INVESTIGATIONS OF THE POTENTIAL USE OF LECITHIN IN YUGOSLAV MEAT PRODUCTS*

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INTRODUCTION

According to Schafer and Wywiol, 1988, no one of foodstuffs consumed by people can be compared with lecithin, because of its combine nutritive and functional effect.
Functional properties of lecithin derive from the chemical structure of phosphatides. Fatty acids represent unpolar part of the phosphatid molecule - lipophilic, and phosphodiesters are bipolar and have hydrophilic character. Due to these properties, soybean lecithin is a surfac active compound having the properties of colloid - dispersive agent, wetting agent and crystallization control agent. Various types of lecithi are widely applied in the production of margarine, conditory and in the processing of snack and instant products and milk products.
In the available literature, we have found few data on the use of lecithin in meat products, and in Yugoslav meat products lecithin has no been used up to now (Wagner, 1992; Worrall, 1981).
All facts on functional - technological and nutritive properties of lecithin were a motivation for the examination of the possibility of its use and the definement of an optimum way of its application in some Yugoslav meat products.

MATERIAL AND METHODS

Paste - like lecithin (Sojaprotein, Bečej, YU), Emultop - powdered hydrolysed soybean lecithin (Lucas Meyer - Germany) and lecithined soybean flour (Soprolec) with the lecithin content of 6% ("Sojaprotein" - Bečej) were used for these examinations.

EXPERIMENT I

Emulsions were produced in laboratory conditions by using different ratios of lecithin, water and fat. Thermostable emulsion was examined at the temperatures of pasteurization and sterilization. Preperation of emulsions and determination of functional properties of lecithin are described in the Institute s methods (Polić M., 1989).

EXPERIMENT II

Technological properties of Soprolec were examined in industrial conditions in ham processing (tin, foil) and in an emulsified product (Paris sausage). For ham production, Soprolec was used in the quantity of 2.20% and 2.56% and for Paris sausage - 2.50%.
Cooled pork with 3.5% of fat, in pieces of about 4cm in size, was used for ham production. In the procedure of hydration and curing and during mechanical treatment of meat, curing brine of definite composition and suspension of Soprolec with water (1 : 2) were used. The composition and quantity of curing brine as well as the quantity of suspension were dependent on the rate of meat hydration (28.58% and 33.33%). Mechanical treatment lasted 18 hours (15 minutes massaging and 15 minutes pause). The products were thermaly treated at the pasteurization temperature.

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For Paris sausage production, beef and pork, firm fatty tissue and Soprolec - water suspension (1 : 2) were used. Usual ingredients, additives and spices were added. Thermal treatment was carried out at the pasteurization temperature.
Basic chemical composition of meat, hydrated meat, ham and Paris sausage was determined by the AOAC methods and the content of free and bound water by the modified method of Grau and Hamm (Polić M., 1989).
Sensory evaluation of products was done with number values from 1 to 5, whereby surface appearance, cut surface appearance, consistency, colour, odour, taste and general impression were evaluated (Baltić, 1992).

RESULTS AND DISCUSSION

Tables 1 and 2 give the results of emulsifiability and thermostability of emulsions, at pasteurization and sterilization temperatures, for paste - like lecithin and powdered lecithin. The results show that refinement and technological treatment of lecithin up to powder decreases its functional characteristics. Paste - like lecithin, at pasteurization and sterilization temperatures, gives thermostable, firm and compact emulsions up to the examined lecithin - water - fat ratio of 1 : 50 : 50. Powdered lecithin gives thermostable and firm emulsions up to the lecithin-water-fat ratio of 1:9:9, at both pasteurization and sterilization temperatures. By using lecithin - water - fat ratios of 1 :11 : 11 and 13 : 13, thermostable paste - like and compact emulsions are obtained. The increase of water - fat ratio influences the formation of half-liquid emulsions at sterilization temperature and of paste - like ones at pasteurization temperature. The examined Soprolec gives thermostable paste - like emulsions up to the lecithin - water - fat ratio of 1 : 9 : 9, at pasteurization and sterilization temperatures.
Graph 1 shows the effects of pork hydration with Soprolec. At higher hydration rate of pork (33.33%), namely by using 2.56% of soybean preparation in meat, lower hydration effect was obtained and quantity of bound water in meat was lower for 2.5%, in relation to more hydrated to 28.58%, namely by using 2.20% of soybean preparation.
These results were confirmed in the final product as well (Graph 2), Ham, for the production of which meat was hydrated to 28.58%, has about 1% more bound water in relation to ham produced from meat hydrated to 33.33%. Regardless of the meat hydration rate, and from the aspect of quality and nutritive value, satisfactory products were obtained. In addition, there were not established any significant differences in sensory properties of hams produced from hydrated pork (28.58% or 33.33%). Somewhat poorer properties regarding consistency, taste and odour were observed in more hydrated hams.
As for the emulsified meat product - Paris sausage, a product of satisfactory organoleptic properties on the whole was obtained by the application of Soprolec in the quantity of 2.50%. The sausage is firm, juicy and under light pressure it did not realase water.

