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Role of the farinograph test in the wheat flour quality determination

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Abstract. Most objectively, the dough rheological methods can characterize the quality of winter wheat. The Farinograph test is the traditionally used one in Hungary, but the importance of other methods, such as Alveograph and Extensograph tests, are getting more widely known due to the interest and requirements of the industry and export markets. The Hungarian Standard on wheat quality follows the changes in the global markets; this is why the falling number appeared in the MSZ (Hungarian Standard) 6383 in 1998. As the interest in the results of other rheological test increased from our accession to the European Union, the evaluation of these parameters on different varieties has become an important issue of qualification and in 2012 limit values for Alveograph and Extensograph parameters appear in the Hungarian wheat quality standard. Additionally, while the baking value was the only evaluated parameter of the Farinograph test earlier, the standard was supplemented with limit values for water absorption capacity and stability too.

In this study, we revised different diagrams of Farinograph tests again from the previous years to reveal whether the new limit values for these Farinograph parameters change the valuation of wheat flour samples, therefore whether the quality groups in which the samples were ranked change considering the new requirements.

Keywords and phrases: wheat, farinograph, Hungarian Standard, absorption capacity, stability.

1 Introduction

Maybe the most informative quality parameter of the Hungarian Standard on wheat quality was the baking quality determined by Farinograph or Valorigraph and its classification (A, B and C) was the basis for the determination on use. The standard was changed in 1998, the falling number and sedimentation volume appeared in the Standard, following the international requirements (MSZ 6383:1998). After sixteen years, the Hungarian Standard was changed again: limit values for Alveograph and Extensograph parameters appeared and the valuation of Farinograph or Valorigraph test enlarged two new test analysis parameters. The standard was supplemented with parameters with limit values: water absorption capacity and stability measured by Farinograph test (MSZ 6383:2012).

With the special instruments, such as Farinograph, Extensograph and mixograph, the comparison of different dough rheological parameters can be performed (*Liu et al.*, 2005). The Farinograph test is described by ISO 5530, the method is applied to winter wheat. The resistance of dough is evaluated by the Farinograph test, which means the evaluation of behaviour of dough against mixing at a specified constant speed with specified water addition (ISO 5530-1:2013).

Parameters determined by 5530 are consistency, farinograph unit (FU), water absorption capacity of flour, dough development time, stability, mixing tolerance index and farinograph quality number (FQN) (*D'Appolonia & Kunerth*, 1984). The different baking products require wheat flours with different quality.

In the study, we revaluated different Farinograph diagrams analysed in the previous years. We would like to know whether the introduction of new limit values causes change in the classification of wheat samples.

2 Materials and methods

2.1 Materials

In 2009 and 2010, several wheat samples were evaluated in the University of Debrecen, Faculty of Agricultural and Food Sciences and Environmental Management Institute of Food Science. We revalued the results of 58 Farinograph tests of winter wheat samples.

The baking value was the only evaluated parameter of the Farinograph test earlier; it corresponded to the MSZ 6383:1998 standard for wheat. Nowa-

days, the MSZ 6368:2012 standards consider limit values for water absorption capacity and stability. We revalued these results with the new standard.

2.2 Methods

The Farinograph test characterizes the rheological behaviour of dough, therefore the quality of winter wheat. Brabender units are used in the Farinograph test. Units are arbitrary units that incorporate torque or dough resistance to mixing.

Figure 1 shows part of the diagram of the Farinograph test:

- Arrival time: time to develop to 500 BU consistencies.
- Peak time: when the dough reaches the maximum strength.
- Departure time: when the top of the curve leaves the 500 BU line.
- Stability: the difference of arrival and departure time.
- Water absorption capacity (*Reese et al.*, 2007).

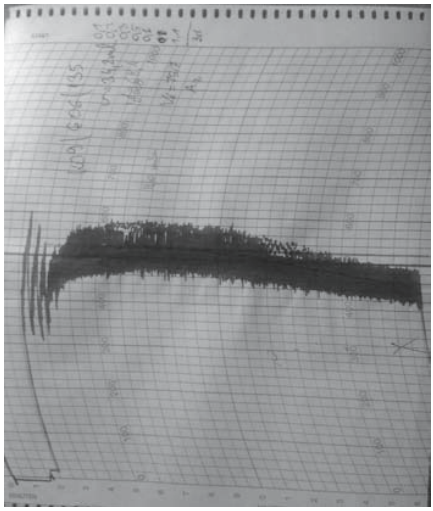

Figure 1: Representative Farinograph diagram

We determined the water absorption capacity and stability (*Table 1*). The "A" quality group shows a minimum of 60.0% water absorption and the "B" quality group has a minimum of 55.0% water absorption (14% moisture content). The other parameter is stability: the limit value of stability is 10 minutes at least

for the "A" quality group, while the limit of the "B1" baking value is minimum 6 minutes and the "B2" quality group has minimum 4 minutes.

