

INTRODUCTION

Recent studies have documented the efficacy of STARTVAC® against *S. aureus* (Schukken et al. 2014) and *E. coli* (Bradley et al. 2015). The former study stressed that the economic impact of STARTVAC® in a specific herd depends on the herd's infection level with *S. aureus* and management level for udder health, such as milking procedures and culling regime of infected cows. Bradley et al. (2014) reported a return on investment of 2.6:1, but in the article it is stressed that this concerns the effects on milk yield alone and not the effect of the vaccine on the reduced severity of clinical cases.

METHOD AND MATERIAL

SimHerd is a stochastic, mechanistic and dynamic simulation model of a dairy herd including young stock (Østergaard et al. 2005). The web-based model is routinely used by Danish veterinary practitioners and farm advisors and it quantifies the economic benefits of improving e.g. reproductive performance. In a collaboration between SimHerd Inc. and HIPRA, a decision support module was added to the existing SimHerd model that can estimate the economic return of using STARTVAC® in a specific herd. The empirical evidence of the aforementioned studies was incorporated in the SimHerd model. Furthermore, SimHerd simulated the efficacy of the vaccine against *S. aureus* using the herd's infection level of *S. aureus* as herd specific data, but also for four different management levels for udder health. The economic impact of the vaccine against *E. coli* was estimated by simulating a scenario in which the vaccine's effect on milk yield alone was simulated and a scenario in which the effect on milk yield and reduced severity of mastitis cases was simulated. The herd's level of mastitis incidence and distribution of severities was entered into the model as herd specific data. Other herd specific data that was used in the SimHerd model, was among others milk yield level, reproductive performance, replacement rate and other diseases treatments.

RESULTS

The simulated results of the four *S. aureus* scenarios and two *E. coli* scenarios are summarized in a three-page report in pdf. The report contains bar diagrams (Figure 1, 2) showing changes in net return per cow per year for the different scenarios, in contrast to the costs of the vaccine, represented by a horizontal line in the bar chart. The report furthermore presents development of economic return over time and technical details for each scenario, such as changes in milk yield per cow per year and culling rate (figure 3). The simulated increase in net return (excluding costs of vaccination) when using STARTVAC® in a typical 200-cow Danish dairy herd is €3087 and € 13825 per

year for the efficacy against *S. aureus*, in case the management level is poor and good, respectively. The increase in net return with respect to the efficacy against *E. coli* is €7919 and €14630 when simulating the effects of milk yield alone and the effects of both milk yield and reduced severity of clinical cases, respectively.

