JAP&T
TPA-Timişoara

Available online at http://journal-of-agroalimentary.ro

Journal of Agroalimentary Processes and Technologies 2022, *28*(2), 149-152

Journal of Agroalimentary Processes and Technologies

Sensory and physical-chemical characterization of different types of pasta

Corina I. Megyesi, Laura Rădulescu, Cristina Mitroi, Nicoleta G. Hădărugă*

[1] *Faculty of Food Engineering, University of Life Sciences"King Mihai I" from Timişoara*

Abstract

Pasta is a basic food that is traditionally eaten all over in Romania, in soups or broths, in the form of pasta with cheese, sauces or sweet desserts. With the rapprochement of Romanian civilization with that of Western European countries, the consumption of pasta in Romania is constantly increasing.

Pasta is included in the category of food products with a relatively long shelf life, obtained from different types of flour (most often wheat flour, recently durum wheat flour) and water. To these two basic components it can be added different additives, such as: eggs, tomato paste, carrot juice, spinach and so on.

The high nutritional value of flour products is based not only on their energy intake, conferred by the high content of carbohydrates and fats, but also on the value of all components that represent forms that can be easily assimilated by the human body.

In this study, the commercial samples of wheat flour pasta were characterized from sensory and physical-chemical point of view. Thus, it was determined the appearance, color, smell and taste of the samples, but also the water content, the acidity, the breaking load when bending, the increase in volume and the boiling behavior, and also, the egg content.

The obtained results show that all analyzed pasta samples situated within standard values.

Keywords: types of pasta, physical-chemical evaluation of pasta.

1.Introduction

When we talk about pasta, we must first define the term. The word "pasta" is generally used to describe traditional Italian noodles, which sets it apart from other types of noodles around the world. Pasta is a product made from a raw, uncooked, unfermented dough consisting of ground common wheat or durum wheat flour and water or eggs. The dough is then cut into a variety of shapes and cooked immediately for serving or dried to a moisture content of 12-13%. The use of durum wheat differentiates pasta from other forms of noodles. The high gluten content of durum wheat and the low humidity make it perfectly suitable for pasta production [5,7,11,12,13].

The use of pasta in the diet is based on the following attributes that characterize them:

- high nutritional value, due to the low humidity they have, the high content of carbohydrates and proteins, as well as the advanced degree of assimilation of these components;
- durability for preservation, being able to be kept for a long time in normal conditions, at room temperature, without diminishing its taste and nutritional qualities;
- speed and simplicity in preparation for consumption, as well as the diversity of ways in which they can be cooked [1,3,6,12,14,16].

There are many theories about the origin of pasta. Some researchers place the origin of pasta in the 13th century, when Marco Polo introduced it to Italy on his return from a trip to China in 1271. However, according to other researchers, the origin of pasta dates back to the ancient Etruscan civilizations, who made pasta by grinding several grains and seeds and

Corresponding authors: E-mail: nicoletahadaruga@usab-tm.ro

then mixed them with water, a mixture that was later cooked, thus becoming a tasty and nutritious food [9,10,12,13].

Today, pasta is found everywhere, often dry but also fresh. Regarding food, the man of civilized society is in an "ocean" of food from which he can choose, taking into account a number of factors, the products that will satisfy his preferences.

The calorific value of pasta can reach 4000 kcal/kg. With regard to pasta, it has been established that, in addition to some special properties they have, such as the high content of vegetable proteins and integral nutrients of flour, the nutritional unit of pasta is 17 times cheaper than that obtained from meat [2,4,8,15,17].

Table 1. Sensory properties of pasta

Attribute	**Definition**
Appearance	Smooth surface, no traces of unkneaded flour; in section glassy appearance, with different shapes; uniform dimensions
Color	Uniform, specific to the addition
Smell and taste	Characteristic, no foreign smell or taste
Infestation	The presence of arachnids and insects in different stages of development is not allowed
Boiling behavior	After boiling, the pasta must be elastic, not sticking together, not forming conglomerates, keeping its shape, not falling apart. The boiling water must be slightly opalescent, without sediment (maximum 50 cm^3)

2.Materials and method

Pasta is a food that is prepared from common wheat flour or durum wheat flour and water, with or without the addition of other ingredients, which have the role of correcting the nutritional value, improving the quality, but also the role of diversifying the assortment. Such auxiliary materials are - meat extracts, milk casein, cheeses, skimmed soybean meal, vegetable albumin, oils, hydrogenated fats, vegetable flour, fruit flour, tomatoes, root vegetables, spinach, gluten, dehydrated egg mixture (frozen or fresh). The kneaded, compacted, unfermented dough is molded or stamped into various shapes and then dried and packaged.

