# NEW RAW-FERMENTED PRODUCT FROM TURKEY MEAT

Gonotsky V., Dubrovskaya V., Hvylya S.
V.M. Gorbatov All- Russian Meat Research Institute, Moscow, Russia

## Background

In recent years a stable growth of poultry meat production including turkey meat has been observed in poultry industry in Russia. Turkey meat is of great interest for semiproduct and sausage production. A broad range of semiproducts, cooked sausages and canned meats from turkey meat has been produced in Russia and other countries. At the same time there is lack of delicacies from turkey meat with durable shelf life and storage stability on Russian market.

The market demand for new and various poultry meat specialties dictate the necessity of developing raw fermented products from turkey meat. While the process of uncooked smoked sausage production is one of the most difficult in sausage manufacture, the technology of raw-fermented poultry products is much more difficult since one of the strong preservative factor, smoking, is not used.

Turkey breast (fillet) and leg muscles differ in colour because of different myoglobin content. Therefore, breast muscles are called white meat and leg muscles are called red meat. Most of the white fibers have low oxidative and high glycolytical ability. In red fibers metabolism is mainly oxidative (1). Glycogen degradation rate in white and red muscles is different – it is significantly higher in white muscles than in red ones. After slaughter, pH in white meat decreases faster than in red meat (2).

We tried to take into account these characteristics of autolysis of white and red meat in the development of raw-fermented product technology. Due to differences in colour, white and red meat is of interest for raw-fermented product manufacture because of the possibility to obtain products of different colour owing to their separate using as well as combining.

The readiness of the raw-fermented products is provided by fermentative ageing and drying. Fermentative ageing takes place during holding the raw material before curing, during curing, hanging, and the initial stage of drying (3). Raw sausage meat microflora consists of a wide spectrum of useful bacteria as well as of those that are intolerable for hygienic reasons. At the same time it is known that the process of ageing of raw and raw-fermented sausages is based on the vital activity of lactic acid bacteria, which gradually become prevailing, suppressing the development of undesirable microflora. However, the process of raw- fermented sausage ageing can not always be directed to the proper way, in consequence of that the sausage meat spoilage can take place. The risk of spoilage of these meat products can be reduced by the addition of starter bacterial cultures to the sausage meat (3).

## Objectives

The purpose of this study was to develop a new raw-fermented sausage from turkey meat.

## Methods

Turkey breast and thigh muscles were used for raw fermented sausage production. Bacterial preparation PB-MP developed in VNIIMP and consisted of mixture of lactic acid bacteria *Lact. plantarum* and *Lact. casei*, and denitrifying *Micrococcus caseolyticus* was used as a starter culture. The usage of this preparation promotes intensive formation of flavour components and at the same time reduces significantly the duration of sausage drying (4).

Cooled turkey meat was ageing in carcasses at 0-4$^0$C during 4 days after slaughter. Then it was deboned, breast and thigh muscles were isolated, trimmed and cured with NaCl (3 kg per 100 kg of raw material) and sodium nitrite (0.0075%).

In order to increase lipid stability and exclude oxidative spoilage, the antioxidant ionol was added at the level of 0.01% to fat and 0.02% to muscle tissue fat. To stabilize hygienic state of the raw material and finished product the preservative Ra-Frisch (Alltex, Germany) containing calcium lactate, sodium acetate and sodium tartrate was applied. Glucose and lactose were added to the samples with starter cultures (PB-MP) in the ratio 1:1 at the level of 400 g per 100 kg of raw material.

The direction of the physical-chemical and biochemical processes was judged from changes in pH, moisture, lactic acid values, free fatty acid content (acid number), carbonyl compound value (TBARS). Microstructural method was used to assess changes in sausage meat structure. Microbiological state was judged from total mesophylic counts, lactic acid bacteria counts, presence of coliforms and pathogens. It is necessary to emphasize that the initial raw material used in the experiment was in good hygienic condition. Sensory assessment of finished product was done using nine point scale system.

