



POSTER

RETROSPECTIVE MULTICENTRE ASSESSMENT OF DAIRY MONITORING DATA TO SUPPORT THE DEVELOPMENT OF AN EARLY-WARNING SYSTEM FOR FOOD SAFETY IN THE DAIRY CHAIN

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Aim of the study. The E_ALERT project aims to identify and assess food safety risks associated with microorganisms potentially transmitted through milk and dairy products and to develop an early-warning system integrating information generated along the dairy production chain. As a preliminary step, this study aimed to integrate and harmonise retrospective laboratory data from participating Istituti Zooprofilattici Sperimentali (IIZZSS), characterise the information available before prospective data collection, and identify data-related constraints and requirements relevant to the subsequent development of predictive models.

Methods. A retrospective descriptive analysis was conducted on laboratory data generated within dairy monitoring and self-monitoring activities across Italy between 2013 and 2025. Historical records concerning milk, curd, raw-milk dairy products and environmental samples from selected farms were integrated into a common data structure. Available variables included sampling date, farm identification code, animal species, sample type and milk quality indicators, antibiotic residue screening and microbiological results for *Salmonella* spp., *Listeria monocytogenes*, *Campylobacter* spp. and Shiga toxin-producing *Escherichia coli* (STEC). A harmonisation workflow was applied to generate a unified multicentre dataset. Quality-control procedures were applied to identify missing values, inconsistencies and data-entry errors. Milk quality indicators were descriptively summarised by animal species and microbiological hazards according to the frequency of positive results.

Results. The analytical dataset comprised 526 observations

from 16 dairy farms collected by 6 IIZZSS. Milk accounted for 72.2% of observations (n= 380), curd and dairy products for 85 (16,2%) and environmental samples for 61 (11,1%). Matrix representation differed substantially among IIZZSS and analytical-variable availability was also heterogeneous. Milk quality indicators showed biologically plausible species-specific distributions (median fat and protein contents were 4.13% and 3.46% in bovine milk and 8.89% and 6.80% in ovine milk, respectively). Five samples tested positive for *Salmonella* spp. and 9 for *L. monocytogenes*, whereas no positive results were observed for *Campylobacter* spp. or STEC.

Conclusions. The retrospective phase of E_ALERT resulted in the integration and harmonisation of heterogeneous multicentre laboratory data into a common analytical structure and identified key constraints relevant to future predictive modelling. In particular, differences in analytical coverage and matrix representation, reflecting heterogeneity in historical monitoring activities and analytical panels, together with the lack of longitudinal linkage between milk, intermediate products and final products, limited the direct use of historical data for training an early-warning model. Rather than constituting a predictive dataset itself, the retrospective assessment provides a methodological basis for defining candidate variables, coding standards and production-chain information to be collected systematically during the prospective phase of E_ALERT, in which data continuity along the production chain will support subsequent development of predictive and early-warning tools.

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