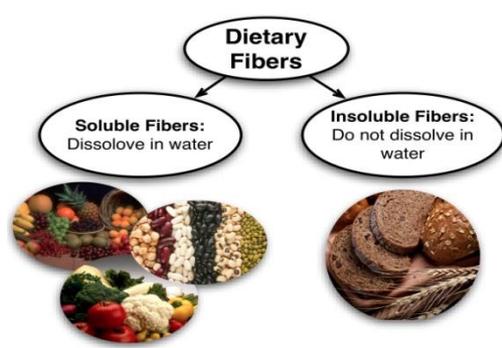




**THE EFFECT OF FIBRE FROM VARIOUS  
ORIGINS ON THE PROPERTIES OF DOUGH  
AND BAKERY PRODUCTS**

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- bread – major component of people’s diet all over the world,
- fibre – important component of diet and nutrition,
- high fiber bread – one of the known products categorized in ‘Functional food’ which is health beneficial (positively contributing to a long list of non infectious diseases).



## Aim of study

- formulate and develop functional breads from wheat flour composited with inulin, potato fiber, naked barley and malt;
- evaluate the products baking properties, nutritional, sensory quality and consumer overall acceptability.

# Material and methods

## Material

- wheat flour type T-650 (Vitaflóra Kolárovo, SK) ;
- inulin from chicory (Dera Food Technology, Belgium): 5%, 10%, 15%, 20% and 25%;
- naked barley, variety PRBL-4 (The Central Controlling and Testing Institute in Agriculture Spišská Belá, SK): 10%, 20%, 30%, 40% and 50%;
- malt, variety Levan (Hordeum Sládkovičovo, SK): 5%, 10%, 15%, 20% and 25%;
- potato fibre POTEX, (Lyckeby, Horaždovice, CZ): 3%, 5%, 7% and 10%;
- commercial compressed yeast.

# Material and methods

## Methods

### Chemical Analysis

1. dry matter, starch, ash, protein and acidity – AACC method 08-01;
2. nitrogen content – semi micro-Kjeldahl method, nitrogen was converted to protein by using a factor of 5.7;
3. sedimentation index (Zeleny test) and falling number – ICC method No 116/1 and ICC method No 107/1;
4. wet gluten, extensibility and swelling of gluten – STN 461011-9 ;
5. soluble, insoluble and total dietary fibre content - AACC method 32-21.01 and 32-06.01.

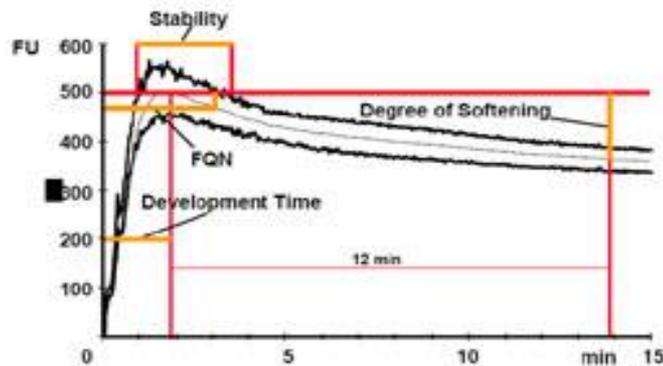


# Material and methods

## Methods

### Dough Characteristics

- Farinograph (Brabender, Duisburg, Germany) – ICC method No 115/1.;
- water absorption (Brabender Units), dough development time stability, degree of softening.

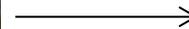


# Material and methods

## Methods

### Baking Tests

- 100 g flour basis consisted of salt (1.8 g), compressed yeast (4 g), saccharose (1 g) and the amount of water required to reach 500 BU of consistency;



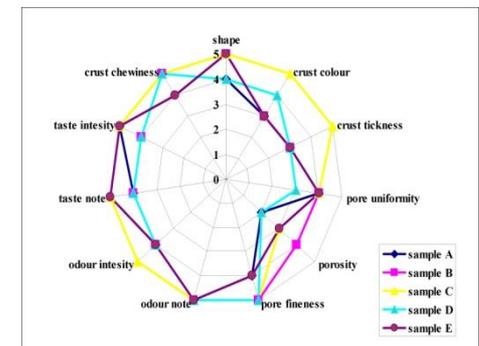
- the bread quality attributes were evaluated after cooling for 24 h at room temperature.

# Material and methods

## Methods

### Bread Quality Evaluation

- volume (determined by seed displacement in a loaf volume meter), specific volume, loss during baking, bread yield and volume yield were evaluated.
- sensory evaluation (ISO 6658) by 15 panellists;
- quality attributes: crumb, color, smoothness, aroma, flavor chewiness, crust color and hardness;



# Results

## Results of Flour Test

		Control	10%	20%	30%	40%	50%
Naked barley	Dry Matter [%]	88.9	88.38	88.53	88.8	88.65	88.66
	Moisture [%]	11.61	11.62	11.47	11.42	11.35	11.34
	Starch content [%]	78.48	77.74	74.82	74.14	73.17	72.04
	Ash content [%]	0.61	0.69	0.72	0.83	0.98	1.09
	Crude Protein [%]	12.48	12.36	12.27	11.77	11.74	11.56
	Acidity [mmol.kg <sup>-1</sup> ]	48	50	51	55	56	61
	Falling number [s]	353	329	312.5	301.5	282.5	254
	Wet gluten [%]	32.8	30.5	29.4	24.8	22.6	20.3
	Extensibility of gluten [cm]	13	12	12	11	11	10
	Swelling of gluten [cm <sup>3</sup> ]	22	21	17	16	14	13
	Sedimentation index [cm <sup>3</sup> ]	40.5	34.5	29.5	25	19	16
	Soluble Fibre [%]	0.89	1.32	1.49	2.10	2.52	3.05
	Insoluble Fibre [%]	2.95	3.46	3.53	4.65	5.34	5.28
	Total Dietary Fibre [%]	3.84	4.78	5.02	6.75	7.86	8.33

