VEGETABLE FIBRE ADDITION INFLUENCE ON BAKERY PRODUCTS QUALITY

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Abstract

In the process of cereal milling most of proteins and starch are kept, instead the quantities of cellulose and pentosanes are 3-4 times smaller than in the whole corn. Decrease of cellulose and pentosane quantity has negative effects on the consumer's health state. The paper analyses the effect of pea fibre use in bread making both on the technological process and the finished product quality from the point of view of the deadweight products quantity necessary to the digestive system health.

Key words: pea fibres, hydration capacity, elasticity, cellulose, hemicelluloses, pentosanes.

Rezumat

În procesul de măcinare a cerealelor cea mai mare parte a proteinelor şi amidonul sunt reţinute, iar cantităţile de celuloză şi de pentozani sunt de 3 – 4 ori mai mici decât în întregul bob. Scăderea cantităţii de celuloză şi pentozani din alimentaţie are efecte negative asupra stării de sănătate a consumatorului. Articolul analizează efectul fibrelor pea folosite în panificaţie atât asupra procesului tehnologic cât şi asupra calităţii produsului finit din punct de vedere al conţinutului de produşi de balast necesari pentru sănătatea sistemului digestiv

Cuvinte cheie:fibre pea, capacitate de hidratare, elasticitate, celuloză, hemiceluloză, pentozani.

Résumé

Dans le procès de mouture des céréales la majorité des protéines et de l'amidon est retenue, en échange les quantités de cellulose et pentosanes sont 3-4 fois plus basses que celles du grain entier. La diminution de la quantité de cellulose et pentosanes a des effets négatifs sur l'état de santé du consommateur. Ce travail analyse l'effet de l'utilisation dans la panification des fibres de pois, aussi sur le procès technologique que sur la valeur du produit fini du point de vue de la quantité des produits de lest nécessaires à la santé du système digestif.

Mots clef: fibres de pois, capacité d'hydratation, élasticité, cellulose, hémicellulose, pentosanes.

Introduction

In the cereal milling process a retaining of starch in proportion of 95, 73% and proteins of 81% is made in white flour, instead the cellulose content is of 19, 26% only, and the pentosane one of 34, 47% from the content of these substances in the whole corn (Belitz, 2000). As a result, the white flour is rich in easy assimilable substances and poor in deadweight compounds. The refinement of cereal products has led to the diminishing of cellulose content in food, fact that has determined an increased incidence of some intestinal affections, together with the cardiovascular ones (Segal, 2002).

Bread is the mostly used food in every day diet and as a result, an efficient management of a food supply programme with nutritive substances or with important role in digestion may be carried out.

Experimental

The paper analyses the pea fibre addition influence on the bakery products quality by studying the technological effect of the Swelite product (produced by Provital Industrie S.A. Belgium) obtained from yellow pea.

White flour 650, of medium towards strong quality, without strange taste or odours was used for experimental determinations. The analysis of the raw material with and without fibre addition and of the finished product was carried out at S.C. ROMPAK Paşcani.

Table1. The physical-chemical and microbiological characteristics of the pea fibres

No.	Physical-chemical characteristics	Physical-chemical characteristics	Microbiological characteristics
1.	Dietetic fibres, 48+/-3%	Density (after packing), 0.38kg/l	Yeasts and moulds, max.50/g
2.	Dry substance, 92+/-2%	Hydration capacity, 10+/-1g/g	Coliform bacteria, max.50/g
3.	Carbohydrates, 93+/-3%	pH (10%solution), 6.0+/-1	Escherichia coli, absent/g
4.	Ash, max.2%	Colour, white	Salmonella,absent/25g
5.	Fat, max.0,5%	Taste, neutral	Listeria, absent/g
6.	Starch, min.36%	Heavy metals, (Hg, Pb, Cd, As), max. 0.5ppm	
7.	Proteins, max.7%	Granulosity, <400μm	No aditives content

Results and discussions

The results obtained through the farinograph method (Bordei 2000) are shown in table 2

Table 2: Results of the farinograme

Parameters	witness sample	1,5%i fibres sample	2,5% fibres sample
Forming time (min)	1. 9	2.2	1. 8
Stability (min)	9. 4	10.6	6. 9
Dipping (FU)	38	34	50
Hydration capacity	59. 3%	62. 2%	63. 3%

The hydration capacity values of the witness sample and of pea fibres samples, obtained through the farinograph method are shown in table 3.

