LITHUANIAN UNIVERSITY OF HEALTH SCIENCES

International Summer School Practice

Comparative evaluation of quality, cholesterol content, and lipid oxidation of commercial eggs from different housing systems

Eggs are an important source of high-quality protein, lipids, vitamins, and minerals, and their quality is influenced by a range of biological, environmental, and post-harvest factors. These include hen nutrition, housing conditions, flock management, and the duration and conditions of egg storage. Commercial eggs are marketed under different housing-system labels, including cage-free, barn, free-range, and organic, which reflect differences in housing practices, access to outdoor environments, and, in some cases, specific feeding requirements. However, the extent to which these housing-system categories are associated with measurable differences in egg quality and composition remains dependent on multiple interacting factors. This scientific summer internship aims to comparatively evaluate the physical quality, cholesterol content, and lipid oxidation status of commercially available eggs from different housing systems.

Eggs labelled as cage-free, barn, free-range, and organic will be obtained from commercial retailers. Where feasible, samples will be selected to minimise differences in egg size, labelling or packing dates, and storage conditions. Physical quality will be evaluated using eggshell strength, yolk colour, Haugh units, and albumen characteristics as indicators of shell integrity, pigmentation, and internal freshness. Cholesterol content will be quantified using a high-performance liquid chromatography (HPLC) method. Lipid oxidation will be assessed by measuring malondialdehyde (MDA), a secondary product of lipid peroxidation, using an HPLC-based determination.

The resulting data will be analysed using appropriate statistical methods to assess differences among the selected housing-system categories. Where the experimental design and sample size permit, associations between physical quality parameters, cholesterol content, and MDA concentrations will also be investigated. Potential confounding variables, including egg size, storage history, and time since packing, will be considered during statistical analysis and interpretation. Particular attention will be given to distinguishing observed associations from causal effects, as commercial housing-system labels may also be associated with differences in feed composition, flock characteristics, management practices, and post-harvest handling.

The study is expected to provide comparative data on the physical quality, cholesterol content, and lipid oxidation status of eggs available in the commercial market. The results may be useful in food quality evaluation and provide evidence for consumer information. In addition, the internship will provide practical experience in food sample handling, physicochemical quality assessment, chromatographic analysis, and the statistical interpretation of experimental data.