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STUDIES REGARDING BAVARIAN PRETZELS QUALITY

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Abstract: *In the last few years, cities have been invaded by bagels, because the vigorous rhythm of people's lives requires fast snacks. Even if we talk about a snack before school, work or an exam, most people choose the cheap and good pretzel that is satiating and is perfect for haste moments. The purpose of experimental research is to determine the physico-chemical quality of the Bavarian pretzels. Pretzels used in experimental research were made using the classical method of making Bavarian pretzels.*

Keywords: *Bavarian pretzel, humidity, ash, protein, compression.*

1. Introduction

Bread making was one of the oldest occupations, constituting one of the major components of food production [2]. The emergence of small bakeries, much more flexible and modernized in all respects, has contributed to the reorganization of production in the sense of diversification, quality improvement and accomplishment of standards and requirements imposed by the European Union [1, 6].

The pretzel is a circular shaped bakery product sprinkled with seeds, generally sesame, poppy, or just salt, widely spread in Turkey, Greece, Serbia, Bulgaria and other parts of the Balkans as well as in the Middle East [6].

Taking into account shape and elasticity, the crispness or the seed that is added, varies according to the geographical area [3]. In Turkish cuisine, pretzel (simit) is traditionally served with tea, fruit jelly, jam or cheese.

Excepting the fact that they represent a piece of tradition, Bavarian Pretzels are defined by a specific flavour and taste [4].

Their manufacturing technology is different from that of plain pretzels, because they are boiled before being baked, in a solution obtained with sodium bicarbonate, diluted with water, and thus not dangerous for consumers [2].

2. Materials and Methods

2.1. Pretzels obtaining

For the experimental research concerning the making process of Bavarian pretzels, was used the following ingredients: 500 g of white wheat flour type 000, 10g of fresh yeast, 10g of sugar, 40 g of butter, 10 g of salt, 275 ml of cold

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water.

Were obtained 9 Bavarian Pretzels weighting 80g each, their weight being determined before the baking process.

Both raw materials and the auxiliary materials, after they have been properly dosed, are introduced into the mixer to be kneaded for 8 minutes, thereby obtaining a homogeneous, soft, elastic but non-stick mass.

The dough obtained is then divided and weighted, so that the final products have the same weight, 80 g for each Bavarian Pretzel created.

The divided dough is formed as wicks, and then they are subjected to the modelling operation. This operation is done manually, so that it runs under the palms in the form of a long rod about 20 cm in such a way that the middle portion of the rod remains thicker than its ends.

Immediately after pretzels modelling, they were boiled in a solution of sodium bicarbonate 100g and 1L of water. Each pretzel was introduced in the boiling solution for about 4 seconds. After boiling, the pretzels were placed in the tray and baked for about 10 – 12 minutes at 150^{o} C.

Before baking, the pretzels were sprinkled with 2 g of salt.

For raw materials, auxiliary materials and dough weighting was used a Radwag precision balance.

Dough mixing was done using the TG Mixer Planet AR FMM mixer.

2.2. Moisture Determination

For moisture determining of flour [5], dough and pretzels is was used the drying stove method was used.

The calculation is done using the formula 1.

$$\%U = \frac{m - m_1}{m} \cdot 100 \quad (1)$$

where:

m is the mass of the analysed product, in g;

m_1 - the mass of the product after drying, in g.

The result is expressed to one decimal place and the difference of two parallel determinations shall not exceed 0,3 g.

2.3. Determination of the Acidity of Flour, Dough and Products using the Method of Water Suspension

The aqueous extract of the test sample is titrated with 0.1 N sodium hydroxide solution using phenolphthalein [5].

The acidity is expressed in degrees for 100 g of product and is calcuated with formula 2.

$$A = \frac{V \cdot 0{,}1}{m} \cdot 100 \text{ [degrees]} \quad (2)$$

where:

V is the volume of the solution of sodium hydroxide 0,1N used for titration, in ml;

m - the mass of the analysed sample, in g;

0,1 - the normality of the sodium hydroxide solution.

2.4. Determination the Hydration Capacity of Flour

Flour hydration capacity is determined using the method of the dough ball.

Principle of the method: Determination of the quantity of flour corresponding to a known quantity of water required to form a dough of normal consistency under

established conditions (technological hydration capability).

