

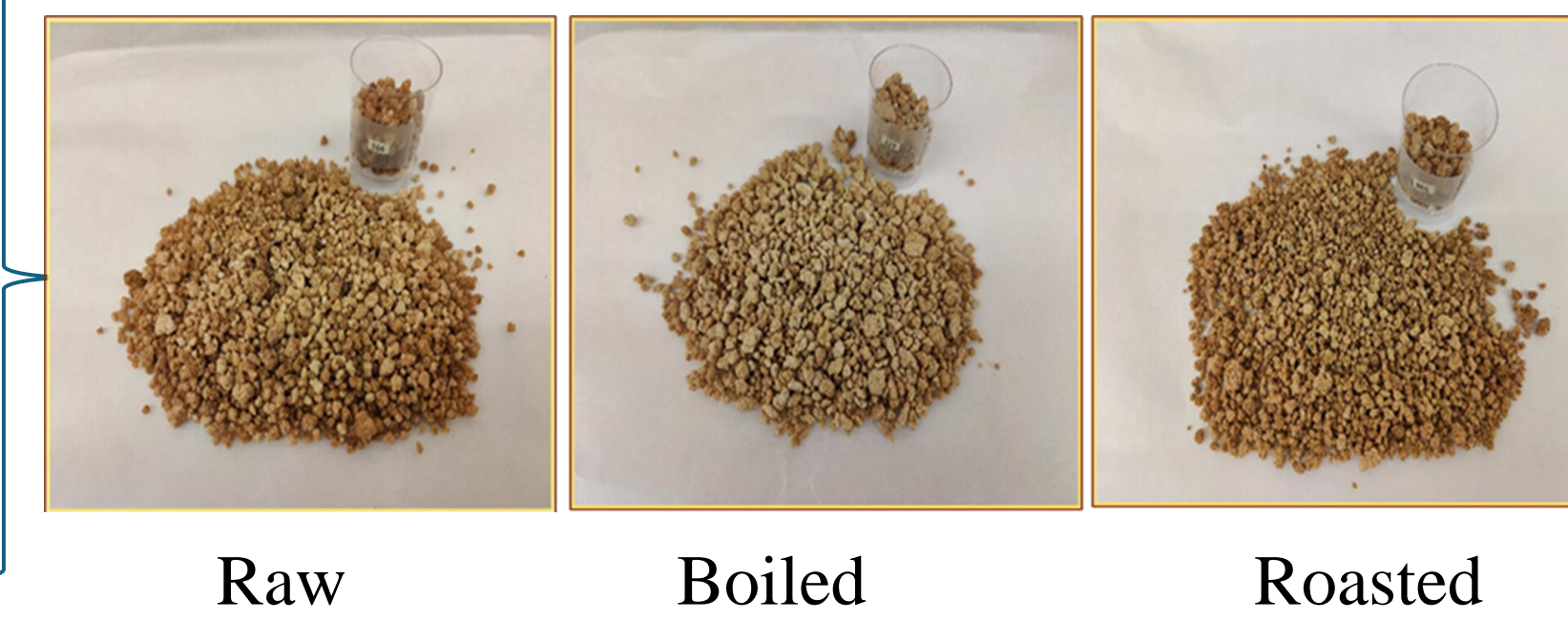
Introduction

Chestnuts are one of the most important nuts in Northeast Portugal. Terra Fria is the main producing region, with a Protected Designation of Origin (DOP) recognized. Chestnuts are a very versatile product, with high nutritional value (rich in carbohydrates, fibers, vitamins, and minerals), gluten-free and with a slightly sweet flavour. However, due to their perishable, chestnuts Portuguese are mainly sold as a fresh product during harvesting season, or as frozen product throughout the year. The development of new products could be a way to promote the integration of this fruit in a wide range of food products, as well as, to contribute to adopt a Mediterranean diet. The present work aimed to develop two innovative products; gluten-free cuscus, maintaining the traditional manufacturing process, and chestnut spreadable with lower sugar content.

