JAP&T
TPA-Timişoara

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

Journal of Agroalimentary Processes and Technologies 2022, *28*(2), 145-148

Journal of Agroalimentary Processes and Technologies

Study regarding the nutritional value of different types of pasta

Liana Maria Alda[1], Despina Maria Bordean[1], Claudia Sirbulescu[2], Delia Ivanis[1], Daniela Scedei[3], Diana Moigradean[1], Teodor Cristea[3], Marcel Danci[3], Simion Alda[3*]

[1]Faculty of Food Engineering, University of Life Sciences "King Michael I of Romania", Calea Aradului no. 119, 300645 Timisoara, Romania
[2]Faculty of Management and Rural Tourism, University of Life Sciences "King Michael I of Romania", Calea Aradului no. 119, 300645 Timisoara, Romania
[3]Faculty of Engineering and Applied Technologies, University of Life Sciences "King Michael I of Romania", Calea Aradului no. 119, 300645 Timisoara, Romania

Abstract

In this study we evaluated ten assortments of dry pasta. The comparative analysis of the nutritional parameters was carried out using X-ray fluorescence (XRF) analyzer device and the informations from the product labels. Our results show that the red lentil pasta assortment had the highest content of protein, K, Zn, Cu and Fe. This assortment has also the lowest energy value and the lowest carbohydrate content among the pasta assortments studied. So, the red lentil pasta can be recommended as part of a balanced diet.

Keywords: FRX method, minerals, pasta assortments

1. Introduction

According to many authors, a good way to increase the nutritional value of wheat pasta is to add vegetables [1,2]. Legume seeds are an excellent source of protein (16-55%) and are rich in essential amino acids, including lysine. The amino acid composition of vegetable protein is similar to that of meat protein. In addition, legumes are rich in starch and fiber. These raw materials contain minerals, especially iron, zinc and calcium, as well as polyphenols and folic acid [1].

The vegetables can be used not only to enhance the nutritional value of pasta, but also as natural coloring components that determine their attractive color [1].

Although traditionally made from durum wheat semolina pasta, which gives the product texture and quality, fortifying pasta with various sources of protein, such as vegetables, cheese, soy protein, mustard protein isolate has been tried, in order to increase the nutritional value of these [3].

The addition of dietary fiber can reduce the glycemic index of pasta and can bring additional health benefits [4].

The banana flour was used in the production of good quality spaghetti characterized by a low digestibility of carbohydrates and an increased content of resistant starches and phenolic antioxidants [5].

For people who are sensitive to gluten or for people who want to exclude gluten from their diet for various reasons, it has generated a growing interest in food development for gluten free products. Currently available gluten free products are often based on starch, mainly rice and corn, which results in low nutritional value (there are deficiencies in the intake of protein, fiber, minerals and vitamins). Quinoa pasta would be a good alternative due to its high nutritional value and bioactive compounds [6].

The unconventional raw materials with a high nutritional value used for replacing wheat flour includes also almond flour [7, 8, 9,10].

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

Lentil is a good source of carbohydrates, vitamins, proteins, and minerals [11,12,13,14]. Lentil flour is frequently used in combination with wheat flour to obtain products with a high nutritional value [11,12].

2.Materials and Methods

In this study we evaluated 10 assortments of pasta available on the Romanian market:

- Whole durum wheat spaghetti (type 1),
- Pasta from corn and rice (type 2),
- Pasta with eggs and meat (type 3),
- Red lentil pasta (type 4),
- Pasta with egg (type 5),
- BIO spaghetti made from durum wheat (type 6),
- Pasta with tomatoes and spinach (type 7),
- Cornmeal pasta (type 8),
- Pasta - Penne (type 9),
- Durum wheat pasta (type 10).

The comparative analysis of the nutritional parameters was carried out using the information from the product labels.

Prior to analysis of the mineral content by the FRX method, the pasta samples were dried to constant weight.
Experimental analysis of the mineral content of dry pasta assortments were performed using X-MET8000 X-ray fluorescence (XRF) analyzer device (figure 1).

