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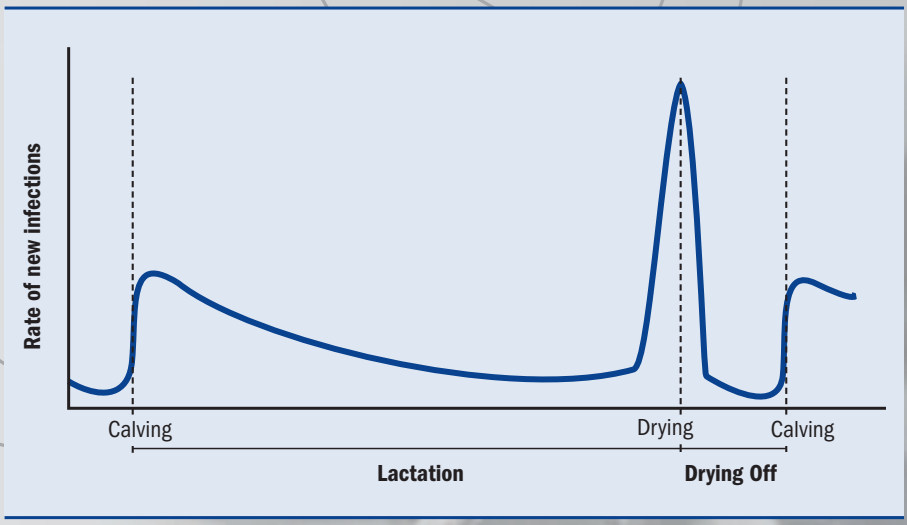
Assessment of the use of the STARTVAC® vaccine on a dairy farm affected by environmental mastitis

Carlos Ribeiro, Veterinary Doctor; Dália Castro, Veterinary Doctor
cr.cveta@netvisao.com | Centro Veterinario de Aveiro, Portugal

1. Introduction

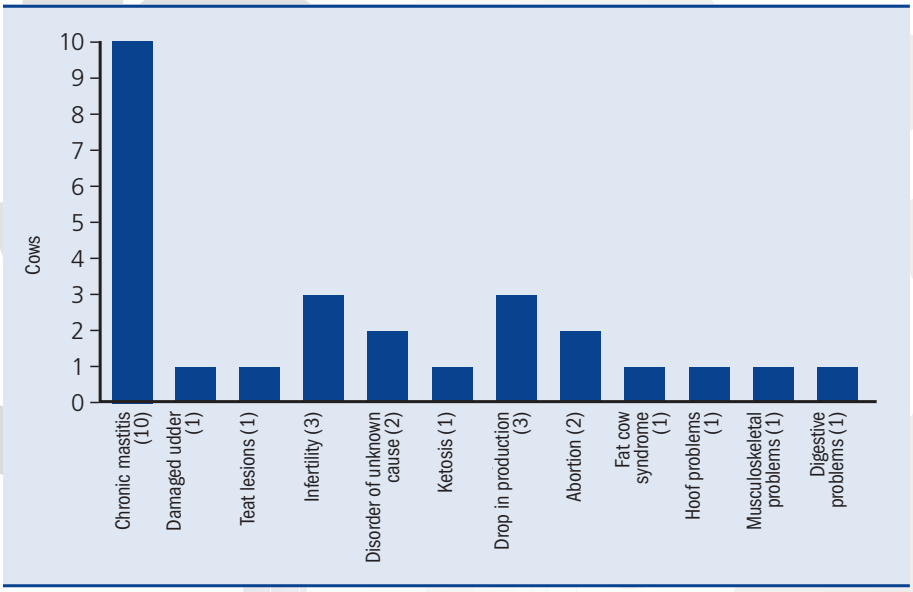
Mastitis represents very high costs for a dairy farm. The cost of mastitis may mean a reduction of 20% to 25% in both milk production and the proportion of fat in it (Sharma et al., 2009). We must add to these economic losses the immediate costs associated with the treatment of mastitis, the value of discarded milk and penalties on the milk price as a result of an increased somatic cell count (SCC) and total bacterial count. To all this, additionally we know many cases of mastitis lead to the loss of one or more udder quarters and early culling of some cows.