Hydration capacity (Ch) expressed in % of water is determined with formula 3.

$$Ch = \frac{m_1}{m - m_1} \cdot 100\ [\%] \quad (3)$$

where:

m_1 is mass of water used for determination, in grams (10g);

m - dough mass resulted after mixing, in grams.

2.5. Determination of the Wet Gluten Content

Principle of the method: gluten separation of protein substances by washing with 2% salt solution of the dough prepared from the flour sample and drying the gluten obtained.

The result is determined by using the formula 4.

$$G = \frac{m_1}{m} \cdot 100[\%] \quad (4)$$

where:

m_1 is mass of gluten remained after drying, in grams;

m - mass of flour sample considered for determination, in grams.

2.6. Ash Content Determination

Principle of method: determination of the resulting residue quantity by calcination at 550-600 °C of the sample to be analyzed [5].

The ash content, expressed as a percentage of dry matter, is calculated using formula 5.

$$C = \frac{m_1}{m} \cdot \frac{100}{100 - u} \cdot 100[\%] \quad (5)$$

where:

m is analysed sample mass, in grams;

m_1 - ash mass, in grams;

u - sample moisture, in %.

2.7. Determination of the Crush Resistance of the Pretzels and Dough

In the experimental research, the Zwick-Roell 5kN Universal Testing Equipment, manufactured in Germany, was used for testing with controlled application of the pretzels considered as samples.

The device has the ability to be connected to a computer, communicating with the "Expert" software, a software that stores the values obtained from experimental testing in its Windows operating system to allow analysis later. All data recorded by the software can be exported to Microsoft Excel.

The crushing rate of the samples was 25 mm/ min.

2.8. Determination of the Protein Content

The method used to determine protein content is the Kjeldahl method, using a Velp Kjeldahl system.

3. Results and Discussion

Physico-chemical analyses were performed on flour, dough and pretzels.

The values resulting from the experimental researches can be found in the following graphs.

As we can observe in Figure 1, moisture content of dough is the highest, with a value of 25.6%. The flour has the lowest moisture content, 12.3%, being optimal

moisture content for a longer storage.

The results of acidity analysis are represented in Figure 2, where it can be observed the fact that dough has a higher acidity than Bavarian Pretzels, dough has 4.3° and pretzels 1.8°.

