



29th EFFoST
Conference

**Food Science Research and
Innovation: Delivering sustainable
solutions to the global economy and
society**

10-12 November 2015 | Athens, Greece

CONFERENCE PROCEEDINGS-VOLUME II



www.fffostconference.com



Edited by:

Dr. Efimia Dermesonlouoglou, Dr. Virginia Giannou, Dr. Eleni Gogou & Prof. P. Taoukis
National Technical University of Athens, School of Chemical Engineering, Athens, Greece

Copyright © NTUA, School of Chemical Engineering, Athens 2015
ISBN: 978-618-82196-1-8

Physicochemical characterization of a traditional Portuguese bread (*Pão Transmontano*) towards its future certification – preliminary results

Agostinho Magalhães^a, Ermelinda L. Pereira^a, Chalissa Pawlak^{a,b}, Ricardo Malheiro^a, Elisabete Ferreira^c, José Alberto Pereira^a and Elsa Ramalhosa^a

^aMountain Research Centre (CIMO) - School of Agriculture, Polytechnic Institute of Bragança, Campus de St^a Apolónia, Apartado 1172, 5301-855 Bragança, Portugal

^bUniversidade Tecnológica Federal do Paraná, Campus Medianeira, 85884-000 Medianeira - Paraná, Brazil
^cPão de Gimonde, Av. do Sabor, n^o 2, 5300-553 Gimonde - Bragança, Portugal

ABSTRACT

The Trás-os-Montes region, Northeast of Portugal, is a region rich in traditions and typical products with different flavors, being the bread one of the most appreciated products. Its importance derives not only from the direct consumption, but also of its inclusion as an ingredient in different products of which it stand out the sausages so famous in the region. In this regard the preservation of knowledge, genuineness and authenticity associated with the production of bread in Trás-os-Montes region according to traditional processes, is one of the most important and current aspects so as not to miss this accumulated knowledge over generations.

In the present work two breads from Vale de Nogueira and Bragança were physicochemical characterized in order to collect data for *Pão Transmontano* future certification. Results regarding dimensions, colour, water activity, pH, moisture, ash, salt, fat, protein and total dietary fibre contents are presented and discussed, being both breads compared with the "common" wheat bread. The mean composition of this bread is described on the Food Composition Table that is a national reference paper for the composition of food products and is regularly updated by "Instituto Ricardo Jorge", a well-known Portuguese institution.

The breads of Vale de Nogueira and Bragança showed lower fat and protein contents than the "common" wheat bread. In terms of the colour coordinates for the crust and crumbs, both breads presented similar values in relation to L^* , a^* , b^* , chroma or saturation (C^*) and hue angle (h^*), indicating that the major differences are found in their nutritional composition instead format and colour.

Keywords: bread; physicochemical properties; Northeast of Portugal.

INTRODUCTION

Bread is a product of great importance worldwide that is sold with different sizes and shapes, depending on the region where it is produced and on the raw materials used. Currently, bread is considered one of the most consumed foods in the world, since eating bread is an eating habit of the majority of the population. This preliminary study aimed to characterize physicochemically two breads of the Northeastern region of Portugal with the aim to identify the similarities and differentiating elements with the objective of its future certification.

MATERIALS & METHODS

Materials

The samples analyzed in this study were two wheat breads from Vale de Nogueira and Bragança (Northeast of Portugal). The two breads were purchased in bakeries that sell to the public.

Physical analyses

The mass, size and color of the crumb and crust were determined. The masses of the breads were measured on a scale (Acculab VIC 5101), having the dimensions, thickness and diameter, been determined with the aid of a caliper. In this study, the color parameters were evaluated using a colorimeter Minolta CR-400 (Spectra Magic Nx software, model CM-S100W 2.03.0006, Konica Minolta Company, Japan), being the

results expressed in the CIE*Lab* system coordinates. L^* corresponds to brightness and varies between 0 (black) to 100 (white). The a^* coordinate takes positive values for reddish colors and negative values for greenish ones, whereas b^* takes positive values for yellowish colors and negative values for bluish ones. The cylindrical color coordinates were also determined: the hue (h^*) and chroma or saturation (C^*), from L^* , a^* and b^* , according to equations 1 and 2. The device was calibrated before each test, using a standard consisting of a white tile. Each sample measurements on bread crust and crumb were performed at four different points.

$$h^* = \tan^{-1} \left[\frac{b^*}{a^*} \right] \quad (1)$$

$$C^* = \sqrt{a^{*2} + b^{*2}} \quad (2)$$

Chemical analyses

The pH, moisture, ash, fat, protein and dietary fiber contents were determined by official methods of AOAC (1999). Water activity was determined by means of a LabSwift-aw instrument (Novasina AG, Lachen, Switzerland). The instrument was calibrated with three water activity standards, namely 11% ($a_w=0.112$), 58% ($a_w=0.587$) and 84% ($a_w=0.845$). The salt content was measured by the Charpentier–Volhard's Method. All determinations were made in triplicate. The results are presented on dry weight, except the moisture content.

