



POSTER

MODELLING THE SURVIVAL OF COAGULASE-POSITIVE STAPHYLOCOCCI IN ARTISANAL RAW MILK CHEESE DURING STORAGE UNDER DIFFERENT PACKAGING AND TEMPERATURE CONDITIONS

Gulnara Guluzade, Thomas Dalmonte, Serena Giacomozzi, Chiara Oliveri, Alessandro Seguino, Andrea Serraino, Alessandra De Cesare

DIMEVET University of Bologna, Italy.

Aim. The aim of this study was to assess the influence of different packaging systems and temperature conditions on the dynamic of coagulase-positive staphylococci (CPS) counts in an artisanal raw milk cheese, from the end of ripening through 90 days of storage.

Materials and Methods. Coagulase-positive staphylococci were enumerated in raw milk cheese samples during 30, 60 and 90 days of storage under four experimental conditions: vacuum packaging at $4 \pm 1^\circ\text{C}$ (TRV) ($n=36$); air packaging at $4 \pm 1^\circ\text{C}$ (TRA) ($n=36$); vacuum packaging at $7 \pm 1^\circ\text{C}$ (TAV) ($n=36$); air packaging at $7 \pm 1^\circ\text{C}$ (TAA) ($n=36$). The storage period started at the end of 90 days of ripening. CPS were enumerated according to the EN ISO 6888-2:2022. Before enumeration, presumptive CPS colonies were confirmed using the MALDI-TOF. Since the dataset included both CPS values < 10 CFU/g and positive enumeration results, CPS concentrations (Log_{10} CFU/g) were analysed using a two-part zero-inflated Bernoulli-Gamma hurdle model. In this framework, the Gamma component describes the magnitude of positive CPS counts, whereas the Bernoulli component models the probability of obtaining zero values, meaning CPS values < 10 CFU/g. Besides CPS, mesophilic lactic acid bacteria (LAB) were enumerated according to ISO 15214:1998 using De Man, Rogosa and Sharpe (MRS) agar.

Results. In the Gamma component, storage time significant-

ly influenced the magnitude of positive CPS. Compared with 30 days of storage, the coefficient estimate was significantly lower at 60 days (estimate = -0.3288 , SE = 0.1639 , $p = 0.0448$) and decreased further at 90 days (estimate = -0.4736 , SE = 0.1933 , $p = 0.0143$), indicating a progressive reduction in the expected magnitude of positive CPS counts during storage. In the Bernoulli component, lactic acid bacteria (LAB) concentrations, always around 8 Log CFU/g , had a statistically significant positive effect on the odds of observing CPS counts below the analytical enumeration limit (< 10 CFU/g) (estimate = 2.8320 , SE = 1.2520 , $p = 0.0237$). Neither packaging system (vacuum versus air packaging) nor storage temperature (4 and 7°C) significantly affected CPS dynamics.

Conclusions. This study demonstrates that CPS populations in raw milk cheese decline significantly during post-ripening storage, with positive CPS counts being significantly lower after 60 and 90 days than after 30 days. Higher LAB concentrations were significantly associated with an increased probability of obtaining CPS counts below the analytical enumeration limit, supporting the important antagonistic role of LAB in suppressing CPS during cheese storage.

Funding: This study has been funded by the Italian Ministry of Agriculture, Food Sovereignty and Forests under the Contratto di Filiera, Stalla modello, DMI n. 0673777 del 22/12/2021, V Avviso n. 0182458 del 22/04/2022 e s.m.