# Results

## Results of Flour Test

		Control	5%	10%	15%	20%	25%
Inulin	Dry Matter [%]	86.85	87.29	87.57	87.79	88.18	88.44
	Moisture [%]	13.15	12.71	12.43	12.21	11.82	11.56
	Starch content [%]	82.61	70.12	69.25	61.4	53.81	48.18
	Ash content [%]	0.42	0.44	0.35	0.34	0.38	0.31
	Crude Protein [%]	11.36	10.81	10.49	9.57	8.86	8.34
	Acidity [mmol.kg <sup>-1</sup> ]	37	36	35	34	32	29
	Falling number [s]	316	309	294.5	267	236.5	69.5
	Wet gluten [%]	35.7	33.8	30.8	28.5	26.1	21.5
	Extensibility of gluten [cm]	13	12.5	12	12.5	12.5	11.5
	Swelling of gluten [cm <sup>3</sup> ]	21.5	20.5	20	20	21	21
	Sedimentation index [cm <sup>3</sup> ]	36	34.5	32	33	33	31
	Soluble Fibre [%]	0.83	2.24	5.70	7.99	10.51	13.48
	Insoluble Fibre [%]	3.26	2.89	2.66	2.41	2.22	2.14
Total Dietary Fibre [%]	4.09	5.13	8.36	10.40	12.73	15.62	

# Results

## Results of Flour Test

		Control	5%	10%	15%	20%	25%
Malt	Dry Matter [%]	88.33	88.45	88.5	88.55	88.73	88.75
	Moisture [%]	11.67	11.55	11.5	11.45	11.27	11.25
	Starch content [%]	76.93	75.74	77.85	76.31	75.94	73.99
	Ash content [%]	0.60	0.64	0.75	0.73	0.70	0.96
	Crude Protein [%]	13.5	13.2	13.1	12.8	13.3	12.9
	Acidity [mmol.kg <sup>-1</sup> ]	34	46	53	62	72	77
	Falling number [s]	359	63	62	62	62	62
	Wet gluten [%]	36.2	33.9	31.6	30.5	29.3	25.9
	Extensibility of gluten [cm]	13	12	12	12	12	12
	Swelling of gluten [cm <sup>3</sup> ]	20	17	16	15	14	13
	Sedimentation index [cm <sup>3</sup> ]	40	41	39	35	32	27
	Soluble Fibre [%]	0.64	1.14	1.40	1.56	1.60	1.64
	Insoluble Fibre [%]	2.03	2.49	3.58	4.03	4.48	4.86
	Total Dietary Fibre [%]	2.67	3.63	4.98	5.59	6.08	6.50

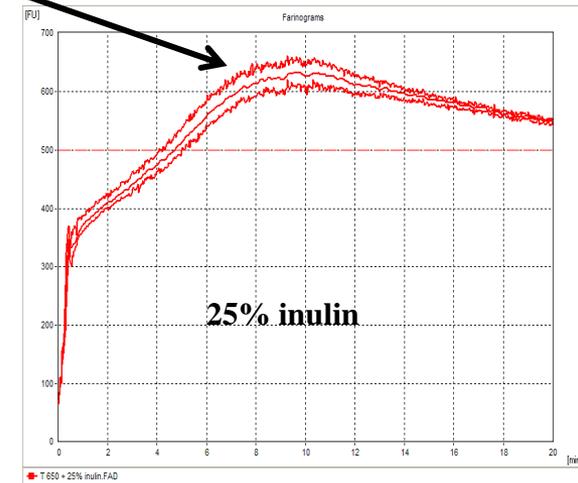
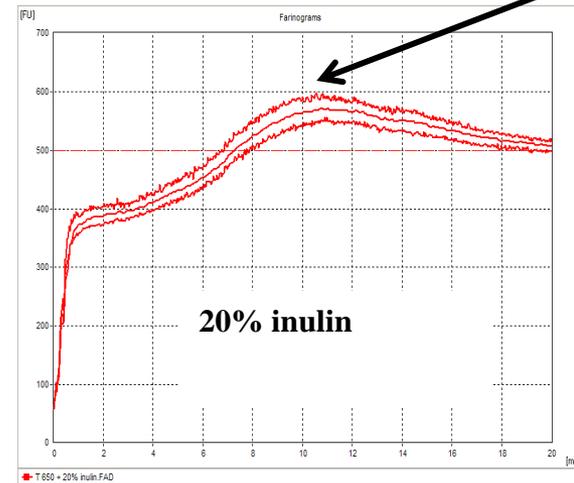
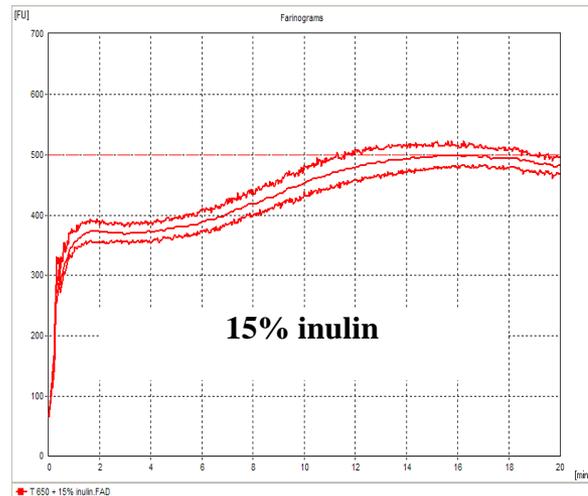
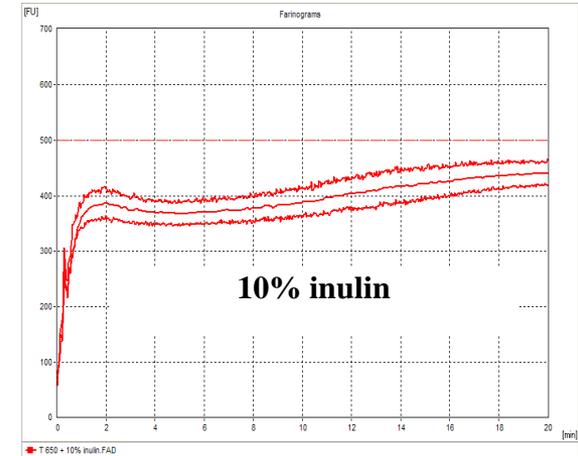
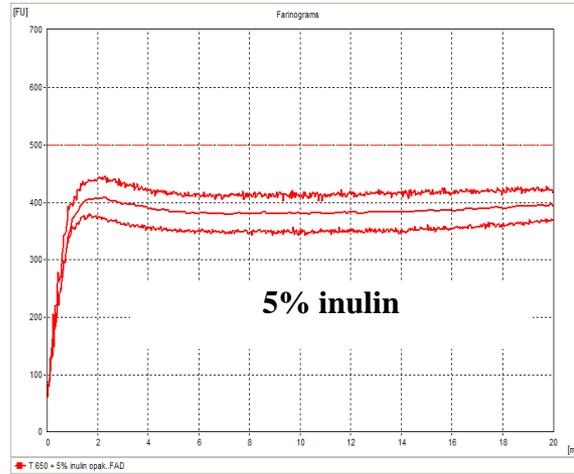
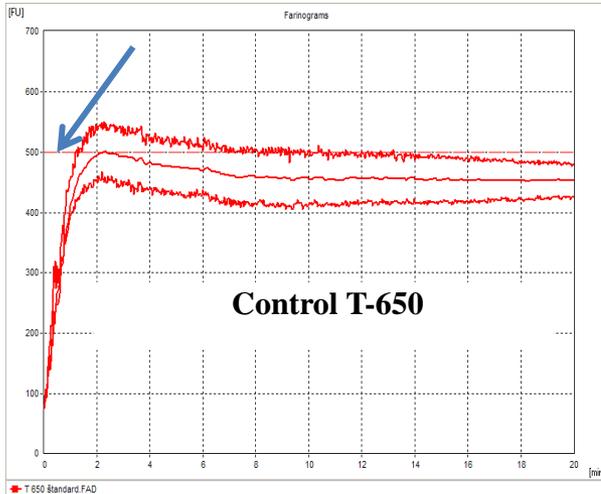
# Results

