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

Ferenc Peles1, Martin Wagner2, Petra Rieck2, Péter Keresztúri1, Béla Béri3, András Szabó1

1 Department of Agricultural Microbiology, Centre of Agricultural Sciences, University of Debrecen, Böszörményi út 138, H-4032 Debrecen, Hungary
2 Institute of Milk Hygiene, Milk Technology and Food Science, University of Veterinary Medicine Vienna, Veterinärplatz 1, A-1210 Vienna, Austria
3 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 (1.1x10^2 CFU/ml) and large farms (3.3x10^2 CFU/ml), than at small farms (1.2x10^3 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 (<5.0x10^2) 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.