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INNOVATIVE TECHNOLOGIES IN THE CREATION OF MINCED MEAT PRODUCTS

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Annotation: *In this article, the possibility of using pumpkin in the production of meat products is investigated and justified. In order to improve the functional and technological properties of sausage, the recipe and production technology of cooked sausage using a natural source of beta carotene have been developed. Physical-chemical, functional-technological and organoleptic properties of the finished product were studied. The results of the study showed that with an increase in pumpkin pulp from 5 to 15%, the content of β-carotene in the developed sausage products proportionally increases from 0.9 mg/100 g to 2.2 mg/100 g. The highest content of β-carotene in cooked sausage with the introduction of pumpkin pulp in the proportion of 15%, which is 44% of the daily intake of βcarotene. The nutritional value of the finished product is determined. The developed sausage products are products of reduced energy value. Values range from 180 to 189 kcal. The practical possibility of using plant bioactive agricultural raw materials in the production of cooked sausages has been proved, which allows us to expand the range of high-quality and functional meat products.*

Keywords: *Meat Processing, Technology, Functional Properties, Pumpkin, Nutritional Value.*

Introduction. Meat consumption in developing countries has been continuously increasing from a modest average annual per capita consumption of 10 kg in the 1960s to 26 kg in 2000 and will reach 37 kg around the year 2030 according to FAO projections. This forecast suggests that in a few decades, developing countries' consumption of meat will move towards that of developed countries where meat consumption remains stagnant at a high level. The rising demand for meat in developing countries is mainly a consequence of the fast progression of urbanization and the tendency among city dwellers to spend more on food than the lower income earning rural population. Given this fact, it is interesting that urban diets are, on average, still lower in calories than diets in rural areas. This can be explained by the eating habits urban

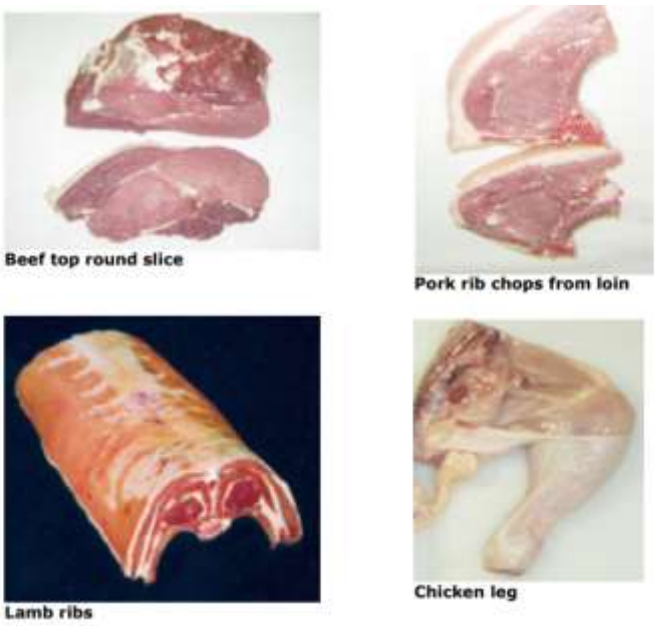
consumers adopt. If it is affordable to them, urban dwellers will spend more on the higher cost but lower calorie protein foods of animal origin, such as meat, milk, eggs and fish rather than on staple foods of plant origin. In general, however, as soon as consumers' incomes allow, there is a general trend towards incorporating more animal protein, in particular meat, in the daily diet. Man's propensity for meat consumption has biological roots. In ancient times meat was clearly preferred, consequently time and physical efforts were invested to obtain it, basically through hunting. This attitude contributed decisively to physical and mental development of humankind. Despite the growing preference in some circles for meatless diets, the majority of us will continue eating meat. It is generally accepted that balanced diets of meat and plant food are most effective for human nutrition. Quantitatively and qualitatively, meat and other animal foods are better sources of protein than plant foods (except soy bean products). In meat, the essential amino acids – the organic acids that are integral components of proteins and which cannot be synthesized in the human organism – are made available in well balanced proportions and concentrations. As well, plant food has no Vitamin B12; thus animal food is indispensable for children to establish B12 deposits. Animal food, in particular meat, is rich in iron, which is of utmost importance to prevent anemia, especially in children and pregnant women. In terms of global meat production, over the next decade there will be an increase from the current annual production of 267 million tons in 2006 to nearly 320 million tons by 2016. Almost exclusively, developing countries will account for the increase in production of over 50 million tons. This enormous target will be equivalent to the levels of overall meat production in the developing world in the mid-1980s and place an vi Meat Processing Technology immense challenge on the livestock production systems in developing countries. The greater demand for meat output will be met by a further shift away from pastoral systems to intensive livestock production systems. As these systems cannot be expanded indefinitely due to limited feed availability and for environmental reasons, other measures must be taken to meet growing meat demand. The only possible alternatives are making better use of the meat resources available and reducing waste of edible livestock parts to a minimum. This is where meat processing plays a prominent role. It fully utilizes meat resources, including nearly all edible livestock parts for human food consumption. Meat processing, also known as further processing of meat, is the manufacture of meat products from muscle meat, animal fat and certain non-meat additives. Additives are used to enhance product flavour and appearance. They can also be used to increase product volume. For specific meat preparations, animal by-products such as internal organs, skin or blood, are also well suited for meat processing. Meat processing can create different types of product composition that maximizes the use of edible livestock parts and are tasty, attractive and nourishing. The advantage of meat processing is the integration of certain animal tissues (muscle trimmings, bone scraps, skin parts or certain internal organs which are usually not sold in fresh meat marketing) into the food chain as valuable protein-rich ingredients. Animal blood, for instance, is unfortunately often wasted in developing countries largely due to the absence of hygienic collection and processing methods and also because of socio-cultural restrictions that do not allow consumption of products made of blood. While half of the blood volume of a slaughtered animal remains in the carcass tissues and is eaten with the meat and internal organs, the other half recovered from bleeding represents 5-8 percent of the protein yield of a slaughter animal. In the future, we cannot afford to waste such large amounts of animal protein. Meat processing offers a suitable way to integrate whole blood or separated blood fractions (known as blood plasma) into human diets.

