A PARTIAL BUDGET ANALYSIS TO ESTIMATE THE ECONOMICS OF A MASTITIS VACCINATION PROGRAM

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OBJECTIVES

Determine revenues and costs resulting from implementing a STARTVAC® vaccination program.

Develop a deterministic simulation model using partial budgeting to estimate the net profit of implementing a STARTVAC® vaccination program.

INTRODUCTION

The use of vaccination to control infectious diseases in dairy cattle is common and vaccination against mastitis pathogens is a control strategy used by some dairy farmers.

STARTVAC® is an inactivated vaccine intended to reduce bovine mastitis problems caused by *Staphylococcus aureus*, *Escherichia coli* and Coagulase Negative Staphylococci.

MATERIAL AND METHODS

Data from a multiherd, randomized, double-blinded, controlled and stratified (primiparous and multiparous) trial evaluating the efficacy of a STARTVAC® vaccination program was used in this economic analysis.

Three hundred and forty three cows from six Spanish herds were randomly assigned at 45 days prior to the estimated parturition date to either a control group (Control) or to a vaccination group (STARTVAC®).

Cows assigned to the STARTVAC® group were vaccinated with STARTVAC® at 45 and 10 days prior to the estimated parturition date and 52 days after parturition.

Input variables (up to 130 days after parturition) that were used in the economic analysis included: a) days of discarded milk obtained from study records; b) milk yield obtained from weekly measurements; c) somatic cell count (SCC) obtained from weekly measurements; d) new intramammary infection risk obtained from weekly cultures from composite samples; e) clinical mastitis incidence; and, f) cow survival (culling and death events) obtained from study records.

The economic value of input variables was based on literature, if available, or on the Spanish market.

RESULTS

Table 1. Input variables obtained from a clinical trial evaluating the STARTVAC® vaccine in six dairies.

Control (0-130 DIM)	
Discarded milk (days)	1.6
Average daily milk yield (Kg)	32
Average SCC (cells/ml)	559,000
Clinical mastitis risk	15%
Subclinical mastitis risk	46%
Culling risk	9%

STARTVAC® (0-130 DIM)	
Discarded milk (days)	0.9
Average daily milk yield (Kg)	30
Average SCC (cells/ml)	328,000
Clinical mastitis risk	4%
Subclinical mastitis risk	18%
Culling risk	5%

Table 2. Economic value assigned to input variables.

€	*16.00*	*Vaccination cost*
€	*3*	*(min/cow)*
€	*8.00*	*Labor (€/cow)*
€	*0.30*	*Syringes cost*
€	*0.08*	*Marginal feed cost per Kg of milk*
€	*0.30*	*Milk price per Kg*
	250,000	*Cut-point SCC premium (cells/ml)*
€	*0.01*	*Premium per Kg of milk at < 250,000 cells/ml*
€	*45*	*Treatment cost per clinical mastitis case*
€	*30.00*	*Drugs*
€	*10.00*	*Labor*
€	*30.00*	*Vet cost per call*
	20%	*Cases seen by the vet*
€	*750.00*	*Cost of an average cull*
€	*1,250.00*	*Value of existing average cow*
€	*2,000.00*	*Price of a new heifer*
€	*500*	*Income from beef*

Table 3. Extra or reduced revenues and costs per cow resulting from using a STARTVAC® vaccination program in six dairies, as well as direct net profits from the intervention.

€	25	STARTVAC® net profit per cow
Extra / reduced revenues		
	NSD	Milk production
€	-	SCC premiums
Reduced / extra costs		
€	7	Days of discarded milk
€	5	Clinical mastitis treatment
€	30	Culling
	NSD	Marginal feed cost
€	16	Vaccination cost

Table 4. Net profit and Return on investment (ROI) per cow when accounting for direct effects alone using effect sizes of 200% and 50%.

€	67	€	4	STARTVAC® net profit per cow
%	200	%	50	Effect size
%	399	%	25	Return on investment (ROI)
%	40			Breakeven (Effect size)

DISCUSSION

The overall net profit of the vaccination intervention was €25 per cow in the first 130 days after parturition (direct effects).

The input variable that had the strongest impact on the profitability of the vaccination program was the reduction in culling undergone by vaccinated cows.

The vaccine was very efficacious in reducing the incidence of clinical mastitis during lactation, which indicates that the profitability of the vaccination program is expected to be directly correlated with the herd incidence of clinical mastitis.

In addition, the observed reduction in subclinical mastitis incidence is expected to result in a reduction of cow-to-cow transmission of mastitis pathogens (indirect effects). These effects were not estimated in this partial budget.

Breakeven was less than half (40%) of the expected effect size even when only considering the direct effects of the vaccine.