RESULTS & DISCUSSION

Regarding the dimensions of the two breads (Table 1), there were no great differences between them. Concerning the color of the crust, no significant differences in the L^* and a^* parameters were determined, which indicated that the samples had approximately the same luminosity and redness. On contrary, in b^* , C^* and h^* parameters, significant differences were observed between the samples, showing the bread of Bragança the highest values, showing the two breads slight different colours. Regarding the crumb colour, significant differences were again found in the b^* and C^* parameters of both breads, showing the bread of Vale de Nogueira higher values than the bread of Bragança.

Table 2 presents the chemical results of the two breads. All results are expressed on dry weight, excluding the moisture content. After analyzing the results obtained, for all parameters analyzed no significant differences were found between both breads. The water activity was less than 0.98, varying the moisture content between 31 and 35%. The determination of moisture content is of great analytical interest, not only for its intrinsic value but also because it affects the bread conservation capacity (Bradley, 2003). In terms of ash content, the values varied between 1 and 2%. The ash content is of utmost importance because it reflects the composition of inorganic minerals that have importance at the nutritional level (Harbers & Nielsen, 2003). Regarding pH, fat, fibre, protein and salt contents, no significant differences were found between samples.

After comparison of the two breads with the "common" wheat bread, described on the Food Composition Table, which is a national reference document for the composition of food products that is regularly updated by the "Instituto Ricardo Jorge", it was observed that the fat and protein contents were lower than that of "common" wheat bread. So, these results indicated that these breads may be more suitable for low-calorie diets than the common bread.

Table 1. Dimensions and colour of the breads from Vale de Nogueira and Bragança (NE of Portugal) analysed in the present work.

Parameters	Samples		
	Vale de Nogueira	Bragança	
Dimensions	Weight (g)	987.6	1123.8
	Height (cm)	8.5	10.0
	Diameter (cm)	23.0	24.0
Crust colour	L*	56.51±6.79 ^a	57.69±2.39 ^a
	a*	8.89±2.06 ^a	10.69±0.54 ^a
	b*	21.37±5.15 ^a	28.47±2.03 ^b
	C*	23.14±5.55 ^a	30.42±1.91 ^b
	h*	67.34±0.79 ^a	69.36±1.63 ^b
Crumb colour	L*	68.17±3.18 ^a	71.85±2.33 ^a
	a*	-1.42±0.25 ^a	-1.62±0.12 ^a
	b*	17.74±0.38 ^a	16.34±1.00 ^b
	C*	17.80±0.37 ^a	16.42±0.98 ^b
	h*	94.58±0.88 ^a	95.69±0.77 ^a

Results are given as mean ± standard deviation

Samples in the same line with the same letter are not statistically different ($p>0.05$).

Table 2. Chemical composition of the Northeast *Transmontano* bread samples analysed.

Parameters	Samples	
	Vale de Nogueira	Bragança
Water activity	0.975±0.012 ^a	0.965±0.005 ^a
Moisture	31.18±4.15 ^a	35.09±1.12 ^a
Ash	1.19±0.32 ^a	1.73±0.01 ^a
Fat	0.95±0.22 ^a	1.50±0.26 ^a
Fibre	4.11±0.50 ^a	6.03±0.51 ^a
Protein	7.18±0.08 ^a	7.98±0.16 ^a
pH	6.36±0.02 ^a	6.28±0.02 ^a
Salt	0.32±0.04 ^a	0.79±0.04 ^a

Results are given as mean ± standard deviation

Samples in the same line with the same letter are not statistically different ($p>0.05$).

CONCLUSION

The two breads analysed in the present work differed slightly in the colour of the crust and crumb. On the other hand, in terms of chemical composition no significant differences were found. Furthermore, these breads presented lower fat and protein contents than the "common" wheat bread, being more suitable for low-calorie diets. Additionally, for the future certification of *Pão Transmontano*, it will be necessary to perform more determinations on a higher number of samples from all localities belonging to Trás-os-Montes region, as well as to do a survey in order to evaluate the manufacturing process, so that to establish similarities and to identify specific characteristics of this kind of bread.

ACKNOWLEDGEMENTS

This work was performed in collaboration with the TRADEIT project which has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 613776.

REFERENCES

- AOAC. 1999. Official methods of analysis. 16ed. Washington: Association of Official Analytical Chemists.
- Bradley, R. 2003. El análisis de las humidades y el contenido total de sólidos. In: Nielsen S.S. (Ed.), Análisis de los alimentos. Editorial ACRIBIA, S.A., Zaragoza, Spain (pp. 97-120).
- Harbers, L. & Nielsen, S. 2003. El análisis de cenizas. In: Nielsen S.S. (Ed.), Análisis de los alimentos. Editorial ACRIBIA, S.A., Zaragoza, Spain (pp. 121-132).