CHANGING OF WHEAT QUALITY PARAMETERS LIKE FOOD RAW MATERIAL DURING SHORT TERM STORAGE

Dr.ing. Ernő GYIMES
Institute of Food Engineering, Faculty of Engineering, University of Szeged

Dr.ing. Balázs P. SZABÓ
Institute of Food Engineering, Faculty of Engineering, University of Szeged

Dr.ing. Antal VÉHA
Institute of Food Engineering, Faculty of Engineering, University of Szeged

REZUMAT. Calitatea grâului este un aspect foarte important, deoarece înseamnă bunătatea şi excelenţa produsului. În general, calitatea este răspunsul scopului, astfel încât consumuri diferite au nevoie de calitate diferită. Comportamentul calității trebuie să fie fix. În sistemul biologic permanenţa este un aspect foarte dificil, pentru că terenurile agricole, vremea etc., determină calitatea. Depozitarea este altă secţiune, pentru că ambiţia este de a păstra valoarea parametrilor. Cu alte cuvinte, se încearcă păstrarea calitatății cerealelor.

Cuvinte cheie: calitatea graului, depozit

ABSTRACT. The quality of the wheat is a very important thing; it means the goodness and the excellent of the product. In generally, the quality is answered to the aim, so different consumptions need different quality. The behavior of the quality must be fixed. In the biology system the permanency is a very difficult thing, because the agricultural land, the weather, etc. determine the quality. The storaged is an other section, because the ambition is to keep the value of the parameters. In other words, we try to keep the quality of the cereals.

Keywords**: wheat quality, storage**

1. INTRODUCTION

The wheat is the most valuable cereal. It is grown in 240-250 m acre all over the world (Pena 1997, Matsuo 1985). Cereal grains and wheat in particular, are among the most important crops globally (Véha 2007).There is a requirement to ensure the organoleptic quality of crops to ensure good commercial returns and safety of the product (Evans et al., 2000). Wheat produces different volatiles with changing storage time. Grain quality maintenance has traditionally been the responsibility of grain storekeepers who rely on measurements of grain or its milled products and on implicit knowledge gained through scientific results, common sense and job experience. It has a good adaptability, and it has a lot of variety, and the demand of these varieties is widespread. The consumption of it is huge, the confectionary, the baking, etc use it. The wheat is good fodder also, and the secondary products are valued, the wheat bran contains a lot of protein. The straw is a good litter. (Szentpétery et al. 2005; Győriné et al. 2006)

The storage of the cereals is a very complex exercise, because it is an active material, it isn't in the full ripe state, but the microorganism, the insects and the murine infection it. To maintain grain quality during storage, grain must be protected from the growth and reproduction of insects, mites and fungi (Sun and Woods, 1997a, b). Young larvae of this species frequently feed on the germ of whole kernels and on fine material in the grain (Rilett, 1949). So to the professional storage, we have to know the biology, biochemical and the technology knowledge (Tohver et al. 2000). The capacity of the silo would be bigger in the last time. Lukow and White (1997) studied changes of the milling and baking parameters of US wheat. The wheat was stored during 15 months storage at temperatures in the range of –4°C and 25°C, and air humidity in the range of 28% and 73%. (Wilcke et al. 2002)

The wheat after the harvest is live; the manifestation of it is the organic content biochemical transformation. It depends of the moisture, the temperature, the health of the wheat, etc. The biochemical transformation causes some end-product. The enzyme activity causes the fermentation, alcohol and organic acid issue.

Criterion of wheat quality:

- Problem of the storage and processing, depend on the raw material, economic process
- The end-product reference specific

- The quality of the end-product, the appearance of the product, satisfy the consumer demand (generally and specifically) Hrušková (2002) examined the sort term storage and its effect to the flour quality. The changes in the moisture contents depended on the short time storage conditions and had a different time course in the individual locations. Wet gluten content tended to decrease with time but the differences did not seem significant for the flour quality.

