THE ROLE OF WATER PHASE IN FORMATION OF MICROSTRUCTURE OF BUTTER WITH RED BEET POWDER ADDITIVE

T.A. Rashevskaya, I.S. Gulyi, G.A. Simachina, N.A. Pryadko,
I.Y. Goyko and N. Tobilevich

Ukrainian State University of Food Technologies,
Vladimirskaya 68,Kiyv,Ukraina

ABSTRACT

Electron microscopic investigation stated that saccharose contained in beet powder favoured the formation of cell structure on the edge of water and fat phase, and increased the mechanical strength of fat globule cover. This fact provided the formation of granular structure and plastic consistence butter with beet powder additive.

INTRODUCTION

Nowadays, the nutrition products possessing prophylactic and medical properties is of great importance in Ukraine. As a result, a new hind of butter with red beer cryopowder addition was developed in USUFT. The beet cryopowder for butter was obtained by sublimation drying[1]. The medical and biological tests made the conclusion about prophylactic medical properties of beet cryopowder as butter additive.

Butter with beet cryopowder additive possesses the refined taste and strongly marked plasticity. In was given a high organoleptic mark[2]. The high plasticity could be explained by interaction of beet cryopowder and butter water phase.

EXPERIMENTAL

The interaction of beet cryopowder and butter water phase was studied by electron scanning microscopy method. The samples for research were prepared by breaking the instantly frozen butter (–160°C). The frozen samples were broken in deep vacuum, then a platinum-carbamide layer was applied on broken surface.

The following butter samples were investigated: addition free sample and sample with beet cryopowder additive (beet cryopowder sample). The butter itself was manufactured by method of high fatty cream transformation, which makes 50% of overall butter production in CIS countries. Both samples were examihed:1-immediately after manufacturing (fresh); 2-being stored at 5°C for 10 days; 3-being stored at –18°C for 6 months.

RESULTS AND DISCUSSION

The microstructure of fresh control butter sample could be classified as homogeneous, because it contained damaged fat globules. They were plunged into butter interglobular fat phase where water phase was dispersed. Some fat globules could be seen outside. The surface of fat globule consisted of partially destructed monomolecular layers. The microstructure of control butter sample after storage at –18°C consisted of foliated lamella crystals covering fat globules. The butter consistence was oversold and crumbling

The microstructure of fresh beet cryopowder sample could be classified as granular, for it contained large number of undamaged fat globules covered by suspension layer in butter plasma. On fat globules surface and in interglobular space there could be matched the formation of small knobby structure. During the storage process at any temperatures the knobs formed cell structure, this was related to interaction of butter water phase and the beet cryopowder components.

The red beet cryopowder contained 70% of sucrose, which diluted in the water phase of butter and was actively exposed to hydration due to hydrogen links established. The presence of hydrate and solvate layers on fat globules surface and on covers of fat globules fragment corresponded to accumulation of sucrose on the surface of water and phases. The formation of edge layer dressed with the diluted component before the front of fat phase crystallization lead to morphological changes of edge surface. First, it got broken in form of knobs. Second, the cell structure was formed, during the storage process.

The sucrose molecules participating in formation of adsorbtionally solvate layer around fat globules increased the mechanical strength of their covers. That's why in process of butter formation the considerable part of fat globules were not destructed, thus forming granular structure providing plastic consistence of butter. The plasticity was also enhanced by the presence

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