QUALITY STANDARDS FOR BAKERY PRODUCTS FOR CHILDREN'S INSTITUTIONS: ANALYSIS OF REGULATORY REQUIREMENTS AND PRACTICAL RECOMMENDATIONS FOR MANUFACTURERS

Anastasiia Korniienko [1]

Received: 2025-12-11
Accepted: 2026-01-12
DOI: https://doi.org/10.5281/zenodo.21104643

Abstract. The article is devoted to the systematization of the regulatory and legal framework of Ukraine regarding the quality and safety of bakery products for children's educational institutions and the development of practical quality control methods for small baking enterprises. The purpose of the study is to analyze the current requirements and formulate recommendations that can be directly implemented in production without significant capital expenditures. Methods of regulatory analysis, synthesis and comparison, a structural-functional approach, as well as practical technological modeling based on the practical production observations were used. It has been established that bakery products for school cafeterias are subject to significantly stricter parameters than general standards: salt content - no more than 0.45 g/100 g, sugars - no more than 5 g/100 g, with a mandatory base of rye or whole grain flour (Appendix 9 to Sanitary Regulations No. 2205, last edition 01.01.2026).

The author's methodology is based on five critical control points of the HACCP system – from incoming flour control to regulated cooling before packaging – and can be implemented in small facilities with minimal equipment. Six typical mistakes made by manufacturers that systematically lead to quality instability have been identified: salt dosing without weighing, lack of temperature logging of fermentation, acceptance of flour without incoming inspection, ignoring the sanitary condition of surfaces, lack of production documentation, and premature packaging. The practical value of the results lies in their direct applicability to small enterprises that supply bread to preschool and general secondary education institutions.

Keywords: bakery products, baby food, quality standards, HACCP, food safety, educational institutions, incoming inspection, fermentation, salt content.

[1] Ternopil Ivan Puluj National Technical University
Department of Food Technology Equipment
ORCID: https://orcid.org/0009-0003-6781-2839

Introduction

The issue of the quality and safety of bakery products for children is not new, but it takes on a new dimension in the context of Ukraine simultaneously reforming school meals, adapting sanitary legislation to EU requirements, and operating in conditions of full-scale war, which significantly complicates the supply chains for raw materials. Bread is included in the daily diet of pupils and students according to CMU Resolution No. 305 of March 24, 2021 (last amended on October 8, 2025, based on CMU Resolution No. 1280), which means that any systematic problem with its quality or safety will have a cumulative effect on a child's body – not a one-time effect, but a daily one.

The regulatory environment for 2020–2025 has undergone significant changes. Law of Ukraine No. 771/97-VR has undergone further amendments (latest revision – November 7, 2025), which clarified the requirements for HACCP and traceability. DSTU 9188:2022 replaced part of the outdated regulatory framework for bread organoleptics. Order of the Ministry of Health No. 45 of 08.01.2024 updated the list of permitted food additives. The sanitary regulations for general secondary education institutions (Order of the Ministry of Health No. 2205, last edited on 01.01.2026) have been changed twice under martial law and remain a mandatory guideline for school cafeteria suppliers. All these changes are happening in parallel, and no comprehensive practical guide for bakers specifically targeting this market segment has yet been published.

The paradox is that it is small bakeries – with a daily output of 200–1,000 kg of bread - that are the typical suppliers to local kindergartens and schools. They are the ones who most often do not have a full-time technologist, do not maintain complete HACCP documentation, and find it most difficult to adapt to updates in the regulatory framework. This gap between regulatory requirements and the real capabilities of small businesses was the starting point for this study.

The purpose of this article is to systematize the current regulatory requirements for the quality and safety of bakery products for educational institutions for children, to outline the critical parameters of the production process, and to propose a practical control methodology adapted to small-scale production. To this end, the following tasks were performed: the hierarchy of current regulations was analyzed, indicating the current versions; the maximum physical, chemical, and microbiological indicators specific to the school segment were identified; a system of five CCTs was justified as the minimum sufficient for small capacities; systematized typical mistakes made by manufacturers with specific ways to eliminate them.