The first aim of the storage is to keep the quality of the wheat (Markovics et al. 2008, Jolly et al. 1996). If the storage is safe, the wheat quality will be in a good condition (physical, chemical state, technological behaviors, nutritive, hygiene) (Bettge et al. 1995). The quality of the wheat is the external and the internal component of the kernel (Martinez, 1997). The internal component is the protein, starch, lipid, cellulose, minerals, etc. The environmental effects determine the cultural plant quality, although the compound of wheat is a genetic factor.

2. MATERIALS AND METHODS

Materials

Eleven samples (registered wheat varieties) of bread with diverse technological qualities were used in this study. We used the varieties of Szegedi Gabonatermesztési Kutató Kht. (Cereal Research NPC, Szeged) as samples: GK Garaboly, GK Békés, GK Kalász, GK Verecke, GK Holló, GK Ati, GK Petur, GK Nap, GK Élet, GK Csongrád, GK Hattyú

The samples were harvested in two different times (Bem. 2. and Bem. 3.).

The samples were cut in two. The first portions of the samples were storage for 3 months together and they were examined (autumn research). The second portions of the samples were storage for 9 months together and they were examined (spring research). The temperature of the storage was ambient temperature. determines the gluten strength of dough. It is measuring the force required to blow and break a bubble of dough. The results include P Value, L Value, P/L Value and W Value.

Statistical analysis

Statistica 8.0 (StatSoft, Inc. Tulsa, USA) and Microsoft © Office 2003 Excel software for Windows were used to perform statistical analyses. The samples were tested for significance using analysis of variance techniques (ANOVA). Three effects were investigated; varieties, harvesting time and storage effect. A level of significance of $p < 0.05$ is used throughout the analysis.

Methods

Hardness index: The Perten SKCS 4100 (Perten Instruments, Sprinfield, Illinois, USA) instrument is one of the well know machines, which examine the kernel hardness. This machine reports the average force for crushing 300 kernels, in terms of a hardness index (HI).

Milling test: Brabender ® Quadrumat ® Senior (Brabender GmbH & Co. KG, Duisburg, Germany) laboratory mill checking the milling properties of different types of grain and determining the flour yield (FL) of the wheat sample.

Ash content: OH63 (Labor-MIM Budapest, Hungary)

Ash content refers to the mineral content of flour. It depends on many factors, such as the variety of wheat, the fertilization, the climate, etc.

Gluten index: The gluten index (GI) was examined by Glutomatic 2200 (Perten Instruments AB Huddinge, Sweden) Dry gluten content was measured after drying with Glutork 2020 (Perten Instruments AB Huddinge, Sweden) automatic gluten dryer.

Farinograph test: The farinograph determines dough and gluten properties of a flour sample by measuring the resistance of dough against the mixing action of blades. Absorption is the amount of water required to center the farinograph curve on the 500-Brabender unit line. We used the Brabender ® farinograph (Brabender GmbH & Co. KG, Duisburg, Germany)

Alveograph characteristics: Chopin Alveorgraph NG (CHOPIN Technologies, Villeneuve-la-Garenne Cedex, France) the alveograph test were determined according to the EU-Standards. The alveograph

3. RESULTS AND DISCUSSION

The Hardness Index of the examined samples were mixed, the Figure 1 shows it.

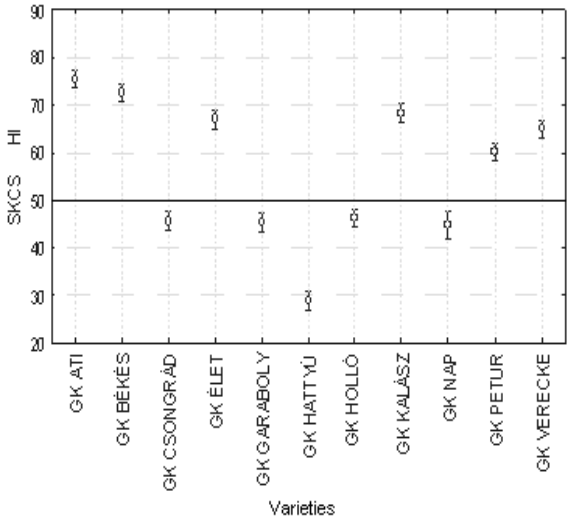

Fig. 1. *The Hardness Index of the varieties*

The SKCS 4100 compartmentalize the results in two groups. Under 50, the entries belong to Soft

