51st International Congress of Meat Science and Technology
August 7-12, 2005 – Baltimore, Maryland USA

DETERMINATION OF ADULTERATION OF MEAT RAW MATERIALS AND MEAT PRODUCTS

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According to official sources, Russia is swept over with the flow of poor quality and adulterated food products. These data are confirmed by the results of investigations of meat products quality in the Russian trade, which are regularly carried out at VNIIMP, by the initiative of controlling organizations and by ROSTEST-Moscow. Thus, up to 30% of the samples presented for the analysis don't meet regulations' requirements. 25% of meat products from this amount are adulterated by the composition of the used raw materials, primarily, by using plant proteins or carbohydrates instead of meat raw materials, and the remaining part by violation of the ratio protein/fat, deterioration of sensory characteristics, excessive use of connective tissue, etc. (Fig.1).

These data strongly suggest that dishonest producers, maintaining allowable levels of substances to be regulated, are using not agreed upon animal or plant components or their excessive amounts. Such products often not relevant to their name by their composition are allowed for marketing as being safe by microbiological and acceptable by sensory and chemical characteristics.

The Laws passed in RF about certification of products and services "About standardization", "About protection of consumers' rights"; "About quality and safety of foods" are intended for strict observation of the requirements concerning raw materials and contents of food products. The situation is generally favorable for the determination of product chemical composition. There are various methods available with adequate modern instrumentation, which allow to quick and accurate determination of product fat, protein, moisture, etc.

At the same time the techniques are known in scientific practice, that make it possible to answer the question about actual composition of food products and to identify the components of meat products subjected to different technological treatment.

Histological method of identification of the content of meat raw materials, used in the meat product

Using this method to study the histological preparations obtained from meat products, one can determine their following components of animal origin: muscle tissue of different species, connective tissue of different species, fat tissue, skin, vessels, nerves, by-products, plant additives (protein and carbohydrate in nature, including starch, wheat flour, and soy protein products (with differentiation into isolate, texturate, concentrate), carrageenan, and spices.

This standardized method covers meat products and comminuted meat products as follows: meat of all species of slaughter animals; mechanically deboned meat (including poultry meat); semi-finished meat products – natural, chopped, ground meat, pelmeni (those with poultry meat); pork products; sausage products (among

them those with poultry meat); canned meat and meat-plant products (among them those with poultry meat).

In analyzing the comminuted meat (ground meats), semi-finished meat products and final meat products, the most common situation is as follows: a) complete or partial substitution of mechanically deboned meat for ground meat; b) substitution of ground meat or product of mechanical deboning produced from poultry, for ground meat of slaughter animals. Studies of sausage products have shown that the content of ground meat had drastically excessive amount of connective tissue, and the added components not indicated in the normative documentation. The composition could contain trimmings, meat from heads, and meat from esophagus, by-products and plant components of carbohydrate or protein nature.

Using light microscopy soy protein products are reliably detected in meat products because they have specific microstructure. And the histological method can determine not only the fact of using soya, but also its technological form (isolate, concentrate, texturate), which is used in each specific case. Histological method can easily detect soya preparations in the amount of 1% in ground meat, semi-finished products of final meat products (based on the weight of the raw materials).

Use of mechanically deboned poultry meat is a special problem in adulterated meat products. In case of adulteration this kind of the raw material, apart from the components of animal origin can often contain non-meat animal components (for example, gizzards of poultry) or different plant additives, among them soy protein preparations or easily hydrated carbohydrates. Often, the content of these, having nothing to do with meat, preparations can be rather significant.

In studying the comminuted multi-component meat raw materials – mechanically deboned poultry meat as produced by different companies of the European Community and other European countries - a quantitative method of morphometric analysis for quality evaluation (composition of raw materials and tissue) was also used. The most differing versions of change of the components composition of mechanically deboned poultry meat and the adulterated product that came to sales channels under the same trade name are presented in Fig.2.

In the products of low quality the predominating components are connective tissue, which sometimes can significantly exceed half of the volume. Correspondingly, in poor raw materials the content of the component having the highest food value – muscle tissue – can be as low as 10 vol. % against 50 – 70 vol. % in high quality raw materials. If adulteration of mechanically deboned meat takes place, the histological analysis reveals various plant additives in the meat mass – plant, protein and carbohydrate components. In Fig. 2 they are 15 vol. %.