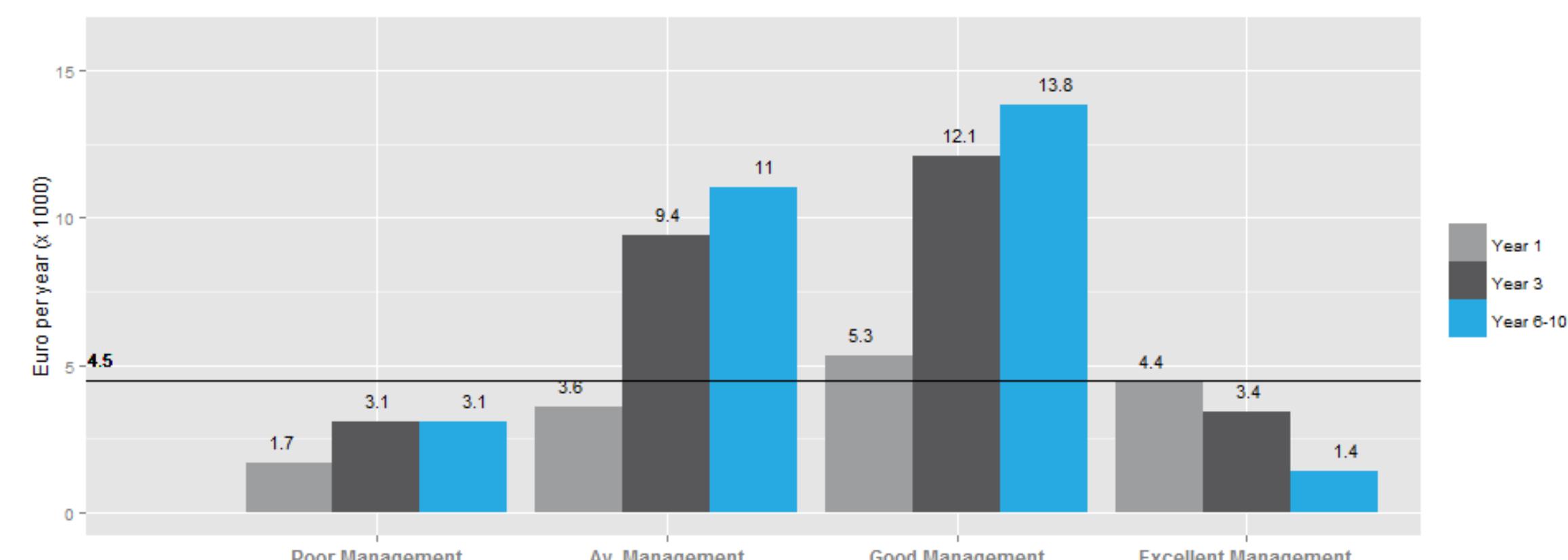


Figure 1. Changes in Net Return per year in the *S. aureus* scenarios and annual costs of vaccination (—)

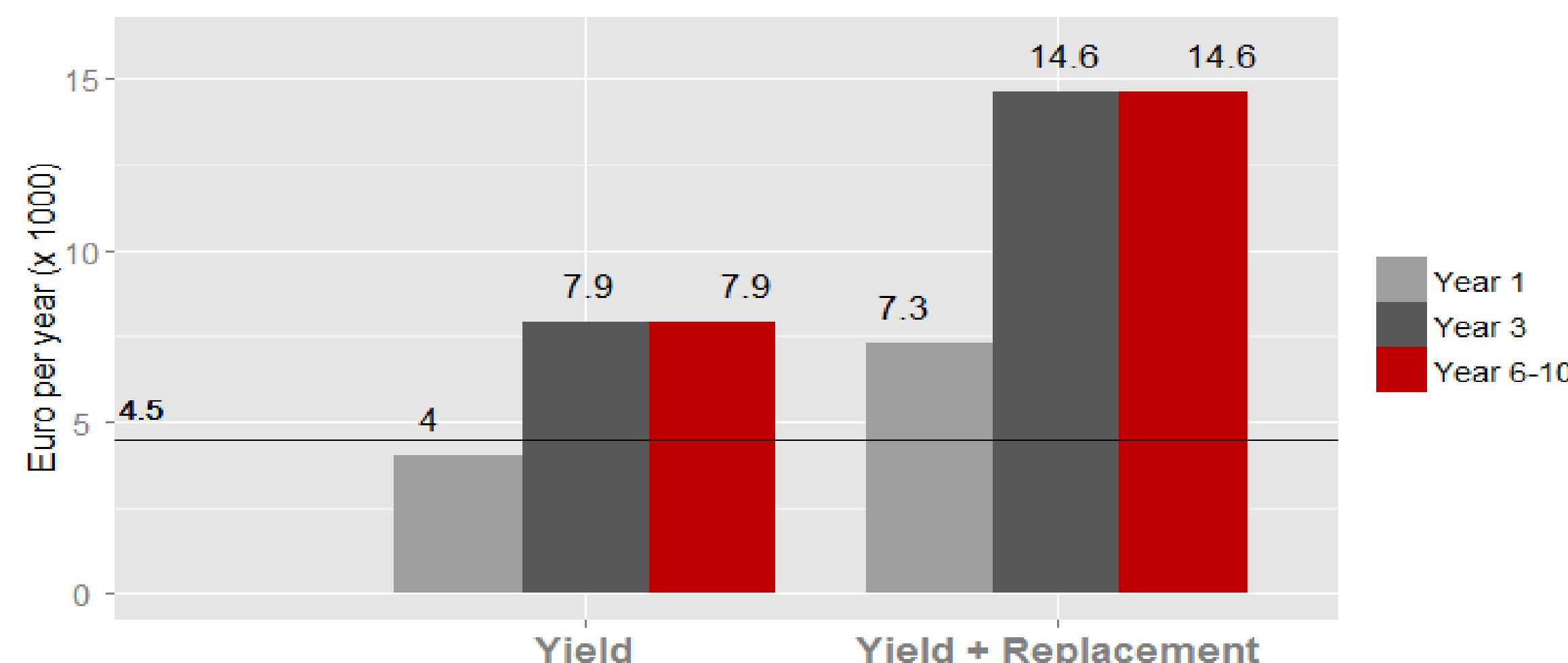


Figure 2. Changes in Net Return per year in the *E. coli* scenarios and annual costs of vaccination (—)