Graphic 1. Rate of new intramammary infections during lactation and the dry period (Adapted from Naztke)

Mastitis can never be eradicated, because the various types are the result of multiple factors: animal, environment, handling, milking routine and microorganisms. High milk production is also one of the predisposing factors for the occurrence of mastitis because it increases the sensitivity of the udder to infections. Several studies have shown

Carlos Ribeiro, Veterinary Doctor; Dália Castro, Veterinary Doctor | cr.cveta@netvisao.com | Centro Veterinario de Aveiro, Portugal



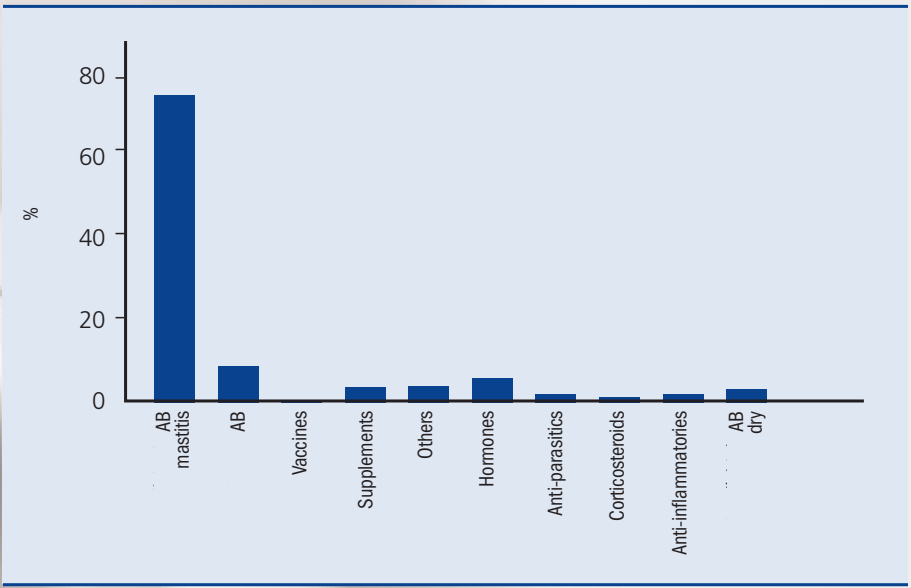
Graphic 2. Reasons for rejection in the period from 15/3/2009 to 16/3/2010

that nearly half of the cases of environmental mastitis developed in early lactation were related to infections acquired during the dry period (Bradley et al., 2000) (Graphic 1).

In the field of mastitis control, apart from antibiotics, environmental management, hygienic measures and milking routine, a prophylactic vaccinal treatment is now emerging in Europe. The J5 type vaccines (*E. coli*) have been available for several years in the United States. They are used in preventing mastitis caused by coliform bacteria such as *E. coli*, *Klebsiella* spp, *Citrobacter* spp and *Enterobacter* spp. According to several studies, administration before calving in adult cows and heifers is a solid investment with a significant economic benefit

Laboratorios HIPRA S.A. have now registered STARTVAC®, which combines immune protection against *E. coli* and coliforms with protection against *S. aureus* and coagulase negative staphylococcus (CNS), to reduce the severity and duration of the clinical status of mastitis and prevent new infections. In order to evaluate the efficacy and cost-effectiveness of this vaccine, we used STARTVAC® on a dairy farm with high economic losses due to mastitis by coliform agents, without altering the established preventive control.

This dairy farm was chosen because of the high total cell count and high costs associated with the use of intramammary antibiotics (Graphic 3). During 2009, this farm had costs of approximately 11,000 euros on intramammary antibiotics used for treating clinical mastitis in lactating cows, which corresponds to 72% of the total cost for drugs.



Graphic 3. Medication costs (as a percentage) in 2009

2. Methodology

The protocol used was according to the manufacturer (HIPRA) and consisted of two 2ml intramamuscular injections of STARTVAC® at 45 and 15 days prior to calving and 50 days after calving in pregnant cows and heifers. This immunisation protocol was implemented for a period of six months, after which the incidence of new infections in all vaccinated animals was assessed, as was the evolution of cell counts in the herd and the costs associated with treatment of mastitis.

