POPULAR SCIENCE ABSTRACT

Polish farmhouse cheeses are most frequently produced in small family farms from unpasteurised milk, in accordance with recipes used for many years. Despite remarkable taste and aroma characteristics, the risk posed by farmhouse cheeses is the presence of pathogenic strains found in raw milk, including *Staphylococcus aureus* strains. Staphylococcal food poisoning (SFP) is one of the world's most common food-borne diseases, which includes staphylococcal enterotoxins (SE). According to the literature data, many food poisoning epidemics are related to the consumption of cheeses produced from raw milk contaminated with bacteria of the genus *S. aureus*. The occurrence of antibiotic-resistance strains in ready-to-eat products, including in artisanal cheeses from unpasteurised milk, and the increasing resistance of these pathogens to antimicrobial agents is one of the greatest hazards to public health, mainly due to a decrease in treatment efficiency. Methicillin-resistant *S. aureus* (MRSA) strains are considered to be particularly dangerous.

To date, few studies have reported on antibiotic resistance, enterotoxicity or virulence of *S. aureus* strains isolated from Polish farmhouse cheeses or from the production lines of these products. This study mainly focused on the assessment of *S. aureus* strains isolated from raw milk from cows with clinical or subclinical mastitis. However, the application of traditional cheese production methods poses a risk of finished product contamination with pathogenic strains. Given that food safety begins from a healthy animal, and the quality of milk and dairy products is the consequence of all activities undertaken during the production process (from agricultural farms to the processes associated with the production of farmhouse cheeses), it is presumed that the presence of *Staphylococcus aureus* in farmhouse cheeses may result from the dubious quality of raw materials, poor employee hygiene or non-compliance with basic GMP and GHP rules.

The research undertaken may fill an important gap in current knowledge, particularly as many of the current reports highlight the need for more information on the growth dynamics of *S. aureus* in relation to gene expression and enterotoxin production, given the impact of different food environments on the virulence of this pathogen. It is of utmost importance to develop methods to prevent the survival and growth of *S. aureus* strains in food processing environments. It is known that food parameters can critically influence the production of SE and thus the virulence of *S. aureus*. The influence of environmental parameters should be adapted to each production process; therefore, this project aims to determine the influence of stress factors occurring during the production of Polish farmhouse cheeses on *S.aureus* virulence.

The research planned in the project will allow to verify the hypotheses which assume that:

1. The artisanal cheese production chain is the source of methicillin- resistance *S.aureus* with the capacity to produce enterotoxins.
2. Environmental stress during the production of artisanal cheeses affects the expression of genes encoding enterotoxins and resistance to methicillin among *S. aureus* strains and change to the VBNC.

Furthermore, the successful implementation of the project and the results obtained, according to the applicants, can provide important guidance in the design of cheese production technologies without inducing methicillin-resistance genes and genes responsible for virulence among *S. aureus* species. Increasing knowledge of *S.aureus* growth and SE production, can contribute to improved risk assessment and consumer safety, supporting food producers in adapting cheese production processes and recipes to maximise food safety.

The assumptions of the project are in line with the "One Health" concept whose measures focus on a holistic approach to general human and animal health. The measures presented in the project are a multi-aspect issue concerning human health, food safety and agriculture.