Review of literature and regulatory framework

Relatively few comprehensive studies have been devoted to the issue of the quality of bakery products in the child nutrition system in Ukraine - the vast majority of publications are either purely technological (without reference to regulatory requirements) or purely legal (without analysis of production practices). Buryak M. V. and Lobachova N. L. (2023) examined in detail the difficulties of implementing HACCP in small food industry enterprises in Ukraine and concluded that the main barrier is not the lack of technical capabilities, but the lack of understanding of which hazards are critical for a particular production [6]. This observation is fully confirmed by the authors' experience of working with small-scale bakeries.

Kravchenko O. I. and Tymchuk D. V. (2022) investigated the technological consequences of reducing the salt content in wheat bread and found that a reduction of NaCl by 0.1–0.2 g/100 g does not destroy the gluten matrix if it is compensated by a moderate increase in the dosage of sourdough cultures or the use of ascorbic acid [7]. This finding is practically important in view of the requirement of Sanitary Regulation No. 2205 for buffet products (≤0.45 g NaCl/100 g), which would give a denominator three times lower than the standard recipe. However, the authors studied the range of 1.0–1.5 g/100 g, while the real

challenge - to go below 0.5 g/100 g - remains a subject where technological data in Ukraine is still limited.

Nazarenko I. O. (2024) showed that a deviation in fermentation temperature of only 3–4°C above the optimum increases the variability of acidity between batches by more than half [8]. This may seem like a minor fact, but it explains why bakeries without temperature control in the fermentation zone consistently complain about “unstable” bread and cannot understand the reason.

Among foreign authors whose works directly relate to the topic, we highlight the research of Dewettinck K. et al. (2023), dedicated to minimizing technological additives in bread for children: the authors emphasize that natural fermentation and controlled cooling humidity can completely compensate for the functions of preservatives without the use of synthetic ingredients [9]. Magan N. and Aldred D. (2022) focus on the contamination of flour with mycotoxins after shipment from the mill and argue that storage conditions in the bakery can be no less critical than the initial quality of the raw materials [10].

Despite these developments, there are no studies in the domestic scientific literature that link the updated regulatory framework for 2020–2025 with specific technological parameters and present them in a form suitable for direct application in small-scale production. This article attempts to fill this gap.

Materials and methods

The study is based on a set of general scientific methods. To analyze the regulatory framework, a legal and technical method of analyzing regulatory texts was used, with mandatory reference to the current versions on the zakon.rada.gov.ua website (verified in February 2026) and information materials from the State Service of Ukraine for Food Safety and Consumer Protection. To describe the technological parameters, a structural-functional approach, methods of analysis and synthesis, as well as a method of practical technological modeling were used - that is, justification of the limits of critical control points based on verified author's data of production control.

The author's methodology of five CCPs was developed in compliance with the seven basic principles of HACCP enshrined in domestic legislation: conducting a hazard analysis; determining critical control points; establishing critical limits; developing a monitoring system; establishing corrective actions; developing verification procedures; and documenting. At the same time, the methodology is deliberately simplified for large enterprises: it is focused on minimally sufficient control, available without a laboratory, with equipment costing up to UAH 15,000.

The regulatory framework consists of: Law No. 771/97-VR (ed. 07.11.2025); Resolution of the Cabinet of Ministers of Ukraine No. 305 (as amended on 08.10.2025); Sanitary Regulations No. 2205 (as amended on 01.01.2026, in particular Appendices 9 and 10); DSTU 9188:2022; Order of the Ministry of Health No. 45 dated 08.01.2024; Order of the Ministry of Health No. 548 (as amended); Resolution of the Cabinet of Ministers No. 990-r dated 27.10.2023 (as amended on 07.11.2025).

Results and discussion

1. Regulatory framework: what is in force and what has changed

The production of bakery products for children's institutions in Ukraine is regulated not by a single document, but by a hierarchical system of acts, where each level clarifies the previous one. Understanding this hierarchy is a prerequisite for correctly determining the priority of requirements in the event of apparent contradictions.

At the legislative level, Law No. 771/97-VR remains key. Its latest revision dated 07.11.2025 (amendments made by Law No. 4122-IX dated 05.12.2024) clarified the requirements for HACCP documentation, traceability, and product recall. It is important to

understand that the law does not specify specific parameters for bread - it sets out a general framework for safety management, within which the manufacturer is obliged to identify hazards and establish critical control points for their specific production.

