6 - 58 DEVELOPMENT OF NEW PRODUCTS, STERILIZED CANNED READY-TO-COOK MEATS, INTENDED FOR SCHOOL NUTRITION

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The industrial manufacture of ready-to-serve and ready-to-cook meat foods is related to a rise in the organization level of the public catering for children and students in this country. In this connection, the development of optimum formulations and technologies of manufacturing children's and students' foods is imperative and it is in line with the programme of the constant improvement in the living standards of the people, as well as being a means for the creation of a healthy, harmoniously developed generation.
The aim of the present work was to develop formulations for the manufacture of ready-to-cook meat-containing main courses to be finished in the relevant children's catering establishments.

Materials and Methods

Using meat raw materials investigated in advance, pork, veal and beef, freshly cooled and produced with high standards of sanitation, and lamb by-products, formulations were developed for the manufacture of the following products: (1) Meat Roll, Coarsely Ground, made of one-grade (non-sorted) beef and one-grade pork derived from the whole carcass without the loin and the hind quarter, gelatine, starch, typical Bulgarian spices, carrots, cummin, dry milk, and common salt; (2) Meat Roll, Finely Ground, consisting of one-grade (non-sorted) pork, pork rinds, savoury, skimmed dry milk, common salt and carrots; (3) Lamb Drob-sarma, containing lamb sets of parenchymal viscera, rice, tomatoes, onions, parsley, savoury, mint, common salt and meat-and-bone broth; and (4) Meat Balls in Bouillon, made of one-grade pork and veal, sorted for minced meat and ground using a plate of up to 4 mm, rice, starch, savoury parsley, ascorbic acid, common salt and meat-and-bone broth.
The meat rolls: coarsely or finely ground, are prepared using a cutter or a grinder-mixer.
Towards the ground meat are added the table salt, the spices, the dry milk and gelatine dissolved in water in advance, and the carrots and the mixture is homogenized for 10-15 min till a uniform structure is obtained. The difference in structure is determined by the size of the meat particles, which should be 2-4 mm and 6-12 mm for the finely and the coarsely ground rolls, respectively.
Meat Balls in Bouillon are made in a mixer, blanched rice, common salt and spices being added to the meat. The mixture is homogenized well and is subsequently fed to a forming apparatus. Formed meat balls are put into a blancher in steam or water. Blanching continues till internal temperature reaches 76°C. Blanched meat balls are dosed by fives into packages and are poured over with hot bouillon.
Lamb drob-sarma is produced out of a set of lamb parenchymal viscera blanched in advance and ground in a grinder or a cutter to a particle size not exceeding 12 mm, blanched rice, tomatoes, onions, common salt and spices which are mixed for 10 min in a mixer. In the end of mixing, 10 l of broth are added.
Filling, dosing and sealing are performed using a continuous mechanized and automated line.
Sterilization was effected in vertical static autoclaves in accordance with set sterilization formulae at a temperature of 118°C. The ready-to-cook foods are manufactured in two package sizes: cans of 220 g for individual nutrition and of 510 g for the catering.
The water content of the canned products was determined in accordance with BDS (Bulgarian State Standard) 5712-74, protein, by Kjeldal (BDS 9374-74), fat content by Soxhlet's method (BDS 8549-74), common salt after Moor (BDS 8397-70); vitamin B_1, by a fluorimetric method; vitamin A, by the Karl Preis method; and phosphorus, by a molybdate method using Merck's test. The biological value determination, chemically, was done by Dvorak's (1980) method.
The ready-to-cook meat foods were tested for 2 weeks in two classes of 30 students each in a day boarding school in the capital city. Main courses were prepared in the school canteen out of the ready-to-cook foods in the form of meat balls in white or red sauce; meat roll with red sauce with vegetables: lettuce or potato chips; lamb drob-sarma, as a national-style dish, poured over with a yoghurt and eggs paste and roasted. with lettuce. The children evaluated the dishes using the degree ratings of

'excellent', 'very good', 'good', 'satisfactory', and 'poor'. In the Institute of Meat Industry, the same dishes were scored by a trained taste panel using Peryam's 9-point hedonic scale.

