MONITORING OF THE INDICES OF BREAD ON AN ASSORTMENT OF COMMON WHEAT AND FLOURS OBTAINED FROM THESE

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Abstract.*Nowadays, the most important elements necessary to obtain a quality wheat are genetic traits of the variety, the fertilization level, treatments against diseases and pests, favourable climatic conditions. We must not neglect other technological elements, but without accurate and timely compliance with the four items above, there is no chance to obtain a quality wheat. Variety is the first issue that must be careful in the establishment of a culture and especially its genetic heritage – it is or not a variety suitable for yielding quality wheat for bread. Regarding quality testing for most raw materials used in the food industry it meant the passing years do not necessarily reduce the number of methods of evaluation thereof. Or wheat flour have been no exception to this rule, so we currently have a growing number of methods for analysing technological qualities. Unfortunately, that method of analysis that says everything about how it will behave flour in the process of all methods Philosopher's Stone, was not invented yet. Optimal amounts of grain with problems in the enzymatic parameters (index falls, deformation index) required for obtaining various mixtures must be established for each case by laboratory tests. A higher percentage of 5% grains with 62 seconds falling number should be avoided, even if apparently resulting mixture has a good index dropping according to the literature (200-250 seconds). Flours obtained thus have poor technological performance, even if apparently all other quality parameters (including alveograph and farinograph) seems to be optimal. This is due precisely to the fact that the new conditions arise industrial flow (breeding, temperatures, pH, enzymatic equipment yeast and so on.), capable of intensifying the enzymatic activity levels beyond determinable by simple testing in laboratory or pilot (baking test).*

Key words: *winter wheat, quality indices, flours power.*

INTRODUCTION

Suitability for bakery of wheat varieties from our country is different and is influenced both by genetic factors - variety, and climatic conditions, technological conditions where wheat production was obtained or how was preserved the seeds lots to their recovery (GH. MATEI, 2010, 2013).

Numerous methods to analyse the technological characteristics of flours from wheat grow continuously growing due to need to anticipate obvious as early as possible their technological behaviour. Conduct technological flours is the result of interactions subtle and extremely complex that we have to judge them usually based on quality parameters very specific: protein content, wet gluten content, the "strength" of gluten index Zeleny index fall, extensibility, dough strength and so on (A. ROTARU 2010, GABRIELA PĂUNESCU, 2012).

A number of studies have attempted to explore how quality parameters of flour depend on each other and therefore somehow value could be predicted with an acceptable error course on account of value to others. A study conducted in 2004 by ANNE INGVER and REINE KOPPEL from Jogeva Plant Breeding Institute (Estonia) showed the flour derived from Estonian wheat cultivated during 1999-2003, correlations exist out between physico-chemical

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parameters and bread volume. Thus, the protein content was correlated with wet gluten content to a level comparable to that recorded for flours in Romanian wheat (POPA, 2007), and the capacity of hydration of flour increased similarly with increasing of protein content and wet gluten (BABEANU ET ALL., 2010).

MARIE HRUSKOVA and collaborators, showed interesting correlations existing between the levels of certain quality parameters of wheat and the flour or bread from it. The study revealed the existence of very significant correlations between all parameters analysed and the corresponding parameters of wheat flour. It was highlighted that there is a negative correlation (r = -0.53) between wet gluten elasticity and extensibility of wet gluten from wheat flours. Appropriate correlation that has been highlighted by BRANLARD ET ALL. (1994).

Also, the study authors have described a positive correlation between parameters of wheat gluten index and the ratio P/L of alveogram (ratio of strength and alveographic extensibility).

MATERIAL AND METHODS

Into the flow receiving of lots of winter wheat belonging to 2015 were recorded and monitored following groups, coded for ease of expressing the results as follows:

- BRMDV 1.i;
- BRMDV 2.i;
- BRMDV 3.i;
- BRMDV 4.i;

The assortments of wheat set were monitored throughout the technological process, from storage to flour obtained achieve technological scheme shown in figure 1.