Table 1: Quality groups and required water absorption and stability

Quality group	A	B	
		B1	B2
Water absorption % (14% moisture content)	60.0	55.0	55.0
Stability (minimum minutes)	10.0	6.0	4.0

The results were perfomed by boxplots using IBM SPSS Statistics 19 programme. The dark line in the middle of the boxes is the median. The lower and upper parts of the boxes represent the quartiles and the farthest (T-bars) line the 95 per cent interval (*Hruzsvai & Vincze*, 2012).

3 Results

Figure 2 shows the baking value. The selection of samples used in our tests was performed by their baking value.

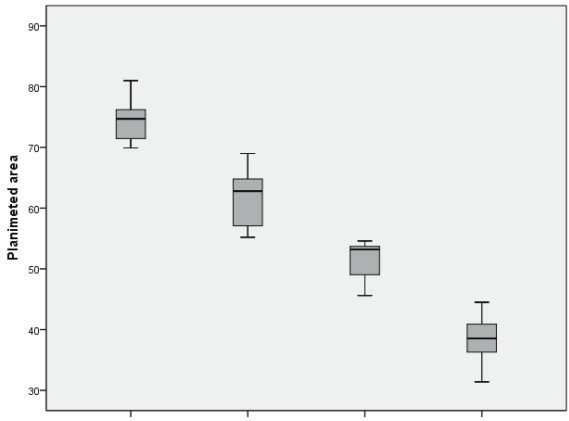

Figure 2: Baking values of evaluated samples by quality groups

We had 58 samples, what is near the limit of each baking value. 12 samples were selected from A2 quality group, 15 samples from B1 quality group, 15

samples from B2 and 16 samples from C1 quality group classified by the MSZ 6383:1998. Those samples were chosen which had their baking value close to the limit value of two quality groups, as the probability of the change in quality groups is higher for these ones. In the revaluation by MSZ 6383:2012, the new classification had the same results.

We revalued 58 samples according to MSZ6383:2012 Hungarian Standard. The results were identical with the previous values of MSZ 6380:1998 Hungarian Standard: A2 12 pieces, B1 15 pieces, B2 15 pieces and C1 16 pieces.

The readings of water absorption capacity of selected samples by quality groups can be seen in *Figure 3*. The inclusion of water absorption capacity values did not result any change between the B1 and B2 quality categories, while the samples of C1 category could have been classified into a higher group. According to their water absorption capacity, the samples in the last category could have been ranked 2 levels higher.

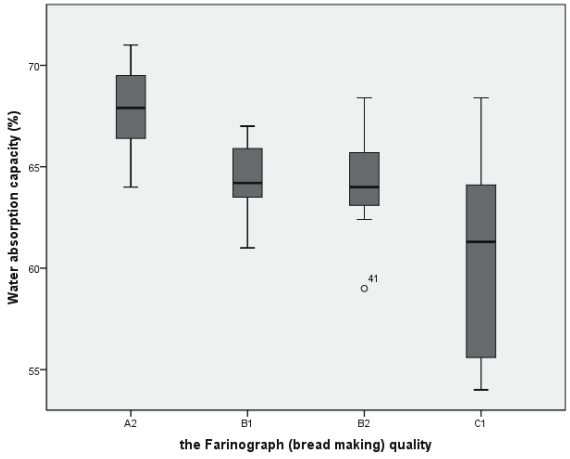

Figure 3: Water absorption capacity values of evaluated samples by quality groups (%)

In *Figure 4*, the readings for stability, the second new parameter of MSZ 6383:2012, can be seen. After the revaluation, we have 11 samples A2, 16 samples B1, 15 samples B2 and 16 samples C1 baking value. Therefore, with the use of the new Hungarian Standard, one sample went from A2 quality group to B1 quality group.

From the A2 quality group, the stability of 1 sample is lower than the limit value for this group; thus, it was classified to the B1 quality group. The

stability time of the sample is 9 minutes; therefore, it does not reach the A1 category's minimum (10 minutes) value. We distinguish 12 samples A1, 16 samples B1, 15 samples B2 and 16 C1 samples according to the requirements of the new standard.

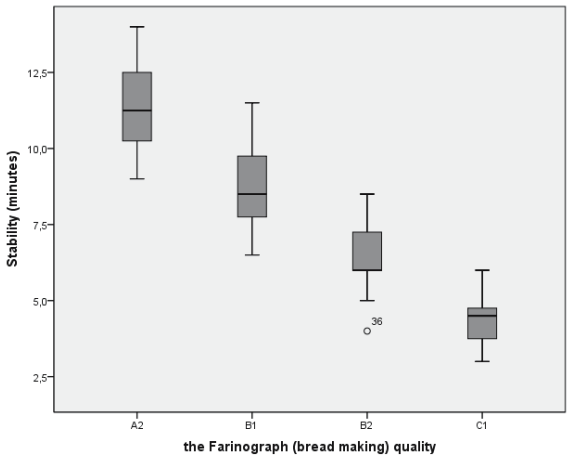

Figure 4: Stability values of evaluated samples by quality groups (minutes)

Based on the evaluations, we concluded that the new Hungarian Standard (MSZ 6383:2012) did not change the baking values significantly. We evaluated 58 winter wheat samples and only one of them stepped back one quality group due to its stability time.

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