EFFICACY OF VACCINATION AGAINST BIOFILM-PRODUCING *STAPHYLOCOCCI* AS A PREVENTIVE MEASURE AGAINST SUBCLINICAL MASTITIS IN LACAUNE AND MANCHEGA SHEEP IN SPAIN

Rodríguez Fernández, J.A.[1]; García Carrero, F.[1]; Delgado Rodríguez, C.[1]; Sanz Franco, M.A.[2]

[1]PROVIS, S.L., Sheep Production (Ciudad Real, Spain); [2] HIPRA, Amer (Girona), Spain

The **Reference** in **Prevention** for **Animal Health**

INTRODUCTION

Subclinical mastitis have recorded **7% losses for counts of 500,000 scc/ml, rising to 18.2% for 1,500,000 scc/ml** (Arias, R. 2009; Gonzalo, C. 2016). *Staphylococci* are the predominant pathogens involved in subclinical mastitis. Their primary pathogenic factor for causing subclinical mastitis is the biofilm produced by them inside the udder. **Vaccination against *staphylococci* as part of a mastitis control programme** helps to decrease *staphylococci* transmission. It results in a decrease in somatic cells and an increase in milk production.

This study assesses the **efficacy of vaccination against *staphylococci* biofilm** in two breeds by measuring **reductions in somatic cell count** (SCC) and **gains in production**. It also proposes a means for calculating the **return on investment** (ROI) of vaccination in production.

MATERIALS AND METHODS

A farm with **Lacaune and Manchega sheep** (handeled separately) and individual management of milk production was selected. In lambings in May 2017, half of the animals from each breed were **vaccinated with VIMCO®** (twice before lambing), and the other half were left unvaccinated as control (4 groups: vaccinated Lacaune (LV =112 sheep), unvaccinated Lacaune (LC =138 sheep), vaccinated Manchega (MV =88 sheep) and unvaccinated Manchega (MC =95 sheep). After lambing, **4 monthly records of the somatic cell count** of each group were performed. In addition, **daily individual milk production checks were performed every 3 weeks**. This information was used to calculate standardised production at 150 days of lactation for Lacaune breed and at 120 days for Manchega breed.

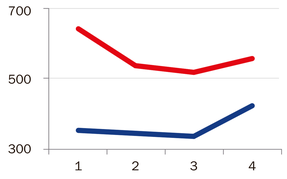
With the base price of milk, multiplied by the sum of fat and protein, and bonuses and penalties due to SCC, **we calculated the price of milk charged in each group** (see Table 1). This calculated **price together with the production were used to evaluate the return on investment** (ROI), of vaccination, considering the cost of the vaccine €4 (complete protocol).

TABLE 1	Fat + Protein	PRICE (Base x SE)	PRICE CHARGED
LC	10.666	€0.672	€0.684
LV	11.007	€0.694	€0.712
MC	12.041	€1.120	€1.120
MV	12.151	€1.130	€1.137

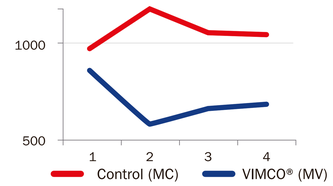
Table 1. Calculation of milk price.

RESULTS AND DISCUSSION

In LC SCC was 563,049 scc/ml and in LV 361,970 scc/ml in the vaccinated group (LV), **representing a total reduction of 55.6%**. This difference is highly significant according to Student's t-test with a p value of 0.001. Being below 500,000 scc/ml represents **a difference in bonuses in the price of milk compared to the control group of €0.00601/litre** of milk (bonus for being between 500,000 and 750,000 scc/ml = €0.01202/litre and bonus for being under 500,000 scc/ml = €0.01803/litre). Graph 1 shows the difference in scc for each group in the 4 checks performed throughout lactation.



Graph 1.
LACAUNE SCC x 1,000 scc/ml



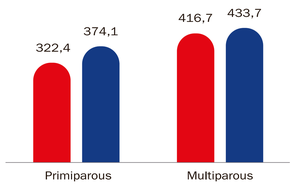
Graph 2.
MANCHEGA SCC x 1,000 scc/ml

In the Manchega breed, SCC were 1,060,938 scc/ml in the control group (MC) and 686,811 scc/ml in the vaccinated group (MV), **representing a total reduction of 54.5%**. This difference is significant according to Student's t-test with a p value of 0.03. Being below 750,000 scc/ml **represents a bonus of €0.00601/litre** of Manchega designation of origin milk. Graph 2 shows the difference in scc for each group in the 4 checks performed throughout lactation.

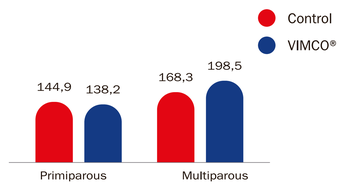
In primiparous animals of the Lacaune breed, the vaccinated group produced **51.6 more litres of milk** (+16%) in standardised production than the control group after 150 days of lactation. In multiparous sheep, **the difference was 17 litres**, representing 4.1% greater milk production in the vaccinated group. These values are shown in Graph 3.

In primiparous animals of the Manchega breed, the control group produced 6.7 more litres of milk in standardised production than the vaccinated group after 120 days of lactation, representing 4.6% less milk. Not finding any difference in this group may be explained by the fact that a small, non-uniform sample was used.

In multiparous sheep, the difference was **30.2 more litres** of milk in the vaccinated group, representing 18% more milk. These values are shown in Graph 4.



Graph 3.
LACAUNE Litres per lactation at 150d



Graph 4.
MANCHEGA Litres per lactation at 120d

With the differences in production and the price of milk, we calculated the ROI. In 2017, the base price of milk was €0.063/l in Lacaune sheep and €0.093/l in Manchega designation of origin sheep. This, multiplied by the degree of fat plus protein, yields the price per litre, to which the bonus for quality (SCC and Bacteriology) must be added. Importantly, although more milk was produced in the VIMCO groups, **fat and protein not only did not decrease, but actually increased**.

In primiparous Lacaune, the difference in revenue from milk in standardised lactation after 150 days was €45.66 in LV, **representing a 21% increase and an ROI of 11**. In multiparous Lacaune, the difference was €23.56, **representing 8% more revenue and an ROI of 6**.

Primiparous Manchega sheep had a negative difference of €5.25, representing 3% more revenue in the MC. In multiparous sheep, the difference in revenue was €37.03, **representing a 20% increase in MV, and an ROI of 9**. These values are shown in Table 2.

TABLE 2	PRIMIPAROUS				MULTIPAROUS			
	€/lactation	Difference	Diff. (%)	ROI	€/lactation	Difference	Diff. (%)	ROI
LC	€220.60	€45.66	21%	11	€285.13	€23.56	8%	6
LV	€266.26				€308.68			
MC	€162.33	- €5.26	- 3%	- 1	€188.59	€37.03	20%	9
MV	€157.06				€225.62			

Table 2. Calculation of gain and ROI.

CONCLUSIONS

- Vaccination with **a vaccine that controls the biofilm** produced by *staphylococci* **contributed to decrease SCC and increased production** in both Lacaune and Manchega sheep.
- When we translated the difference in production to revenue, we found that the **ROI was 6 in Lacaune sheep and 9 in Manchega sheep**. In other words, each euro invested in vaccine yielded a return of 6 euros and 9 euros, respectively.
- Vaccination with **VIMCO® (HIPRA) is an effective tool in controlling subclinical mastitis** caused by *staphylococci*.

NMC Milano2018
The 2018 International Bovine Mastitis Conference
JUNE 11-13, 2018

2018-0177 Ovi