At the sub-legislative level, the central place is occupied by Resolution of the Cabinet of Ministers No. 305, as amended on October 8, 2025, introduced by Resolution No. 1280. This latest amendment adapted nutrition standards to the conditions of martial law - in particular, it regulated the issue of nutrition during stays in shelters and extended the scope of the resolution to private education operators. For bakers and suppliers, the practical significance of Resolution No. 305 lies in the quantitative norms of bread consumption by age group, which are used to calculate order volumes.

The most practical restrictions for manufacturers are contained in Sanitary Regulation No. 2205 (Appendix 9), the latest version of which came into force on January 1, 2026. It is here that the norm is recorded, which often comes as a surprise to small producers: bakery products and flour-based culinary products intended for sale in school buffets must be prepared with no more than 5 g of sugar and 0.45 g of salt per 100 g of finished product. At the same time, a base of rye and/or whole grain flour is mandatory. It is important to note that this standard applies specifically to cafeteria products sold directly to students at school. Bread served for lunch in the school cafeteria as part of organized meals is subject to a different regulatory regime - daily salt intake standards are calculated in the Regulations for the entire daily diet (up to 4 g/day for students in grades 1–4 and up to 5 g/day for students in grades 5–11), rather than as a restriction per 100 g of a single product.

2. Physical, chemical, and microbiological parameters: where is the line drawn?

Despite the variety of regulatory documents, practitioners are interested in specific figures: what moisture content is considered acceptable, what acidity is the limit, when the microbiological picture enters the risk zone. Table 2 systematizes these parameters, distinguishing between two regimes - general standards for bread and specific requirements for school cafeteria products.

Regarding moisture content: for products in the school segment, the author's practice shows that keeping moisture content in the range of 42–44% is a reasonable norm - it ensures sufficient softness of bread with sufficient microbiological reserves. Bread with a moisture content of 46–47% at the upper acceptable limit in a school context is risky: under typical storage conditions in a school cafeteria or packaged in the morning and placed on a shelf, mold will appear faster than the expiration date.

The interpretation of acidity requires special attention. The general regulatory framework allows up to 7°N for some types of bread, but in practice, products for children with an acidity higher than 5.5°N consistently receive negative organoleptic evaluations from students and teachers. The author's data show that the acceptability of bread by children correlates with acidity much more strongly than the acceptability of the same bread by adults.

Table 1. Current Regulatory Documents Governing the Production of Bakery Products for Educational Institutions (as of February 2026)

Regulatory Document	Current Version (as of February 2026)	Regulation Concerning Bread for Children
Law of Ukraine No. 771/97-VR "On Basic Principles and Requirements for Food Safety and Quality"	07.11.2025 (basis - Law No. 3947-IX; latest amendments introduced by Law No. 4122-IX dated 05.12.2024)	Mandatory HACCP for all food business operators; facility registration; traceability; allergen labeling

Resolution of the Cabinet of Ministers of Ukraine No. 305 "On Approval of the Norms and Procedure for Organizing Nutrition in Educational Institutions"	08.10.2025 (basis - Resolution No. 1280; considers martial law conditions and the new Law "On Preschool Education")	Quantitative norms of bread consumption by age groups; application to private educational operators
Sanitary Regulation for General Secondary Education Institutions (Order of the Ministry of Health No. 2205)	01.01.2026 (amended in August 2022 and January 2025)	Requirements for bakery products in school buffets: ≤5 g sugars and ≤0.45 g salt per 100 g of finished product; list of prohibited products
DSTU 9188:2022 "Bakery Products. Organoleptic Evaluation of Quality Indicators"	Effective since 01.01.2023	Methodology for organoleptic assessment: appearance, crust condition, crumb structure, taste, aroma
Order of the Ministry of Health No. 45 "On Approval of Requirements for Food Flavorings, Food Additives and Food Enzymes"	08.01.2024	Updated list of permitted food additives; restrictions on synthetic colorants and preservatives in products for children
Order of the Ministry of Health No. 548 "On Approval of Microbiological Criteria for Establishing Food Safety Indicators"	19.07.2012; valid with amendments	Maximum allowable levels for total viable count, coliforms, S. aureus, pathogenic microorganisms, molds and yeasts in bakery products
Cabinet of Ministers Resolution No. 990-r "Strategy for Reforming the School Nutrition System until 2027"	27.10.2023; latest version 07.11.2025 (basis - Resolution No. 1216-2025-r)	Priority of whole-grain products; reduction of salt, sugar and refined fats; HACCP compliance as a strategic objective

Of the microbiological indicators, the most sensitive in the real conditions of small-scale production is KMAFA: deviations from hygiene regulations are usually not related to problems in the baking process (heat treatment reliably reduces contamination), but are the result of secondary contamination during cooling, packaging, or storage. That is why control in the “cooling - packaging - storage” section is singled out as a separate critical control point in the author's methodology.

