

Application of milk-protein concentrate to the production of chicken sausages

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Introduction

In recent years the production of chicken foodstuffs made good progress. In this respect, the sausage products contributed a considerable part which was additionally furthered by the introduction of mechanical means in boning of chicken (2). Taking into consideration that the mechanically boned chicken meat is still incompletely studied in technological aspect as a raw material for the production of sausages, this is of interest to investigate its compatibility with the proteins used in order to obtain more balanced in nutritive and biological respect meat products in accordance with the requirements of the physiology of nutrition (1).

With regard to this, the present study was carried out to assess the effect of our milk-protein concentrate (3) on the technological properties of the farce and filling mass obtained from mechanically boned chicken meat, as well as on the chemical and aminoacid composition of the finished sausages thus characterizing their nutritive and biological value, respectively.

Material and Methods

The studies were carried out with chicken farce obtained from mechanical boning of whole chicken carcasses previously stored for the last 24 hours at a temperature of -1°C to -4°C until a temperature of -1°C within chicken was reached. Boning was performed with a 'Protecon' boning machine. Boned meat was then treated in a cutter machine with addition of 10% milk-protein concentrate (pH 6.5; dry matter 20-23%). The farce obtained was used for the production of two varieties of cooked sausages with a predominant portion of chicken

meat such as salami 'Parvomay' - 70% chicken, 30% fat; and sausages 'Hebar' - 70% chicken, 10% semi-lean pork and 20% fat. In order to characterize the technological properties of farce and filling mass obtained from chicken meat, these were studied to establish the water-retention capacity and the stability of meat emulsions.

The water content, proteins, fats, mineral substances, aminoacid composition, chemical score and the protein-fat and tryptophan-oxiprolin ratio in the sausages were determined. Data were processed by the methods of mathematical statistics (4,5). The final results are shown in the tables attached.

Results and Discussion

The results obtained for the effect of the protein concentrate on the water retention capacity and the stability of chicken farce and filling mass are summarized in Table I. It is seen that the added protein concentrate exerted no influence on the water retention capacity of farce. The differences between the average values (Table I) obtained for the amount of released free water were within the confidence interval.

The better water retention capacity of the filling mass compared to that of farce was probably due to the addition of other meat materials (fatty tissue and semilean pork) and to their treatment in forming the filling mass.

The stability of meat emulsions, as shown in table I, increased with addition of protein concentrate and consequently the amount of released liquid phase in both the farce and the filling mass decreased.

It should be noted that the finally formed filling mass for chicken cooked sausages was characterized by a higher stability of meat emulsion compared to that of the farce. The results obtained for the chemical composition of the finished sausages are given in table II. It is seen that the addition of protein concentrate resulted in no essential change in the water content and mineral substances. The differences obtained for the values of these indices were within the confidence interval. A more essential change was reported for the protein and the fat content as both components determining the nutritive value

table 1
Effect of protein concentrate on water retention capacity and stability of farce and filling mass emulsions

Indices	Chicken farce		Filling mass of Parvomay salami		Filling mass of Hebar sausages	
	Controls	Samples	Controls	Samples	Controls	Samples
Water retention capacity (% free water)	6.28 ± 1.45	5.72 ± 0.83	4.18 ± 0.33	3.11 ± 0.32	2.93 ± 0.38	1.83 ± 0.22
Emulsion stability (cm ³ released liquid phase per 100g product)	9.82 ± 0.88	7.21 ± 0.67	7.63 ± 0.42	5.53 ± 0.48	7.21 ± 0.53	5.16 ± 0.46

of the sausage products. In that respect, this also resulted in a favourable variation of the protein-fat ratio as is ascertained in table II. This phenomenon corresponded to the modern requirements of the science of nutrition. At the same time, the tryptophan-oxiprolin ratio was higher in the products obtained with the protein concentrate in support of their biological value increased.

table II

Chemical composition of 'Parvomay' salami and 'Hebar' sausages produced with 10% protein concentrate of sour-cream buttermilk