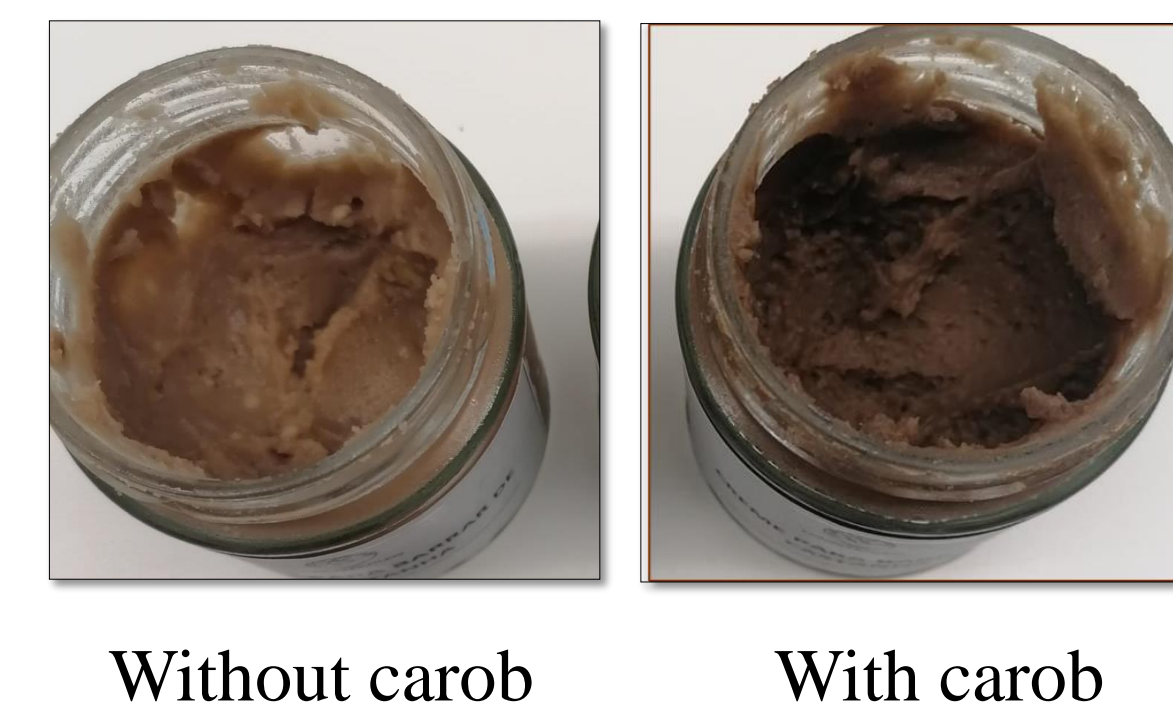
Material

1. Developed innovative products

Chestnut Cuscus



Chestnut Spreadable



2. Chemical characterization

- ✓ Nutritional composition (AOAC methods)
- ✓ Microbiological analyses (ISO methods)



Results

Chestnut Cuscus

Table 1- Nutritional composition of chestnut cuscus.

g/100g dry matter	Raw	Boiled	Roasted
Energy (Kcal/100g)	383.7 ± 0.5	385.1 ± 2.5	384.6 ± 2.0
Protein	8.63 ± 0.15	8.95 ± 0.16	7.13 ± 0.70
Ash	3.42 ± 0.02	3.13 ± 0.32	3.38 ± 0.16
Total Fat	2.20 ± 0.07	1.96 ± 0.27	2.62 ± 0.21
Total Carbohydrates	85.75 ± 0.21	85.96 ± 0.24	86.87 ± 0.53
of which sugars	2.58±0.48	3.63±0.23	3.40±0.13
of which fibers	6.83 ± 0.13	6.11 ± 0.10	7.49 ± 0.47
Sodium	1.76 ± 0.07	1.26±0.01	2.14 ± 0.09



It was observed that the three variations of chestnut cuscus had similar macronutrient levels.

- ❖ During 6 months of storage, **no microbial growth** was observed in any of the spreadable.

Chestnut Spreadable

Table 2- Nutritional composition of chestnut spreadable.

g/100g dry matter	With carob Sterilized	Without carob Sterilized
Energy (Kcal/100g)	401.7 ± 0.3	398.4 ± 0.1
Protein	2.89 ± 0.18	3.22 ± 0.11
Ash	0.7 ± 0.04	0.83 ± 0.02
Total Fat	0.9 ± 0.05	0.34 ± 0.02
Total Carbohydrates	95.52 ± 0.14	95.62 ± 0.11
of which sugars	2.96±0.80	4.81±0.73
of which fibers	0 ± 0	0 ± 0
Sodium	0.66±0.08	0.54±0.06



The formulation with carob had a lower sugar and protein content, while the formulation without carob had a lower fat content.



Figure 1- Microbial growth of aerobic mesophiles, molds, and yeasts in a specific cultured media.

Conclusion

- ❖ In conclusion, the Portuguese chestnuts reveal to be a suitable ingredient to produce gluten free and healthy products.

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