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WHEY DISINFECTION AND ITS PROPERTIES CHANGED UNDER ULTRASONIC TREATMENT

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Abstract. The effect of ultrasonic cavitation on the vital activity of microorganisms in lactowhey has been investigated. The influence of different gases on the process proceeding and oxygen role in the oxidation of whey organic components under the influence of ultrasound has been determined. The destruction of protein macromolecules takes place in whey chemical structure after ultrasonic treatment. The destruction has been investigated and branched amino and carboxyl groups in whey peptides have been observed.

Keywords: lactowhey, ultrasound, protein, decontamination, β -lactoglobulin, pH.

1. Introduction

Whey is used as the source of protein to stabilize food emulsions and dispersions. It is a product containing proteins in the amount of 0.5–1.5 %. The proteins include casein (10 % of the total amount), β -lactoglobulin (7–12 %), α -lactalbumin (2–5 %), albumin, immunoglobulins and proteoseptones. Moreover, whey contains lactoferrin, enzymes and other components. Whey proteins are the most valuable parts of milk proteins due to the presence of scarce and indispensable amino acids (lysine, tryptophane, methionine, threonine and cysteine) in them. Therefore their usage for the food purposes is of great practical importance.

Amino acids of some fractions of whey proteins have the same qualitative composition but their quantitative composition is different. Whey protein has all indispensable amino acids. Their amount satisfies or exceeds the amount of amino acids in the "ideal protein" (except aromatic, sulphur-containing ones and valine). The non-protein nitrogenous compounds present in the whey are: free amino acids, urea, creatine, creatinine and

purine bases). The amount of free amino acids is small and depends upon the whey type. This fact is connected with the deeper hydrolysis of milk proteins under the action of lactic acid bacteria and lactic acid as well [1].

In spite of the greatest content of β -lactoglobulin (BLG) in the whey, it is a poor substrate for many ferments of the food industry. Protein decomposition under the action of enzymes makes it a very strong food allergen [2]. However its protein nature is a sufficiently good medium for the microorganisms growth; thus time of BLG water solutions storage and consequently whey storage is very small. Ultrasound (US) is an effective method for homogenization of foodstuffs containing proteins, oils and solid structural elements [3]. At the same time ultrasonic treatment is an important method for disinfection of drinking water and water contained in food, e.g. milk, juice, etc. [4–6].

The effect of ultrasound on the foam- and emulsion-forming of wheat fiber increases with the increase of its electrophoretic and rheological properties [7]. Under proteins ultrasonic treatment the volume of foam and its stability slowly increase with the increase of ultrasound power and become strongly pronounced at 100 % capacity.

Sukmanov V. *et al.* [8] carried out investigations concerning the rheological properties of eggs. The experimental conditions were: initial concentration of bacteria of intestinal bacillus group within the range of 108 CCQ/ml (cells of conventional organism), the ultrasonic treatment of 20, 30 and 40 W, and 200 MPa at US frequency of 25 kHz for 400 s (100 s of the time is a period of pressure increase and decrease) and complex treatment: ultrasound + high presser (US + HP). The results show that eggs US-treatment within the mentioned range of power increases the temperature twice. The HP treatment ensures eggs sterilization after 350 s and complex treatment – after 300 s.

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locked in economic inequality and the fall of the middle class In *The Great Mistake* Newfield asks how we can fix higher education given the damage done by private sector models The current accepted wisdom that to succeed universities should be more like businesses is dead wrong Newfield combines firsthand experience with expert analysis to show that private funding and private sector methods cannot replace public funding or improve efficiency arguing that business minded practices have increased costs and gravely damaged the university's value to society It is imperative that universities move beyond the destructive policies that have led them to destabilize their finances raise tuition overbuild facilities create a national student debt crisis and lower educational quality Laying out an interconnected cycle of mistakes from subsidizing the private sector to the poor get poorer funding policies Newfield clearly demonstrates how decisions made in government in the corporate world and at colleges themselves contribute to the dismantling of once great public higher education A powerful hopeful critique of the unnecessary death spiral of higher education *The Great Mistake* is essential reading for those who wonder why students have been paying more to get less and for everyone who cares about the role the higher education system plays in improving the lives of average Americans

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