The American Journal of Applied Sciences
ISSN 2689-0992 | Open Access

TYPE Original Research
PAGE NO. 31-36
DOI 10.37547/tajas/Volume07Issue05-03

Research on food safety standards of Uzbekistan and international norms in the production, storage, and distribution of flour and flour products to the population

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OPEN ACCESS

SUBMITTED 08 March 2025
ACCEPTED 04 April 2025
PUBLISHED 07 May 2025
VOLUME Vol.07 Issue05 2025

CITATION

Nilufar Suyunova, Uzokov Yusuf, Muhayyo Toshtemirova, & Irgasheva Maftuna. (2025). Research on food safety standards of Uzbekistan and international norms in the production, storage, and distribution of flour and flour products to the population. The American Journal of Applied Sciences, 7(05), 31–36. https://doi.org/10.37547/tajas/Volume07Issue05-03

Abstract: This article provides an in-depth study of food safety criteria in the processes of production, storage, and distribution of flour and flour products in the regions of Uzbekistan. The research analyzes the requirements of national (O'zDSt , GOST) and international (ISO, HACCP) standards, identifying key differences between them.

The study revealed that standards applied in Uzbekistan are mainly based on organoleptic and physicochemical indicators, whereas international standards focus on ensuring safety and quality control at all stages of the production process. The automated necessity of introducing modern technologies and monitoring systems in production, storage, and transportation

processes has been substantiated.

As a result, specific recommendations were developed to align Uzbekistan's flour industry with international standards, including technological modernization, certification, strengthening sanitary and hygiene requirements, and enhancing export potential. These proposals aim to improve the quality of local flour products and ensure their competitiveness in the global market.

Keywords: Flour products, food safety, national standards, international standards, ISO 22000, HACCP system, GOST requirements, quality control, gluten content, ash content indicator, sanitary and hygiene regulations, technological processes, storage conditions, certification and accreditation, export potential.

Introduction: Flour is a product of grain processing by grinding it. Flour produced only from the endosperm is considered varietal, while flour obtained by grinding the grain together with the shell and germ is called wholemeal.

In the context of globalization and increasing competition, new approaches and principles are being developed in our country [1]. The population's need for wheat flour and its importance occupy an important place in the process of the republic's transition to a market economy [2; 5 p.].

In the first years of independence, grain imports became a significant financial burden, which served as the beginning of reforms to ensure grain independence under the leadership of I.A. Karimov. Since 1994, factories equipped with modern technologies began operating as part of the Uzdonmahsulot company, and the volume of flour production increased significantly. If in 1992 1.25 million tons of grain were produced, then by 2020 this figure exceeded 8 million tons [3].

Today, Uzbekistan not only fully satisfies domestic needs, but has also established wheat exports [4]. The industry was developed by a number of decrees and orders, including: Decree of the President "On measures to accelerate the reform of enterprises with state participation and the privatization of state assets" dated October 27, 2020 No. PF-6096 [5].

According to statistics, each resident of Uzbekistan consumes an average of 160-170 kg of wheat per year. Since 1994, the area under cotton has been reduced in favor of increasing grain crops. Flour is the main raw material for various dishes and plays an important role in satisfying the human body's needs for energy, proteins and carbohydrates. Flour products provide 30-40% of the daily need for proteins and 50-60% for carbohydrates [6; 3-13 p.].

Grain contains 25-28% of essential amino acids, but in premium flour this figure decreases. For example, in 500 g of bread the protein content is: in premium flour - 30%, first grade - 35%, second grade - 40%, and in wholemeal flour - 45-55%. The proportion of vitamins and minerals also decreases. In terms of nutritional value, wholemeal flour ranks highest [7; 66-68 pp.].

OBJECT AND METHODS OF RESEARCH

Object of study:

Standards in force in Uzbekistan, as well as local wheat flour.

Research methods:

The following main research methods were used in the dissertation:

1. Standardized methods of analysis:

o Laboratory analyses based on GOST and Uzstandart documents (flour moisture content, ash content, gluten content, metal-magnetic impurities, vitamins, etc.).

o Organoleptic methods: determination of color, smell, taste and crunch of flour.

2. Comparative and analytical methods:

o Comparative analysis according to local and international standards (ISO, GOST).

o Evaluation of food safety monitoring and control systems.

3. Statistical methods:

o Processing of the obtained results, their generalization and development of recommendations using statistical methods.