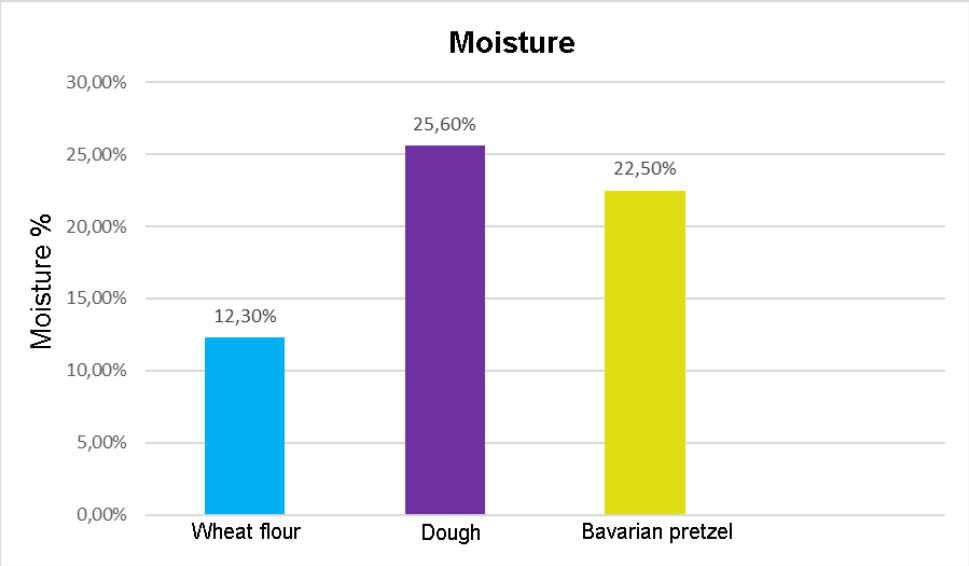

Fig. 1. *Moisture content of wheat flour, dough and Bavarian pretzel*

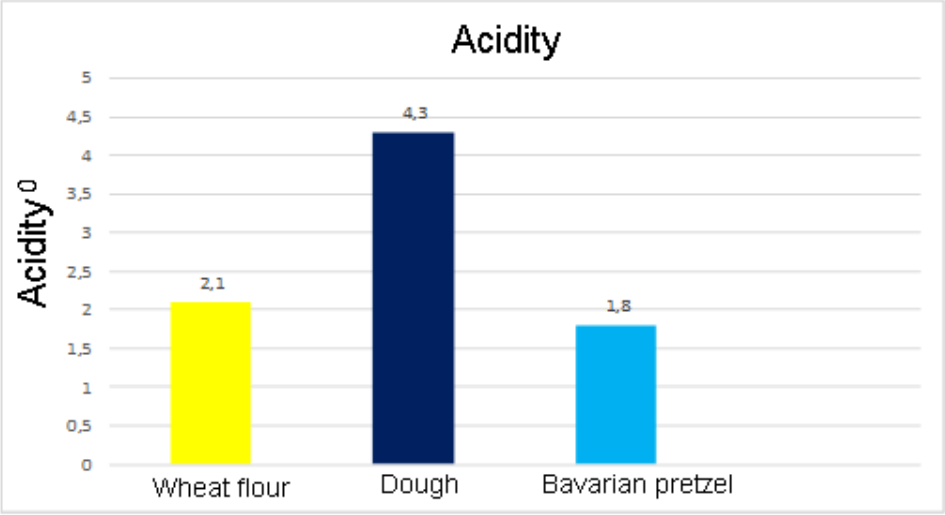

Fig. 2. *Acidity of flour, dough and Bavarian pretzel*

In the graph represented in Figure 3 it can be observed that flour and dough have a similar ash content, 3.52% and 3.56%, comparing to Bavarian Pretzels with 1.02% ash.

Analysing the graph in Figure 4, it can be concluded that the evolution of the crush resistance forces for the two types of samples are similar.

As the moisture content increases, the elasticity properties are diminished, the deformations occurring directly in the area of plastic deformation (flowing). After exceeding the flow path, the characteristic curves again show an upward slope, the slope being approximately identical.

From the perspective of deformation, the lowest value of deformation was 10.78 mm, obtained for dough due to the higher elasticity. It was observed that a low value of moisture content defines a lower elasticity. Protein content, in case of dough and Bavarian Pretzels, it can be observed, according to Figure 5 that is equal, 11.40% in both cases, whereas wheat flour contains 11% proteins.

Wet gluten content in flour had an ideal value, 20.40 %.

