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**INFLUENCE OF THE POLYFUNCTIONAL FOOD SUPPLEMENT
“MAGNETOFOOD” ON THE QUALITY OF THE WHEAT-RYE
BREAD “KHARKIV RODNICHOK” IN THE STORAGE PROCESS**

The issues of preserving the quality of wheat-rye bread “Kharkiv Rodnichok”, enriched with the polyfunctional food supplement “Magnetofood”, in the process of storage are considered. The organoleptic analysis was carried out, physico-chemical, microbiological and structural-mechanical indices of the experimental samples of bread “Kharkiv Rodnichok” were compared with the control, which in complex most fully characterize the preservation of bread freshness during storage and the accompanying processes.

Organoleptic analysis has revealed that the introduction of the food supplement “Magnetofood” slows down the processes of staling of wheat-rye bread “Kharkiv Rodnichok”. The difference in the degree of freshness of the samples – 2 points was noted after 12 hours.

With the help of physico-chemical methods, a change in the quality indices in the process of staling of the experimental samples of bread “Kharkiv Rodnichok”, enriched with the food supplement “Magnetofood” was investigated. It was found that the most intense loss of moisture occurs in the first 24 hours of storage of bread: 12.5% – in the control and 6.25 % – in the bread “Kharkiv Rodnichok” (2 times less).

The swelling of the crumbs of bread “Kharkiv Rodnichok”, enriched with the food supplement “Magnetofood”, is, on average, 1.5 times higher than in the control; and crumbliness – on average 2.0 times lower.

The structural-mechanical indices of the experimental samples of bread “Kharkiv Rodnichok” in the process of its storage were determined. It has been experimentally shown that in the process of storage, the compressibility and elasticity of the crumb of wheat-rye bread is reduced for all the samples, and for bread “Kharkiv Rodnichok” up to the end of storage by 6.5% (elasticity) and 2.5 times (compressibility) is lower than for the control.

It is found that in comparison with the control, the specific volume in bread “Kharkiv Rodnichok” is higher by 27.0 %; and dimensional stability – by 30.5 %.

It has been experimentally proved that the porosity of wheat-rye bread decreases with time: after 24 hours after baking – by 1.0 % and 0.5 %; after 72 hours – by 5.0 % and 2.75 % (for the control and bread “Kharkiv Rodnichok”, respectively).

The microbiological parameters of the experimental samples of bread “Kharkiv Rodnichok” in comparison with the control are determined: after 72 hours QMAFAnM in bread “Kharkiv Rodnichok” is 4 times smaller in comparison with the control, and the number of Bac. subtilis spores after 10 days is 1.5 times lower.

The information analysis showed that all known food nanoadditives have a narrow effect and do not show a complex effect on the quality of wheat-rye bread. In addition, synthetic nanoadditives often have a toxic effect on the human body.

It has been experimentally found that “Magnetofood” can be used as a polyfunctional food supplement, which has a complex action: it has a beneficial biological effect on the human body; possesses sorption, complexing, emulsifying, moisture and fat-retaining properties; due to bacteriostatic and bactericidal action, it exhibits antimicrobial activity, which leads to improved quality, preservation of freshness and prolongation of the shelf life of bakery products. In addition, the food supplement “Magnetofood” at the expense of Fe^{2+} can be recommended as an antioxidant and a source of easily digestible iron and antianemic agent. Thus, the introduction of the polyfunctional food supplement “Magnetofood” in wheat-rye bread increases its quality and shelf life.

From this point of view, the results of the research are of interest not only for Ukraine, but also for the scientific world of other countries.

The study of the influence of the polyfunctional food supplement “Magnetofood” on the quality of wheat-rye bread “Darnytskyi” and “Kharkiv Rodnichok” during storage was carried out on prototype samples (control, sample 1 and sample 2). As a basic formulation in the research, the formula for wheat-rye bread “Darnytskyi” was chosen (Table). Baking was carried out at a temperature of 180–200 °C for a further 3 to 5 minutes.

Table. Recipe for experimental samples of wheat-rye bread “Darnytskyi” and “Kharkiv Rodnichok” with food supplement “Magnetofood”

Ingredients of experimental samples of wheat-rye bread	Bread “Darnytskyi”	Bread “Kharkiv Rodnichok” with food supplement “Magnetofood” (0.15 %)	
		In the form of a powder	In the form of a suspension (OMS – 0.35 %)
	Control	Sample 1	Sample 2
Net weight of one loaf, kg	0.7	0.7	0.7
The composition of the product (per 100 kg)	–	–	–
Wheat Flour Extra Class, kg	80	80	80
Flour rye peeled, kg	20	20	20
Yeast, compressed, kg	1.0	1.0	1.0
Salt, kg	1.5	1.5	1.5
Magnetofood, kg	–	0.15	–
OMS, kg	–	–	0.35

Experimental samples of the bread were stored at a temperature of (20 ± 2) °C and relative humidity (75 ± 2) %, and in regimes corresponding to the necessary storage conditions [JUU 15.8-37-00032744-004: 2005]. The evaluation of bread quality indicators was carried out in several stages: 6, 12, 24, 36, 48, 60, 72, 84 hours after baking.