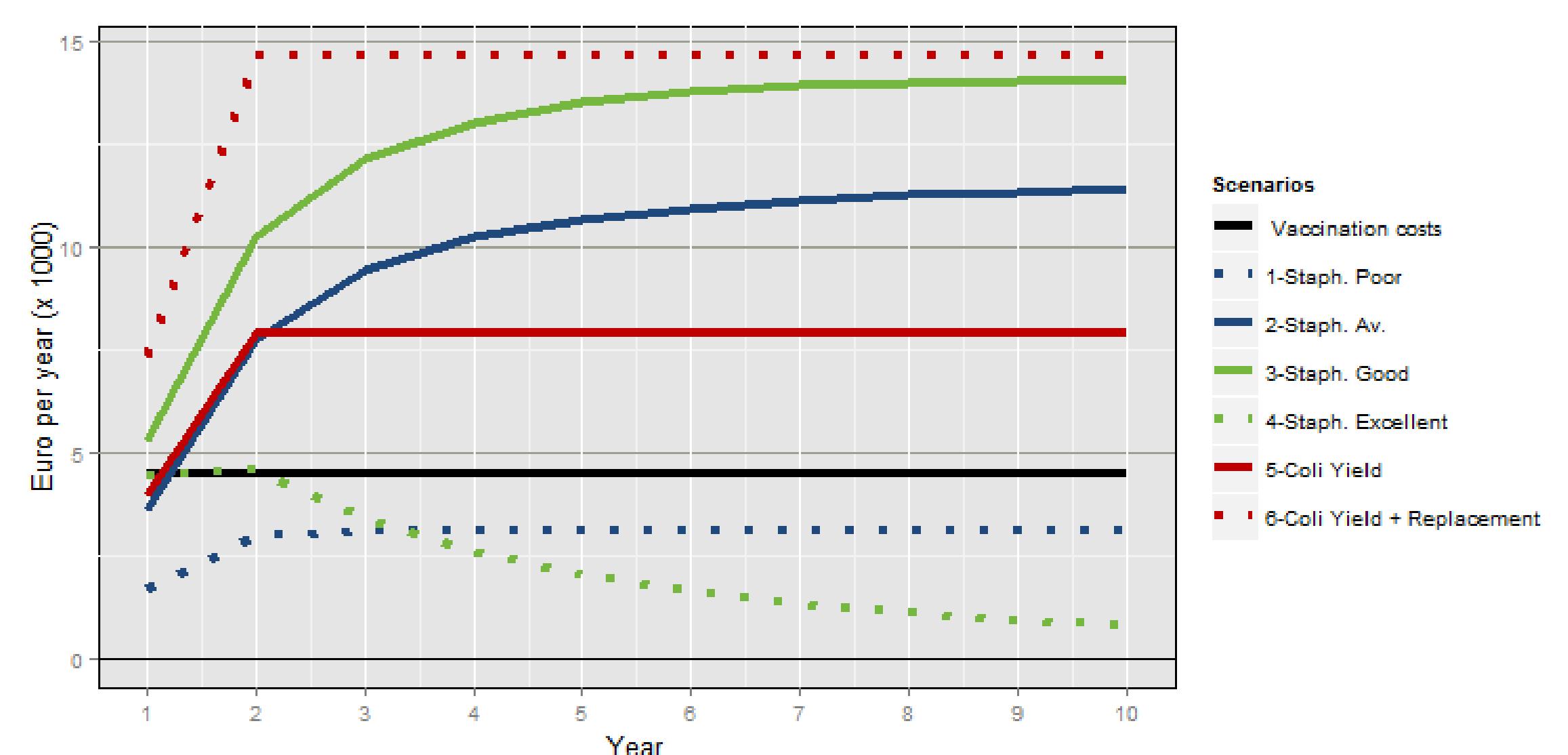


Figure 3. Development of Net Return per year in four scenarios for *S. aureus* (Staph.) with different management levels for udder health (Poor, Average, Good and Excellent) and two *E. coli* scenarios, compared to default scenario

CONCLUSIONS

SimHerd with the additional module for estimating the economic impact of STARTVAC® has since the development been used by Danish veterinarians. The simulated results of the vaccine efficacy are used for decision support but also in the valuable discussion between farmer and veterinarian on management practices of udder health. Simherd has already supported decisions to vaccinate herds in Denmark.