STUDIES ON THE DEVELOPMENT OF PHYSICO-CHEMICAL PARAMETERS IN WHEAT FLOUR BY THE ADDITION OF SODIUM CASEINATE

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Abstract

White flour, occupies the largest proportion for human consumption, being poorer in protein than black flour. It is therefore necessary protein enrichment of flour in general and white ones in particular. The quality of bakery products can be ensured by improving the technological characteristics of the flour so that it produces a dough with optimal characteristics, which produces high quality products. With this purpose is currently used some raw materials which have an effect of improvement or fortified. But the latest, with a tendency to expand globally, says the use of new food products and substances, enzymatic preparations, and substances that improve the quality and nutritional value.

Key words: wheat flour, sodium caseinate, enzyme preparation, fortified

INTRODUCTION

According to consumer and nutritional requirements of the population was drawn Nutritional Pyramid, where food consumption is divided in several food groups. It is noted that cereal product: bread, pasta, breakfast cereals, are underlying this pyramid, so it constitute the basis for a rational diet (Bodei D., 2004).

Although bread and cereals constitute multimillenary food, technique and scientific research are increasingly oriented towards broadening the range of varieties and obtaining products superior quality (Alexa E., 2004). Thus, in addition to traditional flour food processing technologies, have emerged in the last decades new technologies adapted to the world requirements concerning the consumption of food products derived from cereals namely, integral products, expanded flour mixtures with different ingredients or pasta of instant type (Chaudchari R., 1999).

To improve the nutritional value of flours it recourse to proteining, vitaminizing and increase mineral concentrations.

The flour consumed as bread has an important part in ensuring the necessary proteins.

To increase the protein content of flour in the world are discussed the most diverse ways, ranked as order of priority, depending on the possibilities and conditions) (Banu C, 2000). The first way is the creation

of new varieties of grain rich in protein and with a higher content of deficient essential amino acids especially in lysine and tryptophan.

The second way is to separate in the normal technological flow in a mill, from ordinary bakery flour containing 10-12% protein, of fractions with a much larger content, respectively 18-20% protein (Leonte M, 2000).

Casein is the best animal protein with technological performance both on very good consistency of the product and the degree of emulsification of fat, stabilizing well the system water → fat → and protein does not change the taste of the product. It is inserted in the food products up to 15% / 1 kg product.

It is obtained by precipitation of casein at pH 4.6 of skimmed milk. At this pH, colloidal calcium phosphate is dissolved and various casein proteins precipitate.

There are then applied several washes to remove soluble salts, lactose and whey proteins. Caseins precipitates are dissolved by re neutralization with solution of sodium hydroxide of pH 7. After its spraying dry results sodium caseinates.

MATERIALS AND METHOD

Research on improving the nutritional value of wheat flour type 650 produced by SC Starmill SA, through its proteinization with sodium caseinate was done in the laboratories of Oradea Faculty of Environmental Protection. Was used sodium caseinate produced by SC TEC Lactoprot SRL, Bucharest.

To achieve variants has been established the use of sodium caseinate in three different proportions - 3%, 6% and 9%, the resulting products following to be compared with the usual product company.

The organization is presented in Table 1.

Table 1

The organization way

Specification	M	V1	V2	V3
Flour, g	1000	970	940	910
Sodium caseinate, g	0	30	60	90

Way of working: were prepared the samples, were homogenized at a run all three variants studied. Then samples were taken from all 4 variants which were analyzed in the laboratories of the faculty.

Experimental analysis consisted in determination of physico-chemical properties such as: gluten content, gluten index, index of deformation, the ash content, total protein, and rheological characteristics and flour falling index.

RESULTS AND DISSCUSIONS

Following the results of quality indicators (Fig. 1-6 and Table 2) for the three experimental variants compared with the control sample can be seen that the addition of sodium caseinate in the different percentages in the wheat flour affects physico-chemical indicators analyzed.