RESULTS AND DISCUSSION

Standard requirements for flour products in Uzbekistan

1. Regulatory framework: Technological processes and quality requirements for flour production in the Republic of Uzbekistan are regulated by the following documents:

o Resolution of the Cabinet of Ministers of May 25, 2006 No. 95

"On additional measures to improve the system of accounting for grain and grain products and to strengthen control over their safety" .

o Rules for the organization and management of technological processes in mills (1991).

o Technical conditions and standards based on the requirements of Uzstandart and GOST.

Regulatory documents and standards

Requirements for flour products in the Republic of Uzbekistan are regulated by the following standards:

- GOST 27558-87 — Flour. Methods for determining color, smell, taste and crunch.
- GOST 9404-88 — Flour. Methods for determining moisture content.
- GOST 27494-87 — Flour. Methods for determination of ash content.
- GOST 20239-74 — Flour. Methods for determination of metallomagnetic impurities.
- GOST 27839-2013 — Wheat flour. Methods for determining the quantity and quality of gluten.
- GOST 27676-88 — Grain and its processed products. Determination of falling number.
- Requirements for vitaminization : addition of vitamins B1, B2, PP.

2. Flour quality indicators

Type of flour	Ash content (%)	Gluten (%)	Humidity (%)	Metal impurities (mg/kg)
Top grade	0.40-0.55	≥25	15	≤3
First class	0.75	≥28	15	≤3
Second grade	1.25	≥23	15	≤3
Wholemeal flour	1.5-2.0	≥20	15	≤3

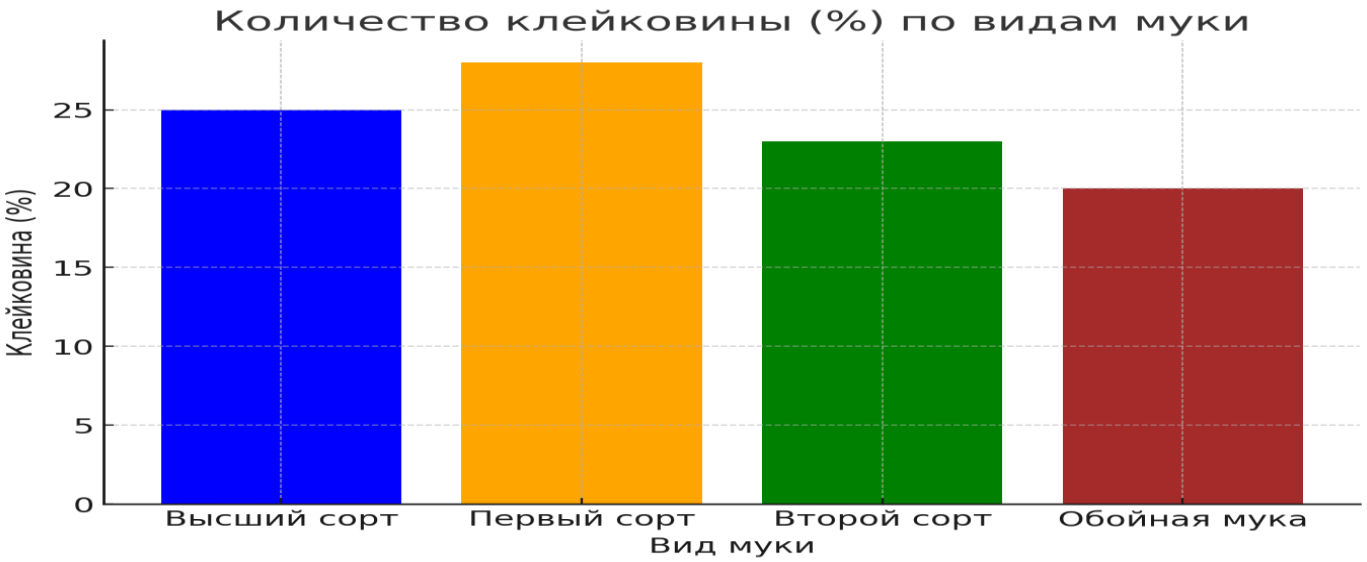
3. Vitamin content in wheat flour (per 100 g of product, mg)