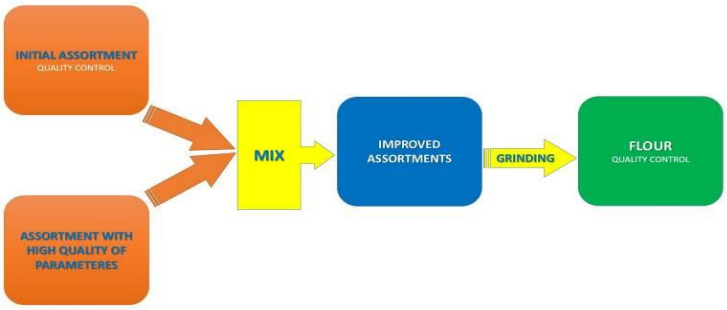


Figure 1 – Technological scheme for wheat and flour control

From the targeted assortment were taken for study laboratory samples in accordance with applicable standards of **STAS 1633/2003** with other additional amendments (figure 2).

Figure 2 – Laboratory samples of wheat and flour before analysis

The samples extracted from the receiving stream have undergone general determinations, respectively:

- seed moisture - (U%);
- determination of foreign bodies (CS%);
- determining MH (hectoliter weight).

Subsequently, the same samples were milled and on the flour obtained from the samples were performed the following determinations

- wet gluten content;
- alveograph test, which included:
  - the maximum height of the curve (H) multiplied by the coefficient standard (1.1) resulting dough resistance to extension – P;
  - dough extensibility (length of curve) – L;
  - report between and P/L

Following the results, the initial assortment (I.A.) were mixed with lots ameliorating (which have higher indices bakery) resulting blends - lots improved (I.L.).

These batches were prepared for milling by correcting moisture to a value close to 14% (STAS moisture for wheat) so that grinding can be made to the standards imposed by the technological parameters, without qualitative or quantitative losses.

RESULTS AND DISCUSSION

Seed's moisture – Following reception of quantitative and qualitative performed at Boromir Deva Mills is noted that in terms of physical moisture of analysed and monitored from batches assortment has the limits of the parameters of storage, all lots with humidity values below that required by STAS more than 14% (figure 3).

Values vary from batch BRMDV 3.i of 10.8% to 11.4% in batch BRMDV 1.i.

Mentioned batches were highlighted in the diagram of conditioning and reception stations were transferred to achieve their qualification parameters technological processing machine to grinding.

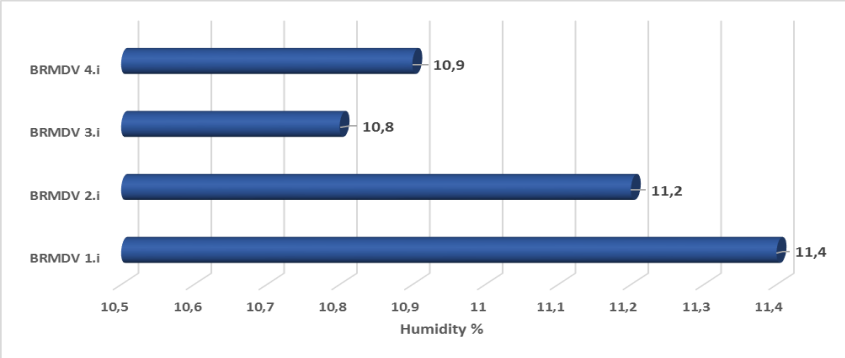


Figure 3 – The percentage of moisture on wheat batches

Foreign bodies – In the milling and baking industry, as in units specialized in long term storage of grain, foreign bodies' content in seed mass is a factor which establishes the cost per kilo wheat upon receipt of lots, and subsequently on applied technology storage process.

Batches surveyed had different values from this point of view, the percentage of foreign bodies ranging from 2% in group BRMDV 3.i and 4.i and 5% in group BRMDV wheat 1.i. (figure 4).