In order to identify the sensory characteristics and the main physical-chemical indicators of different types of pasta, 3 assortments of pasta were tested, produced by different companies. From each assortment, 2 samples were taken from different manufacturing batches, which were subsequently examined.

Sensory analysis was performed based on the senses (sight, taste and smell, touch), with the aim of evaluating products. Thus, the samples were analyzed in terms of appearance, consistency, taste and smell, but also in terms of keeping shape.

From the physical-chemical point of view, the aim was to determine the water content, the acidity, the breaking load when bending, to determine the increase in volume and the boiling behavior and also to determine the egg content of the pasta samples. The water content of pasta can be expressed by determining the loss of mass by heating them in an oven at 130°C for 60 minutes, according to STAS 756/3-1985. The titration method (with 0,1N sodium hydroxide solution in the presence of phenolphthalein) was used to determine the acidity, according to STAS 756/3-1985. The determination of the breaking load when bending was performed by subjecting a macaroni or a spaghetti to bending under the action of an increasing weight, until breaking, according to STAS 756/3-1985. By measuring the volume of the pasta with the graduated cylinder, before and after boiling in water and by examining the boiling water, it was possible to determine the increase in volume and the boiling behavior of the analyzed pasta, according to STAS 756/3-1985. Determination of egg content in pasta samples was performed using the sulfosalicylic acid method (STAS 1184-3/1983). The method consists in precipitating albumin with sulfosalicylic acid and titrating the excess of sulfosalicylic acid with 0.1 N sodium hydroxide. Depending on the amount of sulfosalicylic acid consumed, the egg content is calculated.

3.Results and discussion

The sensory analysis of the pasta samples was aimed at evaluating the appearance, color, smell and taste, the presence of foreign bodies, as well as the boiling behavior. Following these analyzes, it was found that all the analyzed samples corresponded to the legally accepted norms:

- appearance: smooth surface, no trace of unpasteurized flour; in section: glassy appearance, with different shapes, with uniform dimensions;
- color: uniform, specific to the compound in addition;
- smell and taste: characteristic, no foreign smell and taste;
- foreign bodies: missing;
- boiling behavior: elastic after boiling, without sticking to each other, retaining its original shape.

The results of the physical-chemical examination of the samples are presented in the following figures.

The data obtained from the determinations of the amount of water in the pasta samples are presented in figure 1. Thus, the water content of the analyzed pasta samples was below the maximum allowed limits for this parameter of 13%, the highest value being recorded at sample 2_1 (11.56%), and the lowest value at sample 3_2 (8.88%).

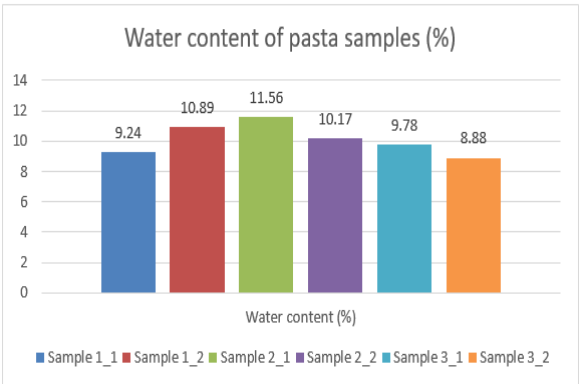

Figure 1. Water content of the analyzed pasta samples

The acidity of the analyzed pasta samples was below the maximum allowed limits for this parameter of 4.0 degrees, registering values between 2.17% and 3.90%. The graphical representation suggests the results of the experimental research (figure 2).

