Mushrooms: a fortifying agent for wheat bread

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Introduction:

One of the most widely consumed staple foods in the world is bread, and producing it poses many difficulties in terms of maintaining nutritional value, shelf life, and quality. Supplementing bread with additives has a beneficial impact on the bread's nutritional content and quality attributes got people's attention[1,2]. Mushrooms have high nutritional value and health properties such as antibacterial, antioxidant, and anticancer activities[3,4]. Additionally, mushrooms could be used to create a variety of functional products such as capsules, functional drinks, and mushroom concentrate powder[5]. This study attempted to examine the impact of fortifying bread with different types of mushrooms separately on the chemical composition, and quality attributes of bread. The used mushrooms types were *Agaricus bisporus* (a commercially cultivated species), *Suilis Luteus*, and *Boletus Edulis* (common wild mushrooms).

Methodology:

Wheat bread (standard—without any shares, only wheat flour), wheat bread with 2% and 5% of ground lyophilized mushroom type (shares calculated based on wheat flour) were baked in the laboratory. Then, changes in nutritional value and quality characteristics were determined by using different methods[6].

Results:

Table 1. Chemical composition of bread after fortification

Kind of bread	Dry mater	Dietary fiber [g/100g]	Fat [g/100g]	Protein [g/100g]	Ash [g/100g]	Carbohydrates [g/100g]	Energy [kcal]
Wheat bread	64,05 a	3,20 a	1,14 c	7,75 a	0,65 a	54,51	259,30
Bread with *A. bisporus* (2%)	66,95 c	3,73bc	0,57 a	8,13 b	0,76 b	57,50	267,63
Bread with *A. bisporus* (5%)	67,70 d	3,85 bc	0,59 a	8,66 b	0,74 b	57,71	270,77
Bread with *S. Luteus (2%)*	73,76 f	3,45 ab	0,82 b	8,54 b	0,81c	63,59	295,92
Bread with *S. Luteus (5%)*	76,46 g	4,85 e	0,80 b	9,52 e	0,92 d	65,22	306,13
Bread with *B.Edulis (2%)*	65,42 b	4,05 d	0,80 b	9,40 d	0,88 c	54,30	262,34
Bread with *B.Edulis (5%)*	68,38 e	3,86 c	0,84 b	8,80 c	0,77 b	58,01	274,47

Table 2. Evaluation of organoleptic characteristics of bread by different persons

Kind of bread	Quality feature									
	Appearance	Crust			Crumb			Flavour	Total+ 8	Quality class
		Color	Thickness	Other features	Elasticity	Porosity	Other features			
Wheat bread	4,5	3,00	3,83	3,93	3,96	2,7	2,93	5,3	38,15	I
Bread with *A. bisporus* (2%)	4,33	2,53	3,76	3,86	3,83	1,9	2,56	5,16	35,93	II
Bread with *A. bisporus* (5%)	4,33	2,5	3,73	3,63	3,53	1,4	2,53	5,23	34,88	II
Bread with *S. Luteus (2%)*	4,5	2,43	3,53	3,86	3,86	2,6	2,83	5,06	36,67	I
Bread with *S. Luteus (5%)*	3,66	2,07	3,16	3,83	3,86	2,53	2,76	3,5	33,37	II
Bread with *B.Edulis (2%)*	4,16	2,63	3,63	3,86	3,83	2,43	2,53	4,2	35,27	II
Bread with *B.Edulis (5%)*	3,83	2,53	3,56	3,76	3,83	2,3	2,46	3,5	33,77	II