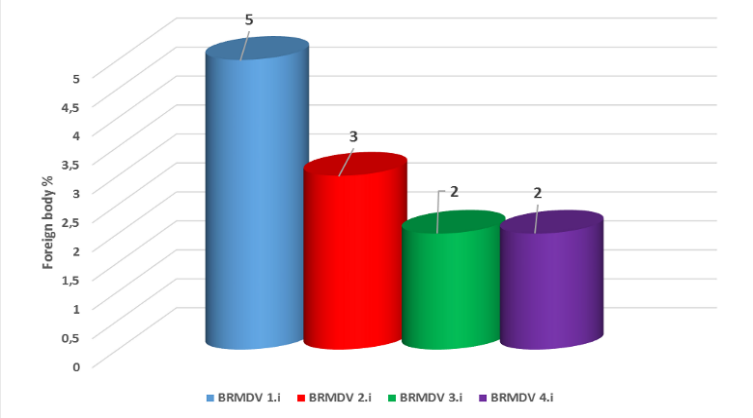


Figure 4 – The percentage of foreign bodies on wheat lots

Different values of these plots show their origin from different farms and entail additional cleaning measures applied before grinding on batches that have value greater than 3%, in accordance with STAS.

Hectoliter weight - Typically, drying and conditioning lots of wheat seed site grow MH, this being a secondary criterion for assessing quality (products that do not include MH on delivery standards and it is not taken into account). The minimum level acceptable for common wheat in industry of making bread is 75 kg/hl and for durum wheat for pasta MH minimum value is 77 kg/hl (ROMAN, GH., ET AL., 2012).

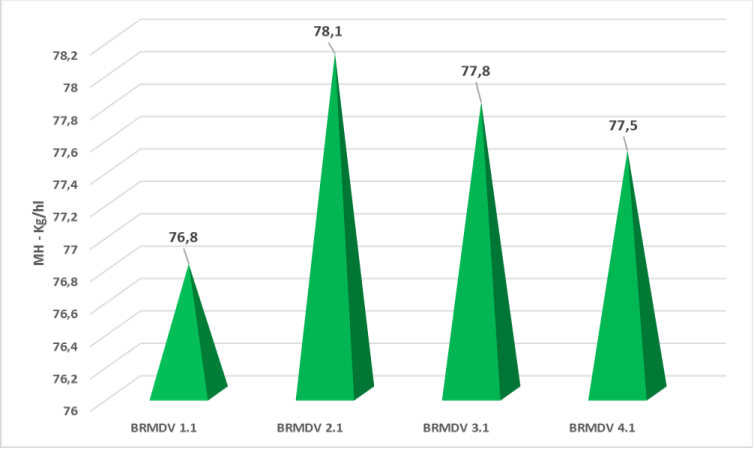


Figure 5 – The level of hectoliter weight on wheat lots

Hectoliter weight is instead the most important criterion for storage of agricultural products, it directly influences the space (volume) occupied by a seed lot. From this point of

view the analyzed lots showed values were between 76.8 kg/hl in batch BRMDV 1.i and 78.1 kg/hl in batch BRMDV 2.i.

Wet gluten content – In watched batches of common wheat, wet gluten content ranged from 24.9% in batch BRMDV 3.i and 25.4% in group BRMDV 2.i (Figure 6). The monitored batches present values at the lower limit specified in the standard, it is therefore necessary that for the high quality of flours to be obtained by grinding to achieve mixtures or blends with other batches whose contents wet gluten is higher, in order to improve the quality of flours thus obtained.

