USE OF MULTIPLE EMULSIONS AS FAT SUBSTITUTES IN MEAT PRODUCTS

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Abstract – Meat and meat products are contained high amounts of fat. Processed meat products are perceived as unhealthy by consumers. Functional meat products may represent an opportunity for the meat industry to improve this perception. For this purpose, it is known that multiple emulsions enable products which are made healthier by reducing the oil in the food. In recent years, research has been conducted on the use of multiple emulsions as fat substitutes, particularly in emulsifier type meat products. In this study, reduction of fat content in processed meat product, applications of multiple emulsions as fat substitutes in the meat products formulation has been compiled.

Key Words – healthy meat product, improving fat reduction, water-in-oil-in-water emulsions (W/O/W)

I. INTRODUCTION

Fat components of meat and meat products in the diet are one of the most significant changes and that such products may help lipid profiles improve nutritional quality. The functionality and texture of the lipid phase (solid animal fat) found in meat products have a significant effect on various product properties. Therefore, reducing or replacing animal fats with oils is a difficult technique. However, it is necessary to define approaches that have similar characteristics and at the same time are compatible with health advice. Thus, the strategies used for stabilizing and structuring the oils include strategies based on the formation of structural emulsions [1]. Multiple emulsions are defined as an emulsion of an emulsion. In multiple emulsions, water in oil (W/O) and water in oil (O/W) phases coexist. There are two main types of multiple emulsions, "water in oil" (W/O/W) and "oil in oil" (O/ W /O). Multiple emulsions may offer some advantages for food applications. The first purpose of (W/O/W) multiple emulsion applications is to encapsulate various flavors, bioactive compounds or sensitive food ingredients. This ensures that components are kept at a controlled level throughout consumption and digestion. The second purpose of (W/O/W) multiple emulsion applications is to allow the production of healthier and low-fat food products. The researchers targeted to evaluate the utility of multiple emulsions as fat replacers in meat systems showed that multiple emulsions had promising effects on major fat reduction and functional properties [2].

REDUCTION OF FAT CONTENT IN PROCESSED MEAT PRODUCT

Three main purposes related to the improvement of fat content in meat reformulations have been determined: reduction of total fat (and energy content), reduction of cholesterol and modification of fatty acid profiles [1]. Fat reduction can be achieved by lowering the fat content of the livestock by means of low-fat meat raw materials or dilution. Dilution consists of reducing fat density by adding water with low-calorie content and other ingredients (fat or carbohydrate-based fat substitutes). Fat content has an important effect on various product characteristics (such as flavor, texture and heat transfer, etc.) and therefore it cannot be simply reduced or modified. Reformulating a meat product should consider the sensory, nutritional, safety, and technological effects on the final product. It is difficult in fact to go below 10% fat in ground meat emulsions. On the other hand, replacing fat with water can lead to a softer texture [3].

II. APPLICATIONS OF MULTIPLE EMULSIONS AS FAT SUBSTITUTES IN MEAT PRODUCTS FORMULATION

When certain structural properties are needed, multiple emulsions can be designed for the intended food. In this regard, aspects relating to the characteristics of the different emulsifiers as well as the oil and water phases of W/O/W emulsions are the main composition factors for the purpose of stabilizing and structuring. Furthermore, several approaches have been proposed to modify lipid phase characteristics for structuring purposes However, the

most promising procedure to obtain a solid material is intervention on the outer aqueous phase. The strategies reported in the formation of hydrogels are also valid in this case. Various soluble polysaccharides (pectin, alginate, gellan gum, etc.) were added to the outer aqueous phase of the double emulsion to act as thickening and gelling agents. Many fat replacers have been used to improve texture in low-fat meat products. Garcia et al. (2008) improved the texture and water retention of low-fat and low-salt sausages using mixtures of carrageenan and locust bean gum with only minor effects on sausage color [4]. There has been very little use of double emulsions in food applications including as fat replacers (food ingredients) in meat reformulation processes were the first to improve fat content (in quantitative and qualitative terms) by replacing pork backfat in a meat system with W/O/W prepared with olive oil. This research confirmed the feasibility of using double emulsion (although in liquid form) as a technological strategy for the development of healthier meat product [5].

III. CONCLUSION

Structured lipids are added to meat products as alternatives to animal fat, and therefore their composition and physicochemical characteristics need to be considered since they affect the quality of the reformulated products. A deeper understanding of structured lipid characteristics will, therefore, facilitate their use, help to elucidate their role in the protein matrix structure and help to improve the quality of the healthy meat-based food systems to which they are added (as fat analogs). It is also important to gain a thorough understanding of the behaviour of structured lipids during processing, aspects which must be considered when designing a multiple emulsion system for a particular meat product application.

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