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«The using of ultrasound for development of baker's yeast activation technology»

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- **The aim of the study** is to test a new method for improving the technological properties of baker's yeast using low-frequency ultrasonic cavitation.

  The research objectives included studding the effect of ultrasonic cavitation on the specific growth rate and yeast rising power, as well as on the physicochemical and organoleptic properties of baked bread.

Materials and methods. The object of the study was active dried baker's yeast Saf-levure. To study the effect of cavitation on the yeast specific growth rate, 4 g of dry baker's yeast were suspended in flask with 210 ml of tap water at a temperature of 35°C and left for 10 minutes until the yeast was completely dissolved in water. Then the samples were processed in a "Grad" ultrasonic bath with different intensities (I) and processing times (t) at a frequency (f) of 35 kHz .

Table 1. The matrix of the experiment.

Sample No	1	2	3	4	5
f = 35 kHz					
Processing options	t = 1 min			t = 3 min	
I = 0.5 W/cm^2	-	+			
			+		
I = 1 W/cm^2				+	
					+

Results

Table 2. Specific yeast growth rate.

Sample No	Processing options	GC, CFU/h
1	No processing	2.04±0.19
2	I=0.5 W/cm^2; t= 1 min; f=35 kHz	3.61±0.36*
3	I=0.5 W/cm^2; t= 3 min; f=35 kHz	3.63±0.36*
4	I=1 W/cm2; t= 1 min; f=35 kHz	3.79±0.38*
5	I=1 W/cm2; t= 3 min; f=35 kHz	5.44±0.32*#

Note: * - the difference is statistically significant between the experimental and control samples; # - the difference is statistically significant between the experimental samples; ($P \leq 0.05$ at t critical 2.10).

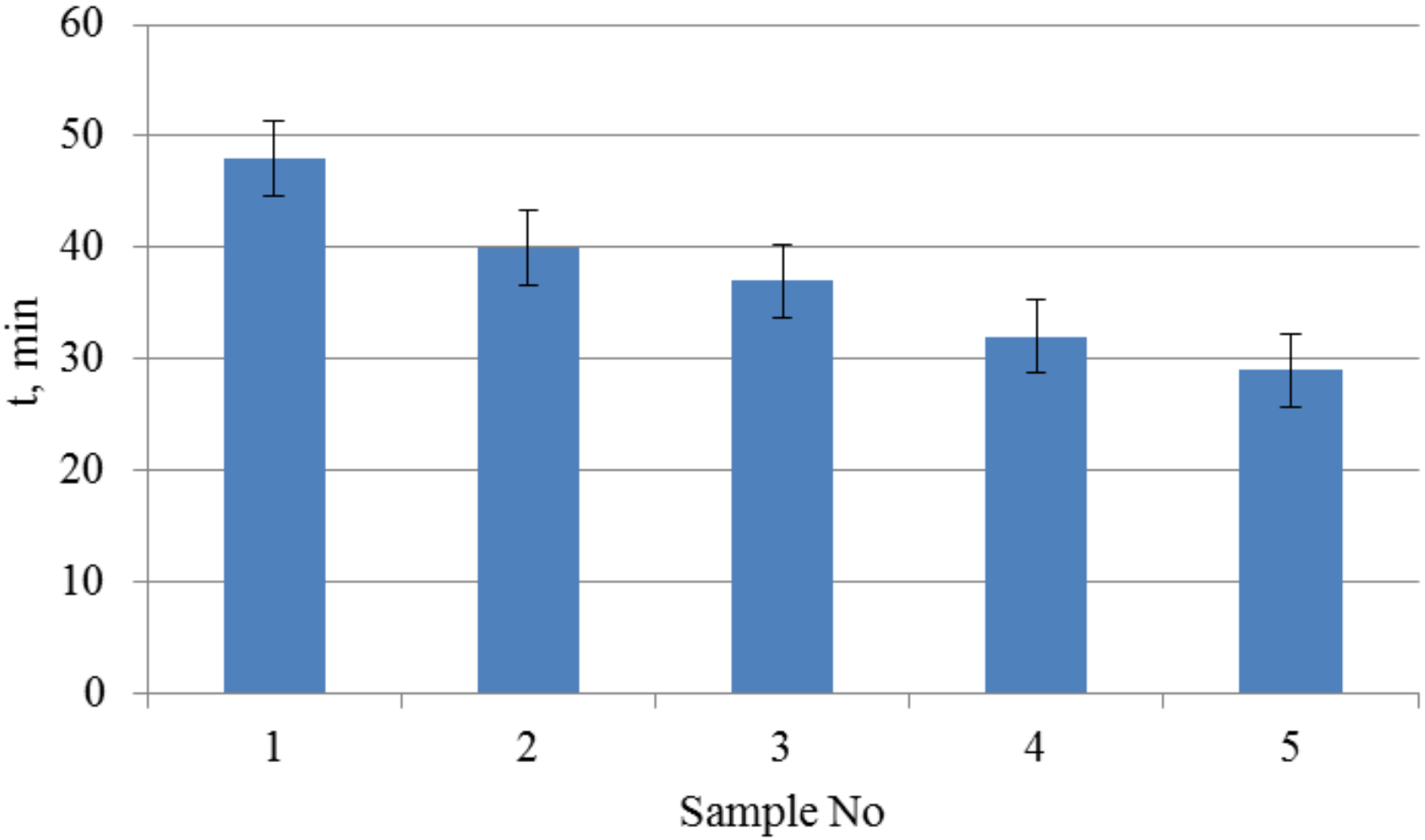

Figure 1. Yeasts' rising power
(1 - control; 2 - 1 min 0.5 W/cm2; 3 - 3 min 0.5 W/cm2; 4 - 1 min 1 W/cm2; 5 - 3 min 1 W/cm2).