Figure 1. The pasta samples and the XRF analyzer device

Table 1. The nutritional parameters of pasta assortments

Pasta assortments	Energy value (kcal/100g)	Fats (g/100g)	Glucides (g/100g)	Fibers (g/100g)	Proteins (g/100g)
Type 1	347	2.5	64.0	8.0	13.0
Type 2	358	1.3	79.0	1.7	6.6
Type 3	388	6.5	68.1	3.3	12.8
Type 4	335	1.7	52.0	6.0	25.0
Type 5	362	1.4	75.1	3.5	10.6
Type 6	350	1.2	71.0	3.5	12.0
Type 7	355	1.5	71.0	2.5	13.0
Type 8	345	0.8	79.0	1.5	5.5
Type 9	351	1.2	72.9	2.3	11.0
Type 10	359	2.0	71.2	3.0	12.5

Each result is the average of two determinations. The results regarding the mineral content are expressed in ppm (mg/kg dry weight).

3. Results and Discussions

In table 1 are the values of the pasta types nutritional parameters: energy value, glucides, fats, fibers and proteins.

Analysing the table above, we observe that:

- The maximal energy value corresponds to type 3 (Pasta with eggs and meat) and the lowest value to assortment 4 (Red lentil pasta).
- The highest value of the fat content corresponds to assortment 3 (Pasta with eggs and meat) and the lowest to assortment 8 (Cornmeal pasta).
- The most elevated glucides content correspond to assortments 2 (Pasta from corn and rice) and 8 (Cornmeal pasta) and the smallest to assortments 4 (Red lentil pasta) and 1 (Whole durum wheat spaghetti).
- The maximal value of fiber content corresponds to assortment 1 (Whole durum wheat spaghetti) and the smallest to assortment 8 (Cornmeal pasta).
- Regarding the protein content of the pasta assortments (figure 7), the highest value corresponds to assortment 4 (Red lentil pasta) and the lowest to assortment 8 (Cornmeal pasta).

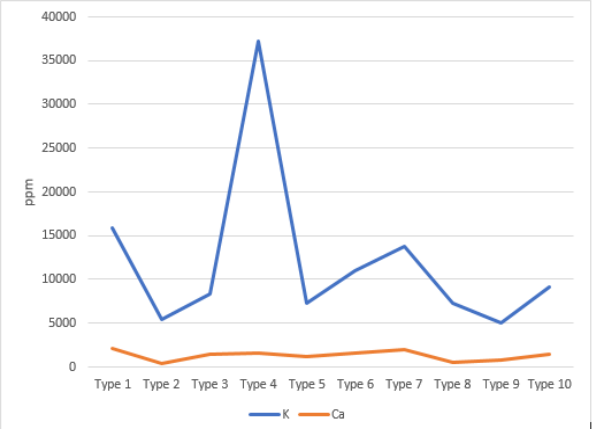

Figure 1. The content of K and Ca of pasta types

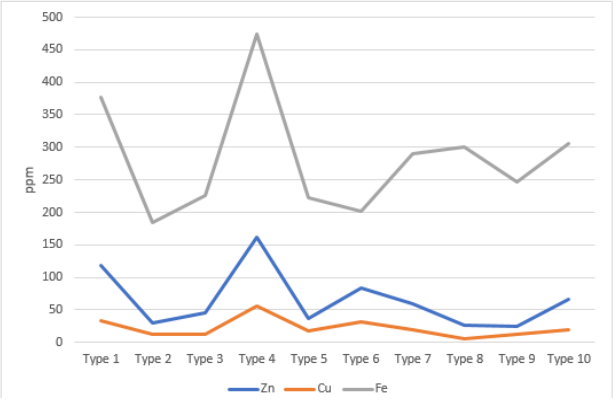

Figure 2. The content of Zn, Cu and Fe of pasta types

The experimental results regarding the content of K, Ca, Zn and Cu of pasta assortments are presented in figures 1 and 2. Each value is the average of two determinations.

We observe that the assortment of 4 (Red lentil pasta) registers the highest values of K, Zn, Cu and Fe contents.

The most elevated content of Ca is recorded by assortment 1(Whole durum wheat spaghetti). The Pasta from corn and rice (type 2) recorded the lowest values of K, Ca and Fe content.

Our results are according with the literature, which highlights the high mineral content of lentils [11,12,13,14].

4.Conclusions

The results of the nutritional analysis of the pasta assortments show that Red lentil pasta has the highest content of protein, K, Zn, Cu and Fe.

Also, this assortment has the lowest energy value and the lowest carbohydrate content among the pasta assortments studied.

In conclusion, red lentil pasta can be recommended as part of a balanced diet.