The study in question was carried out on a group of 65 lactating cows. The trial began on the 27th of July 2009 and during that time, 10 heifers and 16 adult cows were vaccinated. The first cow vaccinated was scheduled to calve on the 7th of September 2009, so it was not until that date when data collection started for the analysis of the efficacy of the vaccinated group in comparison to the previous 6 months.

3. Analysis of the results

To rule out the possibility that our results are masked by possible culling of chronic cows, we compared the number

of animals culled due to mastitis in the six months preceding the trial and during it. Analysing this data, we note that the number of cows rejected due to mastitis was unchanged in both periods (Table1); so we consider that this criteria has no influence on the results. In the six-month trial (from September to February), six cows were rejected for mastitis, which was what had occured in the previous milking period.

Considering that from 250,000 cells/ml upwards, an animal demonstrates both lower milk quality and production losses, we followed this criteria in our trial (Brito *et al*, 1997). As a result, we analysed the number of vaccinated cows with SCCs above 250,000 cells (SCCs above 300,000 imply the loss of one premium point in the payment for milk). (Table 2).

Of the 26 vaccinated animals (heifers and multiparous cows), 5 are marked on the list of animals with SCCs higher than 250,000 cells/ml. This represents 25% of total new cases in adult cows and 10% of heifers vaccinated during this period of time. The bulk milk tank cell count decreased (on average per milking period) from 449,000 cells / ml to 239,000 cells/ml. (Graphic 4).

We can verify after analysing the treatment costs that there was a significant reduction in relation to intramammary medication for mastitis (Graphic 5). The mean monthly expense for monthly intramammary treatments was in excess of 1,000 euros - by September, this expense was reduced to less than half of this.

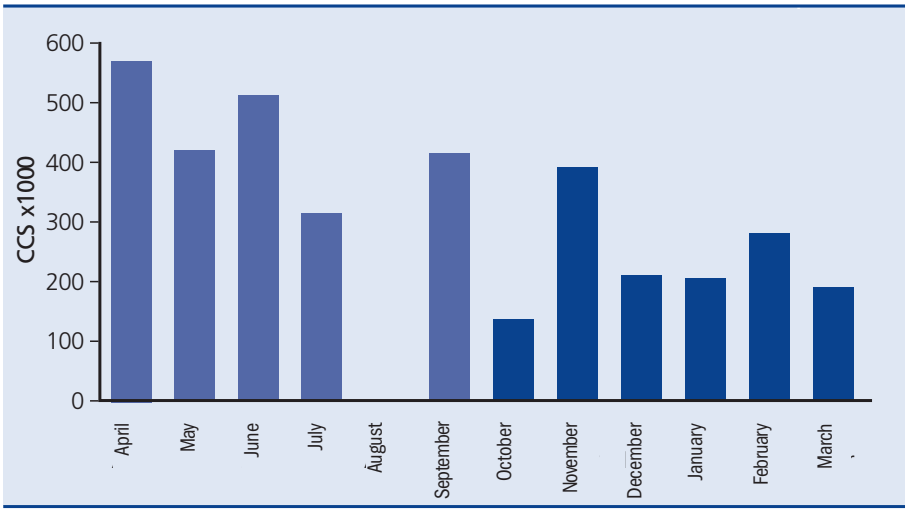
Immunisation during the dry period can be considered as a possible explanation of the immediate reduction in treatment costs, as a lower incidence of mastitis is recorded postpartum and clinical cases respond more quickly to common antibiotics. Given the hypothesis of the typical seasonal character of coliform infections, we looked to see whether if at the same time as in the previous year, this cost reduction in intramammary antibiotics had been verified. In analysing the 2008 data table, which only has figures available from April onwards, there is no

Table 1. Cows rejected in the period from 01-02-2009 to 28-02-2010.