Indices	'Parvomay' salami		'Hebar' sausages	
	Controls	Samples	Controls	Samples
Water, % of total mass	53.50 ± 0.67	54.40 ± 0.81	53.85 ± 0.81	52.50 ± 0.63
Proteins, % of total mass	16.70 ± 0.43	18.90 ± 0.43	17.10 ± 0.66	19.10 ± 0.63
Fats, % of dry matter	65.70 ± 0.64	61.58 ± 1.14	60.12 ± 0.78	56.25 ± 0.82
Mineral substances, % of total mass	1.91 ± 0.09	1.83 ± 0.07	1.82 ± 0.07	1.85 ± 0.05
Tryptophan-oxiprolin ratio	1.52 ± 0.06	1.85 ± 0.09	1.61 ± 0.09	1.97 ± 0.04

Protein-fat ratio	0.25 ± 0.04	0.31 ± 0.07	0.28 ± 0.07	0.36 ± 0.05
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The results of the aminoacid composition of the sausages produced with 10% protein concentrate of sour-cream buttermilk (table III) showed that the amount of each aminoacid found, including the essential ones, was higher compared to that of the products without additives. It is characteristic that the aminoacid ratio was maintained irrespective of the amount increased.

table III

Aminoacid composition of 'Parvomay' salami and 'Hebar' sausages (g aminoacids/100 g protein)

Aminoacids	'Parvomay' salami		'Hebar' sausages	
	Controls	Samples	Controls	Samples
Lysine	1.62	1.84	3.39	4.45
Histidine	1.10	1.62	1.76	1.85
Arginine	1.86	2.31	3.29	3.36
Asparaginic acid	2.19	3.95	4.83	4.92
Threonine	0.97	1.74	2.04	2.45
Serine	0.77	1.43	1.99	2.05
Glutamic acid	5.95	7.59	9.66	9.71
Proline	2.16	2.54	2.83	3.12
Glycine	3.75	7.25	9.16	9.72
Alanine	2.43	2.58	3.39	3.86
Cystine	traces	traces	traces	traces
Valine	1.38	2.33	2.91	3.14
Methionine	0.27	0.31	0.42	0.82
Isoleucine	1.11	2.01	2.16	2.35
Leucine	1.77	3.43	4.07	4.56
Tyrosine	0.64	0.63	1.37	1.56
Phenylalanine	1.06	1.44	0.32	1.90

The values of chemical score for each aminoacid (table IV, characterizing the nutritive and biological value of proteins provided reasons to suggest that in the sausages with milk-protein concentrate the essential aminoacid ratio was to a great extent favourable thus increasing the coefficient of digestibility in connection with the synthesis of substances necessary for the human system.

table IV

Chemical score according to Mitchell and Blok

Aminoacids	'Parvomay' salami		'Heber' sausages	
	Controls	Samples	Controls	Samples
Isoleucine	27.75	50.25	54.00	58.75
Leucine	25.30	49.00	58.14	65.14
Lysine	29.46	33.46	61.64	75.45
Methionine-cystine	7.71	8.60	12.00	23.43
Phenylalanine-tyrosine	28.33	34.50	28.17	57.67
Threonine	24.25	43.50	50.10	53.75
Tryptophane	31.20	48.63	37.81	51.60
Valine	27.60	46.60	58.20	62.80

The results obtained for the total chemical and aminoacid composition of the chicken sausages substantiated that the application of the milk-protein concentrate provided a possibility of producing of foodstuffs of higher nutritive and biological value satisfying to a better extent the requirements of the physiology of nutrition.

Conclusions

1. The addition of a milk-protein concentrate form sour-cream buttermilk in amounts to 10% during the production of chicken cooked sausages led to respective increasing the water retention capacity and the stability of the filling mass.
2. The application of a milk-protein concentrate from sour-cream buttermilk in amounts to 10% to the production of chicken

cooked sausages resulted in improving the aminoacid composition of the protein fraction and in favourable increasing the protein-fat and the tryptophan-oxiprolin ratio thus contributing to obtaining a product of higher nutritive and biological value.

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