Low Caloric Yogurt and Its Powder Production and Improvement of Their Physicochemical Properties

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Abstract

The aim of this project was to improve physicochemical properties of set yogurt and yogurt powder especially syneresis. Syneresis also known as wheying-off which was defined as defect of set yogurt showing weak curd unable to trap water inside and leak to the surface. To reduce the syneresis, fructo-oligosaccharide (FOS) from 0% to 20%w/v was added in combination with additive proteins (0 - 2%wt) to produce a yogurt curd from various types of milk. Four types of milk that used in this study are non-fat milk, low fat milk, full fat milk and skimmed milk powder. Different types of milk induced a significant effect on syneresis of set yogurt. Higher fat content containing in milk showed lower slightly syneresis percentage. Strongly decrease in syneresis showed in the combination of high fat and FOS. As results, higher FOS concentrations decreased more syneresis but unfortunately weaken firmness of prepared yogurt. Further, three types of proteins which were whey protein isolate (WPI), sodium caseinate (NaCn) and egg albumin (EA) in addition with 10% w/v FOS on syneresis were studied. As results, protein immobilized water, later to decrease water separation in its curd. Among all, WPI showed the highest ability to prevent syneresis and still maintain high firmness of prepared yogurt. When mixed, interaction effect between WPI and FOS has been significantly introduced. 1% WPI with higher FOS gave lowest syneresis. Rather, WPI had stronger effect to reduce syneresis more than FOS on non-fat yogurt. According to rheological measurement all developed yogurt samples are solid-like behavior with yield stress. Higher concentrations of WPI dramatically increased yield stress and G′ as solid-like properties where FOS showed less impact. After drying, the addition of FOS and WPI increased total solid content and yield percentage of developed powder. Morphology of powder studied by scanning electron microscope showed that FOS and WPI form multi-layer cover a network of milk protein micelles globule. Stronger network are built up in the presence of milk fat. Further, sensory analysis was investigated on solely set yogurt by Check-all-that-apply (CATA) along with liking and acceptance tests. CATA result showed that main characteristics that differentiate samples were taste attributes which are sweet and sour as well as texture and mouthfeel attributes which are firmness and slow rate of melt. With 10% FOS and WPI, liking score of sweet, sour, overall flavor, mouthfeel and overall liking had higher than those without additives and commercial product. FOS gave sweeter and less sour taste where WPI gave firmer mouthfeel of the products, however, its concentrations didn't have significant effect on the mouthfeel and overall liking. To conclude, FOS caused lower syneresis but only in the presence of fat in milk. Also, WPI decreased syneresis with synergist with FOS addition. The combined effect of FOS and protein in set yogurt further increased yield percentage of freeze-dried yogurt powder. They also showed a positive effect to sensorial properties. FOS contributed to sweetness and smooth texture where WPI contributed to a firmer texture. People may have potential to prefer non-syneresis, firmer and low caloric sweet yogurt by the addition of these natural ingredients.