Results and Discussion

The results of the chemical analyses of the sterilized ready-to-cook meat foods are shown in Table 1.

Table 1. Chemical composition of sterilized canned ready-to-cook meats

Product Designation	Water Content, %	Fat Content, %	Protein, %	Common salt, %	Vit. B_1, mg%	Vit. A, I.U.	Phosphorus, mg%	Energy, kcal/100 g
Meat Roll, Coarsely Ground	57,60	23	14,13	1,36	0,257	0,4	16,36	280
Meat Roll, Finely Ground	60,40	21	12,59	1,13	0,245	0,6	28,42	270
Lamb Drob-sarma	69,60	10	8,10	1,37	0,179	34	7,75	183
Meat Balls in Bouillon	73,00	15	8,17	1,40	0,162	0,6	7,47	210

The results presented indicate that water content is the highest in the product Meat Balls in Bouillon, followed by that in Lamb Drob-sarma and being lowest in the meat rolls, with a small difference between the two canned products. Fat content was the highest in the meat rolls and lowest in lamb drob-sarma. Protein content was within the range of the requirements of BDS for canned meats, above 12%, and for meat-and-vegetable cans, above 8%. Common salt complied with the requirements of the Ministry of Public Health: up to 1,4% for the children's and students' nutrition.

The index of energy, in kcal/100 g of product, demonstrates that the products can be characterized as low-calorie ones compared to home-made foods in this country. On the other hand, the results shown in Table 2 on the biological value of sterilized ready-to-cook meats point to a high chemical score, A/E, relevant to all the four products. On comparing the data on the value of the energy obtained from pure protein, %, with the per cent energy from protein, one can see that the difference is small in the products proposed, which suggests that the animal and plant proteins employed are of a high biological value.

Table 2. Biological value of sterilized canned ready-to-cook meats

Product Designation	Chemical score A/E	Protein energy, %	Total energy, MJ	Pure protein energy, %	Oxyproline, mg%
Meat Roll, Coarsely Ground	69,45	21,56	11142	14,97	255,27
Meat Roll, Finely Ground	72,94	21,15	10120	19,04	163,09
Lamb Drob-sarma	71,58	26,60	5177	15,43	120,12
Meat Balls in Bouillon	72,64	19,59	7089	14,23	109,00

Total energy in MJ was the highest in the products Meat Roll, Coarsely Ground, and Meat Roll, Finely Ground, which is the result of the higher fat contents of these products.

The presented characteristics of the products proposed will serve the children's dietarian in compiling the daily menu of the children in accordance with the two major indices: energy and biological values.

From the sensory analyses carried out in the laboratory of the Institute of Meat Industry, the following issues came out: in the product Meat Balls in Bouillon prepared as the main course Meat Balls in White Sauce, an average score of 8,1 was obtained for the indices colour, structure, texture, aroma, taste, and juiciness, which is a score for excellent quality judging by all the indices; in the product Meat Roll, Coarsely Ground, a score of 6,2 was obtained, for very good quality; in the product Meat Roll, Finely Ground, the score was 5,2 for good quality; and in Lamb Drob-sarma, the score was 8,1 for excellent quality according to all the organoleptic indices.

The inquiry made among pupils points to excellent ratings for the products Meat Balls in Bouillon and the Meat Rolls. Lamb Drob-sarma was evaluated by 50% of the pupils as 'good', and by the remaining 50%, as satisfactory. We can explain this difference in the ratings of the children for drob-sarma by their preference for meat dishes made of ground meat. Similar results were obtained by Manev and Daskalova (1984) with children making organoleptic analyses of other ready-to-cook meat foods.

References

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2. Dvorak, XXIII Eur. Meet. Meat Res. Workers, 1980, Moscow.