Date	Cow ID	Cause of Rejection	Calving No	Days in Lactation
24/02/2009	1057	CLINICAL MASTITIS	1	-
24/02/2009	8601	SUDDEN DEATH	3	-
24/02/2009	4260	POST CALVING DISORDERS	2	-
24/02/2009	1046	DAMAGED UDDER	1	-
24/02/2009	4256	ABORTION	3	-
24/02/2009	8600	FATTY LIVER SYNDROME	2	-
24/02/2009	3857	FATTY LIVER SYNDROME	3	-
18/03/2009	4023	CHRONIC MASTITIS	4	-
18/03/2009	3243	ABORTION	3	-
18/03/2009	5629	CHRONIC MASTITIS	2	-
22/03/2009	4104	DROP IN MILK PRODUCTION	5	-
19/05/2009	8697	DAMAGED UDDER	3	-
20/06/2009	4830	CHRONIC MASTITIS	3	-
20/06/2009	8602	INFERTILITY	2	-
20/06/2009	8597	UNKNOWN DISEASE	3	-
23/06/2009	2234	UNKNOWN DISEASE	3	-
25/08/2009	1048	DIGESTIVE DISORDERS	1	-
25/08/2009	9602	CHRONIC MASTITIS	2	-
19/09/2009	4296	KETOSIS	2	2
22/09/2009	4253	ABORTION	3	293
24/09/2009	6741	FATTY LIVER SYNDROME	4	5
25/09/2009	4252	MUSCULOSKELETAL DISORDERS	3	325
15/12/2009	6970	CHRONIC MASTITIS	3	330
15/12/2009	1595	CHRONIC MASTITIS	3	441
16/12/2009	2702	CHRONIC MASTITIS	3	408
16/12/2009	2227	CHRONIC MASTITIS	4	347
16/12/2009	4266	CHRONIC MASTITIS	2	365
16/12/2009	0344	CHRONIC MASTITIS	3	403
18/01/2010	6968	INFERTILITY	3	482
18/01/2010	9520	DROP IN MILK PRODUCTION	4	112
18/01/2010	4241	DROP IN MILK PRODUCTION	3	43
21/02/2010	9451	INFERTILITY	1	417
21/02/2010	4255	HOOF DISORDERS	4	111
21/02/2010	4293	DAMAGED UDDER	2	178

Table 2. List of cows with SCC values above 250,000 somatic cells.

Cow ID	Calving No	05 Jan	04 Feb	04 Mar	04 May	03 Jun	03 Jul	03 Oct	03 Nov	03 Dec	04 Jan	03 Feb	03 Mar	Days in Lactation	Total milk production	Average milk production
4261	05/04/09/2/G	-	-	-	39	-	-	-	-	109	876	290	304	332	13,426	40.44
4295	04/05/09/2/G	34	149	65	-	226	171	227	967	570	929	787	577	349	9,969	28.56
1042	07/05/09/2/G	146	176	121	-	143	577	301	545	306	1975	1929	880	300	12,057	40.19
1053	19/05/09/1/G	-	-	-	-	64	41	381	1770	1185	487	1020	781	288	9,200	31.94
4262	15/06/06/2/S	40	36	40	-	-	29	15	43	64	207	112	2570	307	10,237	33.35
4268	26/07/09/2/G	111	272	262	275	-	-	47	58	102	200	179	405	220	6,039	27.45
1051	11/09/09/1/I	-	-	738	-	-	-	31	133	236	71	638	433	173	5,875	33.96
4300	27/11/09/2/I	77	205	20	219	-	-	-	-	43	79	138	305	96	4,729	49.26
1043	27/12/09/2/C	50	44	-	29	20	80	111	199	-	64	1559	1550	66	2,377	36.02
1049	18/01/10/2/I	-	-	3556	412	3556	874	398	345	-	-	130	437	44	1,702	38.68
1052	23/03/10/2/P	33	47	379	265	379	176	309	541	336	-	-	-	-	-	-
1060	17/04/10/2/P	-	1151	139	303	139	176	76	153	137	92	147	-	-	-	-



Graphic 4. Evolution of BSCC throughout the last year. Bulk tank milk cell count decreased (average per period) from 449,000 cells/ml to 239,000 cells/ml.