The values of the breaking load when bending of the examined pasta samples were between 4.8 N/m^2 and 7.5 N/m^2.

For this parameter the minimum allowed value is 4 N/m^2, all values determined in the laboratory being above the admissibility threshold.

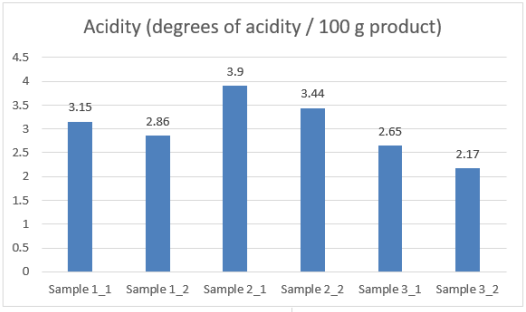

Figure 2. Acidity of the analyzed pasta samples

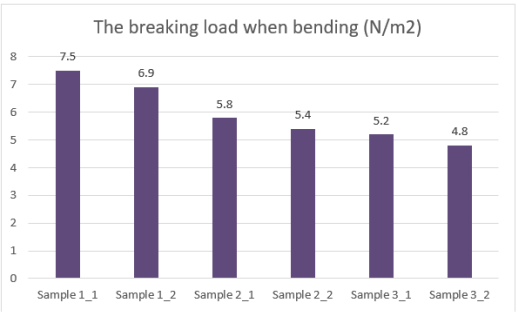

Figure 3. Breaking load when bending of the analyzed pasta samples

Regarding the increase in volume of the analyzed pasta samples, all samples exceeded the minimum admissibility limit (250%), the maximum value being determined in sample 3_1 (347.23%).

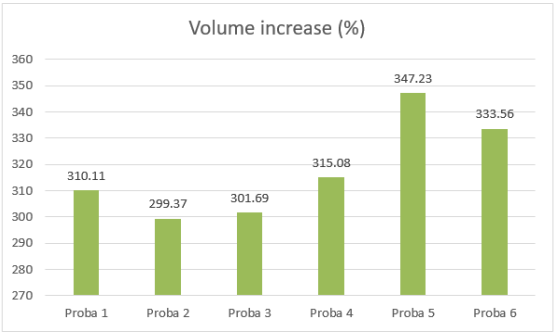

Figure 4. Volume increase of the analyzed pasta samples

The egg content of the analyzed pasta samples recorded values between the admissibility limits - minimum 80 g/kg and maximum 400 g/kg - in all cases.

The highest value of this parameter was determined in sample 3_2 (233.75%) and the lowest value in sample 1_1 (178.34%).

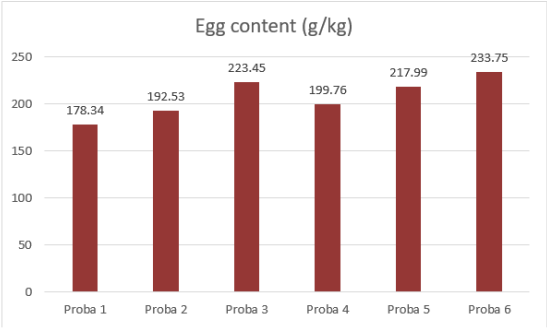

Figure 5. Egg content of the analyzed pasta samples

Conclusion

Organoleptic and physical-chemical analysis of the examined pasta samples did not find any deviations from the legally required regulations for this product.

The results of the physical-chemical analysis of the pasta samples led to the following main conclusions:

- humidity values ranged from 8.88% to 11.56%, below the maximum allowed limits for this parameter of 13%;
- regarding the acidity value of the analyzed pasta samples, the highest value was recorded for sample 2_1 (3.90%), and the lowest value for sample 3_2 (2.17%);
- the highest value of the breaking load when bending was recorded for sample 1_1 (7.5 N/m^2), and the lowest value for sample 3_2 (4.8 N/m^2);
- all the pasta samples examined showed an increase in volume of over 250% (the minimum value allowed for this parameter) the highest value being recorded for sample 3_1 (347.23%);
- the egg content of the analyzed pasta samples recorded values between the admissibility limits - minimum 80 g/kg and maximum 400 g/kg, with an average value of 207.636 g/kg.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human or animal subjects (if exist) respect the specific regulation and standards.