Table 3: Hydration Capacity Values

Parameters	Witness sample	1,5% fibres sample	2,5% fibres sample
Hydration capacity	59,3%	62,2%	63,3%

The fibres capacity of water retaining, with benefic effect on the product freshness, may be observed from the analysis of the obtained data. The fibres addition influence on the rheological characteristics of the dough is carried out through the extensograph method, at a range of 45 minutes on the three samples:

1. the witness sample, consisting of 300 g flour, 6 g salt, water
2. 1, 5 % pea fibres sample, consisting of 300g flour, 4,5 g pea fibres, 6 g salt, water
3. 2, 5% pea fibres sample, consisting of 300g flour, 7,5g pea fibres, 6g salt, water.

The results obtained at extensograph are shown in table 4.

Table 4. Mechanical characteristics of the dough (obtained at extensograph)

No	Parameters	1,5% fibres sample	2,5% fibres sample
1.	Stretching resistance (BU)	119	133
2.	Extensibility(mm)	170	165
3.	Absorbed energy(cm^2)	42	44
4.	γ=R/E	1,7	0,8

The ratio γ=R/E shows that the analysed flour is of good quality (Sirbu, 2001). An increase of stretch resistance and a slight decrease of the dough extensibility may be noticed. The dough obtained

from the analysed samples is modeled automatically into the round shape afterwards it is let to preleaven for 15 minutes. After the pre-leavening period, an automatic and manual modeling takes place. As a result of these operations, one may notice that all samples keep their form and develop normally. The leavening phase takes place at 35^0C and humidity of 70%, for 30 minutes. After leavening, one may notice that all samples keep their form, develop normally, those with fibres addition having a higher volume. Before getting into oven, they are notched superficially. The baking takes place at the temperature of 240-250^0C, for 20 minutes. The results of the baking samples are shown in table 5:

Table 5. Properties of the baking samples

No	Parameters	Witness sample	1,5%fibres sample	2,5%fibres sample
1.	Bread form	symmetric	symmetric	symmetric
2.	Bread volume	increased	increased	increased
3.	Crust aspect	shiny, smooth	smooth, without cracks	shiny, smooth, without cracks
4.	Crust colour	golden	golden, without cracks	golden, without cracks
5.	Crust resistance	elastic	elastic	a little soft
6.	Crumb aspect	elastic, it does not crack	elastic, well baked, it does not crack	elastic, it does not crack
7.	Crumb colour	uniform	white , uniform	white, uniform
8.	Crumb porosity	uniform	uniform	uniform
9.	Pores structures	fine, medium pores	fine, medium pores	big pores
10.	Aroma	nice	nice	nice
11.	Taste	specific	specific, no strange taste	specific, no strange taste

Conclusions

One may see from the analysis of samples dimensions that the volume of the fibres addition bread is 6-9, 5 % higher than the witness sample.

- the vegetable fibres content provides the bakery products with dietetic qualities by increasing the cellulose and hemicellulose percentage in bread, with benefic effects on the digestive system
- due to the increase of water absorption capacity, a 4,5-5% higher quantity of dough is obtained which covers the price of the added product
- the rheological characteristics of the dough are by far improved, the fibres addition dough showing a smaller gluing tendency than the witness sample
- it provides longer life time to the bread freshness naturally with at least 36 hours
- due to the emulsifying role of the pea fibres, the crumb has a fine and regular structure, and the crust has a nice and uniform colour.

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