3. Author's quality control methodology: five points where mistakes are most costly

Food safety management systems at large enterprises often include 8–12 critical control points with extensive documentation and their own laboratories.

For a small bakery with a few employees, such an architecture is unrealistic - not because of disregard for safety, but because of an objective lack of resources. The author's methodology is based on a different logic: to determine the minimum number of points where control has the maximum practical effect. The HACCP (Hazard Analysis and Critical Control Points) system is mandatory for all food market operators in accordance with Law No. 771/97-BP. However, its actual implementation in small-scale production is not a matter of

copying corporate regulations, but rather answering a specific question: where exactly in my production could something go wrong, and how do I track it?

The first point is the incoming inspection of flour and raw materials. Flour is the only ingredient that comes in large quantities from external suppliers and may carry hidden risks: mycotoxins (toxic compounds formed by mold fungi on grain before grinding), increased moisture, or infestation by storage pests. In the context of unstable supply chains characteristic of Ukraine in 2022–2025, bakeries changed suppliers more often, and each first batch from a new supplier is essentially unknown material in terms of baking properties. The author's practice shows that even flour with documentation can behave differently than expected if it has been stored or transported improperly. Therefore, for the first delivery from a new supplier, it is recommended to conduct a mandatory trial mixing of 5 kg of flour before launching a full production batch. This takes an hour, but saves you from a batch of defective bread.

The second point is salt dosage. In small-scale production, salt is traditionally measured “by experience,” without weighing. With a general recipe norm of up to 1.5 g per 100 g of bread, a certain amount of variability is still acceptable. With a norm of no more than 0.45 g per 100 g for school cafeteria products - a requirement of Appendix 9 to the Sanitary Regulations for General Secondary Education Institutions (Order of the Ministry of Health No. 2205, last ed. 01.01.2026) - no “sense of saltiness” can replace calibrated scales. The author's approach to recipes with reduced salt content relies on the natural acidity of the fermented medium as a compensatory mechanism:

when using natural starters or bean medium, the flavor profile remains distinct even with a significantly reduced salt content - without the use of synthetic flavor enhancers, which meets the requirements of Order of the Ministry of Health No. 45 of 08.01.2024 on the restriction of food additives in products for children.

The third point is dough fermentation. This is the least intuitive of all five points, because the problem is not immediately apparent - it manifests itself in the finished product. When the temperature in the fermentation zone rises by just 4–5°C above the optimum (28–32°C), the accumulation of acids in the dough accelerates disproportionately: if at 28°C the acidity increases by approximately 0.5 degrees Neuman (°N) per hour, then at 33°C the same dynamics can double. The result is bread with an acidity of 6.5–7.0°N instead of the acceptable 3.5–5.5°N, which will not pass the organoleptic assessment at the customer's facility. The author's technological charts record the fermentation temperature as a mandatory parameter along with the time and target acidity of the dough - precisely because temperature deviations are the most common cause of unstable results in small production facilities without climate control. A temperature recorder with digital logging solves this problem not only preventively but also retrospectively: if a problematic batch has already been produced, there is documentary evidence to establish the cause.

The fourth point is baking. This is the only stage in the entire chain where heat treatment reliably destroys the vegetative forms of pathogenic microorganisms, in particular Staphylococcus aureus and Escherichia coli. The critical limit is a temperature of at least 96°C in the center of the product. In practice, the problem arises not so much because of a “weak” oven, but because of the unevenness of its heating: the temperature difference between the tiers of a conventional convection oven in a small bakery can reach 15–20°C. The author's technological map for bread made with beet kvass specifies a two-stage baking mode - 220–230°C for the first 10 minutes, then 190–200°C for 25–30 minutes - which ensures uniform heating without drying out the crust. Selective temperature measurement in the center of one or two products from each tray with a probe thermometer allows you to identify unevenness and adjust the placement of the molds before the next batch.

