

The Technology of Butters' enriching with carrots' Powder

T.O Rashevska^a professor, O.M. Vasheka^b, assistant

a - National University of Food technologies, Kiev, Ukraine, E-mail: rashevsk@mft.edu.ua

b - National University of Food technologies, Kiev, Ukraine E-mail: Oksana.Vasheka@meta.ua

INTRODUCTION

The main scientists of the world consider that the situation of bad health and appearing some chronic diseases in many cases is associated with bad nutrition. Because of this situation one of the main problems nowadays is new products producing that are reach for biological active substances. It should be a harmonious combination of traditional food with natural additions. On the basic of conventional dairy lines we developed the technologies of functional types of butter with herbal additions. We also provide insertion additives to the finished butter during its mechanical treatment. The method consist of insertion the specially prepared suspension of the herbal into the butter during its mechanical treatment. The selection criteria of powders were the functional characteristics and harmonious combination with the taste of the product. Immunomodulatory, oncology and radioprotective properties of carrot are well-known and widely used around the world. That is why, the new type of butter with carrot powder was developed.

MATERIALS & METHODS

The subject of research for the microstructure's study were water suspensions of carrot powders, obtained by thermal, convection and cold spray drying (powder Karotte-100 made by "OBIPEKTIN AG, CH-9220 BISCHOFZELL", Switzerland). For making carrot's microscopic suspensions' preparation the powder was restored in water at 30 ... 35 ° C. From the received suspensions a preparation was made for viewing on an optical microscope MIN-8 with light "on passing" by the standard procedure. Were investigated the samples of butter with carrot powder of convective and cold spray drying. The test samples were made by the described technology of enriched butter producing. The powder influence on the phase transformation in butter's fat has been studied by differential scanning calorimetry methods.

RESULTS & DISCUSSION

We analyzed the microstructure of water solution of the additives. It was established that suspension of the powder, produced by cold spray drying contains big and small parts (15-80 micrometers, 1-5 micrometers). Microstructure of recovered particles are similar to particles of fresh vegetable. The suspension of powder, produced by thermal drying contains remains of destroyed tissues. Puring swelling they stick together. The suspension of powder, produced by convectional drying contains recovered parts with size – 15 micrometers.

The study of phase transformations in milk fat of butter samples was performed by using the thermal differential scanning calorimeter (DSC). DSC curves showed the melting peaks of group's of high-melting (HMG), medium-melting glycerides (MMG) and a peak of compatible liquid phase and low-melt glycerides (LMG). The curves showed their melting temperature (Figure 1). In Figure 1 the DSC curves of just prepared samples of butter. In curve (Figure 1 I, a) the control sample we clearly see the interval with a peak melting - 32,4 ° C, which corresponds to the group HMG. Melting peak at 13,2 ° C is in the temperature interval of 8 ° C to 25 ° C and corresponds to a compatible melting compatible of MMG and LMG. The largest peak temperature of 3,8 ° C was formed by melting of LMG and liquid phase of product. In the curve the jump of devitrification at -31 ° C is marked. The process of devitrification

passes without change of phase, and therefore it is not a phase transition. During this process the process of "unfreezing" of mobility glycerides of milk fat is going on.

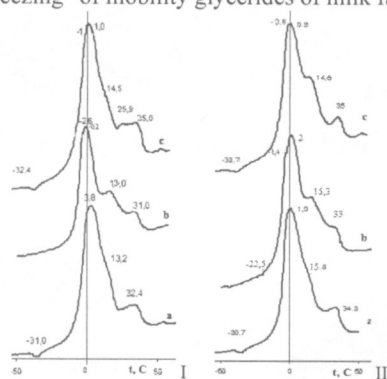


Figure 1: Curves of butter's specific heat
I – fresh-made butter; II – after storage (+5 °C)
a – control sample; b – butter with carrot powder of convective drying; c – butter with carrot powder of cold spray drying.

When comparing the DSC curves of fresh made butter with the carrot powder of convective drying and the control sample, we can see that the introduction of additives leads to the appearance of distinct melting peaks diffuse of MMG and HMG. Their melting temperatures in butter with powder of convective drying are 1,4 and 0,23 °C lower than melting temperature of the peaks in control sample. The peak temperature of LMG and liquid phase of product decreases for 3,6 °C. On the DSC curves of butter with powders two peaks of LMG and liquid phase of product are present. The melting temperature of peaks in comparison with control sample reduced to 2,8 °C after adding the powder of CSD. So, there are two peaks of MMG and LMG with melting temperatures of 25,9 and 14,5 °C. The melting temperature peak of HMG of 35 °C. It is 2,6 °C more to conformable peak

melting from control. The general trend for both types of butter with the powder compared to the control is reducing the melting temperature peaks compatible LMG and liquid phase of product. This gives evidence shows that the powder presence in the system promotes differentiated edging of LMG that are unable to crystallize during the formation of crystalline phases of butter in the area of lower temperatures. We believe this is due to the additives' presence that and their ties in a fatty phase of the product that is not typical for butter components. During control sample storage the temperature of the melting peaks of MMG and HMG grow on 2,6 and 1,9 °C. This is due to glyceride's recrystallization processes. A decline of melting temperature of LMG and liquid phase of product of butter for 2,8 °C also shows that. The processes of recrystallization of glycerides' separate groups undergo during the storage of butter with carrot powder of convective drying. This is evidenced by the growth of the temperature of the melting peaks of HMG, NMG and LMG with liquid phase of product. In the butter with powder of CSD the melting temperature peaks of glycerides individual groups vary slightly after storage. One melting peak of MMG disappears. That's why, manifested peaks of melting of LNG and HSV temperatures 14.6 and 35 °C are shown more clearly on the curve.

CONCLUSION

According to the microstructural studies it was revealed that production of carrot powder by cold spray drying contributes to the formation of particles with a size 1-5 micrometers and saves the powder component properties. The melting curves of butter showed that the introduction of carrot powder leads to displacement of fusible glycerides of the solidification front into the zone of lower temperatures. Insertion of additives of cold spray drying leads to reducing the temperature melting peaks of compatible LMG and liquid phase product to 2,8 °C and to increasing the melting temperature peak of HMG to 2,6 °C in the fresh butter. During further storage of butter with carrot powder of cold spray drying the temperature melting peaks of glycerides vary slightly. Adding the powder of convective drying reduces the melting temperature of compatible LMG and liquid phase product at 4 °C. During further storage the temperature melting peaks of glycerides groups gradually increase and are close to the melting temperature of the control sample.