In the last years the share of imported products with adulterated composition has increased. Taking into consideration the opinion of experts predicting the increase of the share of meat products import following Russian joining WTO, the problem of carrying out identification of the composition of raw materials as used in the manufacture of meat products will cease to be just a scientific problem. The technique of quick determination of raw materials adulteration can at the same time become the means for preventing of penetration of poor quality imported products to the domestic food market.

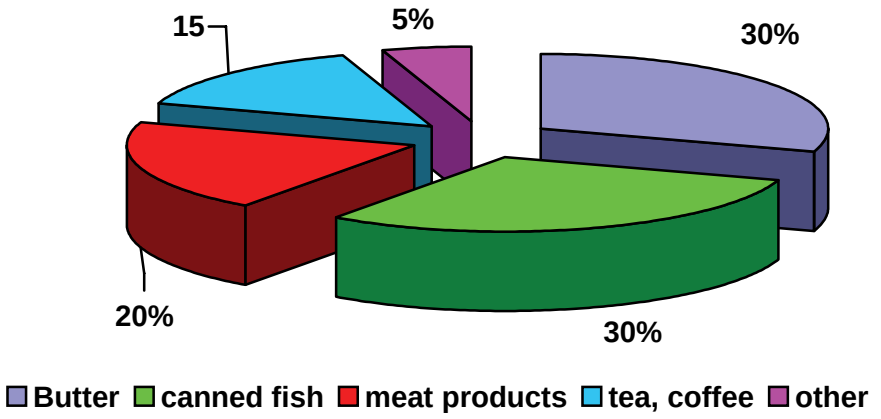

Fig.1 Adulterated products on Russian marked in 2004. (Data of trade inspection of RF)

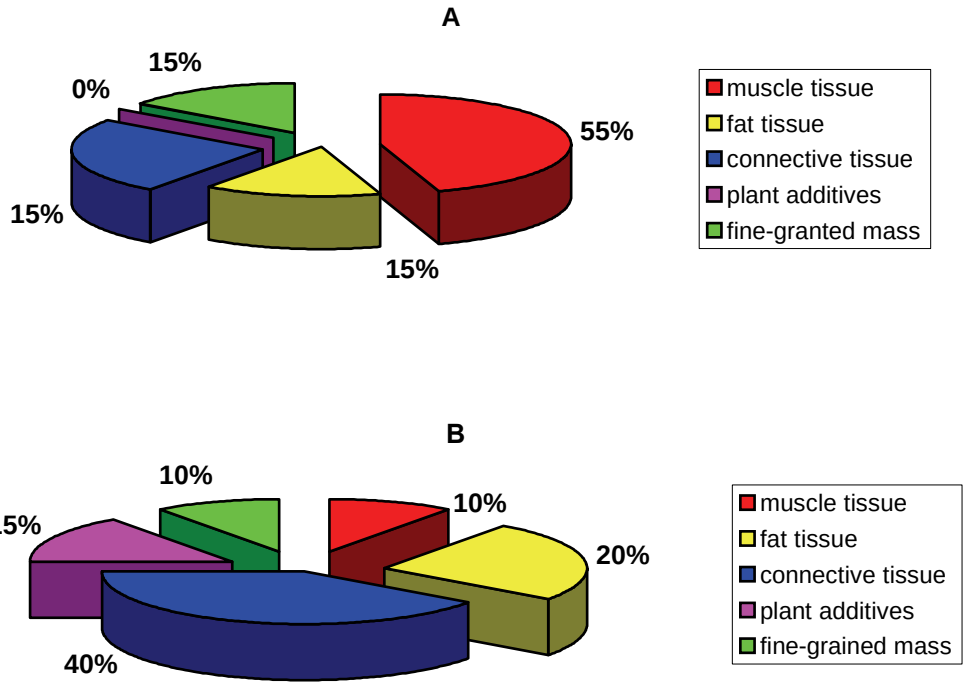

Fig. 2 Composition of raw materials in a quality and adulterated mechanically deboned poultry meat