## Results of Flour Test

		Control	1%	3%	5%	7%
Potato fiber	Dry Matter [%]	89.13	89.19	89.20	89.06	89.19
	Moisture [%]	10.87	10.81	10.80	10.94	10.81
	Starch content [%]	82.20	81.93	80.43	79.92	79.19
	Ash content [%]	0.54	0.62	0.63	0.70	0.73
	Crude Protein [%]	11.8	11.8	11.67	11.63	11.46
	Acidity [mmol.kg <sup>-1</sup> ]	43	43.5	48	49	53.5
	Falling number [s]	419	401	397	391	374
	Wet gluten [%]	32.54	32.52	32.51	31.44	30.27
	Extensibility of gluten [cm]	11	10	11	11	12
	Swelling of gluten [cm <sup>3</sup> ]	20	22	22	22	21
	Sedimentation index [cm <sup>3</sup> ]	37	37	35	34	34
	Soluble Fibre [%]	0.83	0.89	1.06	1.16	1.29
	Insoluble Fibre [%]	2.46	3.05	4.14	5.34	6.51
	Total Dietary Fibre [%]	3.29	3.94	5.20	6.50	7.80

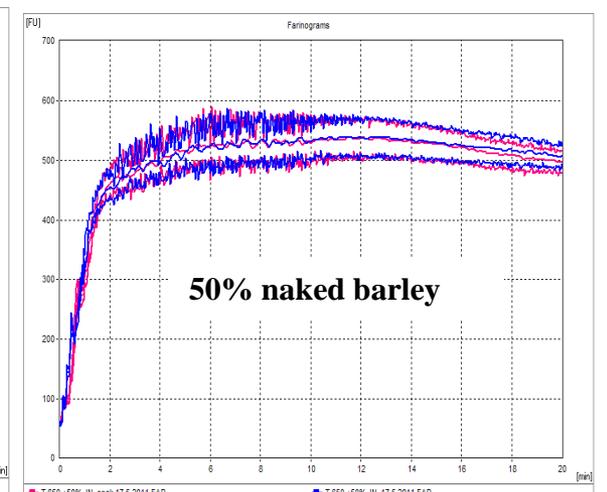
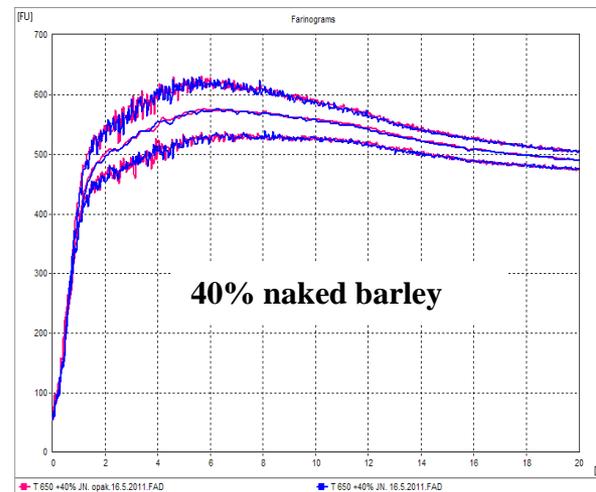
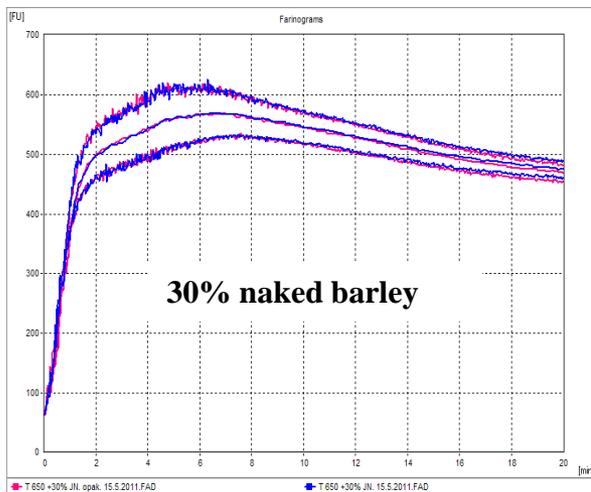
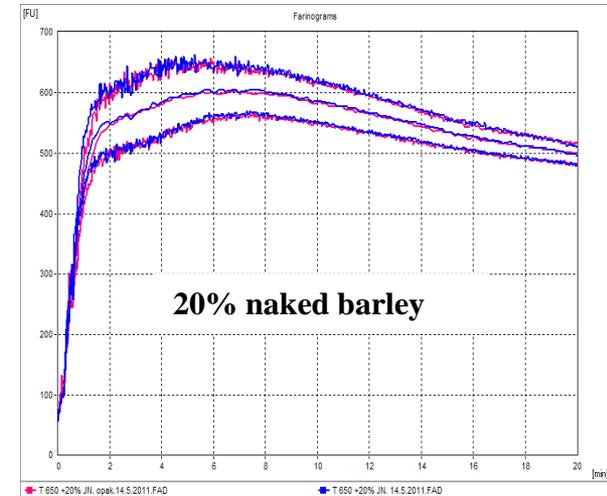
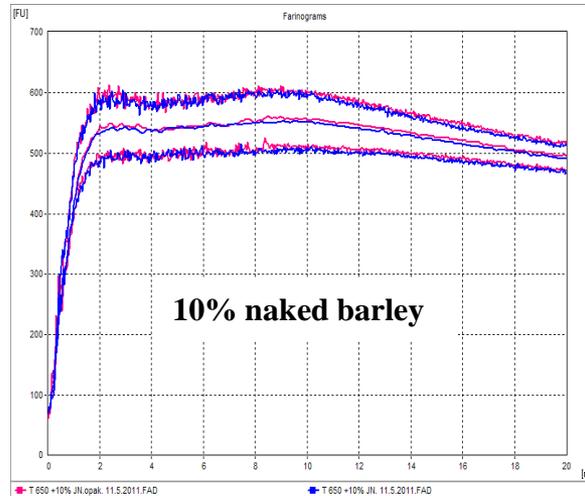
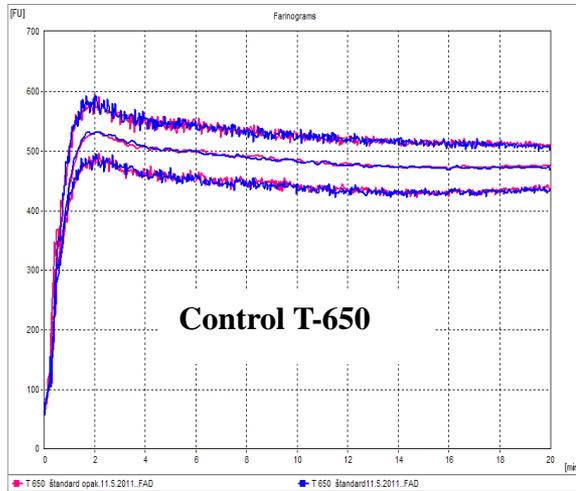
# Results