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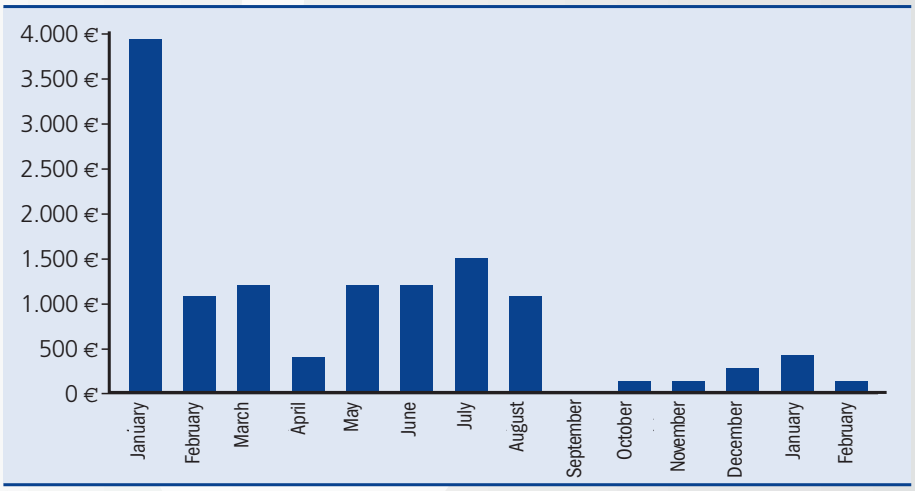
seasonality, and costs remain constant throughout the year at an average of 1,250 euros (Graphic 6).

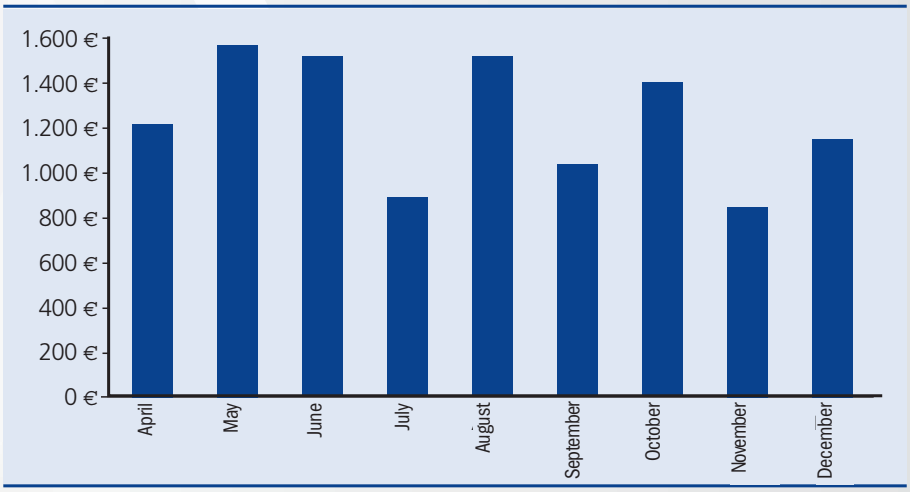
4. Conclusions

During the period we vaccinated with STARTVAC®, we achieved very positive results with decreased cell counts in the herd (average SCC reduction of 210,000) and a remarkable cost reduction in intramammary antibiotics (a decrease in the monthly average, which was above 1000 euros, to less than half of that). There was also a decrease in the severity of both clinical and subclinical mastitis (SCC > 250,000).

With regard to the incidence of new cases, we cannot say what their evolution is; we only know that the incidence in all of the vaccinated animals was 20%. To reinforce these findings, it would be interesting to undertake further studies to assess the cost-effectiveness of the vaccine, with a larger number of animals and for a longer time.



Graphic 5. Intramammary medication costs in 2009



Graphic 6. 2008 average monthly costs of intramammary medications used

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Laboratorios Hipra, S.A.
Avd. la Selva, 135
17170 Amer (Girona)
Spain

Tel.: (34) 972 43 06 60
Fax: (34) 972 43 06 61
hipra@hipra.com
www.hipra.com