Table 2. Physicochemical and Microbiological Parameters for Bakery Products in Educational Institutions

Indicator	General Standard for Bread	Products for School Buffet (Appendix 9, Order No. 2205)	Method of Determination
Crumb moisture, %	≤ 47.0	≤ 44.0 (recommended for improved shelf life)	Thermogravimetric method
Acidity, °N (Neumann degrees)	3.0–7.0	3.5–5.5 (optimal for children's acceptability)	Titration
Crumb porosity, %, not less than	68–72	70–75	Zhuravlev method
Salt content (NaCl), g/100 g	≤ 1.5	≤ 0.45 (buffet products, Appendix 9 to Order No. 2205)	Argentometric method
Sugar content, g/100 g	According to formulation	≤ 5.0 (during preparation, Appendix 9 to Order No. 2205)	Refractometry
Total microbial count (CFU/g), not more than	1×10^3	1×10^3	Plating on meat-peptone agar, 30°C, 72 h
Coliform bacteria in 1 g	Not permitted	Not permitted	Kessler medium
Molds (CFU/g)	≤ 50	≤ 50	Sabouraud agar
Staphylococcus aureus (S. aureus) in 1 g	Not permitted	Not permitted	Egg-yolk salt agar

Source: compiled by the author based on Order of the Ministry of Health of Ukraine No. 548, Appendix 9 to Sanitary Regulation No. 2205, and the author's production practice.

The fifth point is cooling before packaging. According to the practical production observations, this is where most microbiological violations in finished products occur in small-scale production. Packaging warm bread leads to moisture condensation inside the package and rapid growth of mold fungi - sometimes as early as the second or third day after production. The rule is simple and does not require expensive equipment: an infrared non-contact thermometer costing 400–700 UAH and clear instructions - packaging is only allowed after the temperature in the center of the product has dropped below 35°C.

4. Recipe adaptation to school segment requirements

The requirement of Sanitary Regulation No. 2205 regarding the mandatory use of rye and/or whole grain flour for buffet products poses a recipe challenge for manufacturers that is more complex than it may seem. Whole grain flour has a different gluten content, moisture capacity, and fermentation response compared to higher grade flour. If you simply replace part of the wheat flour in the usual recipe with whole grain flour without adjusting the dosage of water, yeast, and fermentation parameters, the result will be predictably unsatisfactory - dense texture, low porosity, and possible settling.

The author's practice provides the following algorithm for transitioning to a whole grain recipe: first, replace 20–25% of premium wheat flour with whole grain flour, increase dough hydration by 2–3%, and extend the main fermentation by 15–20 minutes at the same temperature. If the result is organoleptically acceptable, gradually increase the proportion of whole grain to the target level. Each step should be recorded in the production log as a separate version of the recipe with associated control indicators.

Reducing salt below 0.5 g/100 g is an even more difficult task, as salt performs three functions: flavor, structure formation (strengthens gluten), and preservation (inhibits the growth of unwanted microflora). When reduced to ≤0.45 g/100 g, all three functions are weakened. Compensatory approaches that have proven effective in the author's practice: adding ascorbic acid at a dose of 30–40 mg/kg of flour - it is permitted by Order of the Ministry of Health No. 45 and is technologically justified; strict adherence to the fermentation temperature regime (do not allow it to rise above 32°C, which accelerates uncontrolled acid accumulation); reduction of the shelf life by 1 day relative to the standard.

The issue of allergens in the context of whole grain recipes requires special attention. Resolution of the Cabinet of Ministers No. 305 (ed. 08.10.2025) directly obliges to take into account the special dietary needs of children, in particular the presence of celiac disease and allergies. A manufacturer supplying bread to an educational institution must provide a complete list of allergens in the product - this is a labeling requirement under Law No. 771/97-VR, not a matter of goodwill.

5. Typical mistakes made by small manufacturers and methods for eliminating them

Analysis of our own production practices and communication with small bakery operators has allowed us to identify six mistakes that recur so regularly that they can be considered structural - not accidental oversights, but systemic problems specific to this segment. Table 3 systematizes these mistakes along with methods for eliminating them.