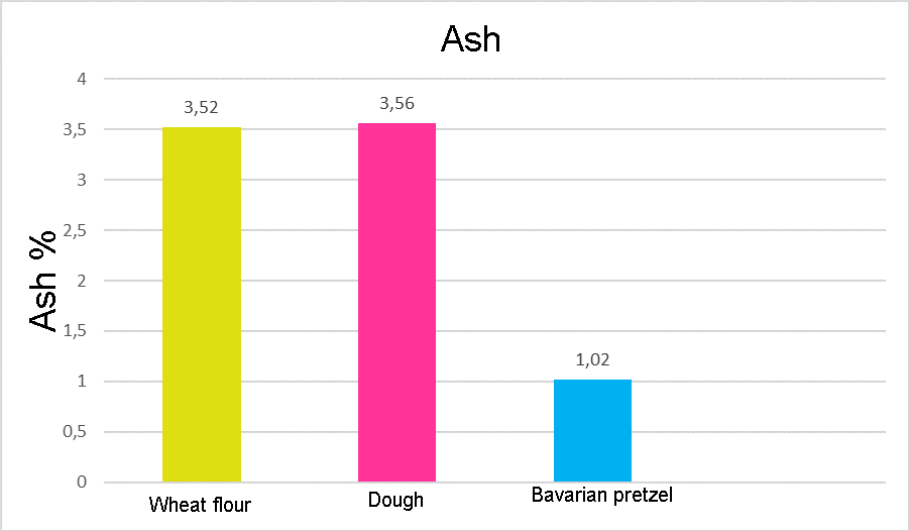

Fig. 3. *Ash content of flour, dough and Bavarian Pretzel*

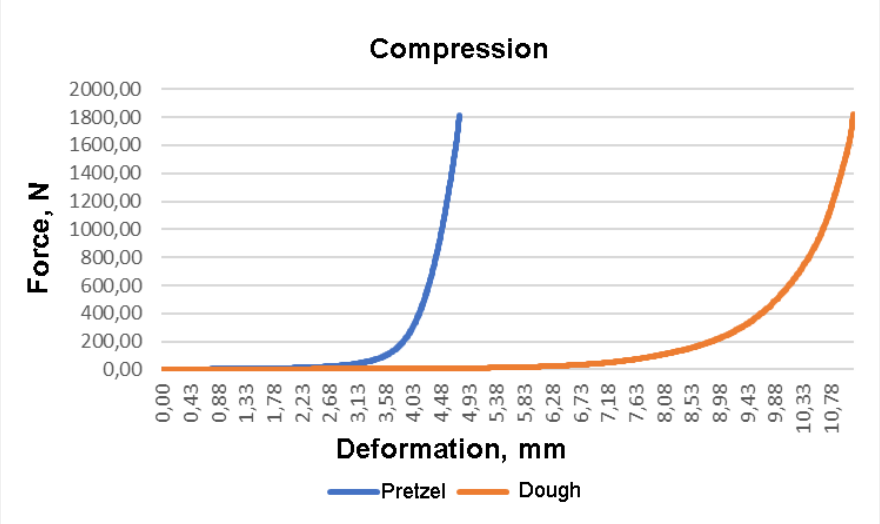

Fig. 4. *Compression test of Bavarian Pretzel and dough*

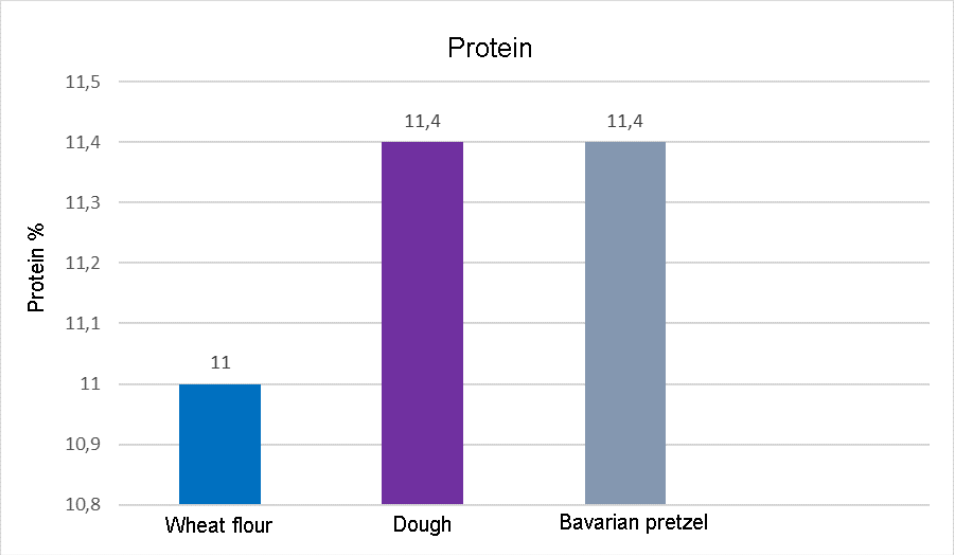

Fig. 5. *Protein content of flour, dough and Bavarian Pretzel*

Moisturizing capacity analysis was performed on wheat flour type 000 and it can be seen that this type of flour possesses a high degree of hydration, about 58%. This percentage indicates that the analyzed flour is of good quality.

4. Conclusions

The pretzels used in this experimental study were realised using the classical method of making Bavarian Pretzels.

Analysing the results obtained through experimental research, it was concluded that from the physico – chemical point of view, the pretzels are according to the quality aspects mentioned in the national product standards.

References

1. Banu, C., 2009. Tratat de industrie alimentară (Treated of food industry). ASAB Publishing House, Bucharest, Romania.
2. Costin, I., 1988. Miller book. Technical Publishing House, Bucharest, Romania.
3. Ghimbășan, R., 2000. Technologies in the food industry. Transilvania University Press, Brasov, Romania.
4. Levitt, S.D., 2016. Bagels and donuts for sale: A case study in profit maximization. In: Research in Economics, vol. 70, pp. 518-535.
5. Stoica, A., Banu, C., 2004. Methods of analysis and control in the bakery industry. Biblioteca Publishing House, Târgoviște, Romania.
6. ***
https://ro.wikipedia.org/wiki/Covrig