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INDUSTRIAL APPLICATION OF A GEORGIAN-BRED WHEAT CULTIVAR IN BREAD PRODUCTION

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ABSTRACT

The utilisation of locally developed wheat cultivars in industrial bread production can contribute to the effective use of domestic agricultural resources and the diversification of raw materials in the food industry. This study investigated the practical application of flour obtained from the Georgian wheat cultivar 'Lomtagora 126' in bread production, focusing on its reported physicochemical and technological characteristics, its incorporation into an industrial bread formulation, and the nutritional composition of the resulting commercial product.

The flour was characterised by a protein content of 14.8%, a starch content of 75.0%, a total sugar content of 1.5%, a lipid content of 1.5–2.5%, an ash content of 1.07%, a falling number of 161 s, and a gluten content of 28.0%. Gluten content was determined using a washing-out method, while ash content was determined by incineration in a muffle furnace under standardised conditions in accordance with ISO 2171:2023. The flour was incorporated into the bread formulation at a proportion of 65%. The resulting bread was produced in cooperation with LLC 'Ipq'li Dighomi' and marketed under the name 'Tsekhvili'. Its nutritional composition was determined by laboratory analysis.

The practical production trial demonstrated the applicability of 'Lomtagora 126' flour under the conditions of the participating enterprise. The findings provide a basis for further investigation of this Georgian wheat cultivar as a raw material for bread production. Additional comparative baking trials, standardised analytical measurements, and objective quality assessments are needed to establish its technological performance relative to reference flours.

Keywords: 'Lomtagora 126'; Wheat Flour; Bread Production; Gluten Content; Ash Content; Falling Number; Nutritional Composition; Industrial Application

1 INTRODUCTION

Bread is one of the most widely consumed staple foods and remains an important component of diets worldwide. Its quality depends on several factors, including the composition and technological properties of flour, the formulation, and the processing conditions. The selection of suitable wheat raw materials is therefore an important consideration in traditional and industrial bread production [1, 2, 3].

Wheat flour contains proteins, starch, lipids, minerals, and other constituents that contribute to its technological functionality. Gluten-forming proteins play a central role in dough development by forming a viscoelastic network

during mixing. This network helps retain gases produced during fermentation and contributes to dough expansion and the structure of the baked product. Consequently, the quantity and functional properties of gluten are important considerations when evaluating flour for bread-making applications (Belderok et al., 2000; Cauvain and Young, 2006) [2, 3, 4].

Starch is the principal carbohydrate component of wheat flour. During baking, starch gelatinisation contributes to crumb formation and interacts with changes in the gluten network. The functional properties of starch, together with water availability, enzyme activity, and processing conditions, influence the characteristics of the finished bread. Nevertheless, starch content alone cannot determine the overall bread-making quality of a flour [2, 3].

The falling number is a widely used indicator for assessing the effects of α-amylase activity in wheat and flour. The method measures the time required for a stirrer to descend through a heated flour–water suspension under specified conditions. Lower falling-number values generally indicate greater α-amylase activity, whereas higher values generally indicate lower activity. The interpretation of the result depends on the intended application and must be considered alongside other flour characteristics (ISO 3093:2009) [5].

Ash content is another important parameter in flour characterisation. It represents the inorganic residue remaining after incineration under specified conditions and is commonly used as an indicator of the mineral residue in flour. Ash content can be influenced by the characteristics of the grain and the milling process, but it does not provide information about the concentrations of individual mineral elements [6].

The evaluation of locally developed wheat cultivars is relevant to strengthening the links between domestic agriculture and food processing. Their use in commercial bread production may create opportunities to increase the utilisation of local agricultural resources and diversify the range of flour-based products. Such applications should be supported by appropriate analytical characterisation and evaluation under practical processing conditions.

The Georgian wheat cultivar ‘Lomtagora 126’ was selected for the present study to investigate the practical application of its flour in bread production. The work considered the reported physicochemical and technological characteristics of the flour, its incorporation into an industrial bread formulation, and the nutritional composition of the resulting commercial product.

The aim of this study was to evaluate the practical applicability of flour obtained from the Georgian wheat cultivar ‘Lomtagora 126’ in bread production and to document the characteristics of the flour and the resulting bread.

2 MATERIALS AND METHODS

2.1 Raw Material and Milling

The principal raw material was wheat of the Georgian cultivar ‘Lomtagora 126’. The grain was processed by stone milling to obtain flour for bread production.



Figure 1*:* Stone milling of wheat grain for the production of flour from the Georgian wheat cultivar ‘Lomtagora 126’.

2.2 Flour Characterisation

The flour was characterised using the reported parameters of protein content, starch content, total sugar content, lipid content, ash content, falling number, and gluten content. The results are presented in Table 1.

Gluten content was determined using a washing-out method. ISO 21415-1:2006 describes a manual method for determining wet gluten in wheat flour. The result obtained by a washing-out method should be interpreted according to the specific procedure used and the basis on which the gluten content is expressed [6].

Ash content was determined by incineration in a muffle furnace under standardised conditions in accordance with ISO 2171:2023. The reported ash content of the flour was 1.07% [7].

