

SUITABILITY GRAIN OF WINTER WHEAT SPELT FOR BAKING AND FEEDING PURPOSES

Technological quality and overall nutrient of purified and unpurified grains of wheat spelt to use for baking and feed purposes were investigated. Established that spelt grain has a high value feed units and it is therefore may be highly fodder for animals. Bread produced from spelt flour had good mark that allow use it for produce high nutrient bread of good quality.

Keywords: *grain of winter wheat spelt, nutritive, technological indicators of quality, quality of bread, bakery and feed purposes*

Introduction. Spelt is undemanding, winter-hardy species of wheat which is known since ancient times. It was common in Europe and Asia is mentioned in the treatises of ancient Rome and medieval monks. Humanity millennium fed these grains and still remains unknown causes in which he was forgotten for many years.

As spelt almost perfect combination necessary for the human body vitamins, minerals, micronutrients, protein, fats and carbohydrates. Spelt richer than ordinary wheat for protein unsaturated fatty acids and cellulose. It contains special carbohydrate solution – mycopolisaccharides that can strengthen the immune system. Useful substances contained in spelled had high solubility, so they were easily and quickly absorbed by the body [1-3, 5-6].

Increased attention to spelt in many European countries over the last decade due to many reasons including low-suitability for agriculture was very popular in many countries and even some nutritional and technological advantages it can in some cases to press traditionally dominant soft wheat. Grain spelt have typical high protein content in grain (more than 21%). Flour obtained from grain of wheat suitable for the manufacture of the finest quality confectionery products [2, 6].

The negative economic spelt qualities include pretty rough floral tape to snug against the grain and cover it. Such morphological feature complicates processes thrashing out grain from ears [3].

The aim of research was to determine the technical quality and overall nutrient purified or unpurified grain of winter wheat spelt for use in baking and feed purposes.

Materials and methods. For studies were taken grain of winter wheat spelt variety Zorya Ukraine nurtured by the standard for the right-bank forest-steppe Ukraine cultivation techniques of cultivation: purified (free from flower films) and do not of purified (with film). Spending identifying key process Indexes quality of grain spelt carry out according to state standards in laboratory department of storage, processing and standardization of plant products named after prof. B.V. Lesik and Ukrainian Laboratory of Quality and Safety of Agricultural Products of National University of Life and Environmental Sciences of Ukraine. Total dietary 1 kg grain of spelt was calculated. Also by baking quality of the grain spelt as compared with grain wheat and spelt soft and mixture (1:1) produced by unleavened dough method laboratory trial batch of dough under intensive methods Ukrainian Institute examination of plant varieties [4].

Results and discussion. The first stage of our research was to study the basic biochemical parameters purified and unpurified grain of spelt which led to a number of conclusions on the use of data samples of grain for food and feed purposes (*Table 1*).

Refined grain spelt characterized primarily high in nitrogen (protein) – 22.3 %. The content of crude protein in the unrefined grains are also quite high – 15.3 %. Simultaneously, the crude grain compared with refined spelt almost half the starch content – 35.6 % against 60.1 % in purified.

Table 1

Biochemical parameters of purified and unpurified grains of wheat spelt

Name of indexes	Purified grains	Unpurified grains
Humidity,%	10.0	9.7
Crude protein,%	20.4	15.3
Crude fat, %	4.43	3.46
Fiber, %	2.7	13.6
Starch,%	60.1	35.6
Ash,%	1.7	1.7
Nitrogen by Kjeldahl method	22.3	–

Ash content of grain spelt is average with which grain is suitable for the manufacture of flour.

For recommending spelt grain for feed purposes to calculate its nutritional value. And so as a grain of spelt difficult to separate from the films, it is important to compare the feeding value of crude and refined grains (Tables 2 and 3).

Table 2

Calculation of total dietary 1 kg of purified grain of wheat spelt

Nutrients	Protein (P)	Fat (F)	Fiber (Fb)	Nitrogen-free extractive substances (NfES)
Contents crude indicators, g	204	44.3	27	707.7
Coefficient of digestibility	0.70	0.90	0.33	0.92
Content of digestible nutrients, g	142.8	39.87	8.91	651.08
Indicators of productivity, g	1.57	3.18	1.67	1.67
General productive action, g. f.u.	224.19	126.79	14.88	1087.30
Sum – 1453.16				

Nitrogen-free extractive substances – is no nitrogenous extractives which is determined by the formula:

$$\text{NfES} = 1000 - (\text{P} + \text{F} + \text{A} + \text{Fb})$$

$\text{NfES} = 1000 - (204 + 44.3 + 17 \text{ (ash)} + 27) = 1000 - 293.30 = 707.7 \text{ (g)}$. To express the parameters P, F, A, Fb in grams per kg. Should value their mass fraction multiplied by 10.