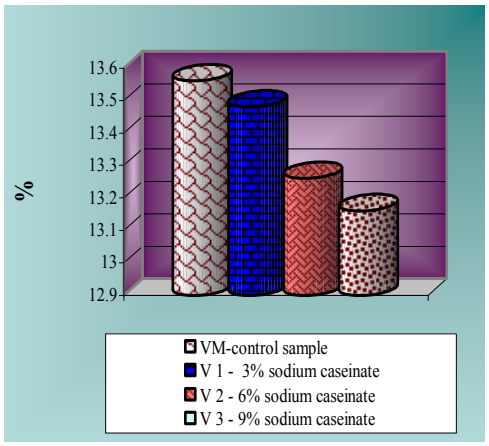

Fig. 7. Evolution of gluten flour

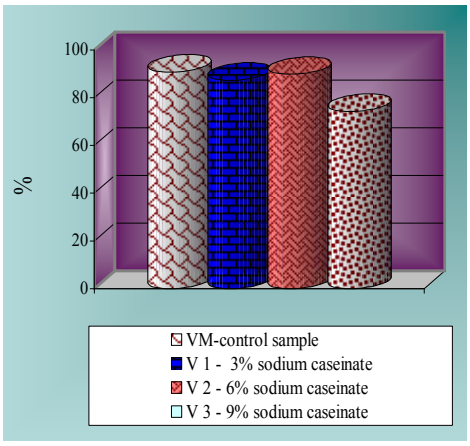

Fig. 8. Evolution of the index of gluten flour

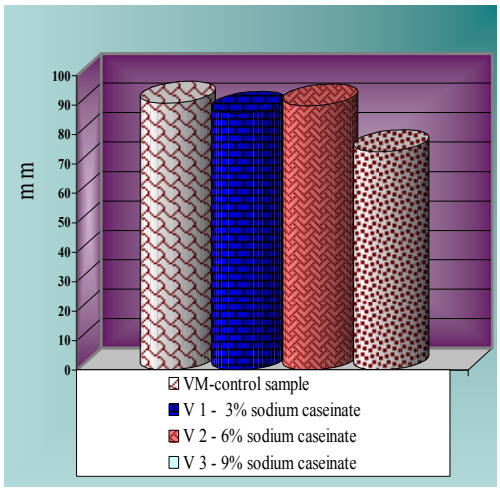

Fig. 9. Evolution of deformating index

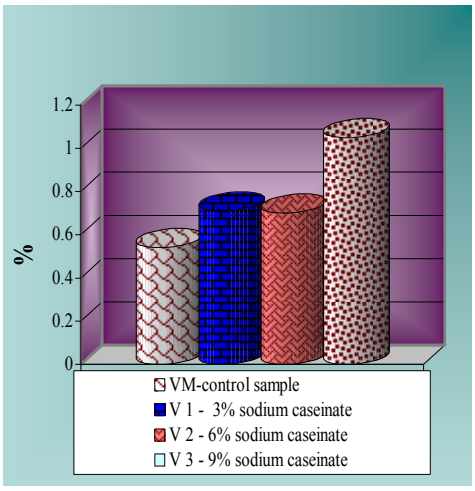

Fig. 10. Evolution of ash content

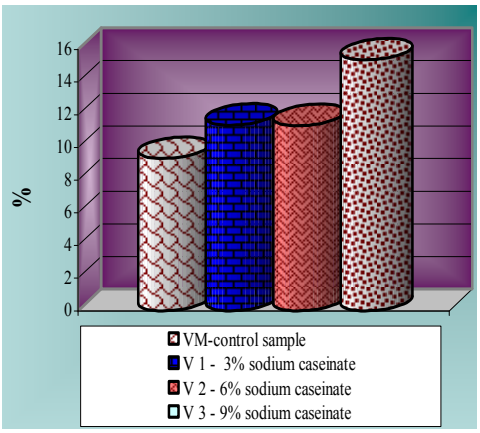

Fig. 11. Evolution of total protein in the flour

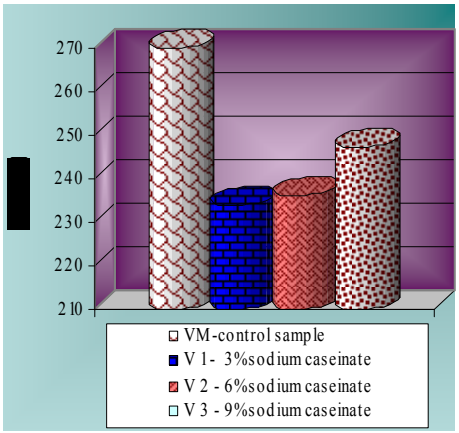

Fig. 12. Evolution of falling number (Falling number)

Table 2

Rheological characteristics of flour

Experimental version	Nr. sample	Followed indicators						
		P mm	L mm	G mm	W 10^{-4} j	P/L mm	Ie mm	W_{40} 10^{-4} j
V_M	1	50	66	17,8	110	0,75	45	82
	2	52	62	18	112	0,84	44	80
	3	54	66	17,7	111	0,82	45	84
	4	52	62	17,8	110	0,84	47	84
	5	52	64	17,8	112	0,81	47	80
Average value		52	64	17,8	111	0,81	45,7	82
V_1	1	88	59	16,8	159	1,49	35,8	125
	2	86	56	17	156	1,52	36	130
	3	90	55	16,7	157	1,64	35,8	120
	4	88	58	16,8	155	1,52	35,6	130
	5	88	57	16,8	158	1,52	35,8	135
Average value		88	57	16,8	157	1,55	35,8	130
V_2	1	150	20	10,3	156	7,50	0	0
	2	152	24	10,5	154	6,33	0	0
	3	151	22	10,7	152	6,86	0	0
	4	150	20	10,7	150	7,50	0	0
	5	152	24	10,3	153	6,33	0	0
Average value		151	22	10,5	153	6,90	0	0
V_3	1	103	9	6,74	43	11,44	0	0
	2	104	10	6,70	46	10,4	0	0
	3	104	8	6,72	44	13	0	0
	4	102	9	6,70	40	11,33	0	0
	5	102	9	6,74	42	11,33	0	0
Average value		103	9	6,72	43	11,5	0	0

According to the results represented in Figure 1-6 are observed the following:

- the samples with small additions of sodium caseinate (3% and 6%) recorded values of the analyzed indicators close sometimes of variant with 6% sodium caseinate exceeds V1;
- increasing sodium caseinate content results in a similar increase in ash and protein content, test V3 exceeding the control variant with 51% for ash content and with a 60% increase protein content.

It is worth mentioning that the Falling number has registered lower values in variants with lower addition of sodium caseinate compared to V3 and control sample respectively, for V1 falling index was 234 seconds, V2 recorded a value close (236 seconds) and V3 with 13 seconds longer than V1. In another order of ideas, it can be noticed that in all variants the fall of dough occurred in a shorter time interval compared with VM.

Also, the addition of sodium caseinate in wheat flour affects the rheological characteristics of it. This can be seen from data presented in Table 2.

CONCLUSIONS

The addition of sodium caseinate in wheat flour determines changes in the value of nutrition and in some physical-chemical parameters. Addition of sodium caseinate flour has as result its improvement in terms of protein. Sample flour without addition of sodium caseinate has 9.33% protein, while at the samples with the addition of sodium caseinate (3%, 6%, 9%) it records an increase from 17.95% (V1) to 39.26% protein.

The addition of sodium caseinate negative influence the falling index, particularly, on adding small quantities.

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