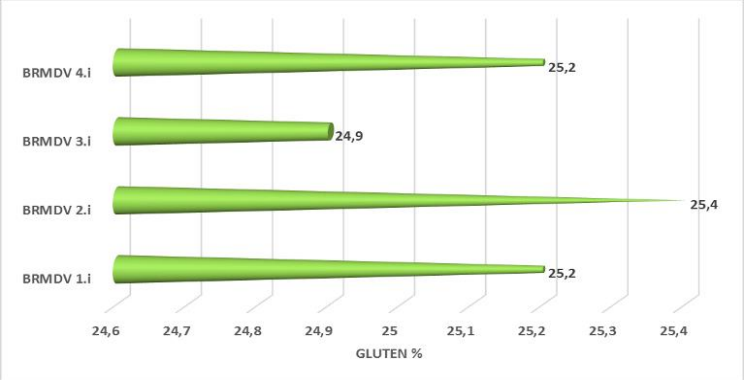


Figure 6 – Wet gluten content

Alveograf test - establishing quality for bakery of lots monitored using ALVEOGRAF TEST supposed pursuit of parameters determined by device named ALVEOLINK (CHOPIN) - figures 7 - were determinate the following indices:

P - resistance to extension of dough;
L - dough extensibility curve length;
P/R – ratio between P and L;
W – flours power.

Figure 7 – Alveograph

The most important indexes determinate with Alveograph test are presented in table 1 and figures 7 to 18. Among these indices, the most relevant in the bakery field seems to be flour power index (W), which is expressed in Joules and whose values were between 170 J and 296 J in batches BRMDV4i and respectively BRMDV2F.

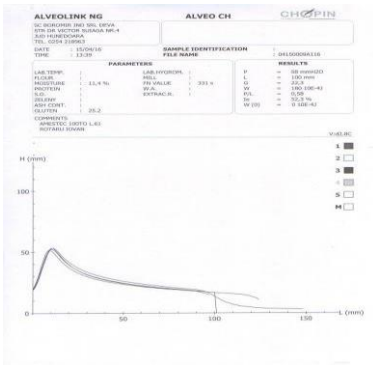
Table 1

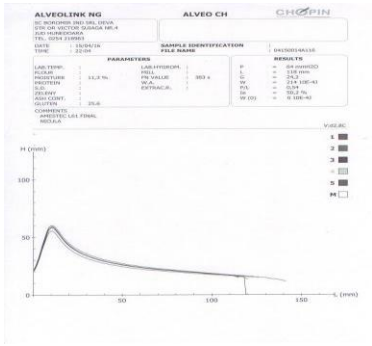
Values of main indexes determinate with Alveograph test

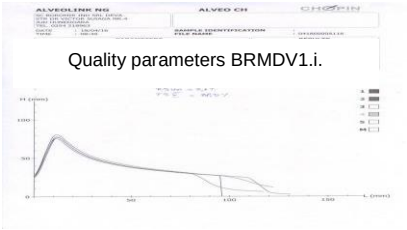
Batch/index	P (mm H_2O)	L (mm)	P/L	W (J)
Initial batches (i)				
BRMDV 1.i	58	100	0,58	180
BRMDV 2.i	68	92	0,74	172
BRMDV 3.i	67	117	0,57	188
BRMDV 4.i	59	100	0,59	170
Improvet batches (I)				
BRMDV 1.I	64	118	0,54	214
BRMDV 2.I	73	89	0,82	186
BRMDV 3.I	71	96	0,74	194
BRMDV 4.I	68	99	0,69	194
Flour (F)				
BRMDV 1.F	86	96	0,90	268
BRMDV 2.F	89	114	0,78	296
BRMDV 3.F	96	99	0,97	289
BRMDV 4.F	88	97	0,91	251

Analyzing the values obtained in accordance with the classification of bread flour, related to W, we can say that:

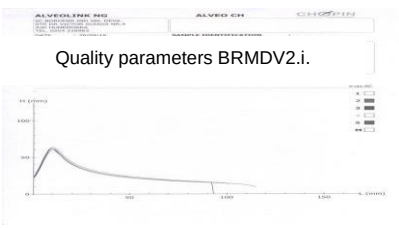
- initial batches (BRMDV 1.i - BRMDV 4.i) with values between 180 and 188 J flours give poor quality, so it is necessary that mandatory blending measure achievement of the batches have superior features to further improving its technological processing ;
- improved batches of which were obtained flours are all index values greater than 251 W J (BRMDV 1.f - BRMDV 4.F), the most valuable batch proving to be BRMDV 2.F with 296 J.