Expected productive force on 1 kg of grain multiplied by a factor of usefulness and determine nutrient: $1453.16 * 0.95 = 1380.50 \text{ g}$ or 1.38 f. u.

$$\text{NfES} = 1000 - (153 + 34.6 + 17 + 136) = 659.40 \text{ (g)}$$

Expected productive force on 1 kg of grain multiplied by a factor of usefulness and determine nutrient: $1355.22 * 0.95 = 1287.46 \text{ g}$ or 1.28 f. u

Table 3

Calculation of total dietary 1 kg of no purified wheat spelt

Nutrients	Protein (P)	Fat (F)	Fiber (Fb)	Nitrogen-free extractive substances (NfES)
Contents of crude indicators, g	153	34.6	136	659.40
Coefficient of digestibility	0.70	0.90	0.33	0.92
Content of digestible nutrients, g	107.1	31.14	44.88	606.65
Indicators of productivity action, g	1.57	3.18	1.67	1.67
General productive action, g f. u.	168.14	99.02	74.95	1013.11
Sum – 1355.22				

Thus, grain spelled as refined and crude way has a high nutritional value, expressed significant fodder units. In particular, refined grains 1.38 and crude 1.28 f. u., which is a little difference. For comparison, soft wheat is characterized in average 1.18 feed units

Therefore, we can conclude that as refined and Untreated grain spelt is a highly fodder for animals. The use for feeding purposes crude grain spelt reduces cost of post harvest handling and simultaneously reduces the cost of the food.

The literature emphasizes the use of spelt grain in bread baking and for making confectionery. Therefore, our next task was to determine the properties of grain spelt flour and baking quality compared to soft wheat (Table 4, 5)

Table 4

Technological parameters as refined grains spelt that affect the flour and baking properties

Name of the indexes	Humidity	Grain-unit	Mass of 1000 grains	Vit-reous	Quantity of gluten	Quality of gluten	Falling number
Value of indexes	13.3 %	665 g/l	41.7 g	66 %	49.5 g	102.5 u.a.	266 s

To produce flour weighty importance grain unit and weight of 1000 grains. For more promise than corn, the higher yield of flour. In grain spelt situ mass index is quite low – 665 g/l and a characteristic grain in wheat is low – grain unit. Simultaneously, weight of 1000 grains is spelt averages for wheat (41.7 g) and a corn flour is suitable for purpose.

The high rate vitreous grain spelt out 66 % provide high-quality flour of smaller particles. The sample studied grain spelt also had a high gluten content – 49.5 g, while low quality – 102.5 u. a. With so many gluten-free bread available high volume, but due to the quality of the dough may be blurred and reduce the amount of bread.

Index falling number 266 s has an average grain α -amylase activity that is positive and relatively high quality starch grain spelt that during the preparation of dough and bread create a stable "frame" and high volume. A direct method of determining qualities is baking cakes laboratory test that we conducted on grain spelt flour and wheat mixture (1:1) and spelt soft bread to assess options studied (Table 5, Figure 1, 2).

Describing the resulting bread is worth noting a larger volume of grain spelt flour obtained from 650 (cm³) compared to soft wheat (610 cm³). In terms of appearance and pulp noted a higher quality bread in the bread produced from wheat flour mix with a little lower and still lower with spelt flour.

Table 5

The quality of bread from flour of different types

Flour of wheat grain of different kinds	Volume of bread,		Qualitative features, balla							Overall bakery score, mark
			Appearance			Porosity	Elasticity	Color of crumb	Taste and smell	
	cm ³	mark	Surface	Form	Color of crust					
Spelt	650	7	7	7	9	6	6	5	7	6.8
The soft	610	6	8	7	8	8	8	6	9	7.5
A mixture of spelt and soft (1:1)	610	6	7	7	8	7	7	5	9	7.0