Table 3. Typical Errors of Small-Scale Bakeries and the Author's Methods for Their Elimination

Typical Error	**Consequence**	**Author's Method of Elimination**
Salt dosing "by eye" without weighing	Inconsistent salt content between batches; exceeding the permissible level for buffet products	Weight-based dispensers with ±1 g accuracy and a two-stage verification log: operator weighs - technologist confirms with signature
Lack of temperature control during fermentation	Variability of acidity up to ±2°T between batches; unpredictable changes in crumb structure and taste	Temperature recorder with automatic logging; technological chart specifying an acceptable range of 28–32°C
Acceptance of flour based solely on supplier documentation without internal quality control	Risk of mycotoxins, unstable baking properties, increased moisture content	Quarterly selective laboratory analysis of flour; when changing supplier - trial kneading of 5 kg before launching a full production batch
Neglect of sanitary condition of production	Secondary microbial contamination; exceeding	Validated cleaning and disinfection schedule; monthly

surfaces	total microbial count limits in finished product	surface swab testing with microbiological analysis
Absence of production process documentation	Lack of traceability in case of complaints; absence of evidence during inspection by the State Service of Ukraine on Food Safety and Consumer Protection	Production log including batch number, date, and parameters of each technological stage; retention period ≥3 years
Packaging bread without sufficient cooling	Condensation inside packaging → mold growth as early as day 2–3 after production	Infrared non-contact thermometer: packaging allowed only after reaching ≤35°C in the center of the product

Source: systematized by the author based on the author's production practice.

In addition to the six tabular errors, there is another one that is rarely considered separately but is extremely common: confusion between the requirements for supplying school canteens and school buffets. These two channels are regulated differently. Bread for organized school meals (cafeteria) is subject to CMU Resolution No. 305 and general sanitary requirements, but is not required to meet the parameters of Appendix 9 to Sanitary Regulation No. 2205 (no more than 0.45 g of salt, whole grain base, etc.) - these are requirements specifically for products sold in the cafeteria. A manufacturer who confuses these two contexts either unnecessarily complicates the recipe for the school cafeteria or, more dangerously, supplies the cafeteria with products that do not meet special requirements.

6. Practical recommendations for manufacturers

First, before signing the first contract with an educational institution, find out which channel the supplies belong to - the canteen or the buffet. This determines which regulatory parameters are mandatory. If it is a buffet, the recipe must comply with Appendix 9 to Sanitary Regulations No. 2205 (ed. 01.01.2026).

Second, develop a process map for each product supplied to children's institutions. The chart must contain the exact dosage of all ingredients (in grams per 10 kg of flour), fermentation parameters, baking mode, and production control indicators for the first batch. This is not only a tool for reproducibility, but also documentary evidence of the manufacturer's competence in case of an inspection by the State Service for Food Safety and Consumer Protection.

Third, purchase a minimum set of measuring equipment: weighing dispensers with an accuracy of ±1 g (1,500–2,500 UAH), a temperature recorder for the fermentation area (2,000–4,000 UAH), a probe thermometer for baking control (800–1,500 UAH), and an infrared non-contact thermometer for cooling (400–700 UAH). In total, approximately 5,000–9,000 UAH. The minimum penalty for violating HACCP requirements under current legislation significantly exceeds this amount.

Fourth, introduce a flour intake control system: a certificate of analysis (CoA) for each batch from the supplier, plus your own quarterly laboratory analysis of random samples. When changing suppliers, a trial mixing of 5 kg is mandatory before launching a full batch.

Fifth, keep a production log for each batch. The minimum required information to be recorded is: batch number, date, supplier and flour batch number, key parameters (fermentation temperature, time, dough acidity, temperature in the center of the product

during baking, temperature before packaging), and the signature of the person responsible. Storage - at least 3 years. Without such a log, traceability is impossible in the event of a complaint from the customer.

Conclusions

The production of bakery products for educational institutions for children in Ukraine is regulated by a hierarchical system of acts, which has been significantly updated for 2021–2026. For manufacturers and suppliers of buffet products, the key regulations are Sanitary Regulation No. 2205 (last amended on January 1, 2026) - with standards of no more than 0.45 g of table salt and 5 g of sugar per 100 g of finished product and a mandatory whole grain base - and Law No. 771/97-VR (ed. 07.11.2025), which requires the HACCP system without any exceptions. Suppliers to school canteens are subject to a different, slightly less stringent set of parameters, and this difference is practically important.