## Results of Farinograph



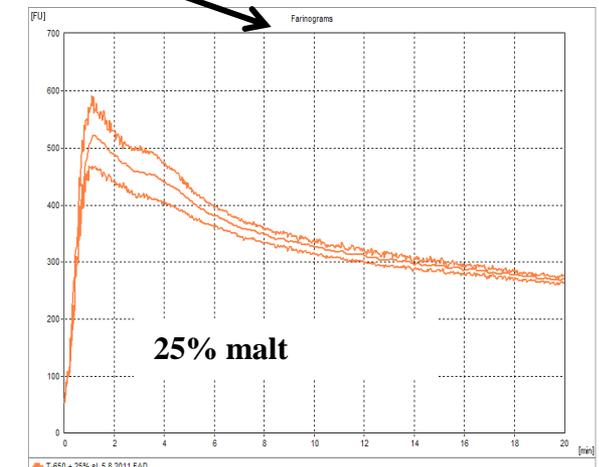
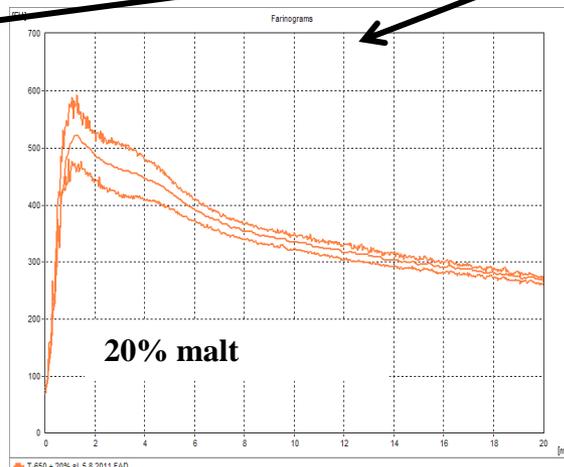
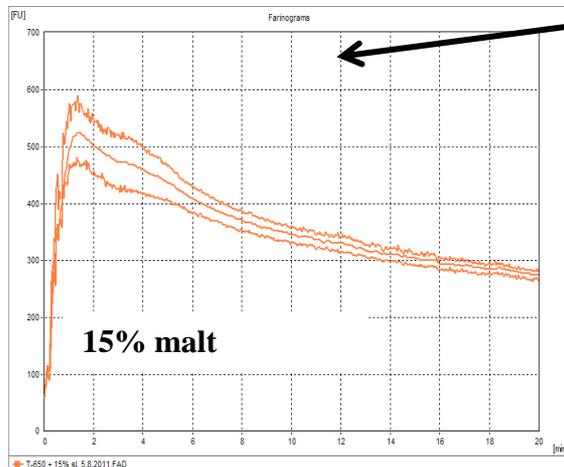
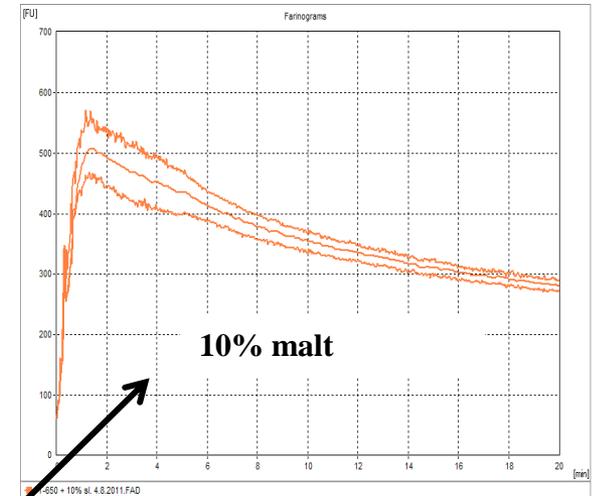
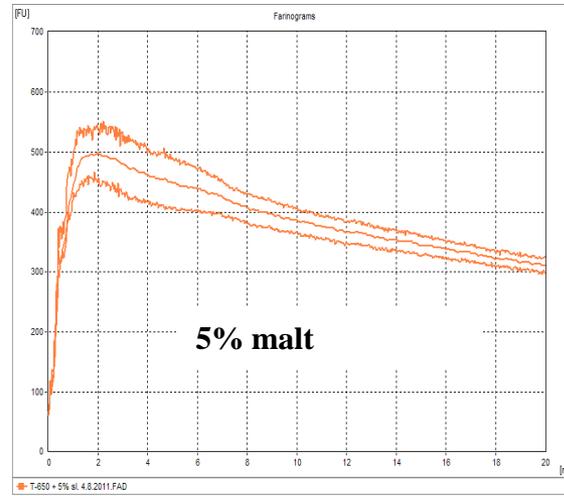
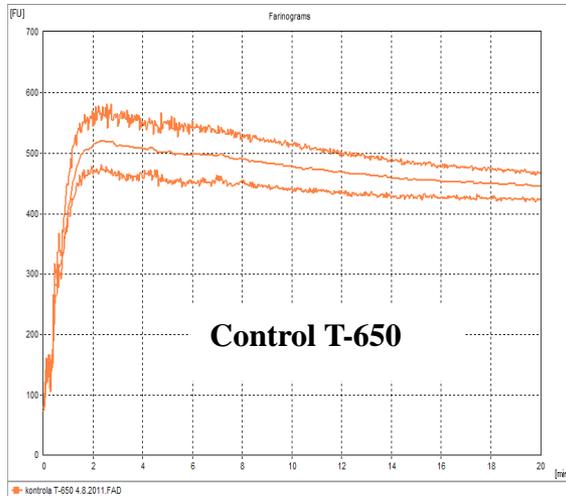
# Results