## Results and discussion

Moisture loss was 2-3% during curing. The most significant changes in moisture content (12%) were observed during first 10 days of drying, whereas at day 20 the moisture content of muscle tissue was 49,6% .

Due to autolysis, pH of white meat was 5.87, and that of red meat – 6.59 after 4 days at 0-4°C, which can be explained by the characteristics of their fermentative system. During curing, pH of both types of meat changed insignificantly. During hanging (starter cultures were added to the test samples of sausage meat), pH decreased more intensively. During drying, this dynamics remained invariable up to 10 days, however, by days 20-26 the increase in pH values was observed. These variations in pH values can be explained by accumulation of low-molecular substances with basic character due to autolysis.

Higher lactic acid content was observed in samples with starter cultures. Also, it should be noted that by day 26 the decrease in lactic acid content was observed in control samples, as well as in the samples with starter cultures. During curing (0-4$^0$C, 5 days), hanging (5 days) and drying, glycolytic and oxidative processes in lipids took place, which were shown by accumulation of free fatty acids and carbonyl compounds. At the same time, application of the antioxidant ionol delayed significantly these processes.

Addition of the bacterial preparation caused higher content of lactic acid microflora in test samples vs. control samples during all stages of the technological process. It should be noted that during hanging, lactic acid counts increased by order of 1 and were 5,4 E6 CFU/g in test samples, while in control samples they increased by order of 3 and were 9,4 E5 CFU/g. After 20 days of drying, lactic acid bacteria counts equalized in test and control samples, and by day 26 decreased in all types of sausages.

During turkey meat ageing at the stages of sausage curing, hanging and holding, the most intensive processes of microstructural autolytic changes took place in breast muscles, while in thigh muscles they were slightly delayed. They were expressed in progressive accumulation of meat fiber destruction products – fine granular protein mass, swelling and later hardening of muscle fibers with simultaneous worsening of their nuclear staining. Muscle fiber striation remained at all stages of sausage ageing as a whole.

The largest amount of fine granular protein mass, promoting the formation of more compact and homogeneous sausage meat in terms of its texture properties was in sausage produced from white turkey meat (Fig. 1, 2). The extension of holding duration almost did not cause the intensification of destructive texture changes in muscle and connective tissue elements, typical of meat ageing processes. The observed muscle fiber hardening caused the decrease in moisture holding capacity, which is in agreement with the special literature data (3). The process of sausage ageing and drying was accompanied by significant moisture loss, which lead to changes in fine-granular mass from homogeneous to pronounced reticular. No significant microstructural changes were observed in fat tissue of fat added to sausage during processing.

During examination of sausage meat microstuctural preparations, small as well as larger colonies of bacterial starter cultures were observed. They were arranged near the surface of the sausage, on the pore surface in sausage meat, in association with muscle tissue elements and inside fine-granular protein mass. The dynamics of microflora development seen by microscopic analysis was similar to the dynamics described on the basis of microbiological examination at various stages of technological process.

## Conclusions

Thus, the developed new specialty from turkey meat, raw-fermented sausage, meets all requirements of food products of this kind.

## References

Kraren P.W, Lambooij E, Veerkamp Ñ.H. et al. Haemorrhages in Muscles of Broiler Chickens. //World's Poultry Science J., 2000, v56, nº 2, p. 93-126

Berri Cecile. Variability of Sensory and Processing Qualities of Poultry Meat. //World's Poultry Science J., 2000, v56, nº 3, p. 209-224.

Sokolov A.A., Pavlov D.V., Bolshakov B.C., et al., "Technology of meat and meat products", M. Pischevaya Promyshlennost, 1970.

Kostenko Yu. G., Tekut'eva D.A., Zharinov A.I., Sokolova N.A., "New kinds of uncooked smoked products", Myasnaya Industrya , 2000, 2, 25-26