The falling number was reported in seconds. ISO 3093:2009 describes the Hagberg–Perten method for determining the falling number in wheat and flour. The falling-number result is presented as reported in the study data [4].

2.3 Bread Formulation and Production

Flour obtained from the Georgian wheat cultivar 'Lomtagora 126' was incorporated into the bread formulation at a proportion of 65%. The other reported ingredients included water, a hop and wheat decoction, and salt.

Industrial bread production was carried out in cooperation with LLC 'Ipq'li Dighomi', under the supervision of the enterprise manager, Nisan Osebashvili. The production trial was intended to evaluate the practical applicability of the flour within an industrial bread-making process.

The 65% value refers to the proportion of flour in the bread formulation and is distinct from the 75.0% starch content reported for the flour.

2.4 Laboratory Analysis of Bread Nutritional Composition

The nutritional composition of the resulting bread was determined by laboratory analysis. The parameters reported included energy value, fat, saturated fat, total sugars, starch, protein, and salt. The results are presented per 100 g of product in Table 2.

2.5 Data Presentation and Interpretation

The study combined the reported flour characteristics, the industrial production trial, and laboratory analysis of the resulting bread. The results are presented descriptively.

The interpretation focuses on the practical use of 'Lomtagora 126' flour in bread production and the relevance of the reported flour characteristics to the production process. Conclusions regarding superiority over other wheat flours are not drawn in the absence of documented comparative baking trials and corresponding objective measurements.

3 RESULTS AND DISCUSSION

3.1 Characteristics of Flour Obtained from 'Lomtagora 126'

The reported characteristics of the flour obtained from the Georgian wheat cultivar 'Lomtagora 126' are summarised in Table 1.

The reported protein content of 14.8% is relevant to the technological evaluation of the flour. Wheat proteins, particularly gluten-forming proteins, contribute to dough structure and gas retention [3, 4]. However, total protein content alone does not establish gluten strength, dough elasticity, or extensibility. These characteristics also depend on protein composition and functionality, as well as on processing conditions (Belderok et al., 2000; Cauvain and Young, 2006).

The gluten content of 28.0%, determined using a washing-out method, provides additional information about the flour's gluten-related characteristics [7]. Gluten content is an important parameter in wheat flour evaluation, although its interpretation depends on the analytical procedure and whether the reported value represents wet gluten or another gluten measure. Comparison with other flour samples requires consistent analytical procedures and reporting bases.

The reported starch content of 75.0% indicates that starch constitutes the principal carbohydrate fraction of the flour. During bread baking, starch gelatinisation contributes to the development of crumb structure. Its technological

behaviour is influenced by water availability, temperature, and enzyme activity [2, 3]. Consequently, starch content should be considered together with the other characteristics of the flour.

The total sugar content of 1.5% is another reported characteristic. Sugars may contribute to fermentation and participate in browning reactions during baking [2, 3]. Their technological significance depends on sugar composition, yeast activity, fermentation conditions, and the overall formulation.

Table 1: Physicochemical and technological characteristics of flour obtained from the wheat cultivar 'Lomtagora 126'

Parameter	Reported value
Protein content	14.8%
Starch content	75.0%
Total sugar content	1.5%
Lipid content	1.5–2.5%
Ash content	1.07%
Falling number	161 s
Gluten content	28.0%

The reported lipid content ranges from 1.5% to 2.5%. Lipids in wheat flour may interact with starch and proteins and can influence dough properties and the structure of the baked product [3, 4]. The effect of the reported lipid content on the bread produced in this study cannot, however, be established without additional comparative and analytical data.

The ash content of the flour was 1.07%, determined by incineration in a muffle furnace under standardised conditions in accordance with ISO 2171:2023. Ash content represents the inorganic residue remaining after the organic matter has been removed under the specified conditions. It is commonly used as an indicator of the mineral residue in wheat flour and can be influenced by grain characteristics and milling conditions [6]. It does not, however, establish the concentrations of individual mineral elements.

The falling number of 161 s is relevant to the assessment of α-amylase activity. This enzyme affects starch breakdown and the availability of fermentable sugars during bread production [5]. The technological significance of the result depends on the intended bread type and the other properties of the flour. Therefore, the falling number should not be used in isolation to determine overall bread-making quality.

Taken together, the reported characteristics provide an initial profile of 'Lomtagora 126' flour for bread-making applications. Their interpretation in relation to technological performance would be strengthened by comparison with reference flours analysed using the same procedures and tested under equivalent baking conditions [2, 3, 4].

3.2 Industrial Application of 'Lomtagora 126' Flour in Bread Production

Flour from 'Lomtagora 126' was incorporated into an industrial bread formulation at a proportion of 65%, together with water, a hop and wheat decoction, and salt. The production trial was conducted in cooperation with LLC 'Ipq'li Dighomi'.

The practical significance of the study lies in the application of flour from a Georgian wheat cultivar under industrial production conditions. The work extended beyond flour characterisation to the production of a bread product intended for commercial use.

The technological suitability of flour depends on the combined effects of protein content and quality, gluten functionality, enzyme activity, water absorption, mixing, fermentation, and baking conditions [2, 3, 4]. Consequently, the reported flour characteristics should be interpreted in the context of the formulation and production process.

