

NON-THERMAL METHODS FOR WHOLE MILK TREATMENT

**Ukrainets A., Marinin A., Svyatnenko R., Pasichnii V., Kochubey -
Litvinenko O.**

Non-thermal food processing methods became popular in recent years due to extended demand for food with high quality and fresh-like characteristics.

The kinds of non-thermal processing methods that are being use to microflora inactivation, shelf-life extending without nutrient quality loss are high hydrostatic pressure, pulsed electric field (PEF), high-intensity ultrasound, ultraviolet radiation, ionizing radiation [1, 2]. Non-thermal processing methods were developed to decrease the using of high temperatures at treatment and that way avoid of negative impact of high temperatures on the odour, taste and food quality.

Milk has a special place among all foods, as it supplies human body with necessary proteins, fats, some vitamins, bioactive compounds and mineral components. The rich composition, high milk component bioavailability provides not only high food quality but also the growth of microorganisms, especially lactic acid bacteria, which leads in turn to a change in the output characteristics of this valuable product. For dealing the problem of milk fast spoilage it was proposed different kinds of treatment, most of them be used to destroy pathogens in milk. Almost all known methods of milk processing have its weaknesses. A common for all is the nutritional value reduce due to loss of vitamins and likely changes in the composition and state of biologically active substances of milk.

In this regard there is a need to develop the new kinds of milk processing which allow to safe or even improve the nutritional value of milk and provide the long shelf-life of milk.

We can consider that pulsed electric field (PEF) treatment can provide the microorganism inactivation and has no impact on vitamin content and other biological valuable compounds of milk. This suggestion is based on fact that high

intensity PEF treatment provides the microorganism inactivation at tenth of a second with treatment temperature not exceed 75-80°C [3,4].

In this study the antibacterial effect of complex high-voltage pulse processing can be explained by that the bacterial cells experience a range of effects: strong pulsed electric field and the pulsed magnetic field, hydraulic shock, the effect of ozone and temperature gradient [5].

The research of study the PEF impact on whole milk is provided in Problem Science Research Lab at NUFT together with the Department of Engineering Electrophysics at NTU "KPI". Specific of this study is application of high intensity PEF to 100 kV/cm with pulse time no more 25.

The prospects of future development of this direction is to the creation the new processing methods for whole milk based on PEF with better characteristics.

Created techniques and methods aimed to clarify the mechanisms of PEF factors in further concept development of PEF treatment theory.

1. Butz, P., Tauscher, B., (2002). Emerging technologies: chemical aspects. Food Research International 35, pp. 279–284.

2. Святненко Р.С. Вивчення впливу електрофізичних методів обробки на мікробіологічні показники харчових продуктів. / Р.С. Святненко., А.І.Маринін., О.В. Кочубей–Литвиненко. // Всеукраїнський науково – технічний журнал «Техніка, енергетика, транспорт АПК» – Вінниця, 2016. – 4 (96) – 200 с.

3. Н.И. Высоковольтные аппараты и технологии на основе комплекса высоковольтных импульсных воздействий / Н.И. Бойко // Вісник НТУ «ХП».2001. — № 16 — С.11 — 16.

4.Українець А.І. Дослідження впливу електромагнітної обробки на мікроорганізми молочної сироватки. / А.І. Українець., А.І. Маринін.,Р.С. Святненко., О.В.Кочубей-Литвиненко., М.І.Бойко . // Науковий вісник ХНТУСГ імені Петра Васеленка, 2016 – Випуск 179. 148-151с

5. Максимова, И.В. Антибактериальная активность диатомовых водорослей. Липиды и их антибактериальная активность / И.В. Максимова,

О.О. Малахова, Е.Г. Прядильщикова // Физиология растений. — 1984. — 31, № 5. — С. 944-950.