Acknowledgements: This work was supported by proving the equipment's of the Faculty of Food Engineering Timișoara – "Food Science"- Research Center.Scientific material support for the didactic activity within the Faculty of Food Engineering, University of Life Sciences "King Michael I of Romania"– Timișoara

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. Teterycz, D., Sobota, A., Zarzycki, P. *et al.*, Legume flour as a natural colouring component in pasta production, *J Food Sci Technol*, **2020**, 57, 301–309.
2. Stoin, D., Jianu, C., Poiana, M. A., Alexa, E. C., Velciov, A. B., Current trends in the use of unconventional raw materials for the development of gluten-free bakery and pastry products with high nutritional value: A review., *Journal of Agroalimentary Processes and Technologies*, **2021**, 27(4), 378-391.
3. Gopalakrishnan, J., Menon, R., Padmaja, G., Sajeev, M. S., Moorthy, S. N., Nutritional and functional characteristics of protein-fortified pasta from sweet potato. *Food and Nutrition Sciences*, **2011**, *2*(09), 944-955. doi:10.4236/fns.2011.29129 Published Online November 2011 (http://www.SciRP.org/journal/fns).
4. Gull, A., Prasad, K., & Kumar, P., Nutritional, antioxidant, microstructural and pasting properties of functional pasta, *Journal of the Saudi Society of Agricultural Sciences*, **2018**, Volume 17, Issue 2, 147-153, ISSN 1658-077X
5. http://www.rompan.ro/uploaded_files/file/2009_3_revista.pdf
6. Linares-García, L., Repo-Carrasco-Valencia, R., Glorio Paulet, P. *et al.* Development of gluten-free and egg-free pasta based on quinoa (*Chenopdium quinoa* Willd) with addition of lupine flour, vegetable proteins and the oxidizing enzyme POx. *Eur Food Res Technol*, **2019**, 245**,** 2147–2156. https://doi.org/10.1007/s00217-019-03320-1
7. Gillespie, R.; Ahlborn, G.J.; Mechanical, sensory, and consumer evaluation of ketogenic, gluten-free breads, Food Sci Nutr., **2021**, 1–9.
8. Stoin, D, Jianu, C., Misca, C., Bujanca, G., Radulescu, L., Effect of almond flour on nutritional, sensory and bakery characteristics of gluten-free muffins, 18 International Scientific Conferences on Earth and Geo Sciences - SGEM VIENNA GREEN HOFBURG SGEM 2018, ISSN 1314-2704, ISBN: 978-619-7408-71-3, **2018**, 18(64), 127-134.
9. Oluwafemi, G.I.; Ikuomola, D.S.; Production and quality evaluation of vegetable cookies from defatted almond seed-wheat flour blends, 5th International Biannual Conference of School of Science and Computer Studies on Science and Technology as a Panacea for reshaping the Nigeria Economy to meet global challenges, **2016**, 1-20.
10. Martinescu, C.M., Sârbu, N.R., Velciov, A.B., Stoin, D., Nutritional and sensory evaluation of gluten-free cake obtained from mixtures of rice flour, almond flour and arrowroot flour, *Journal of Agroalimentary Processes and Technologies*, **2020**, 26(4), 368-374
11. Thavarajah D, Thavarajah P, Wejesuriya A, Rutzke M, Glahn RP, Combs GF et al The potential of lentil (*Lens culinaris* L.) as a whole food for increased selenium, iron, and zinc intake: preliminary results from a 3 year study. *Euphytica*, **2011,** 180(1), 123–128
12. Marchini, M., Carini, E., Cataldi, N., Boukid, F., Blandino, M., Ganino, T.,Pellegrini, N. , The use of red lentil flour in bakery products: How do particle size and substitution level affect rheological properties of wheat bread dough?. *LWT*, **2021,** *136*, 110299.
13. Chelladurai, V., Erkinbaev, C. (2020). Lentils. *Pulses*,**2020**, 129-143, Springer, Cham.
14. Paucean, A., Moldovan, O. P., Mureșan, V., Socaci, S. A., Dulf, F. V., Alexa, E., Muste, S., Folic acid, minerals, amino-acids, fatty acids and volatile compounds of green and red lentils. Folic acid content optimization in wheat-lentils composite flours. *Chemistry Central Journal*, **2018,** *12*(1), 1-9.