Wheat-, while entries above values 50 considered as Hard Wheat category. We had 5 soft wheat varieties (GK Csongrád, GK Garaboly, GK Hattyú, GK Holló, GK Nap) and we had 6 hard wheat varieties (GK Ati, GK Békés, GK Élet, GK Kalász, GK Petúr, GK Verecke).

Table 1 shows the results of the flour yield, ash content and other technological traits of the wheat samples.

Table 1. *Selected technology parameters of the entries in the study*

Harvest time	Variety		Flour yield (%)	Ash content (%/sz.a.)	Gluten index (%)	Wet gluten (%)	Dry gluten (%)	Gluten-ratio	Gluten-flattering (mm)
Bem.2.	GK ATI	Autumn search	72,19	0,68	83	35,38	12,26	2,89	0,9
Bem.2.	GK BÉKÉS	Autumn search	73,37	0,71	84	36,16	12,70	2,85	1,1
Bem.2.	GK CSONGRÁD	Autumn search	70,55	0,68	76	33,53	11,47	2,92	1,8
Bem.2.	GK ÉLET	Autumn search	75,41	0,56	93	32,01	11,33	2,83	1,0
Bem.2.	GK GARABOLY	Autumn search	69,06	0,52	65	30,63	10,65	2,88	2,0
Bem.2.	GK HATTYÚ	Autumn search	67,32	0,49	80	28,53	9,83	2,90	0,8
Bem.2.	GK HOLLÓ	Autumn search	63,33	0,52	74	30,34	10,13	3,00	1,5
Bem.2.	GK KALÁSZ	Autumn search	66,89	0,62	91	32,67	11,50	2,84	0,5
Bem.2.	GK NAP	Autumn search	70,91	0,51	71	32,26	11,18	2,89	1,9
Bem.2.	GK PETUR	Autumn search	76,43	0,52	98	29,98	10,59	2,83	0,8
Bem.2.	GK VERECKE	Autumn search	75,89	0,53	98	26,31	9,33	2,82	0,5
Bem.3.	GK ATI	Autumn search	75,86	0,66	56	35,11	12,31	2,85	2,0
Bem.3.	GK BÉKÉS	Autumn search	74,28	0,72	73	38,46	13,42	2,87	1,5
Bem.3.	GK CSONGRÁD	Autumn search	68,60	0,63	68	32,95	11,32	2,91	1,6
Bem.3.	GK ÉLET	Autumn search	74,19	0,54	92	30,47	10,74	2,84	0,5
Bem.3.	GK GARABOLY	Autumn search	69,74	0,53	61	30,49	10,58	2,88	2,3
Bem.3.	GK HATTYÚ	Autumn search	67,56	0,48	67	28,34	9,82	2,89	0,8
Bem.3.	GK HOLLÓ	Autumn search	68,73	0,61	60	31,68	10,74	2,95	2,5
Bem.3.	GK KALÁSZ	Autumn search	77,29	0,74	93	32,94	11,61	2,84	0,8
Bem.3.	GK PETUR	Autumn search	75,24	0,59	95	30,47	10,72	2,84	1,1
Bem.3.	GK VERECKE	Autumn search	76,89	0,56	96	26,01	9,26	2,81	0,8
Bem.2.	GK ATI	Spring search	67,86	0,60	67	35,64	12,56	2,84	1,4
Bem.2.	GK BÉKÉS	Spring search	69,31	0,64	78	35,56	12,51	2,84	0,8
Bem.2.	GK CSONGRÁD	Spring search	61,60	0,50	53	32,19	11,16	2,88	2,4
Bem.2.	GK ÉLET	Spring search	71,05	0,48	79	31,61	11,20	2,82	1,0
Bem.2.	GK GARABOLY	Spring search	64,77	0,49	45	29,86	10,50	2,84	1,9
Bem.2.	GK HATTYÚ	Spring search	66,85	0,46	64	26,33	9,27	2,84	0,9
Bem.2.	GK HOLLÓ	Spring search	62,16	0,49	70	30,53	10,42	2,93	1,6
Bem.2.	GK KALÁSZ	Spring search	68,39	0,55	83	32,98	11,50	2,87	1,1
Bem.2.	GK NAP	Spring search	63,75	0,46	75	30,83	10,88	2,83	1,5
Bem.2.	GK PETUR	Spring search	70,05	0,51	87	30,03	10,57	2,84	1,1
Bem.2.	GK VERECKE	Spring search	71,66	0,48	93	26,86	9,52	2,82	0,8
Bem.3.	GK ATI	Spring search	71,51	0,58	73	35,70	12,51	2,85	1,8
Bem.3.	GK BÉKÉS	Spring search	71,05	0,62	69	37,78	13,29	2,84	1,1
Bem.3.	GK CSONGRÁD	Spring search	63,09	0,55	54	32,53	11,14	2,92	2,1
Bem.3.	GK ÉLET	Spring search	72,43	0,49	81	31,32	10,96	2,86	0,6
Bem.3.	GK GARABOLY	Spring search	65,59	0,49	54	29,41	10,32	2,85	2,4
Bem.3.	GK HATTYÚ	Spring search	65,34	0,43	69	27,54	9,47	2,91	1,1
Bem.3.	GK HOLLÓ	Spring search	62,65	0,47	55	30,67	10,42	2,94	2,8
Bem.3.	GK KALÁSZ	Spring search	70,27	0,58	87	34,02	11,91	2,86	0,6
Bem.3.	GK PETUR	Spring search	70,03	0,47	95	29,67	10,52	2,82	0,9
Bem.3.	GK VERECKE	Spring search	73,01	0,49	97	25,56	9,03	2,83	0,5

