

# FACTORS AFFECTING CURE OF STAPHYLOCOCCUS AUREUS MASTITIS TREATED WITH SYSTEMIC OR INTRAMAMMARY EXTENDED THERAPIES

Martin Pol<sup>1</sup>, Carlos Catracchia<sup>1</sup>, Julia Maito<sup>1</sup>, Liliana Tirante<sup>1</sup>, Javier Chaves<sup>1</sup>, Luis Calvino<sup>2</sup>

<sup>1</sup>Lactodiagnostico Sur, Olivos, Buenos Aires, Argentina. <sup>2</sup>EEA INTA, Rafaela, Santa Fe, Argentina

## Introduction

The prevalence of *Staphylococcus aureus* infections can be reduced through the 5-point plan. Proper milking techniques, appropriate treatment of clinical cases, dry cow therapy, post dipping, and culling of chronically infected animals have been used successfully by producers. The segregation of infected animals has shown its efficacy in preventing new infections, however not all producers can handle extra groups (Wilson et al., 1995). During the last years many studies were conducted to determine factors at cow, pathogen, and treatment level that affect the probability of cure of infections caused by *Staphylococcus aureus* (Barkema et al., 2006). Intramammary infusions or the combination of intramammary and systemic products are commonly used to treat these infections. There is relatively little information on the efficacy of systemic treatments to treat *Staphylococcus aureus* subclinical infections.

The objective of this study was to evaluate how selected cow and pathogen factors affected the probability of cure of subclinical mastitis caused by *Staphylococcus aureus* treated with systemic tylosin or intramammary cefacetil-rifaximin extended therapies.

## Materials And Methods

In a herd (n=956 cows) with a high prevalence (30%) of *Staphylococcus aureus*, composite samples were obtained from each lactating cow during a whole herd investigation. Quarter samples (n = 1378) were obtained one month later, from all lactating cows that had yielded a *Staphylococcus aureus* culture from the composite sample and from all the cows that calved during that month. Samples were cultured plating 0.05 mL in a blood-agar plate and NMC guidelines were followed to identify bacterial species. Colony forming units appearing in the plate were recorded as 1 of the following 3 categories: actual number ( $\leq 10$  cfu), ++ (11 to 100 cfu), +++ ( $> 100$  cfu). Cow factors studied included parity, days in milk (DIM) until treatment, test day linear score, previous test day linear score and mean linear score of the current lactation. Forty cows with 1 or 2 quarters infected with *Staphylococcus aureus* were randomly selected and treated during 10 consecutive milkings with an intramammary infusion (IMM) containing cefacetil and rifaximin (Cefaximin-L, Fatro). The rest of the cows with at least 1 quarter infected with *Staphylococcus aureus* were treated intramuscularly (SYS) with tylosin (Tylan 200, Elanco Animal Health) every 24 h during 5 days. A total of 40 mL were injected on day 1, while 30 mL were injected the following days. Cure was assessed at 7 and 14 d post treatment sampling those quarters (n = 414) that were infected with *Staphylococcus aureus* before treatment. Total cure rate (CR) was defined for quarters not yielding *Staphylococcus aureus* at days 7 and 14. Statistical association of treatment (IMM or SYS), pathogen or cow factors with cure was evaluated using the Chi-square test of Statistix (Statistix 8.0).

## Results

A total of 204 cows (414 quarters) resulted infected with *Staphylococcus aureus* when sampled at quarter level. Cows with IMM treatment averaged 1.4 infected quarters per cow while cows with SYS treatment averaged 2.1 infected quarters per cow.

Colony forming units were recorded for 320 isolates. About 70% of *Staphylococcus aureus* plates yielded less or equal than 10 cfu. Number of colonies was associated with cure both for IMM and SYS treatments ( $P < 0.001$ ). Quarters that yielded  $\leq 10$  cfu per plate ( $n = 218$ ) resulted in a higher cure rate (50%) as compared to quarters that yielded  $> 10$  cfu per plate ( $n = 102$ ; CR = 16%) when SYS treatment was used. Parity was associated with cure for cows treated with SYS treatment ( $P < 0.01$ ), but not for those treated with IMM treatment ( $P > 0.05$ ). Quarters of first lactation cows ( $n = 41$ ) resulted in a higher cure rate (58%) as compared to quarters of older cows ( $n = 286$ ; CR = 36%). Stage of lactation was associated with cure. Quarters of cows with  $\leq 100$  DIM ( $n = 88$ ) resulted in a significant higher cure (48%) as compared to quarters of cows with  $> 100$  DIM ( $n = 239$ ; CR = 35%) when received SYS treatment. Conversely, quarters that received IMM treatment and where  $> 200$  DIM ( $n = 13$ ) resulted in a significant higher cure rate (84%) as compared with quarters of cows with  $\leq 200$  DIM ( $n = 38$ , CR = 47%). The number of infected quarters per cow was associated with cure for cows treated with SYS ( $P < 0.05$ ), but not for cows treated with IMM. Quarters from cows with 1 infected quarter ( $n = 57$ ) resulted in a higher cure (54%) as compared with quarters from cows with  $> 1$  infected quarter ( $n = 270$ ; CR = 36%). Linear scores (test day, previous test day, and mean linear score) were not associated with cure both for IMM and SYS treatments ( $P > 0.05$ ).

To compare cure rates obtained with IMM and SYS treatments only cows with 1 or 2 infected quarters were considered. No significant differences were found among treatments across lactation groups ( $P > 0.05$ ) (Table 1).

Table 1. Number (%) of quarters from cows with 1 or 2 infected quarters treated with extended schedules of intramammary cefacetril-rifaximin (IMM) or intramuscular tylosin (SYS).

	All lactations				Lactation 1 to 3				Lactation 1			
	IMM		SYS		IMM		SYS		IMM		SYS	
	N	%	N	%	N	%	N	%	N	%	N	%
Cured	29	(56.8)	71	(50.3)	16	(53.3)	41	(48.2)	5	(62.5)	14	(70.0)
No Cured	22	(43.2)	70	(49.7)	14	(46.6)	44	(51.7)	3	(37.5)	6	(30.0)

## References

- Barkema, H. W., Y. H. Schukken, and R. N. Zadoks. 2006. Invited review: the role of cow, pathogen, and treatment regimen in the therapeutic success of bovine *Staphylococcus aureus* mastitis. J Dairy Sci 2006 89: 1877-1895.
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