CONCLUSIONS

1. Paste - like, not refined lecithin shows excellent emulsifyng properties, but has not practical use due to the impossibility of regular application to products.
2. Refinement and technological processing of lecithin up to powder lowers its emulsification capacity. In spite of that, powdered lecithin shows good emulsifiability.
3. Lecithined soybean flour, from the aspect of technology and economy, represents a good quality preparation for the application in Yugoslav meat products.

LITERATURE

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Table 1. Emulsifiability and thermostability of paste-like lecithin emulsions ("Sojaprotein" - Bečej)

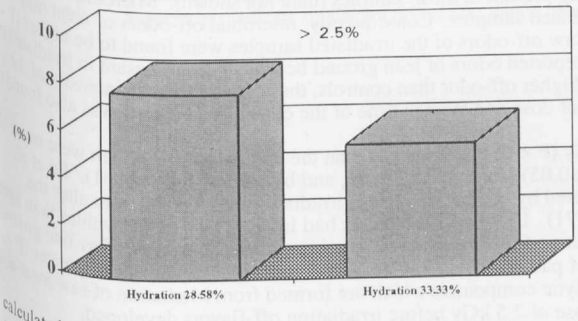
Lecithin-water-fat ratio	Thermostability	
	Pasteurization	Sterilization
1:7:7	+++	+++
1:9:9	+++	+++
1:11:11	+++	+++
1:13:13	+++	+++
1:15:15	+++	+++
1:17:17	+++	+++
1:20:20	+++	+++
1:25:25	+++	+++
1:30:30	+++	+++
1:50:50	+++	+++

Legend:
- +++= termostable, homogeneous, without separation of fat or water, firm, compact emulsion
- ++= thermostable, homogeneous, without separation, paste-like, compact emulsion
- += thermostable, homogeneous, without separation, half-liquid, compact emulsion
- - = thermally unstable, nonhomogeneous, separated fat or water, not compact emulsion

Table 2. Emulsifiability and thermostability of powderad lecithin emulsions (Lucas Meyer-Germany)

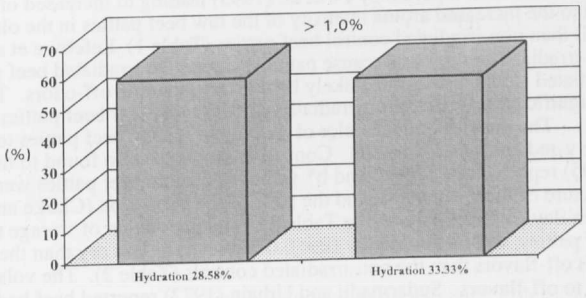
Lecithin-water-fat ratio	Thermostability	
	Pasteurization	Sterilization
1:7:7	+++	+++
1:9:9	+++	+++
1:11:11	++	++
1:13:13	++	++
1:15:15	++	+
1:16:16	++	+

Graf 1. **Raw pork hydration effect ***

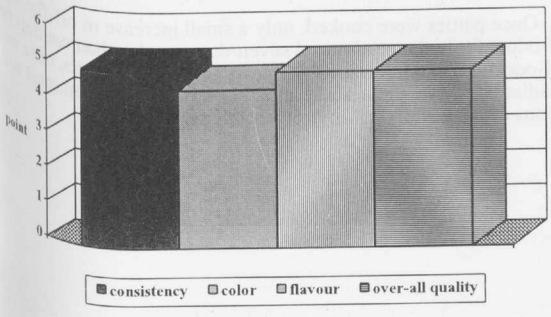


* calculated on the differences between bounded water of hydrated and of unhydrated meat

Graf 2. **Bounded water in ham**



Graf 3. **Sensory evaluation (Paris sausage)**



Graf 4. **Sensory evulation (ham)**