**Staphylococcus aureus bovine mastitis in Israel: incidence, molecular features, transmission mechanisms and risk factors.**

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**Abstract**

 *Staphylococcus aureus* is one of the most important pathogens causing intramammary infection (IMI) in dairy herds. The goals of this study were 1) to describe the prevalence of *S. aureus* in Israeli dairy farms; 2) to characterize the *spa*-based clonal structure of mastitis-related *S. aureus* isolates; 3) to analyze the transmission network of a large outbreak within a single farm; 4) to characterize the virulence factors of the outbreak strain and 5) to characterize the risk factors for *S. aureus* infection.

The prevalence and the molecular survey were performed on all Israeli IMI-related isolates, 9.2019-8.2020. Molecular methods included *spa*-typing for the survey and whole-genome sequencing (WGS) for the investigation of the farm 'A' outbreak. Risk factors for S. aureus mastitis were investigated by a phone questionnaire with the farmers and their instructors.

During the one-year survey, *S. aureus* was identified in 152 dairy farms, with a total of 440 positive samples. The *spa* t2873 was found in 284 isolates (64.5%) across 112 farms (73.6%). Other common types included t529 (n=46), t9303 (n=34) and the methicillin-resistant *S. aureus* t011 (n=11).

The highest number of cases (n=25) was detected in farm A, all of which were found to be *spa* t2873. Phylogenetic analysis confirmed that most transmission events occurred within the same milking group, and inter-group transmission was due to the transfer of cows between groups or due to consecutive milking order. The *spa* t2873 strain contained putative virulence genes, including various intracellular and collagen adhesion proteins. Two factors were identified as associated with reduced incidence of *S. aureus* infections: The use of a parallel milking apparatus and the use of selective dry-cow therapy.

Our study revealed the dissemination of the t2873 strain to the majority of Israeli dairy farms. Although some factors can reduce the risk of infection within a farm, the possibility of inter-farm transmission should be monitored and prevented.