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Epidemiological and Preventive Studies on Bovine Staphylococcal Mastitis

By

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VI. Summary

Mastitis is the most prevalent and costly disease affecting dairy farms. Therefore, the aim of this work is to determine the prevalence of clinical and subclinical bovine mastitis in dairy farms under different hygienic measures, recognize the prevalence of Staphylococcal infections in clinical and sub clinical cases, evaluate the use of Staphylococcal vaccine in reducing prevalence of mastitis and lowering somatic cell counts during lactation, and to evaluate the use of antibiotic and vaccine in the treatment of clinical and sub-clinical mastitis in dairy cows.

In the present work a total of 420 lactating Holstein cows in three dairy farms at Damietta (farm A, 120 lactating cow and farm C, 160 lactating cow) and El-Sharkia (farm B, 140 lactating cow) governorates in Egypt; were examined for clinical and subclinical Staphylococcal mastitis and also vaccinated by *Staph. aureus* bacterin and were observed during the period from May 2013 to December 2016.

Concerning to the prevalence rates of clinical and sub clinical mastitis; it was found that the overall prevalence rate of mastitis in this study was (62.08%) at the level of quarter, 286 (17.54%) were clinical and 726 (44.53%) were subclinical.

In respect to bacteriological cultures of clinical and sub clinical samples at the level of quarter, the results for clinical mastitis revealed that the total number of positive bacteriological milk samples for clinical quarters were 189 quarters, while results for subclinical mastitis revealed that the total number of positive bacteriological milk samples for subclinical quarters were 557 quarters with total prevalence rate of 66.1% and 76.7%, respectively.

From etiological point of view, the current bacteriological examinations revealed that the total number of *Staph. aureus* isolated from milk samples of clinical quarters were 56 isolates, while the total number of coagulase negative staphylococci were 133 isolates with total prevalence rate of 19.5% and 46.5%, respectively. Also the results for subclinical mastitis revealed that the total number of *Staph. aureus* isolated from milk samples of sub clinical quarters were 233 isolates, while the total number of coagulase

negative staphylococci were 324 isolates with total prevalence rate of 32.1% and 44.6%, respectively.

In the present work, between 1012 clinical and sub clinical mastitic quarters total prevalence rate of *Staph. aureus* was 28.6%. While the total prevalence rate of coagulase negative staphylococci was 45.2%.

Concerning to vaccination with *Staph. aureus* bacterin, after vaccination (after the 120 day from vaccination and at the end of the trial) the overall prevalence rate of clinical mastitic quarters among vaccinated cows at the level of quarter was reduced to 11.8% (192/1630), while the overall prevalence rate of subclinical mastitic quarters among vaccinated cows at the level of quarter was reduced to 30.06% (490/1630).

Bacteriological isolation and identification after vaccination revealed that the total number of *Staph. aureus* isolated from milk samples of clinical mastitic quarters were 36 isolates, while the total number of coagulase negative staphylococci were 96 isolates with total prevalence rate of 12.5% and 33.6%, respectively. Also the total number of *Staph. aureus* isolated from milk samples of sub clinical mastitic quarters were 137 isolates, while the total number of coagulase negative staphylococci were 192 isolates with total prevalence rate of 18.9% and 26.4%, respectively.

In respect to the effect of *Staph. aureus* bacterin on total prevalence rate of *Staph. aureus* and coagulase negative staphylococci isolated from clinical and sub clinical mastitic quarters, the total prevalence rate of *Staph. aureus* was reduced by 40.1% , and the total prevalence rate of coagulase negative staphylococci was reduced by 36.9%. Also average of milk yield per cow was increased by 15.8%.

Regarding to the effect of vaccination on bulk tank analysis, total bacterial count was reduced by 53.6%, SCC was reduced by 47.8%, total Staphylococcal count was reduced by 69.2%, *Staph. aureus* count was reduced by 95.1% and the percent of fat and protein was increased by 9.5% and 10.8%, respectively.

Concerning to the effect of vaccination on culling rate per farm, the overall culling rate was reduced by 30.8%. Also effect of vaccination on frequency of new *Staph. aureus* IMI was observed and found that the total prevalence rate of new *Staph. aureus* mastitis was 10.3% at the level of quarter, while the total prevalence rate of coagulase negative

staphylococci was 38.3% with total protection rate of 63.9% and 15.3% for *Staph. aureus* and CNS, respectively.

Regarding to the effect of vaccination on immunoglobulin sera titers against *Staph. aureus*, vaccinated cows showed elevated immunoglobulin sera titers to *Staph. aureus* bacterin.

Results of the trial of evaluation of Lysigin® and systemic antibacterial treatment to eliminate *staph. aureus* mastitis revealed that the combination of vaccination and intramuscular administration of Marbofloxacin have a significantly higher bacteriological clearance rate (7/13) quarters [53.8%]), also OD values of anti-staphylococcal antibodies and lymphocyte responses were significantly higher compared with the untreated control group (0/5 [0%]). In comparison, bacteriological clearance rate in group treated with Marbofloxacin (4/12 [33.3%]) was higher than bacteriological clearance rate in group received Lysigin® only (2/10 [20%]). OD values of anti-staphylococcal antibodies in the vaccinated group were found to be positive with increased antibody levels. In non-immunized group, the antibody levels fluctuated but lower than vaccinated groups. Lymphocytic responses and phagocytic index were significantly higher in vaccinated groups.