

The Effect of Heat Treatment on Crystallization Behaviour of Pure Pork Fat and Emulsified Pork Fat - A LF-NMR Study

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Controlling the fat crystallization is a key process in the production of many food products such as chocolate and ice cream. Fat crystallization in O/W emulsions is a complex phenomenon affected by many factors, such as emulsion droplet size, droplet-droplet interaction, polymorphism of fat, effects of cooling rate and subsequent temperature variation. Previous studies have shown dissimilarity between crystallization behaviour of raw pork fat and pork fat as an ingredient in liver pâté. This dissimilarity might be due to the present of the other ingredients in the liver pâté; these ingredients might induce heterogeneous nucleation acting as catalytical impurities especially at increasing supercooling. Another explanation of the dissimilarity of the two products might be the formation of the emulsion network in the liver pâté, and this network might reduce the mobility of the fat in liver pâté and thereby have an influence on the dissimilarity between the crystallization behaviour of the two products.

In this study, we have investigated the crystallization/melting behaviour of pure pork fat (lard and leaf fat) vs. pork fat in an emulsion – a Danish style liver pâté – with the purpose of investigating the opportunities to control sensory properties, in particular the mouth feel, of the pâté. The systems were studied during heating and subsequent cooling and reheating with Low Field ¹H Nuclear Magnetic Resonance (LF-NMR). The relaxation curves were analyzed using distributed exponential fitting, which indicated two major proton populations are present both in the pure fat and the emulsion containing fat. These two components clearly describe the melting of fat and the crystallization of fat, respectively. The results are compared to the results of the X-ray and DSC (Differential Scanning Calorimetry).