Title Effect of high-pressure induced ice I/ice III-transition on the texture and microstructure of fresh and pretreated carrots and strawberries

Author S. Van Buggenhout, T. Grauwet, A. Van Loey and M. Hendrickx

Citation Food Research International, Volume 40, Issue 10, December 2007, Pages 1276-1285

Keywords High pressure-low temperature processes; Ice I/ice III transition; Texture; Microstructure; Carrots; Strawberries

Abstract

The effect of pressure treatments at −25 °C between 150 and 300 MPa, indicated as high-pressure induced crystallization (HPIC) processes if formation of ice III occurs during pressurization, on the texture and structure of frozen strawberries and carrots were studied. The formation of ice III, which has been proven to inactivate the microbial load of a frozen food, occurred when pressure was increased to 250 MPa or higher. Volume changes related to the formation of ice III affected the cell wall integrity of infused frozen strawberries and caused a 42–46% reduction of the fruit's hardness. These textural and structural changes were not affected by the pressure holding time (30 s versus 10 min), and thus by partial thawing during the pressure holding time, and were absent in frozen fruits treated at pressures lower than 250 MPa. The structure and texture of frozen carrots were respectively not and only slightly altered during high-pressure–low-temperature (HP–LT) treatments at all pressure levels studied. However, if carrots were blanched (30 min at 60 °C, 2 min at 90 °C and a combination of both) prior to freezing, structural damages during pretreatment and freezing made the tissue, in terms of both structural and textural quality, unsuitable for a post-freezing HP–LT treatment. These observations should be taken in mind when analyzing the possibilities of HPIC processes as a tool for post-freezing microbial reduction when applied to tissue based systems.