## Results of Farinograph



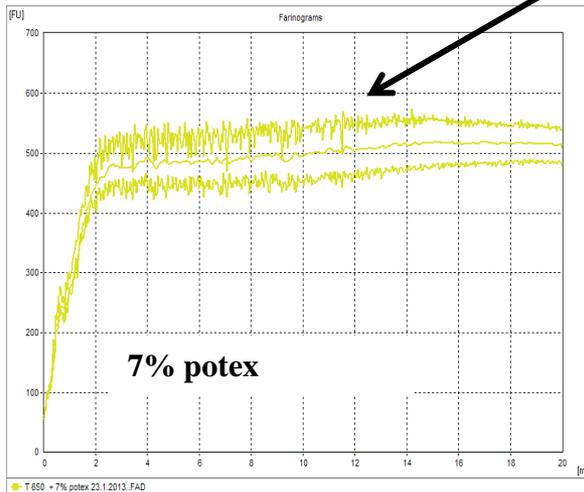
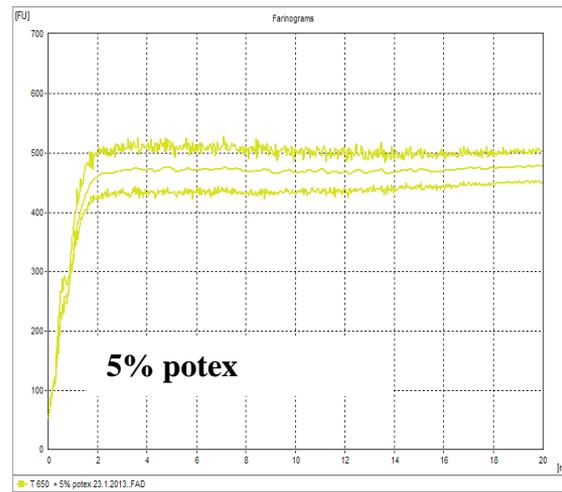
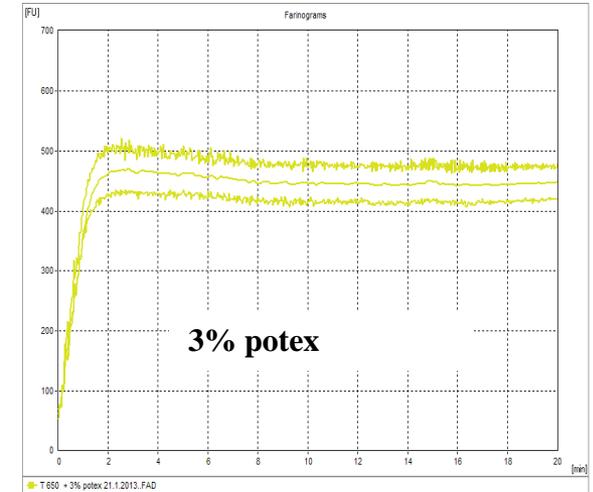
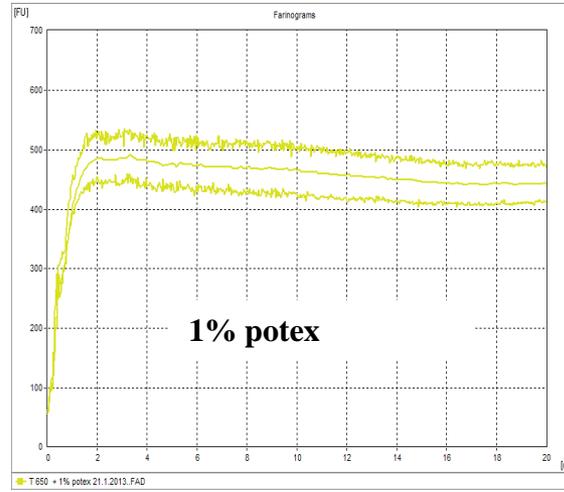
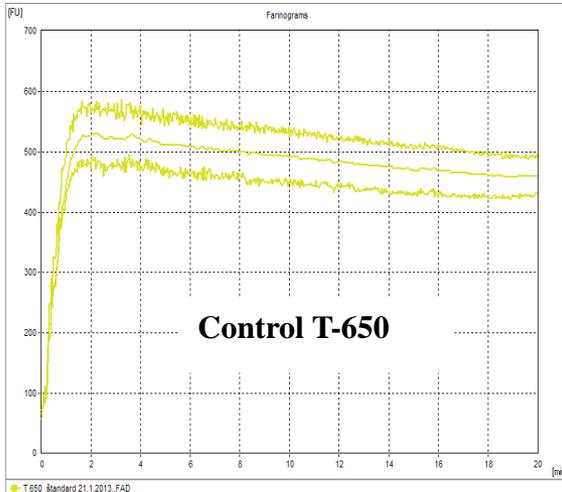
# Results