References

1. Bhatt D.K., Jatav A.K., Kiledar S., Srivastava A.K., Development and evaluation of physicochemical and nutritional properties of protein enriched fortified pulses pasta, *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*, **2015**, 9(2), Ver. III, 62-67;
2. Bouasla A., Wójtowicz A., Zidoune M.N., Gluten-free precooked rice pasta enriched with legumes flours: physical properties, texture, sensory attributes and microstructure, *LWT*, **2017**, 75, 569-577;
3. Boudalia S., Gueroui Y., Boualem B., Bousbia A., et all, Evaluation of physicochemical properties and sensory qualities of pasta enriched with freeze-dried sweet whey, *Scientia Agriculturae Bohemica*, **2020**, 51(3), 75-85; DOI:10.2478/sab-2020-0010
4. Çalışkan Koç G., Tekgül Y., Çoban S., Physicochemical properties, fatty acid composition, cooking quality, and sensory evaluation of pasta enriched with different oleiferous powders, *Journal of Food Measurement and Characterization*, **2020**, 14, 3048-3057;
5. Carini E., Vittadini E., Curti E., Antoniazzi F., Viazzani P., Effect of different mixers on physicochemical properties and water status of extruded and laminated fresh pasta, *Food Chemistry*, **2010**, 122(2), 462-469;
6. Chauhan A., Saxena D.C., Singh S., Effect of hydrocolloids on microstructure, texture and quality characteristics of gluten-free pasta, *Journal of Food Measurement and Characterization*, **2017**, 11, 1188-1195;
7. Cole M.E., Prediction and measurement of pasta quality, *International Journal of Food Science + Technology*, **1991**, 133-151
8. El-Sohaimy S.A., Brennan M., Darwish A.M.G., Brennan C., Physicochemical, texture and sensorial evaluation of pasta enriched with chickpea flour and protein isolate, *Annals of Agricultural Sciences*, **2020**, 65, 28-34;
9. Foschia M., Beraldo P., Peressini D., Evaluation of the physicochemical properties of gluten-free pasta enriched with resistant starch, *Journal of the Science of Food and Agriculture*, **2017**, 97(2), 572-577;
10. Foschia M., Peressini D., Sensidoni A., Brennan M.A., Brennan C.S., How combinations of dietary fibres can affect physicochemical characteristics of pasta, *LWT – Food Science and Technology*, **2015**, 61(1), 41-46;
11. Martinez C.S., Ribotta P.D., León A.E., Añón M.C., Physical, sensory and chemical evaluation of cooked spaghetti, *Journal of Texture Studies*, **2007**, 38(6), 666-683;
12. Serventi S., Sabban F., Pasta: The history of a universal food, *Columbia University Press*, **2002**, New York;
13. Shelke K., Pasta and Noodles: a global history, *Reaktion Books Ltd*, **2016**, London;
14. Teterycz D., Sobota A., Przygodzka D., Łysakowska P., Hemp seed (*Cannabis sativa* L.) enriched pasta: Physicochemical properties and quality evaluation, *PLoS ONE*, **2021**, 16(3): e0248790. https://doi.org/10.1371/journal.pone.0248790;
15. Tudorică C.M., Kuri V., Brennan C.S., Nutritional and physicochemical characteristics of dietary fiber enriched pasta, *Journal of Agricultura land Food Chemistry*, **2002**, 50(2), 347-356;
16. Vimercati W.C., Macedo L.L., Araujo C.S., Filho A.M.M., Saraiva S.H., Teixeira L.J.Q., Effect of storage time and packaging on cooking quality and physicochemical properties of pasta with added nontraditional ingredients, *Journal of Food Processing and Preservation*, **2020**, 44(9), https://doi.org/10.1111/jfpp.14637;
17. Wójtowicz A., Mościcki L., Influence of legume type and addition level on quality characteristics, texture and microstructure of enriched precooked pasta, *LWT - Food Science and Technology*, **2014**, 59(2), part 1, 1175-1185.