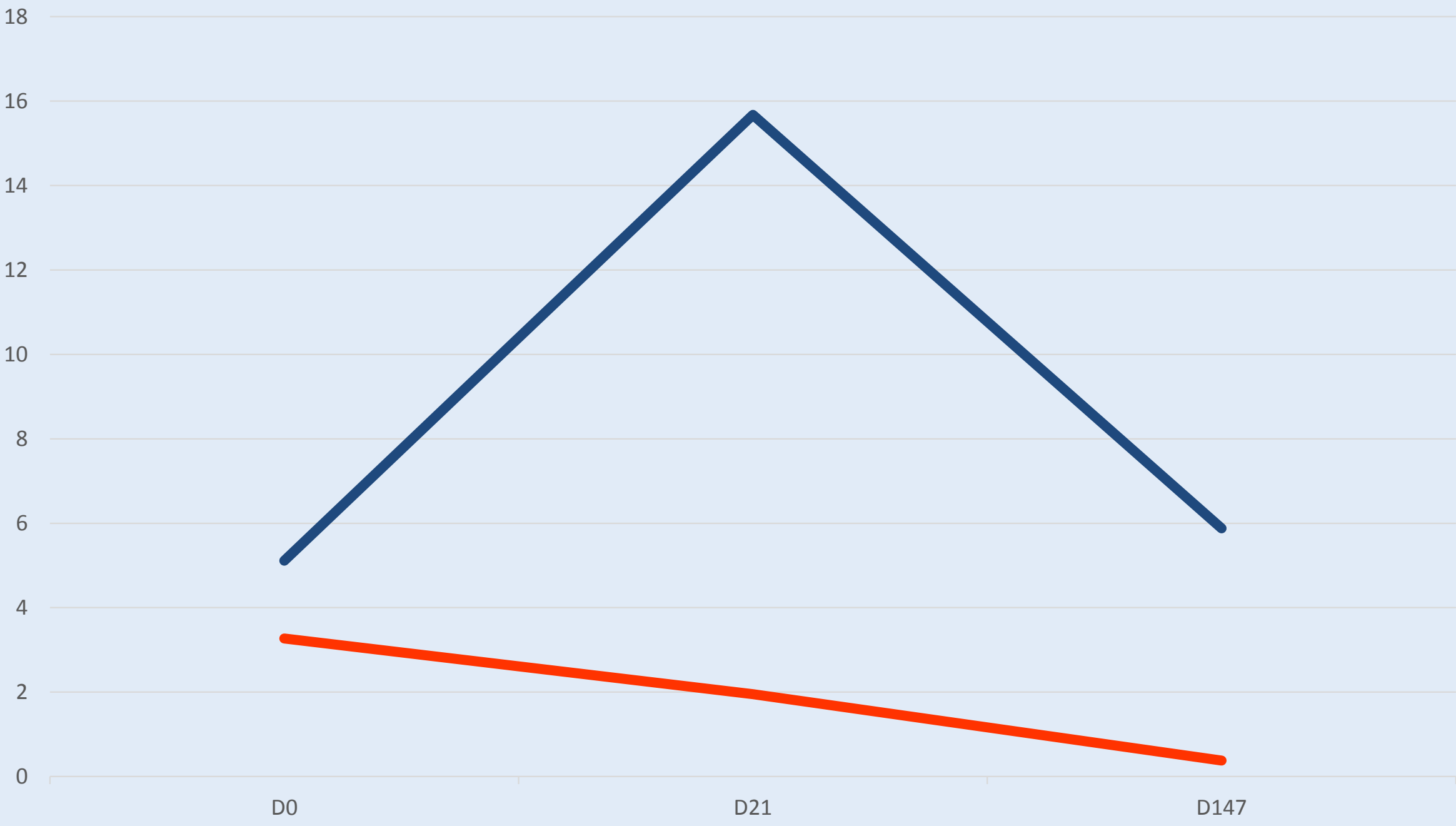
Cases of mastitis per animal per day at risk after 90<sup>th</sup> day post-lambing



Mean day of first case of mastitis post-lambing



Titers of anti-staphylococcal slime antibodies



CONCLUSIONS

- The results confirmed a protective effect of Vimco® vaccine against staphylococcal mastitis in ewes; protection of vaccinated ewes was stronger up to 90<sup>th</sup> day of the lactation period.
- During the first three months of lactation period, protection of ewes is of particular importance, as there is increased risk of mastitis and milk production is at highest level; hence, mammary infections have a significant adverse effect in dairy (reduced milk production) and in meat (suboptimal growth of lambs) production systems.

ACKNOWLEDGEMENTS  
CONFLICT OF INTEREST

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The authors declare that the funding body has not had any involvement in the production and presentation of field data related to measures of mastitis development.