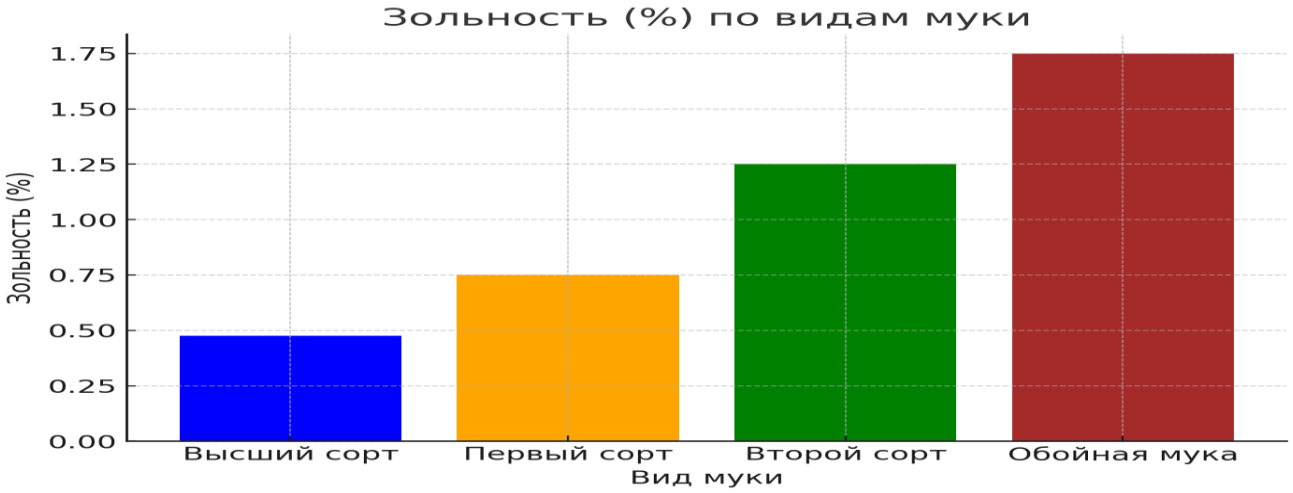
Type of flour	B1	B2	PP
Top grade	0.17	0.04	1.2
First class	0.25	0.08	2.2
Second grade	0.37	0.12	4.55
Wholemeal flour	0.41	0.15	5.5
Premium grade (fortified)	0.57	0.44	3.2

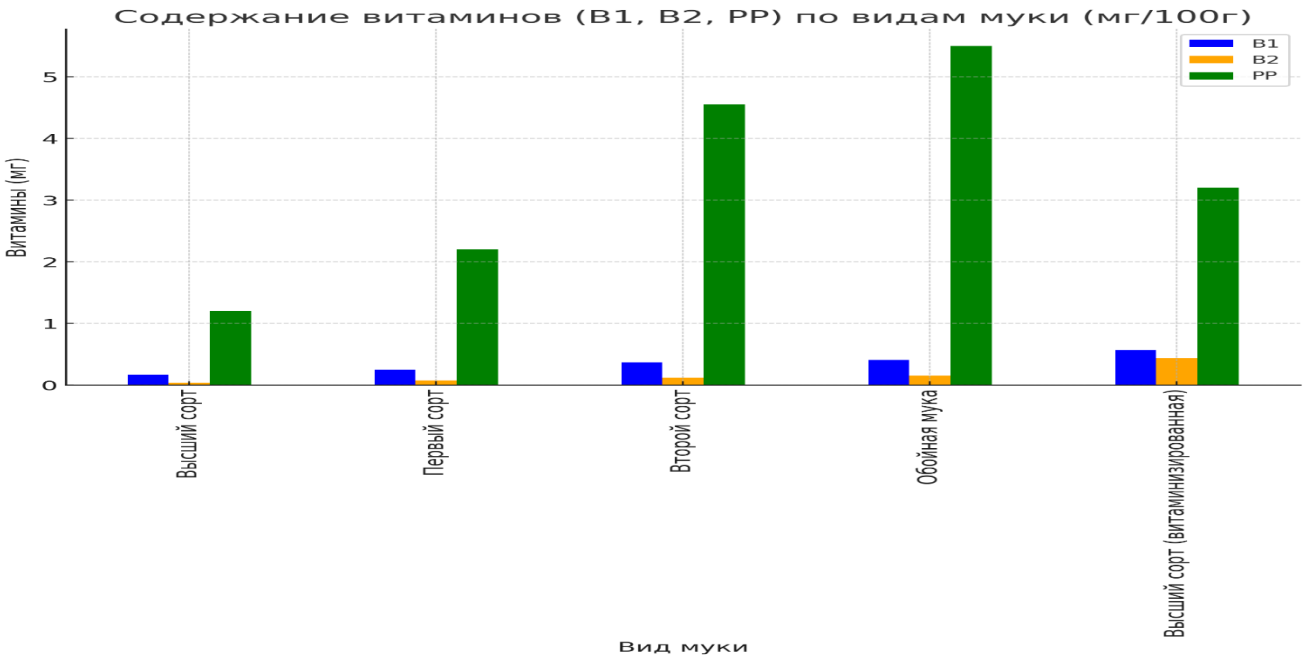
4. Sanitary, hygienic and safety requirements

During the production, storage and transportation of flour, the following sanitary and hygienic requirements must be observed:

- Ensuring dry and cool conditions in storage areas.
- Compliance with organoleptic indicators: colour, smell and taste characteristic of flour.
- Regular implementation of preventive measures against pests.
- The content of metal-magnetic impurities should not exceed 3 mg per 1 kg of flour.


