

Timisoara, 25-26 May

## Quality evaluation of functional biscuits developed from wheat flour and malted barley flour mixtures

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**Abstract:** Biscuits are nutritious, ready-to-eat snacks that come in different shapes and sizes. The aim of this study was to exploit the nutritional potential of some types of malted barley flours (MBF) in order to develop a range of functional biscuits with improved nutritional value and sensory and technological qualities. Three types of brewer's MBF (*Amber, Biscuit and Chocolate*) were used to replace WF (wheat flour) in amounts of 10, 20 and 30%, respectively. Biscuits with 100% wheat flour (WF) serve as a reference sample. The proximate composition, physical and sensory characteristics, the total polyphenol content (TPC) and antioxidant capacity (AA) of the biscuit samples using standard laboratory procedures, were evaluated.

### • Introduction

In the last decades the search for functional foods has been widely encouraged by food companies. Consumers demand of new food products not only to satisfy a physiological need but also to have healthy food with necessary nutrients to prevent nutrition-related diseases and to improve physical and mental health. In this regard, a close relation between nutrition and health has been established and functional foods containing ingredients with a specific health benefit were technologically developed.

### • Material and method

**Raw material and ingredients:** *Wheat flour (WF), Malted barley flour (MBF)* and the other ingredients used in this study were purchased from local market in Timisoara town, Romania.

**Production of the composite biscuits:** Biscuit samples (control and with different substitution levels of WF with MBF) were prepared according to the AACC International Method 10-50.05 with minor modifications.

**Sensory evaluation of biscuits with WF and MBF.** A panel of 20 panelists have evaluated biscuits using a 9-point hedonic scale. The general appearance, colour, texture, taste and overall acceptability, were evaluated.

**The proximate composition, physical and the total polyphenol content (TPC) and antioxidant capacity (AA) of the biscuit samples** using standard laboratory procedures, were evaluated.

- **Results and discussions:** Centralizing the results obtained in terms of sensory analysis of the biscuit samples, it can be seen that the biscuit sample with 20% *Biscuit MBF* was the most appreciated by the evaluators (flavor - 8.32 and taste - 8.44, overall acceptance - 8.67) and the biscuit sample with 10% *Chocolate MBF* (flavor - 8.12 and taste - 8.26, overall acceptance - 8.52) respectively.



**Figure 1. The assortments of biscuits**

- The results showed an improvement in the nutritional profile of the biscuits in proportion to the increase in the proportion of MBF (30%) in the composite flour blends in terms of protein, fibre and mineral content, as well as a significant increase in functional attributes such as TPC (8.23 mgGAE/ g DW) and AA (68.64%).

**Table 1. Chemical evaluation of biscuits**

Chemical composition (%)	Biscuits samples			
	CB	AMBER: WF	BISCUIT: WF	CHOCOLATE: WF
Moisture	4.84±0.07	5.26±0.09	5.53±0.03	5.22±0.02
Fat	14.28±0.04	14.48±0.12	14.62±0.14	14.44±0.11
Protein	12.28±0.27	13.03±0.20	13.56±0.01	13.23±0.33
Ash	2.06±0.22	4.24±0.13	4.46±0.05	4.58±0.05
Crude fiber	3.64±0.02	5.26±0.08	5.32±0.03	5.26±0.14
Carbohydrates	62.90±0.08	57.73±0.46	56.49±0.23	57.27±0.31

### • Conclusions

**MBF investigated in this study can be considered as suitable ingredients for biscuits supplementation, due to their high nutritional value. Results from this study clearly showed that MBF can be used up to 25 and 30% to enhance nutritional value of biscuits without remarkable effect on its rheological properties and quality parameters without any effects on the other sensory attributes. This standardized recipe therefore is a step towards the further scope of experimentation and trials for a nutritious baking option with apart from above target audience to also children, elderly, women, valescent patients and even adults.**