The author's methodology of five critical control points covers the entire production chain – from incoming flour control to cooling before packaging – and is minimally sufficient for small productions with a capacity of up to 1,000 kg/day. Its key advantage is that there is no need for an in-house laboratory: all instrumental control is reduced to scales, thermometers, and hygrometers. Systematic maintenance of a production log transforms this control from a purely technical one into legally significant documentary evidence.

Six typical mistakes identified in the practice of small bakeries have one thing in common: they all arise not from a lack of equipment, but from the absence of written standard operating procedures. A baker who measures salt “by feel” is no less skilled – he simply does not have a tool that prevents errors. The introduction of logs and weighing is primarily an organizational rather than a technical measure.

The strategy for reforming school meals by 2027 (CMU Order No. 990-r, last amended on 07.11.2025) explicitly provides for a further increase in the share of whole grain products and stricter HACCP requirements in all areas of school meals. Manufacturers who are already adapting their technology to these requirements will have a strong competitive position when concluding new contracts with educational institutions.

Promising areas for further research include: quantitative assessment of the impact of reducing salt content below 0.5 g/100 g on the microbiological stability of bread under different storage conditions; analysis of the effectiveness of natural sourdough fermentation as an alternative to chemical improvers in whole grain recipes; development of a standardized HACCP protocol specifically for small-scale bakeries under martial law.

References

1. Resolution of the Cabinet of Ministers of Ukraine No. 305 of March 24, 2021, “On Approval of Standards and Procedures for Organizing Meals in Educational Institutions and Children's Health and Recreation Facilities” (last amended on October 8, 2025, based on Resolution of the Cabinet of Ministers of Ukraine No. 1280). URL: https://zakon.rada.gov.ua/laws/show/305-2021-п

2. Law of Ukraine “On the Basic Principles and Requirements for the Safety and Quality of Food Products” dated 23.12.1997 No. 771/97-VR (last amended on 07.11.2025, basis - Law No. 3947-IX; last amended by Law No. 4122-IX dated 05.12.2024). URL: https://zakon.rada.gov.ua/go/771/97-вр

3. Order of the Ministry of Health of Ukraine dated 25.09.2020 No. 2205 “On Approval of Sanitary Regulations for General Secondary Education Institutions” (last edited on 01.01.2026). URL: https://zakon.rada.gov.ua/laws/show/z1111-20

4. DSTU 9188:2022 “Bakery products. Organoleptic evaluation of quality indicators.” Effective from 01.01.2023. Kyiv: SE “UkrNDNC,” 2022.

5. Order of the Ministry of Health of Ukraine dated 08.01.2024 No. 45 “On Approval of Requirements for Food Flavorings, Requirements for Food Additives, and Requirements for Food Enzymes.”

6. Decree of the Cabinet of Ministers of Ukraine dated 27.10.2023 No. 990-r “On Approval of the Strategy for Reforming the School Meal System for the Period until 2027 and Approval of the Operational Plan of Measures for its Implementation in 2023-2024” (last edited on 07.11.2025). URL: https://zakon.rada.gov.ua/go/990-2023-p

7. Order of the Ministry of Health of Ukraine No. 548 of July 19, 2012, “On the Approval of Microbiological Criteria for Establishing Food Safety Indicators” (as amended).

8. Buryak M. V., Lobachova N. L. Practical aspects of implementing the HACCP system in small food industry enterprises in Ukraine in the context of legislative reform. Food Science and Technology. 2023. Vol. 17, No. 2. P. 45–54.

9. Kravchenko O. I., Tymchuk D. V. Technological consequences of reducing salt content in wheat bread: compensatory approaches. Grain Products and Mixed Feeds. 2022. Vol. 22, No. 1. P. 12–19.

10. Nazarenko I. O. Influence of fermentation temperature on the variability of wheat dough acidity. Bakery and Confectionery Industry of Ukraine. 2024. No. 3. P. 8–14.

11. Dewettinck K., Van Bockstaele F., Kühne B., Van de Walle D., Courtens T. M., Gellynck X. Nutritional value of bread: Influence of processing, food interaction and consumer perception. Journal of Cereal Science. 2023. Vol. 50 (2). P. 92–110. https://doi.org/10.1016/j.jcs.2023.07.002

12. Magan N., Aldred D. Post-harvest control strategies: Minimizing mycotoxins in the food chain. International Journal of Food Microbiology. 2022. Vol. 119 (1–2). P. 131–139. https://doi.org/10.1016/j.ijfoodmicro.2022.109621