Количество клейковины (%) по видам муки
Клейковина (%)
0
5
10
15
20
25
Высший сорт
Первый сорт
Второй сорт
Обойная мука
Вид муки


Зольность (%) по видам муки
Зольность (%)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
Высший сорт
Первый сорт
Второй сорт
Обойная мука
Вид муки


Содержание витаминов (B1, B2, PP) по видам муки (мг/100г)
B1
B2
PP
Витамины (мг)
0
1
2
3
4
5
Высший сорт
Первый сорт
Второй сорт
Обойная мука
Высший сорт (витаминизированная)
Вид муки

International standards and norms (ISO, GOST) for flour and flour products

1. General information about international standards:

At the international level, there are standards such as ISO and GOST, which strictly define the technical and hygienic characteristics of the products. The production process is controlled through ISO 22000 or HACCP systems, with great importance being given to the chemical composition and appearance of the wheat.

2. International requirements for the production process:

- ISO 22000 — Food Safety Management System.
- HACCP - Hazard Analysis and Critical Control Points.
- GOST — Unified system of standards for the CIS countries:
  - GOST ISO 3093-2016 — Determination of starch damage.
  - GOST 27839-2013 — Determination of the quantity and quality of gluten in wheat flour.
  - GOST 27676-88 — Determination of the falling number for grain and its processed products.

3. International standards for storage conditions:

- The optimal storage temperature for products should be 18-22°C with controlled humidity levels.
- Mandatory use of special containers and ventilation systems.
- Strict control over the implementation of preventive measures against pests.

4. Compliance with quality and safety requirements:

- International standards require:
  - Strict control over protein and gluten content.
  - Regular analysis of pH and physical and chemical parameters.
  - Monitoring and document management system at every stage of production.

5. Certification and accreditation:

- To enter the international market, products must have the following certificates:
- ISO 22000, HACCP, GOST-R (for Russia and CIS countries)
- These certificates confirm that the products meet quality and safety requirements.

CONCLUSION

O Comparative analysis of Uzbek and foreign (international) standards in the process of production, storage and distribution of flour and flour products

There are significant differences between Uzbek and foreign (international) standards in the production, storage and distribution of flour and flour products. The following key aspects were identified as a result of the study:

1. Standards Coverage:

In Uzbekistan, control over flour products is carried out mainly on the basis of GOST, O'zDSt standards and local technical conditions. These standards are focused mainly on organoleptic and physicochemical indicators (moisture, ash content, gluten).

o International standards (ISO, HACCP) pay special attention not only to product quality, but also to safety at all stages of production, monitoring and control systems aimed at reducing risks and protecting consumer health.

2. Technological approach:

o In Uzbekistan, technological processes are partially carried out on outdated equipment, and control is mainly based on laboratory analysis.

o Modern automated systems and technologies for real-time monitoring are widely used in international practice.

3. Storage and transportation conditions:

o In Uzbekistan, storage of products is based on a standard warehousing system, but temperature and humidity control are not sufficiently sophisticated.

o International standards provide strict requirements for storage temperature (18-22°C) and relative humidity (65-70%).

4. Certification and export potential:

o Flour products produced in Uzbekistan meet the requirements of the domestic market, but the number of enterprises with ISO 22000 and HACCP certificates for entering the international market remains insufficient.

o In the international market, the presence of quality and safety certificates is a key factor in the competitiveness of products.

OFFERS

1. Technological modernization:

o Implementation of modern technologies and automated monitoring systems at flour production

plants to ensure stable product quality.

2. Integration of international standards:

o Expansion of certification processes for Uzbek flour producers according to international standards ISO 22000, HACCP.

o Stimulating enterprises through partial subsidization of certification costs by the state.

3. Improving the storage and logistics system:

o Installation of automated temperature and humidity control systems in warehouses.

o Use of modern vehicles to ensure strict compliance with sanitary and hygienic requirements during transportation of products.

4. Training of specialists:

o Organizing regular trainings on food safety and international standards.

o Implementation of educational programs that meet international requirements in specialized universities and training centers.

5. Strengthening state control:

o Review and improvement of the legislative framework in order to bring local standards closer to international norms.

o Digitalization of monitoring systems to ensure food security.

6. Increasing export potential:

o Developing an export strategy through the production of local flour in accordance with international requirements and the development of new markets.

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