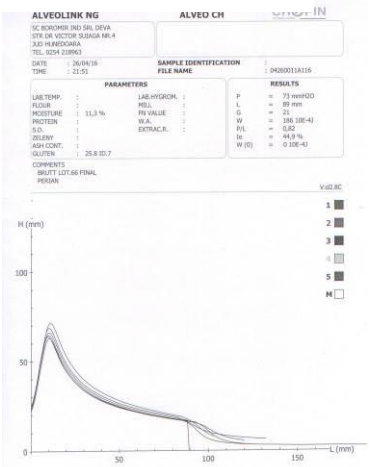


Quality parameters BRMDV1.i.

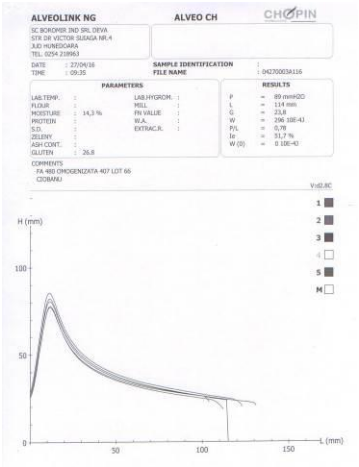


Quality parameters BRMDV2.i.

Quality parameters BRMDV3.i.

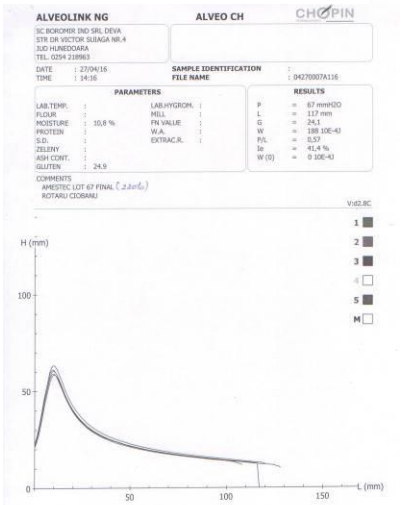


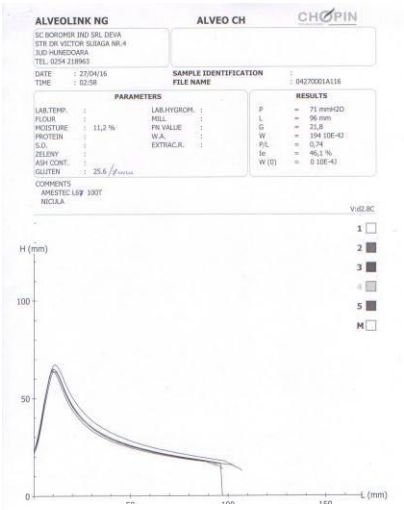
Quality parameters BRMDV4.i.



Quality parameters BRMDV1.I.

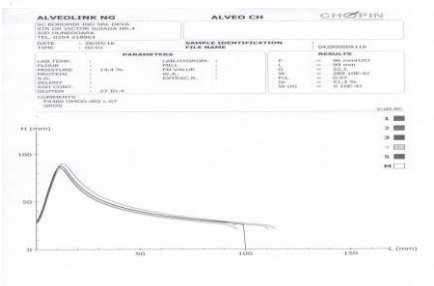
Quality parameters BRMDV2.I.

