

## OCCURRENCE OF ENTEROTOXIN-PRODUCING *STAPHYLOCOCCUS AUREUS* ON SEVERAL DAIRY FARMS OF HAJDÚ-BIHAR COUNTY

\*Ferenc Peles<sup>1</sup>, Martin Wagner<sup>2</sup>, Petra Rieck<sup>2</sup>, Péter Keresztúri<sup>1</sup>, Béla Béri<sup>3</sup>, András Szabó<sup>1</sup>

<sup>1</sup> Department of Agricultural Microbiology, Centre of Agricultural Sciences, University of Debrecen, Böszörményi út 138, H-4032 Debrecen, Hungary

<sup>2</sup> Institute of Milk Hygiene, Milk Technology and Food Science, University of Veterinary Medicine Vienna, Veterinärplatz 1, A-1210 Vienna, Austria

<sup>3</sup> Department of Animal Husbandry, Breeding and Nutrition, Centre of Agricultural Sciences, University of Debrecen, Böszörményi út 138, H-4032 Debrecen, Hungary

*Staphylococcus aureus* is a very important pathogen for dairy farms and milk processing plants. Subclinical mastitis is often caused by this species, and it can contaminate bulk tank milk during milking cows suffering from mastitis. Additionally thermostable enterotoxins produced by some types of this bacterium can cause food poisoning.

The aim of our research was to examine the number of *S. aureus* in bulk tank milk in twenty dairy farms of different size and the enterotoxin-producing ability of *S. aureus* strains. We investigated seven large farms (A-G), four medium farms (H-K) and nine small farms (L-T).

We did not find *S. aureus* in the bulk tank milk of six farms (B, G, J, K, S, T). From the bulk tank milk of the other farms, fifty-five *S. aureus* isolates were collected. With the multiplex PCR assay we investigated the distribution of staphylococcal enterotoxin (SEA, SEB, SEC, SED, SEG, SEH, SEI, SEJ) genes (*sea*, *seb*, *sec*, *sed*, *see*, *seg*, *seh*, *sei*, *sej*) and the toxic shock syndrome toxin (TSST-1) gene (*tst*) in the *S. aureus* isolates.

Analysing the connection between the farm size and the number of *S. aureus* in bulk tank milk, we found that the number of *S. aureus* was smaller at medium ( $1.1 \times 10^2$  CFU/ml) and large farms ( $3.3 \times 10^2$  CFU/ml), than at small farms ( $1.2 \times 10^3$  CFU/ml). The number of *S. aureus* in bulk tank milk of small farms significantly differed from that of the other farms ( $P < 0.05$ ). The results of the analysis of the quality categories showed that the proportion of the best quality ( $< 5.0 \times 10^2$ ) samples was 90.9% in medium, 80.8% in large and only 56.5% in small farms.

Thirteen (24.1%) of the fifty-four isolates carried enterotoxin genes. In three large (A, C, E), one middle (I) and one small farm (N) out of fourteen farms enterotoxin-producing *S. aureus* strains were found. No strain possessed the *seg*, *seh*, *sei*, *sej* or *tst* gene. The isolates carried just one gene. The *seb* gene was present in five isolates (9.3%) of farm "E" and farm "N". The *sea* gene in three-three isolates (5.6%) of farm "C" and farm "I". The *sed* gene in two isolates (3.7%) of farm "A".

The results showed that number of *S. aureus* were the highest at little farms using tied stall barns and bucket milking installation, and these values often exceeded the limit values. The number of *S. aureus* in bulk tank milk was high in farms where there were problems with the detection and separation of cows suffering from subclinical mastitis. In this way, the milk of the mastitic cows could contaminate the bulk tank milk.

During the investigations of the enterotoxin-producing ability of *S. aureus* strains, we found different enterotoxin-producing (SEA, SEB, SEC, SED) *S. aureus* strains in three large farms, one medium and one small farm. The incidence rate of the *seb* gene was the highest. The isolates carried just one gene.