## Results of Farinograph



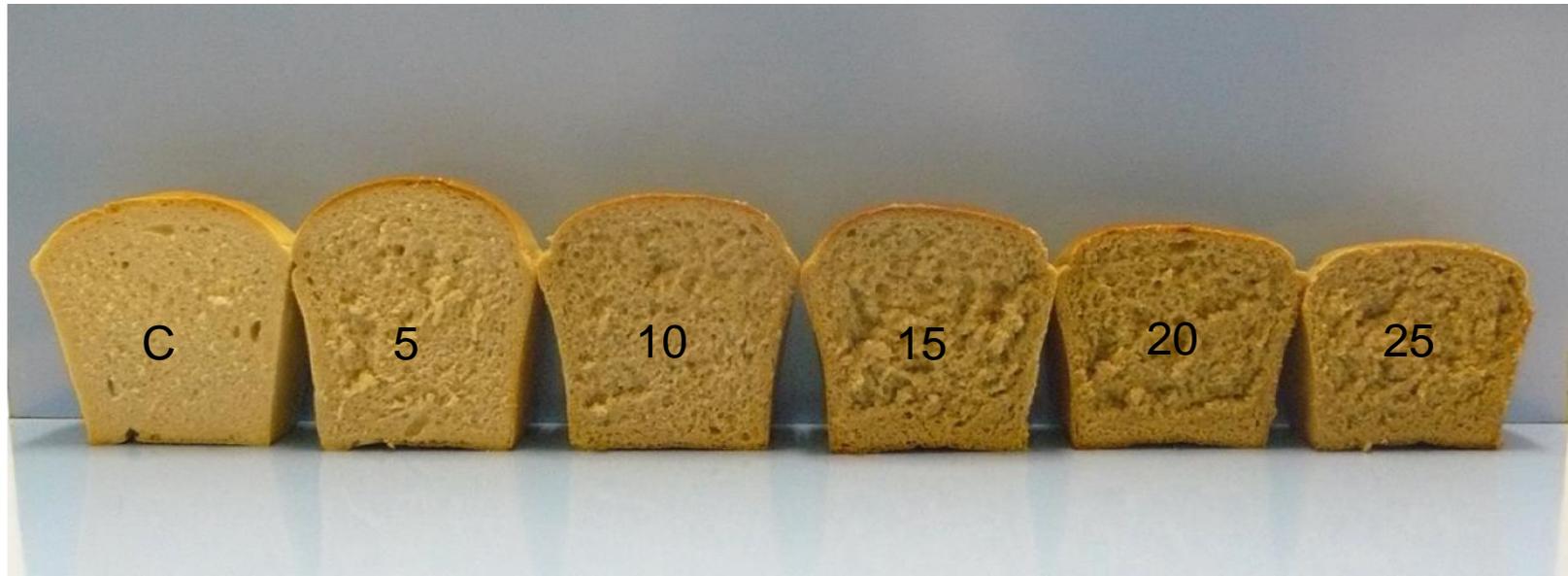
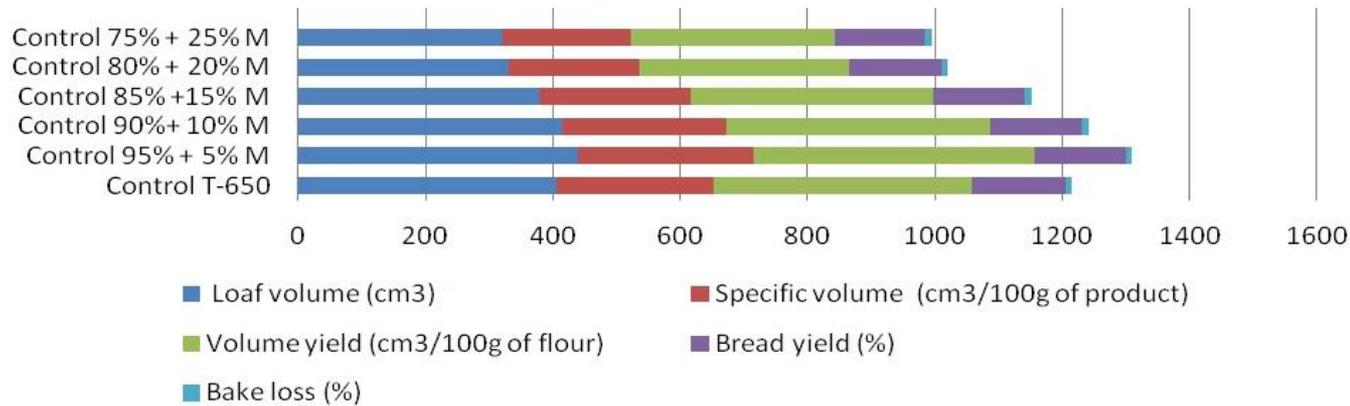
# Results

## Results of Farinograph



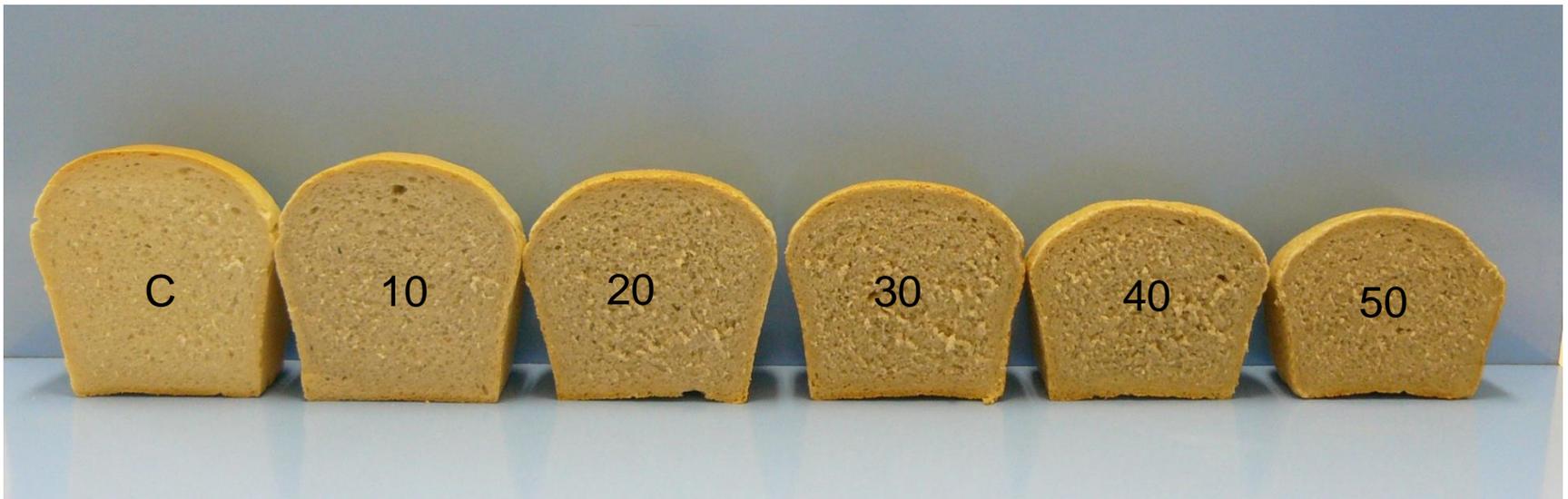
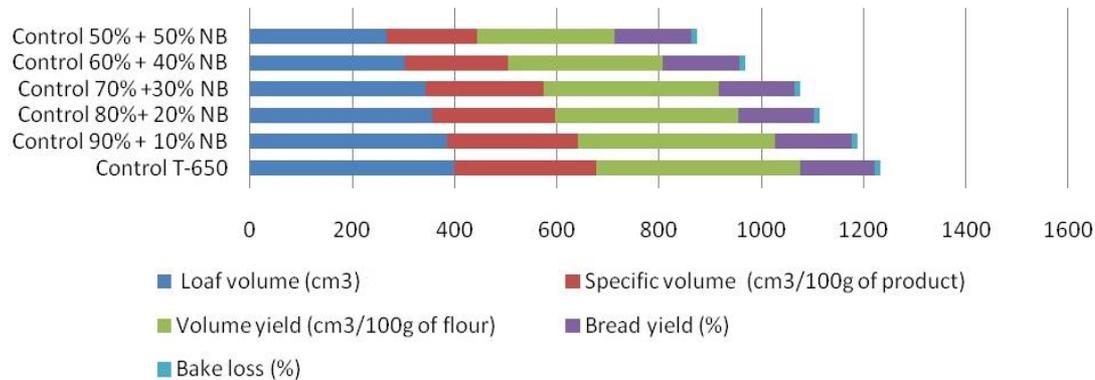
# Results

