Hungarian University of Agricultural and Life Sciences

Institute of Food Science and Technology

Product Development and Technology Engineering, Department of Livestock Product and Food Preservation Technology, Department of Bioengineering and Alcoholic Drink Technology

ISAM AL-JANABI

Egg White and Fruit Juice Fermentation by Probiotic Bacteria

Probiotic is a relatively recent word meaning "for life" that is used to describe bacteria that have been linked to health benefits for people and animals. Functional non-dairy products are a popular choice among individuals who are lactose intolerant, have a milk protein allergy, or follow a plant-based diet. They offer a wide range of health benefits and can be used in many recipes as a substitute for traditional dairy products.

ToTu products made from egg white is lactose, milk, fat and preservative free and has a low calorie but high protein content. It can be suitable alternatives for those who cannot consume dairy products due to a medically diagnosed illness or who just want to change their lifestyle and to improve their health. It will be possible to develop any fermented product made from the ToTu drink, which can be a new dairy-free alternative for people suffering from lactose intolerance or milk protein allergy. The purpose of my study was to develop the nutritional and sensory properties of the egg white drink (ToTu) and make it into a fermented probiotic product, and discover the properties of the probiotic-enriched ToTu drink. During the research, the fermentability of ToTu drink using two strains of probiotic bacteria, *L.casei* 01 and *L.salivarius* CRL1328 was investigated and the effects of adding fruit juices (pineapple and strawberry juices) 25% fruit content in terms of bacterial growth. Where the following parameters were measured for the fermented ToTu drink with probiotic bacteria and fruit juices during and after fermentation and during six weeks of refrigerated storage at (4±1°C) by investigating the pH values using a digital pH meter (Mettler-Toledo GmbH, Switzerland), viscosity measurement by MCR 92 Anton Paar Rheometer, microbial cell number and viability which was measured by total plate count (TPC) method, color measurement with Konica-Minolta CR-400 chromameter, sensory evaluation and changes in total protein content during the fermentation process by gel electrophoresis technique. Four samples were prepared by mixing them separately with egg white drink. and pineapple or strawberry juice at the ratio of 3:1 (v/v) respectively. The fermentation was inoculated individually by 1% of *L.casei* 01 and *L.salivarius* CRL1328 .and incubated at 37 °C under aerobic conditions

for 16-24 hours. The results showed that there was a significant decrease in the pH value of all the tested samples during 24 hours of fermentation from initial pH 5.55 to 3.80 ±0.01, and this is a good indicator to protect the product from microbial growth by increasing the shelf life of the product. At the same time, egg white drink with pineapple juice inoculated by *L.casei* 01 recorded the highest viable cell number growth during fermentation from 7.38 to 8.97± 0.13 Log10 CFU/mL. For the rheology test during viscosity measurement, results show the Newtonian behavior for all fermented egg white samples at a temperature of 20°C was determined between the shear rate 10 to 500 (1/s). The color measurement is important for the quality because it will affect the color of the final product. In the case of L* the highest L* values and the lightest are the pineapple with *L.salivarius* CRL 1328 followed by the pineapple juice sample with *L.casei* 01, respectively. The results also showed that there were no significant differences in the colors of the fermented samples by *L.casei* 01 or *L.salivarius* CRL1328, as a reduction in some protein intensity was observed after 16 hours of fermentation, since the probiotic bacteria had a proteolytic system which decompose the proteins into peptides that required for its growth. The egg white and strawberry juice sample fermented by *L.casei* 01 recorded the lowest rate of protein decomposition for ovalbumin than others. Egg white and strawberry juice fermented by *L. salivarius* CRL 1328 recorded the highest value of fruity odor, fruity flavor, overall odor intensity, sweet taste and color hue, which makes it the best sample in sensory evaluation from the others. During the storage stability test, *L.casei* 01 significantly outperformed *L.salivarius* CRL1328 in terms of viable cell number for six weeks. The growth of *L.salivarius* CRL1328 decreased significantly in the fourth week during storage at 4°C, while no significant change was recorded in the pH value of all samples.

We observed that the experimental setup significantly affects the end results. The study showed promise and delivered good results in creating new functional non-dairy products, and it can be depended upon to further improve the quality of food and raise its help with sustainability.