The falling number of 161 s provides information relevant to amylolytic activity, which can affect starch behaviour during processing [5]. However, the overall performance of the flour cannot be attributed to this parameter alone. Controlled comparative trials would be required to determine how the flour performs relative to other commercially available flours.

The industrial production trial demonstrated the practical applicability of 'Lomtagora 126' flour in the production process described. The available findings do not establish that the flour is superior to other wheat flours or that it produces better bread in terms of volume, crumb structure, texture, or sensory properties. Such conclusions would require objective measurements, documented processing conditions, and replicated comparative trials.



Figure 2: 'Tsekhvili' bread produced using flour from the Georgian wheat cultivar 'Lomtagora 126'.

3.3 Nutritional Composition and Commercial Application of 'Tsekhvili' Bread

The bread produced using flour from 'Lomtagora 126' was marketed under the name 'Tsekhvili'. Its commercial application represents a practical outcome of the work and demonstrates the use of flour from a Georgian wheat cultivar in a marketable product.

The laboratory results for the nutritional composition of the bread are presented in Table 2.

Table 2: Nutritional composition of 'Tsekhvili' bread per 100 g, determined by laboratory analysis

Parameter	Reported value
Energy	250 kcal (1046 kJ)
Fat	1.2 g
of which saturated fat	0.3 g
Total sugars	2.5 g
Starch	48.5 g
Protein	7.8 g
Salt	1.0 g

The laboratory results provide a nutritional profile of the finished bread. Energy value and the reported contents of fat, saturated fat, sugars, starch, protein, and salt are relevant to its nutritional characterisation.

The starch content of the finished bread, reported as 48.5 g per 100 g of product, is distinct from the 75.0% starch content reported for the flour. These values refer to different materials and should not be treated as interchangeable. Similarly, the 65% flour proportion refers to the bread formulation and does not represent the starch content of the flour or the finished product.

The nutritional composition of bread is influenced by the formulation, processing conditions, and moisture content of the finished product [2, 3, 8]. The laboratory results therefore provide information about the product as analysed, rather than a direct measure of the nutritional composition of the flour alone.

The commercial production of 'Tsekhvili' demonstrates the practical application of 'Lomtagora 126' flour in a marketable bread product. Further research involving standardised sensory evaluation, instrumental measurements of bread structure, shelf-life studies, and comparative baking trials would provide a more comprehensive assessment of the product's quality and technological characteristics.

4 CONCLUSIONS

This study investigated the practical application of flour obtained from the Georgian wheat cultivar 'Lomtagora 126' in bread production. The reported flour characteristics included a protein content of 14.8%, a starch content of 75.0%, a total sugar content of 1.5%, a lipid content of 1.5–2.5%, an ash content of 1.07%, a falling number of 161 s, and a gluten content of 28.0%.

The flour was incorporated into an industrial bread formulation at a proportion of 65%, together with water, a hop and wheat decoction, and salt. The resulting product, marketed under the name 'Tsekhvili', was characterised by laboratory analysis of its nutritional composition.

The practical production trial demonstrated that flour from 'Lomtagora 126' could be used in the bread-making process described. This provides a basis for further investigation of the cultivar as a raw material for the food industry and supports the practical utilisation of Georgian wheat resources.

The findings do not establish the superiority of this flour over other wheat flours or demonstrate statistically significant improvements in bread quality. Further studies should include replicated baking trials with appropriate reference flours, complete documentation of processing conditions, and objective measurements of dough and bread properties.

Standardised sensory evaluation, instrumental assessment of bread structure, and shelf-life studies would also strengthen the evidence regarding the technological performance of 'Lomtagora 126' flour and the quality characteristics of the resulting bread.

Overall, the study provides a practical example of the application of a Georgian wheat cultivar in industrial bread production and establishes a basis for further comparative research.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

REFERENCES

[1] Codex Alimentarius Commission. *Standard for Wheat Flour*. CXS 152-1985. Rome: FAO/WHO.

[2] Auerman, L. Ya. *Technology of Breadmaking*. St. Petersburg: Profession, 2005. (In Russian).

[3] Cauvain, S. P., and Young, L. S. *Technology of Breadmaking*. New York: Springer, 2006.

[4] Belderok, B., Mesdag, J., and Donner, D. A. *Bread-Making Quality of Wheat: A Century of Breeding in Europe*. Dordrecht: Springer, 2000.

[5] International Organization for Standardization. *ISO 3093:2009. Wheat, rye and their flours, durum wheat and durum wheat semolina — Determination of the falling number according to Hagberg-Perten*.

[6] International Organization for Standardization. *ISO 2171:2023. Cereals, pulses and by-products — Determination of ash yield by incineration*.

[7] International Organization for Standardization. *ISO 21415-1:2006. Wheat and wheat flour — Gluten content — Part 1: Determination of wet gluten by a manual method*.

[8] Shewry, P. R., and Hey, S. J. The contribution of wheat to human diet and health. *Food and Energy Security*, 4(3), 2015, 178–202.