

## LECITHIN IMPACT ON THE TEXTURE OF EMULSIONS BASED ON WALNUT OIL

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**Introduction.** Lipids exhibit polyfunctional properties in texture formation of different food products containing fat. Physically and chemically these foods are emulsions, which structure composition represents dispersion systems of Lipid/Aqua or Aqua/Lipid type. The stabilization of these dispersion systems is accomplished by the use of emulsifiers – surfactants that reduce the interfacial tension within the separation boundary of polar (Aqua) and hydrophobic (Lipid) phases [1]. The study was realized in order to determine the dependence of emulsifier concentration on the amount of oil used in substitution of dairy fat in spread-type emulsions.

**Materials and Methods.** Lecithin has been used as an emulsifier to stabilize the spreadable product with a high content of polyunsaturated fatty acids based on virgin walnut oil (*Juglans regia L.*). The experiment has been planned by a mathematical modeling [2] and fulfilled by the determination of analyzed samples thermostability [3].

**Results and discussion.** It has been planned a Full two-Factor, two-level Experiment (FFE 2<sup>2</sup>) and determined extreme influence factors (Table 1).

*Table 1*

Extreme values of influence factors

Influence factors		Code	X <sub>min</sub> (-)	X(0)	X <sub>max</sub> (+)	ΔX
Walnut oil	% of total fat content	X <sub>1</sub>	20	35	50	30
Lecithin	% of total product content	X <sub>2</sub>	0,1	0,25	0,4	0,3

Four samples of spreads were obtained, the thermostability of which was analyzed at t=27±1°C (Table 2).

*Table 2*

Samples thermostability

	Initial sample diameter, mm (D <sub>0</sub> )	Thermostability					
		1 h		2 h		3 h	
		mm (D <sub>K</sub> )	$T = \frac{D_0}{D_K}$	mm (D <sub>K</sub> )	$T = \frac{D_0}{D_K}$	mm (D <sub>K</sub> )	$T = \frac{D_0}{D_K}$
1	1,5	1,6	0,937	1,9	0,789	1,9	0,789
2	1,5	1,6	0,937	1,8	0,833	2,0	0,750
3	1,5	1,5	1,0	1,6	0,937	1,6	0,937
4	1,5	1,5	1,0	1,6	0,937	1,7	0,882

The data in Table 2 were mathematically processed to elaborate a regression equation using a hand-made software in Excel.

$$T_{3h} = 83,95 X_0 - 7,0 X_1 + 2,35 X_2 - 0,04 X_{12} \quad (1)$$

The equation (1) is the mathematical model of spreads thermostability variation in dependence on the concentration of vegetable fats and lecithin in product. Factor X<sub>1</sub> shows a negative influence on system stability, i.e. an increased content of walnut oil in spread lowers its rheological properties. Lecithin (factor X<sub>2</sub>), on the contrary, improves the product thermostability, but three times weaker than walnut oil destabilizes the system. The interaction factor β<sub>12</sub> is practically equal to „zero”, i.e. there is no interaction between Factors X<sub>1</sub> and X<sub>2</sub> (walnut oil and lecithin act independently).

**Conclusion.** Therefore, the concentration increase of walnut oil in emulsions lipid phase may be partially compensate by the lecithin concentration rise, not because of the interaction of these factors, but due to the concomitant increase of vegetable emulsion volume in final product.

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### References:

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