## Results of Baking Tests – MALT



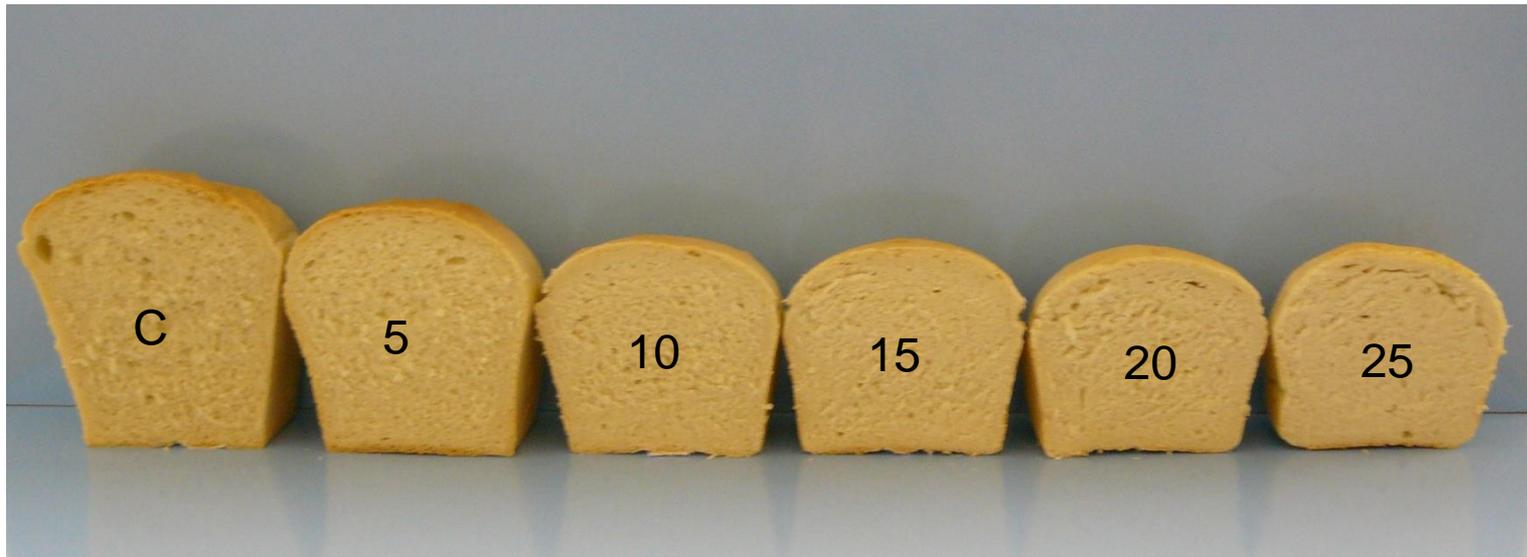
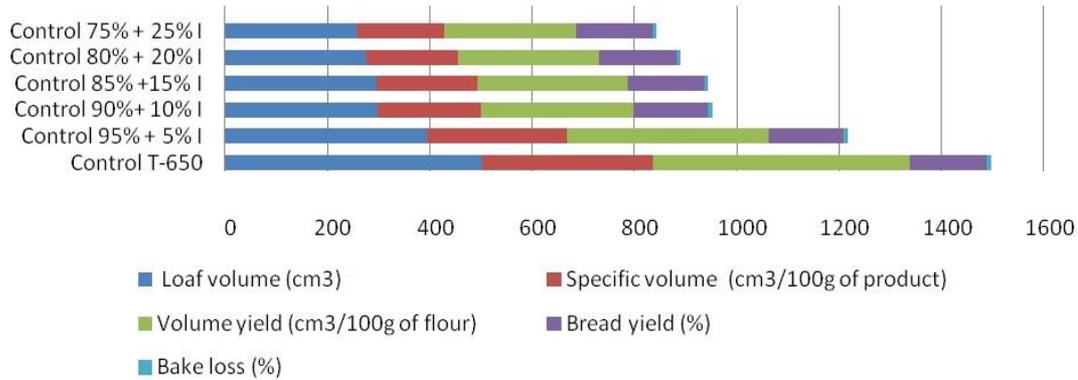
# Results