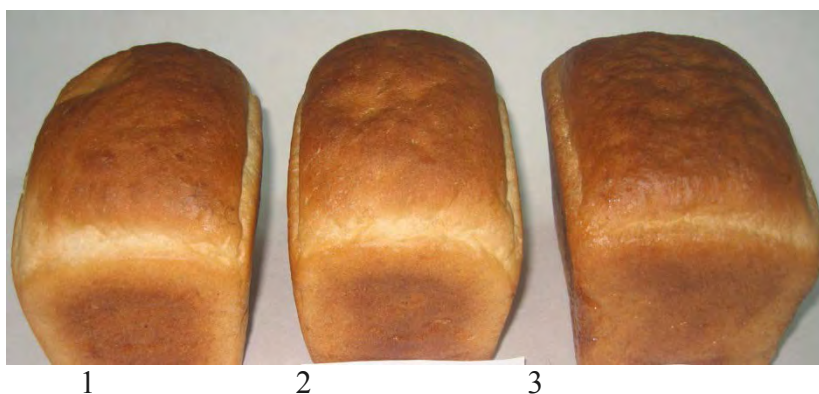


Fig. 1. Bread from wheat flour various species (appearance):
 1– mixture of spelt and soft; 2 – soft; 3 – spelt

Overall rating baking bread produced from flour spelt was 6.8 points with a slightly higher mix – 7.0 and even higher with wheat – 7.5 points. In such marks wheat flour all investigated variants score well characterized (6.6-7.8 points). This assessment bread can be used spelt flour for making bread.



Fig. 2. Bread from wheat flour various types (cross-section)

Conclusions. Spelt wheat is characterized by good biochemical parameters: purified grain had protein – 21 %, starch – 60 % ash – 1.7 % but unpurified grain containing crude protein – 15.3 %.

Spelt grain has a high nutritional value: purified grain – 1.38 and unpurified grain – 1.28 f. u. Consequently, grain spelt is a highly fodder for animals and the use of crude grain significantly reduces the costs of post-harvest handling and also reduces the cost of the food.

Grain spelt characterized as low grain unit. At the same time, it has a high vitreous (66 %) and gluten content (49.5 g) and low quality of gluten (102.5 u. a.). Index falling number 266 s characterizes the quality of starch grain spelt. Bread produced from flour was spelt overall assessment baking – 6.8 mark and score well characterized, allowing the use spelt flour for the production of a highly good quality bread.

References

1. Горн Е. Лучше чем пшеница, но ... / Е. Горн // Фермерське господарство. – 2008. – № 4 (372). – 21-22.
2. Жуковский П. М. Культурные растения и их сородичи / П. М. Жуковский. – Л. : Колос, 1971. – 752 с.
3. Кривченко В. И. Устойчивость зерновых колосовых к возбудителям головневых болезней / В. И. Кривченко. – М., 1984. – С. 303.
4. Методика державного сорто випробування сільськогосподарських культур / Під ред. О. М. Гончара – К. : Алефа, 2000. – Вип. 7. – 144 с.

5. Парій Ф. М. Оцінка господарськи цінних властивостей нового сорту пшениці спельти озимої Зоря України / Ф. М. Парій, О. Г. Сухомуд, В. В. Любич // Насінництво. – 2013. – № 5 (125). – С. 5.

6. Чекалін М. М. Селекція та генетика окремих культур / М. М. Чекалін, В. М. Тищенко, М. Є. Баташова. – Полтава : ФОП Говоров С. В., 2008. – 368 с.

Анотація

Подпрятков Г.И., Яцук Н.О.

Придатність зерна пшениці спельти озимої для хлібопекарських та кормових цілей

Досліджено технологічні показників якості та загальної поживності очищеного та не очищеного зерна пшениці спельти озимої з метою його використання для хлібопекарських та кормових цілях. Встановлено, що зерно спельти має високі значення кормових одиниць і тому є високопоживним кормом для тварин. Хліб отриманий із борошна спельти характеризується оцінкою добра, що дозволяє використання останнього для виготовлення хорошої якості високопоживного хліба.

Ключові слова: зерно пшениці спельти озимої, поживність, технологічні показники якості, якість хліба, хлібопекарські та кормові цілі

Аннотация

Подпрятков Г.И., Яцук Н.А.

Пригодность зерна пшеницы спельты озимой для хлебопекарских и кормовых целей.

Исследованы технологические показатели качества и общей питательности очищенного и не очищенного зерна пшеницы спельты озимой для его использования в хлебопекарных и кормовых целях. Установлено, что зерно спельты имеет высокие значения кормовых единиц и поэтому является высокопитательным кормом для животных. Хлеб полученный из муки спельты характеризуется оценкой хороша, позволяет использование последнего для изготовления хорошего качества высокопитательного хлеба.

Ключевые слова: зерно пшеницы спельты озимой, питательность, технологические показатели качества, качество хлеба, хлебопекарные и кормовые цели