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Obtaining and characterizing some varieties of bread with fruit and vegetables. HACCP plan for the technological flow

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Abstract: Consumers are showing increased interest in functional foods enriched with natural nutrients. Bread, a staple food, is an ideal product for fortification with fruits and vegetables, thus improving its nutritional and sensory profile. This study aims to obtain and comparatively characterize three innovative bread varieties: pumpkin bread, beetroot bread, and blueberry bread, compared to a reference bread. The main objective is to evaluate the impact of these additions on the rheological properties of the dough, the quality of the finished product, and the content of bioactive compounds.

The three types of bread were obtained under laboratory conditions and evaluated from a sensory point of view. The energy value is explained by the nutrients: lipids, carbohydrates, and proteins in its composition. The pumpkin, beetroot, and blueberry bread varieties are defined by their distinctive organoleptic properties, due to the vegetables and fruits added during the preparation process, which give them a distinctive taste and aroma specific to the added ingredients.

A HACCP plan was developed for the technological flow of manufacturing pumpkin, beetroot, and blueberry bread assortments by identifying biological, physical, and chemical risks and analyzing critical control points. The principles of HACCP were followed in this study, establishing specific and effective procedures to ensure food safety for consumers.



• Results and discussions

Sensory characteristics of bread varieties

ASSORTMENT	SENSORY ATTRIBUTES						Average
	APPEARANCE	COLOR	TEXTURE	SMELL	TASTE	CORE	
Pumpkin bread	5	5	4,8	5	5	5	4,96
Beetroot bread	4,4	4,8	4,6	4,8	4,8	4,4	4,63
Blueberry bread	4,6	4,6	4,6	4,8	4,6	4,6	4,63

Finished product parameters

Name	Presentation	Packaging option	Organoleptic characteristics	Validity	Humidity Storage temperature
Pumpkin bread	Bread of varying weight, elongated in shape, which can be braided or scored, slightly flattened	preformed bags of various sizes	The bread is identified as a bakery product with a shiny or matte appearance and texture, brown-orange in color (the pumpkin variety), flesh-colored (the beet variety), and bluish in color (the blueberry variety), with a sweet-salty taste, the specific aroma of baked bread, and a smell characteristic of the added fruits and vegetables.	1-3 days	44-45% 18-20°C
Beetroot bread					
Blueberry bread					

Hazard analysis - Nature and origin

Gravity	Frequency in PF/In consumption		
High	3	4	4
Medium	2	3	4
Small	1	2	3
	Low	Medium	High

Hazard analysis - Prevention

Risk class Degree of significance	Contamination	Appearance in the final product	Control measures Prevention
1	At a theoretical level Signs	No distinguishing features	None
2		Absent	Informare permanentă analiză
3	Posibil	Nu atinge nivel critic	Măsură colectivă control, verificare
4	Potențial	La valori critice	Măsuri specifice de control CCP (validare/verificare)

• Conclusions

The pumpkin, beetroot, and blueberry bread assortments are defined by their distinctive organoleptic properties, due to the vegetables and fruits added during the preparation process, which give them a unique taste and aroma specific to the added ingredients. An HACCP plan was developed for the technological flow of manufacturing pumpkin, beetroot, and blueberry bread varieties by identifying biological, physical, and chemical risks and analyzing critical control points. The principles of HACCP were followed in this study, establishing specific and effective procedures to ensure food safety for consumers.