## Results of Baking Tests – **NAKED BARLEY**



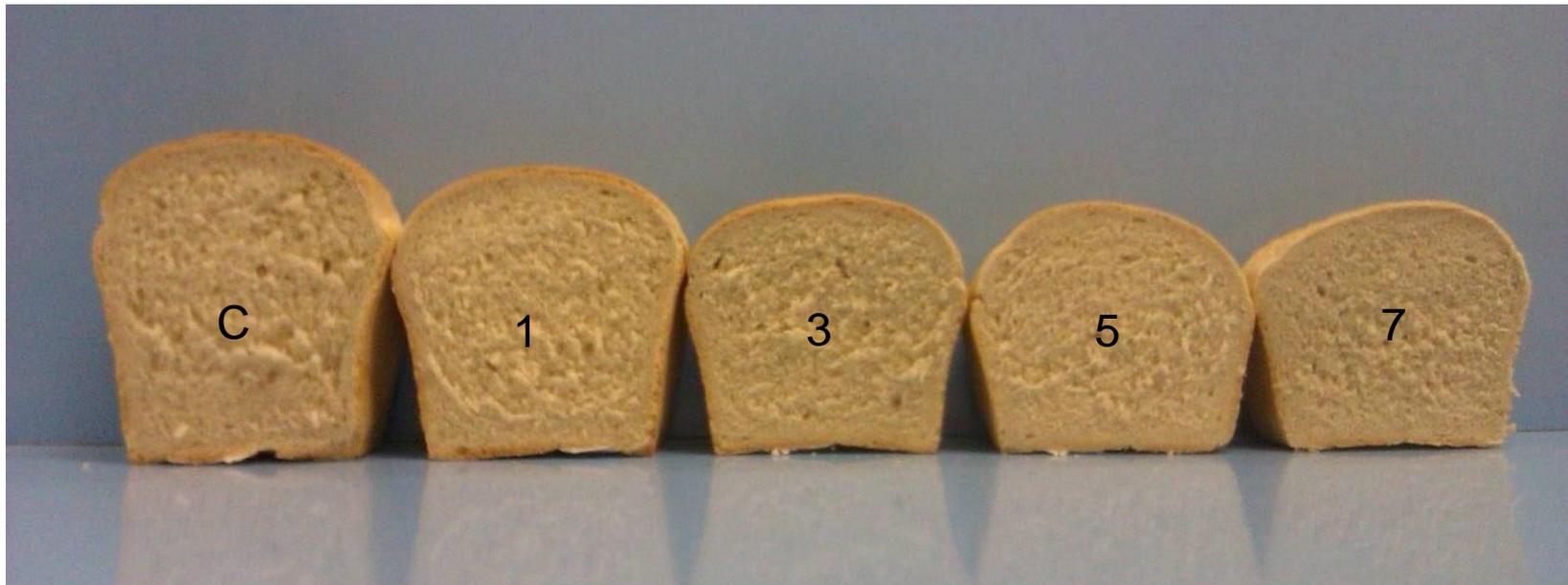
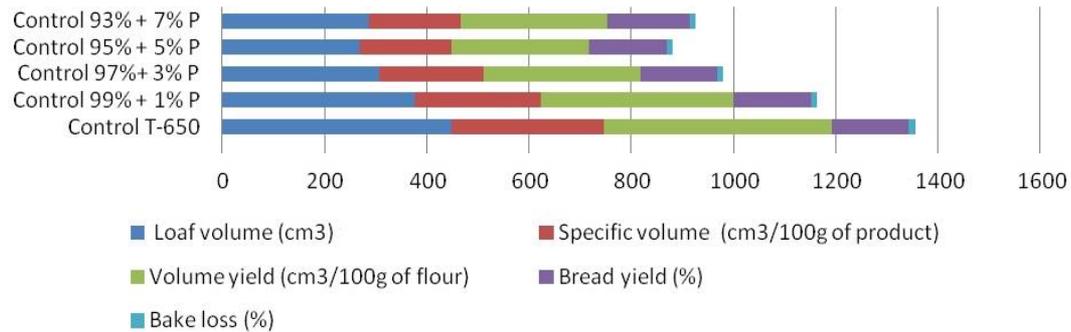
# Results

## Results of Baking Tests – INULIN



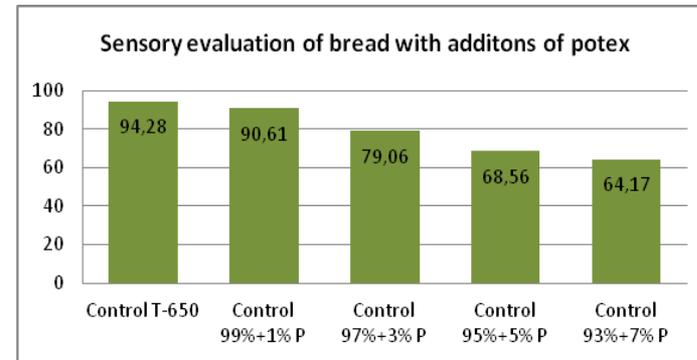
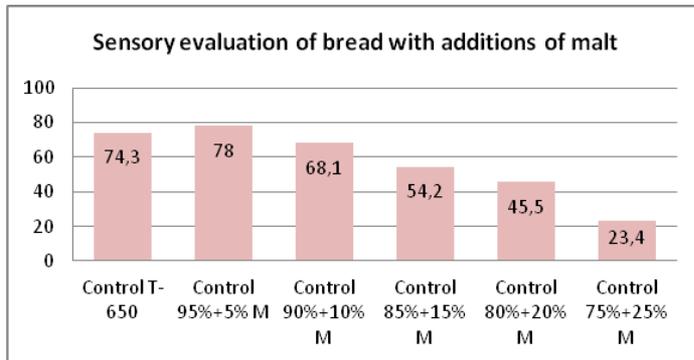
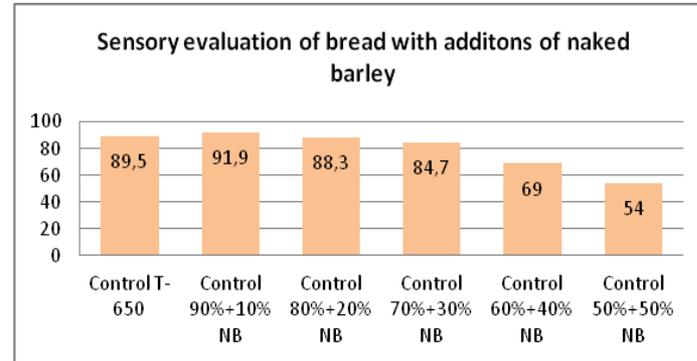
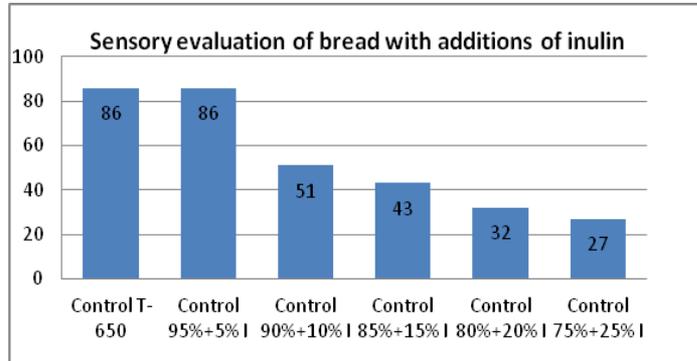
# Results

## Results of Baking Tests – **POTATO FIBER**



# Results

## Results of Sensory Analysis



# Conclusion

- breads with inulin, potato fiber, naked barley and malt substitutions – nutritionally superior (have higher ash, fibre content) to 100% wheat bread;
- organoleptic attributes – generally inferior to that of wheat bread;
- composite breads would serve as functional food because of the high fibre content;
- further research – focused on the phytochemical content and how to improve the organoleptic qualities and hence acceptability of breads with inulin, potato fiber, naked barley and malt.



**Get Enough!** The Surprising Facts about  
**Dietary Fiber**

# Thank you for your attention!

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