Table 3. Physical and chemical parameters of bread crumb.

Sample No	Processing options	Acidity, °	Humidity, %	Porosity, %
1	No processing	1,8±0,2	40,0±3,9	20,1±1,9
2	I=0.5 W/cm2; t= 1 min; f=35 kHz	1,7±0,1	34,6±3,4*	32,7±3,2*
3	I=0.5 W/cm2; t= 3 min; f=35 kHz	1,6±0,1*	33,8±3,3*	45,4±4,4* #
4	I=1 W/cm2; t= 1 min; f=35 kHz	1,5±0,1*	32,7±3,2*	47,6±4,6*
5	I=1 W/cm2; t= 3 min; f=35 kHz	1,5±0,1*	31,5±3,1*	50,2±4,9* #

Note: * - the difference is statistically significant between the experimental and control samples; # - the difference is statistically significant between the experimental samples; ($P \leq 0.05$ at t critical 2.10)

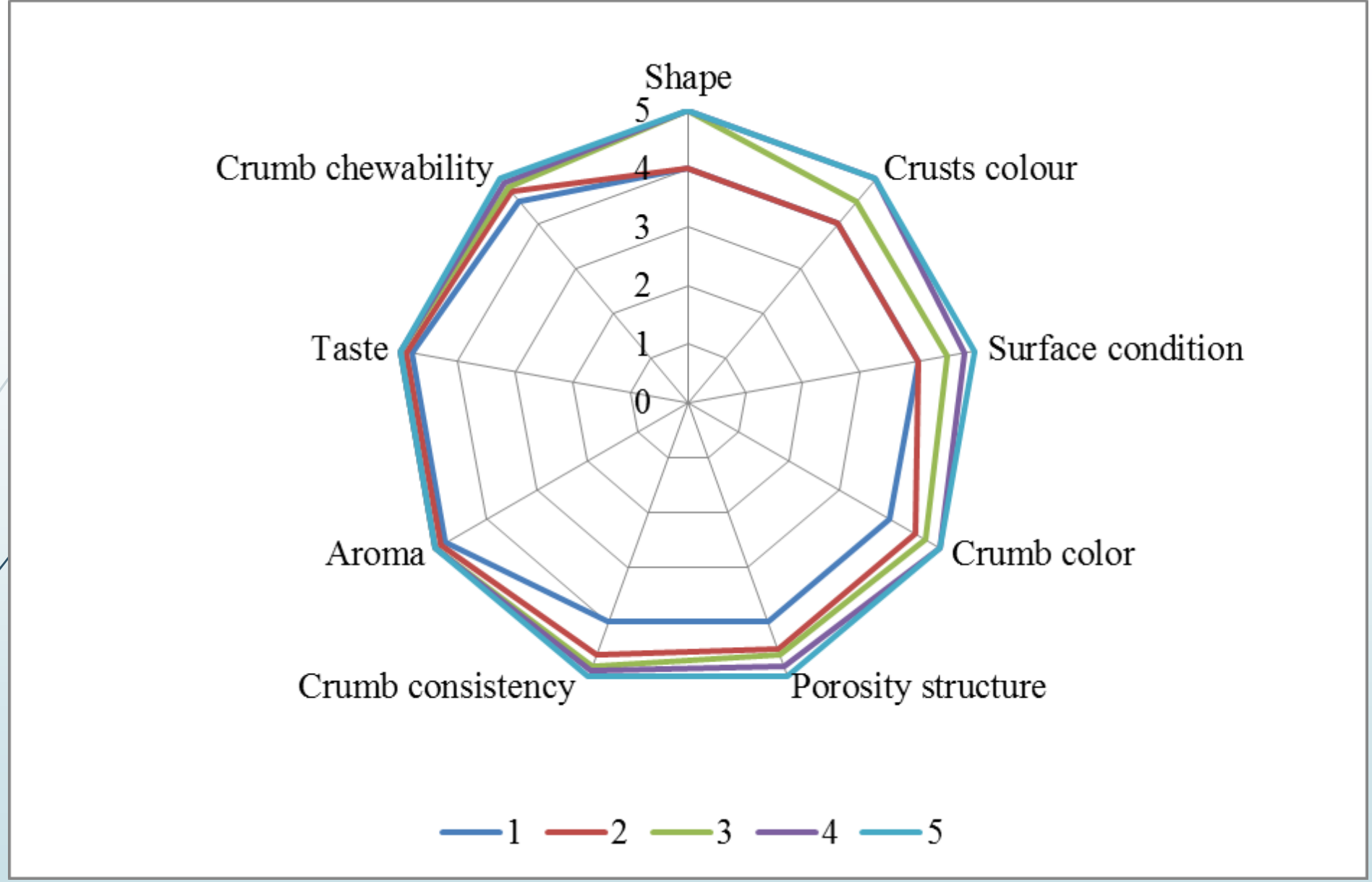

Figure 2. Bread organoleptic properties
(1 - control; 2 - 1 min 0.5 W/cm2; 3 - 3 min 0.5 W/cm2; 4 - 1 min 1 W/cm2; 5 - 3 min 1 W/cm2)

Conclusion:

Thus, pre - treatment with low-frequency ultrasound improves the technological properties of baking yeast: the yeast specific growth rate increases by more than 2 times, on average, and yeasts' rising power increases by more than 1.5 times. At the same time, baked with ultrasonic-treated yeast bread has significantly improved physicochemical and organoleptic characteristics compared to traditional bread.