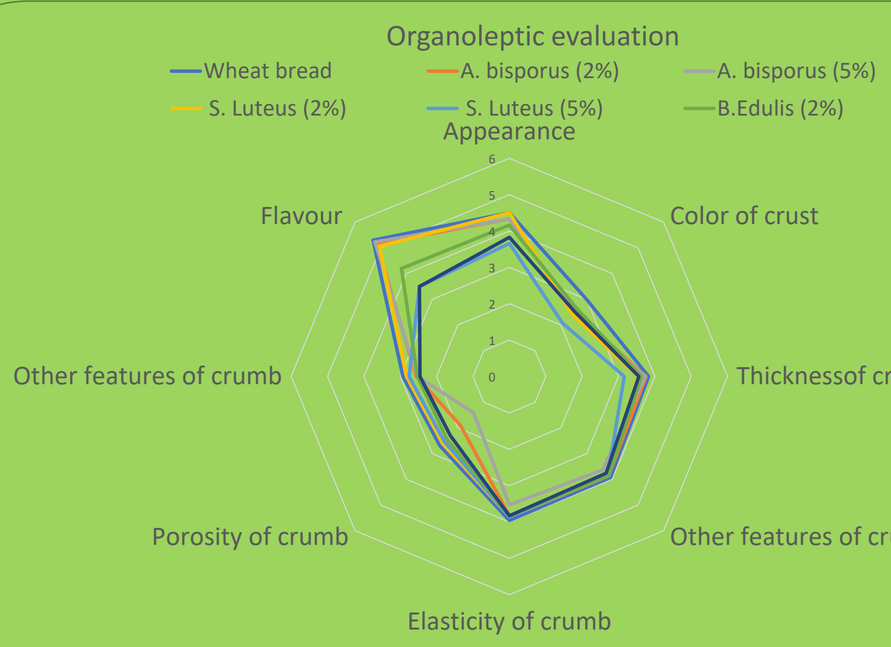

Figure 1. Graph for organoleptic characteristics of different bread

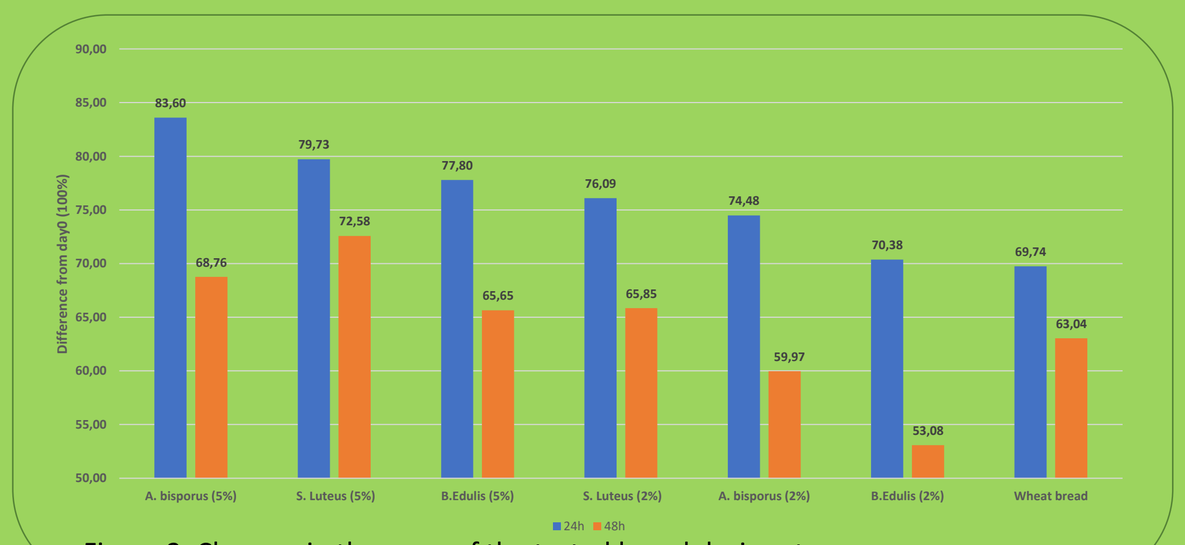

Figure 2. Changes in the mass of the tested bread during storage

Conclusion:

All bread fortified with mushrooms has a higher content of dietary fiber, protein, ash, and carbohydrates and a lower fat content. Also, the Substitution of 2% wheat flour with *S. luteus* qualified as quality I class, which indicates that fortification of the wheat bread with 2% *S. luteus* improves the nutritional value without any negative effect on the quality.

Conflicts of Interest:

The authors declare no conflict of interest.

Acknowledgments:

This work was supported by the Ministry of Science and Higher Education of the Republic of Poland for 2023.

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