# STAPHYLOCOCCUS AUREUS MASTITIS INVESTIGATION ON HERD LEVEL ON A DAIRY FARM IN HUNGARY

**Tirián, A.[1], Kovács, M.[1], Brydl, E.[2], Szenci, O.[2], Könyves, L.[2], Jurkovich, V.[2] and Tegzes, L.[2]**

[1] University of Kaposvár, Kaposvár, Hungary; [2] Szent István University Fac. of Vet Sci, Budapest, Hungary; Corresponding author: tirian@tvn.hu

## SUMMARY

A herd level investigation was performed on a dairy farm in Hungary to determine the incidence of *S. aureus* intramammary infection (IMI). Because of the expected high number of infected cattle a filtering method based on the SCC values was used to select cows for sampling. The filtering method showed partial success, the incidence of the infection in the selected population was significantly higher than the prevalence of the whole herd.

## INTRODUCTION

*Staphylococcus aureus* mastitis is one of the most common diseases in the dairy production. The estimated losses in Hungary are close to 400 Euros per lactation year for each infected cow (1).

The *S. aureus* caused mastitis is a contagious disease. The infection can happen horizontally and vertically in the herd. In case of horizontal infection the cows are infected mostly during milking (4). By the vertical process is the feeding of contaminated milk and the fly invasion of the farms of capital importance (2, 3).

The elevated somatic cell count (SCC) is a sign of the infection. Since *S. aureus* IMI is very difficult to treat and the bacteriological cure rate is usually below 30% (5) the infected animals have despite treatment a constantly elevated SCC value or repeatedly high values throughout the lactation period.

## OBJECTIVE

Goal of the study was to determine the incidence of Staphylococcus aureus intramammary infection (IMI) on a large scale dairy farm in Hungary using a preselection of the dairy cows based on the somatic cell count (SCC) values of the last 14 months.

## MATERIALS AND METHODS

The study was conducted on a large scale dairy farm in Hungary with 595 milking cows. The bulk tank milk SCC was above 1.000.000 cell/ml, and previous *S. aureus* IMI's were determined, 40 infected cows were kept separately. The data of the previous 14 monthly milk controls were used to select the cows for milk sampling. As threshold values were 500.000, 1.000.000 and

2.000.000/ml chosen. All cows having SCC values at least three times or at two different IMI occasions (between two high SCC data at least two monthly record was below 400.000) have been selected for sampling.

As preevaluation for the three different threshold values were used the data of the previously known S: aureus cows. The sensitivity according to the preevaluation was the highest using 500.000 cell/ml as threshold, but the number of cows selected for sampling was close to the number of the whole herd (the population involved also some culled animals). In case of 1.000.000 as threshold value the preevaluation showed a high sensitivity and the size of the population was also acceptable, by using 2.000.000 the sensitivity was very low (Fig. 1)

**Table 1**. Preevaluation of the different threshold values

| Treshold value | Population sampled | *S. aureus* pos. Population |
|---|---|---|
| 500.000 | 580 | 40 (100%) |
| 1.000.000 | 388 | 36 (90%) |
| 2.000.000 | 244 | 23 (57,5%) |

According to the data of the preevaluation 1.000.000 has been chosen as threshold value. Altogether 209 cows have been selected for sampling (some cows of the selected population were dried off, were in the treated mastitis group or were culled in the previous 14 months) and 809 quarter milk samples were taken at the morning milking. The samples were cooled and transported to the laboratory of the Szent István University, Faculty of Veterinary Science, Department of Animal Hygiene. The samples were frozen for 5 days, then after thawing were streaked on Columbia sheep blood agar. For identification of the bacteria culturing on Baird-Parker agar and Staphylase test (Oxoid Diagnostic Reagents) was used. The antibiotic resistance was determined via plate diffusion test on Müller-Hinton agar plates (Fig 2).

## RESULTS

Out of the sampled 209 cows 121 were S: aureus positive (58%). The number of known infected cows in the whole herd was 161 (26%).

According to the high incidence of *S. aureus* IMI an eradication protocol was implemented. The main points were following:

– All infected cows should be kept separated from the *S. aureus* negative cows. The positive cows should be milked at last in the milking house. After drying off the *S. aureus* positive cows can be kept together with the *S. aureus* negative population, but 3 weeks before the expected parturition should be separated from them.

– Infected cows should calve in a separated calving barn. The calves should receive colostrum of a *S. aureus* negative cow. The feeding of mastitis milk or milk of the high SCC group to the calves is prohibited.

– *S. aureus* positive cows with clinical mastitis should be treated according to the results of the antibiotic resistance test.

– Changes in the milking technology were suggested. Most important point of the changes was the disinfection of the milking units between two consecutive milkings to avoid spreading of the infection during milking.

–   Sampling protocol should be following: All cows with clinical mastitis should be sampled. Cows with high SCC value should be tested with CMT, positive quarters should be sampled. Every freshly calved first parity cow should be sampled in the first 5 day after calving.

**Table 2**. Antibiotic resistance of the *S. aureus* bacteria

|  | 2343 | 1988 | 2239 | 2170 | 1328 |
|---|---|---|---|---|---|
| penicillin | + | + | + | + | + |
| streptomycin | +/– | +/– | +/– | +/– | +/– |
| ampicillin | + | + | + | + | + |
| cloxacillin | + | + | + | + | + |
| amoxi-clav | + | + | + | + | + |
| cefalexin | + | + | + | + | + |
| linkomycin | + | + | + | + | + |
|  |  |  |  |  |  |
|  | 1334 | 1926 | 2761 | 2034 | 1548 |
| penicillin | + | + | + | + | + |
| streptomycin | +/– | +/– | +/– | +/– | + |
| ampicillin | + | + | + | + | + |
| cloxacillin | + | + | + | + | + |
| amoxi-clav | + | + | + | + | + |
| cefalexin | + | + | + | + | + |
| linkomycin | + | + | + | + | + |

In the following months 449 samples were sent to our laboratory, 97 of them were *S. aureus* positive. Out of 75 first parity cows 18 (24%) freshened with *S. aureus* IMI after calving. Despite the high culling rate, the incidence of *S. aureus* infection on herd level is close to 30%.

## CONCLUSIONS

The filtering method used in our study can be a useful tool in the selection of cows for *S. aureus* sampling, although there is a risk leaving infected animals unsampled. The high number of *S. aureus* positive samples after the filtered sampling can be due to left infected animals out of the sampled population but also due to new mastitis cases. The high prevalence of *S. aureus* IMI in the first parity cows shows the important role of feeding mastitis and high somatic cell milk to the calves.

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