

## Effects of high hydrostatic pressure treatment on the properties of different egg white-based dairy product alternatives

K.I. Hidas<sup>1\*</sup>, A. Tóth<sup>1</sup>, A. Nagy<sup>2</sup>, P. Penksza<sup>2</sup>, I. Nyulas-Zeke<sup>1</sup>, L. Friedrich<sup>1</sup> and Cs. Németh<sup>2</sup>

<sup>1</sup>Szent István University, Department of Refrigeration and Livestock Products Technology, H-1118 Budapest, Ménesi Street 43-45., Hungary

<sup>2</sup>Capriovus Ltd., H-Szigetcsép, Dunasor 072/73 hrsz., Hungary

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\*e-mail: Hidas.Karina.Ilona@phd.uni-szie.hu

During hydrostatic pressure treatment, the food is treated with high pressure, which causes the microorganisms to be partially or fully inactivated. Changes in taste, color and texture of products are negligible.

In our experiment, we worked with products of Capriovus Ltd based on egg white, which are alternatives to various dairy products. The development of the product group was induced by the consumer demand for lactose and milk protein-free dairy analogues. The product family includes a semisolid rugged egg white product (cottage cheese alternative) made of fresh hen eggs, with the separating of the egg yolk. After that come a homogenization process, pasteurization and concentration of the egg white. Other products are an egg white based cream product with high viscosity (cream cheese alternative), an egg white based cream product with lower viscosity (sour cream alternative), and an egg white based drink (milk alternative). An additional enzymatic treatment is also used in the case of egg-white creams and drink. The dry matter content of drink product is adjusted to 6% by adding water.

Rugged, two types of cream and drink samples were packed in polyethylene film and vacuum sealed. Subsequently, they were subjected to hydrostatic pressure treatment of 200, 400, and 600 MPa for 2 minutes to determine the pressure treatment that greatly increases the shelf life but does not cause significant changes in the organoleptic properties. High hydrostatic pressure treatments were performed by Resato FPU-100-2010 equipment. Pressure treated and non-pressurized (control) samples were subjected to microbiological testing or sensory evaluation to determine the maximum pressure that can be applied to each product. Microbiological analysis included determination of total viable count and the number of *Enterobacteriaceae* in samples by pour plate method. Total viable count was identified with Nutrient agar after 48 hours of incubation at 37°C. The number of *Enterobacteriaceae* was determined with Gelose VRBG agar after incubation for 24 hours at 30°C. After incubation, colony forming unit (CFU) were enumerated and expressed as log<sub>10</sub> CFU/g. In addition, the presence of pathogens (*Salmonella spp.* and *Listeria spp.*) was investigated in all cases. During the expert sensory evaluation we examined whether there was any change in the texture, structure, smell and color of the samples due to the high pressure treatment. After determining the appropriate pressure values, a shelf life test was performed, in which the total viable cell count was examined.

All samples were free of microorganisms of *Salmonella* and *Listeria spp.* Results of microbiological and expert sensory analysis show, that the desired microbial inactivation and slight change of organoleptic properties were achieved with high pressure treatment of 400 MPa in the case of rugged and viscous cream egg white-based products. This treatment had no effect on the color and odour of samples, and it resulted in a

slightly creamier texture and the disappearance of blisters. We determined a decrease of 1,5 orders of magnitude in total viable count in both samples. Number of *Enterobacteriaceae* decreased 1 order of magnitude in rugged sample and it was under the detection limit in the viscous cream sample. 600 MPa was the optimal pressure value for egg white-based product with lower viscosity and for the egg white based drink. There was no change in color, odour and texture of these products, but we could detect the disappearance of blisters. Total viable count decreased more than 3 orders of magnitude and the number of *Enterobacteriaceae* was below the detection limit in the samples treated with a pressure of 600 MPa. Results of the self-life test show, that the rugged sample can be stored for 35 days, while the viscous cream for 37 days. The cream sample with lower viscosity and the drink, which were treated with a pressure of 600 MPa, were stable for 90 days.

In summary, high hydrostatic pressure treatment is an applicable alternative for prolongation of shelf life of egg white based milk product alternatives. In addition, it has a slight effect on the organoleptic properties. However, it is necessary to examine the costs of investment and operation for industrial application.

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