Determination of the characteristics of the flour made of soft wheat and its impact on the pasta

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Abstract

Abstract: The wheat type and quality are defining elements to ensure a certain quality of the flour used for the pasta production; and the flour has a determining role on the pasta quality particularly when boiling them. Further on there were developed testwork regarding the characteristics of the flour obtained of soft common poor quality wheat used for the pasta production.

Keywords: pasta, flour, determination, tests, wheat, gluten.

1. Introduction

The main characteristics of the boiling pasta are: duration of boiling, resistance, mastication, glueing, disintegration (Banu, 1999). To obtain the pasta, the flour should have certain characteristics and the most important are the grain size, content and quality of proteins as well as the vitreous appearance of the wheat. Such characteristics influence the structure and rheological features of the paste, its workability and the pasta quality. It is recommended to use smaller grain size flour for producing shorter pasta and larger grain size for the longer pasta. The content and quality of the protein matters are the main characteristics of the flour used for pasta production. They also influence the rheology of the paste, its modeling and pasta quality.

To obtain high quality pasta, the flour should contain at least 10% proteins (28-30% wet gluten), the optimal content being 12-13% (35-40% wet gluten), and the deformation index should reach 5-10 mm. The flour which deformation index is less than 5 mm produce pastes with low compaction, the products surface is rough, their breaking resistance is low while the flour types with deformation index over 10 mm produce products that are little resistant, highly adhering to the processing machine surface and the modeled pasta are deformed and glue together (Burbuc, 2003). The use of flour types with protein content amounting to more than 12% dry gluten produce a type of flexible compact paste which require a long and intensive kneading and modeling. After drying, the product is resistant and it has better nutritive and tasty features (Banu, 1999).

The durum wheat flour is characterized by high hydration capacity because of the high percentage of deteriorated starch, it needs a shorter time for rising than the flour made of common wheat and a larger tolerance at kneading. It generally contains lower quality proteins than the common soft wheat flour which is characterized by a vitreous appearance (Burbuc, 2003).

The flour for the pasta production should develop a normal proteolitical action, should contain little α-amylase (falling number of 280-400 s.), it should develop a lipoxygenesic activity for the yellow pigment oxidation (particularly of the lutein) and low content of peroxidases and polyphenoloxidase which provide dark colour compounds.
To reduce and to hold back the enzyme activity, the air drying method at very high temperatures (>80°C) is used (Leonte, 2003).

Among the flour types from common cereals the best ones are those obtained of the cereals with vitreous appearance over 60% and the optimal ones are those obtained of hard cereals. The flour grain size particularly influence the structure and rheology of the paste (consistency, elastic, glutinous and plastic features).

The mineral content (ash) results in the dark colour of the flour and respectively of the paste products. That is the reason why mineral contents of:
- Max 500 mg % s.u. for smooth 500 type flour;
- Max 550 mg % s.u. for fine semolina are recommended.

The flour humidity determines the flour behaviour while being stored and during the production process. A humidity of 14% is recommended.

2. Results and discussions

A study referring to the use of the flour made of soft low quality wheat (60% vitreous appearance) (550 type), for pasta production attempted to establish the parameters that are characteristics for the said flour type.

The deformation index is around 10 mm.

To determine the humidity the thermal balance drying method was used (the loss of mass as a result of the drying process at 130oC+3oC, based on the thermal gravity principle, was used) and the value obtained was 13%.

The ash was determined by the calcination method at 900-920oC, and was obtained a value of 0,47% s.u. The value obtained at the wet gluten determination amounted to 26%. Using the Hagberg – Perten method, the falling number was calculated (Falling Number): 383 s.

The rheology parameters of the flour were determined by means of the Chopin Alveograph (seed cell graph) and the following results were obtained:
- stretching resistance $P = 47 \text{ mm H}_2\text{O}$
- dilatability $L = 53 \text{ mm}$
- swelling index $G = 16,2$
- resistance $W = 71 \ 10E^{-4} \text{J}$
- P/L ratio $= 0,89$
- elasticity index $I_e = 27,1 \%$
- $W(0) = 0 \ 10E^{-4} \text{J}$

The P/L ratio value provided by the alveograph (seed cell graph) are beneficial for the gluten content and quality of the pasta obtained of this flour.

The results obtained further to these determinations do not indicate characteristics of the flour which could produce high quality pasta. If only mineral free water and flour have been used, there have been obtained pasta which got broken very easily when touching them. When boiled, they glue together and break. The boiling liquid is not at all transparent.

Conclusions

It proceeds with the studies to obtain some high quality pasta made of flour produced of common, soft, low quality wheat with similar characteristics like those mentioned above.

References

Banu C. Manualul inginerului de industrie alimentara-vol. II, Editura Tehnica Bucuresti, 1999