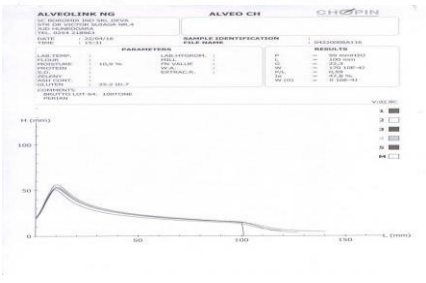




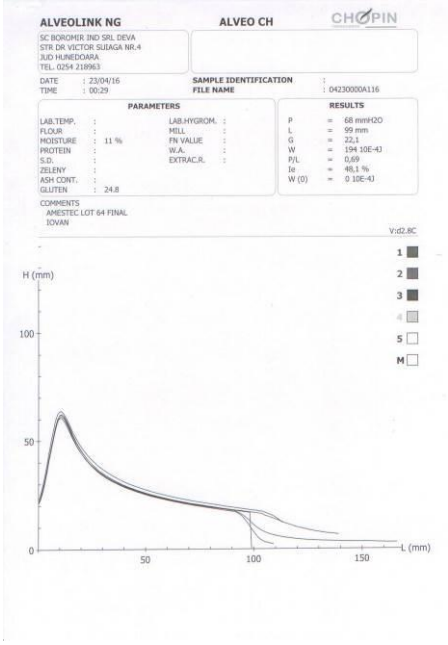
Quality parameters BRMDV3.I.

Quality parameters BRMDV4.I.

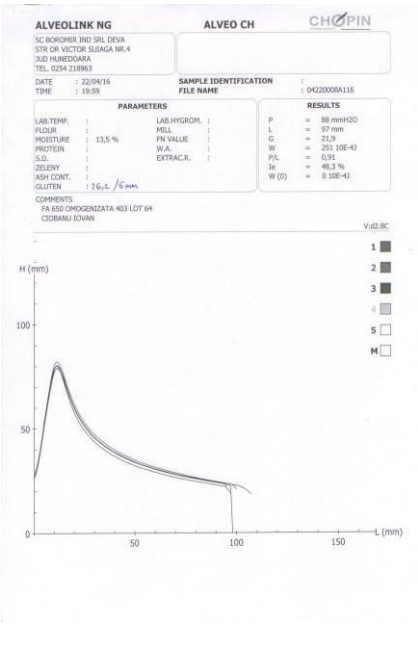




Quality parameters BRMDV1.F.



Quality parameters BRMDV2.F.



Quality parameters BRMDV3.F.

Quality parameters BRMDV4.F.

Figures 8-18 – Quality parameters of monitored batches

CONCLUSIONS

From the presented data, we can say the follow:

- It is known that on wheat embryo and the lining are more plastic than the endosperm and the humidity contained in whole wheat is distributed differentially in these parts, which significantly influences the milling process;
- For each variety of wheat there is an optimum humidity as the milling process to proceed normally, humidity coating must be higher than the endosperm humidity. Ignorance of these factors lead to the application of a technological process inappropriately with repercussions on the quantity and quality of production;
- Impurities affect the quality of wheat flour technology, therefore, it is necessary to remove them from the bulk of the grains. Determination of impurities is performed according to SR ISO 7970: 2001;
- Indices on traits of a bakery flours can be obtained by examining its gluten quality. A good quality gluten should be well crowded, quite durable and elastic;
- Proteolytic activity is uneven in whole wheat; endosperm and shell have a small contributions and aleuronic layer and germ have a very high activity. The gluten deformation index indicates the proteolytic activity of flours,

loads monitored from this point of view achieving higher values as quality classifications;

- In the last years the most used method to appreciate the quality of the flour is to use the ***flour power (W)*** which tends to become one of the most frequently resorted indices used in milling and baking quality. Those flours with high level of W higher than 200 Joule are more appreciated in the technological process;
- Analyzing the quality of the monitored batches thru the quality indicators presented above, it appears that they have complementary qualities for bread use and to obtain high quality products it is recommended (based on the quality analysis) to mixt batches of wheat before grinding.

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