The wheat was tested for significance using analysis of variance techniques (ANOVA).

Table 2. *Results of analysis of variance (level of significance of p < 0.05)*

Methods	Connection	
Flour Yield	S.	↓
Flour Ash	S.	↓
Gluten Index	S.	↓
Wet Gluten	N.S.	↓
Dry Gluten	N.S.	↓
Gluten Ratio	N.S.	↓
Gluten Flattering	N.S.	↑
Falling Number	N.S.	↓
Water Absorption Capacity	S.	↓
Value Number	S.	↑
P	S.	↑
L	S.	↑
P/L	S.	↑
W	S.	↑

S.- Significant; N.S.- Non Significant

The Figure 2 shown that the flour yield is decreased, the statistical behaviour show it. The gluten index is a very important behaviour of the flour, and it is decreased (4 %).

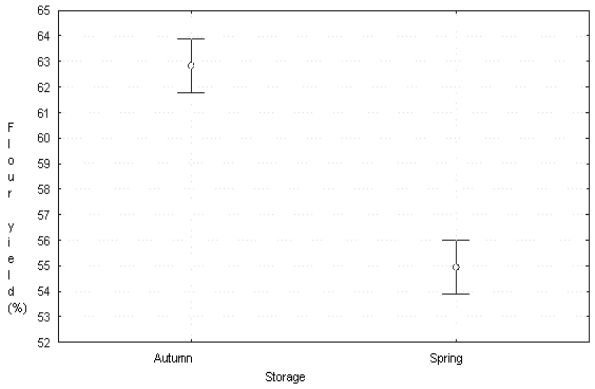

Fig. 2. *Flour yield confidental interval*

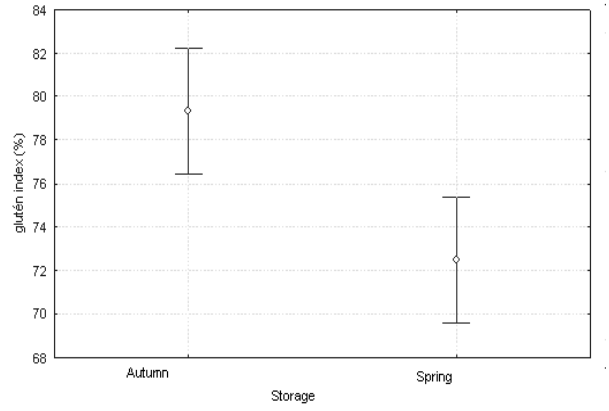

Fig. 3. *Gluten index confidental interval*

The water absorbant capacity is decreased during the short time storage (Figure 4.)

