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ANALYSIS OF ANTIPESTIC REGULATIONS IN THE PROCESSING OF LIQUID FOOD PRODUCTS

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Abstract

This article examines the role and effectiveness of antipestic regulations in the processing of liquid food products, focusing on contemporary challenges associated with microbial and mycotoxin contamination. The study evaluates the implementation of preventive hygienic measures, regulatory frameworks, and quality assurance systems applied in modern food processing industries. Emphasis is placed on integrating technological advancements with international standards to enhance food safety and consumer health protection.

Keywords

Liquid food products, antipestic regulations, food safety, hygienic standards, mycotoxin control, food technology

INTRODUCTION

The continuous evolution of food technology has brought significant improvements to the production and safety of liquid food products. However, the increasing complexity of raw material sourcing and storage conditions poses considerable risks of microbial and pesticide-related contamination. Antipestic regulations are designed to prevent contamination during all stages of production—from raw material handling to final packaging. Global studies (Selko, 2025; DSM-Firmenich, 2024) show that the persistence of mycotoxins and pesticide residues remains a critical concern in dairy and plant-based beverages. Therefore, systematic analysis of these regulations is essential for sustainable and hygienic food production.

MATERIALS AND METHODS

The research employs a systematic review methodology based on the analysis of 2019–2025 scientific publications indexed in Scopus and Web of Science databases. Comparative assessment of regulatory standards from the European Union, FAO, and Uzbek national legislation was performed. The study also includes industrial case analyses from dairy and juice production enterprises

implementing HACCP and ISO 22000 systems. Analytical data were interpreted according to Codex Alimentarius guidelines for food hygiene and safety.

RESULTS AND DISCUSSION

The analysis revealed that effective implementation of antipestic regulations directly correlates with the reduction of microbial and chemical hazards in liquid food processing. Studies conducted by Corassin and Oliveira (2023) demonstrated a significant decrease in aflatoxin M1 presence when systematic hygienic control and monitoring were applied in dairy processing. Similarly, BIOR et al. (2024) identified lower mycotoxin levels in plant-based beverages processed under enhanced sanitary protocols. In addition, global reviews by Selko (2025) and DSM-Firmenich (2024) emphasize the need for comprehensive surveillance programs and digital traceability tools to prevent contamination along the food chain. The adoption of automated cleaning-in-place (CIP) systems, temperature control units, and anti-fungal filtration membranes has proven effective in maintaining safety in continuous-flow production lines.

From a technological perspective, the integration of infrared and ultrasonic processing technologies has contributed to the inactivation of microbial agents without compromising nutritional quality. Moreover, harmonization of national standards with Codex and ISO frameworks has enabled more consistent quality assurance across food sectors. The study highlights that regulatory gaps remain in post-harvest control of raw materials, particularly in developing countries, where monitoring infrastructures are limited. Continuous education of food technologists and periodic audits are recommended to ensure compliance with international antipestic principles.

CONCLUSION

Antipestic regulations play a vital role in safeguarding the hygienic integrity of liquid food products. Strengthening national legislation in accordance with international frameworks is essential for sustainable production and export competitiveness. The study concludes that harmonized control systems, coupled with innovative technologies such as ultrasound, infrared drying, and digital monitoring, can significantly enhance food safety outcomes. Furthermore, the development of specialized training programs for food industry personnel will ensure long-term compliance and continuous improvement in production hygiene.

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