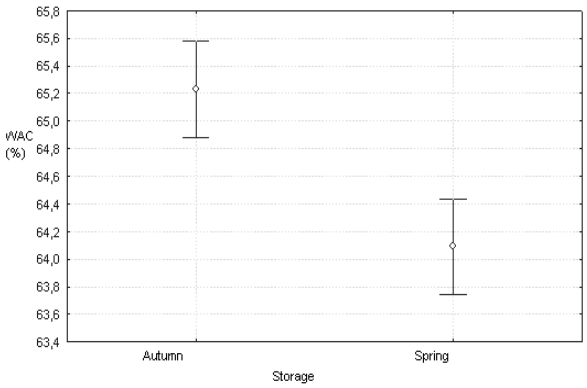

Fig. 4. Water absorbant capacity confidental interval

The P value and W value of alveograph is increased during the 6 mounts storage.

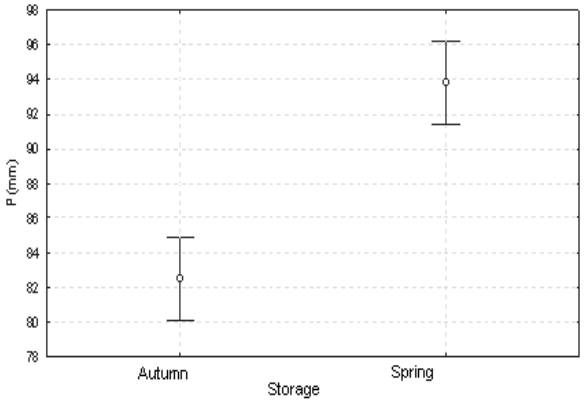

Fig. 5. *P value of alveograph confidental interval*

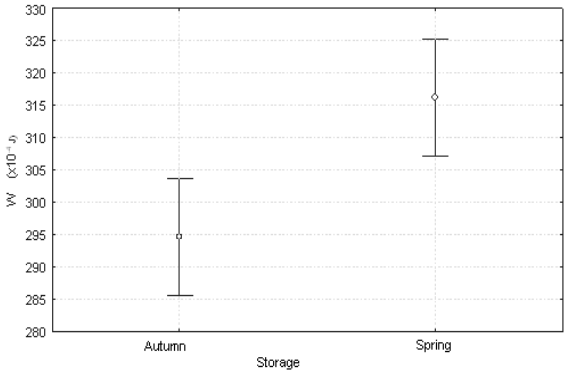

Fig. 6. *W value of alveograph confidental interval*

4. CONCLUSIONS

Eleven different Hungarian wheat varieties were examined in our study. The physical properties and the flour were analyzed. The physical behaviour wasn't change during the storage.

The hardness index average was 73,18 of the Bem. 2. in the autumn research, and 72,49 in the spring research. The hardness index average was 67,19 of the Bem. 3. in the autumn research and 67,96 in the spring research. The flour yield is decreased (it is 4 %). The Bem. 2. had 74,04 % flour

yield in the autumn research, and 69,76 % in spring research. The Bem. 3. had 76,37 % flour yield in the autumn research, and 72,26 % in spring research. The gluten index shows the same (For example, the Bem. 2. had 90,5 % gluten index in the autumn research, and 80 % in spring research). There was a significant decrease in connection the water absorbent capacity. The important W value of alveograph was increase significantly. The W value was 348,85 of the Bem. 2. in the autumn research, and 358,35 in spring research. The W value was 268,55 of the Bem. 3. in the autumn research, and 328,95 in spring research.

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