Processing technology. Meat processing technologies were developed particularly in Europe and Asia. The European technologies obviously were more successful, as they were disseminated and adopted to a considerable extent in other regions of the world – by way of their main creations of burger patties, frankfurter-type sausages and cooked ham. The traditional Asian products, many of them of the fermented type, are still popular in their countries of origin. But Western-style products have gained the upper hand and achieved a higher market share than those traditional products. In Asia and Africa, there are a number of countries where meat is very popular but the majority of consumers reject processed meat products. This is not because they dislike them but because of socio-cultural reasons that prohibit the consumption of certain livestock species, either pork or beef depending on the region. Because processed products are mostly composed of finely comminuted meat, which makes identifying the animal species rather difficult, or are frequently produced from mixes of meat from different animals, consumers stay away from those products to avoiding eating the wrong thing. But when the demand for meat increases and a regular and cost-effective supply can only be achieved by fully using all edible livestock parts, consumers will need to adjust to processed meat products, at least to those where the animal source can be identified. Younger people already like to eat fast-food products such as beef burgers or beef frankfurters. Outlet chains for such products and other processed meat products will follow when the demand increases.

This manual. In regions where processed meat products are widely popular and therefore produced in great variety, the consumer may get confused with the multitude of different products and product names. With this manual, we have set out to clarify the types of meat products and the techniques for producing them, with a specific focus on operational and technical requirements for small- and medium-scale processing units. As a first approach in international meat literature, this manual classifies existing meat products according to their processing technology into six clearly differentiated groups. Practically every processed meat product can be integrated into one of these groups. This system provides transparency in the meat-products market and allows for the exact characterization and defining of differences in the processing technology. The processing technologies, including meat processing equipment to be used, are described in detail in the respective chapters. In addition, Annex I contains detailed recipes for representative products for each group. In meat-product manufacturing, the basic processing technologies, such as cutting and mixing, are accompanied by various additional treatments and procedures, depending on the type and quality of the final product. Such treatments involve curing, seasoning, smoking, filling into casings or rigid containers, vacuum packaging, cooking or canning/sterilization. Due to the importance of these procedures, suitable and up-to-date techniques for carrying out these processes and the equipment needed are described in separate chapters but are also referred to in the manual in connection with the respective product groups. Processing technologies for meat products will not deliver satisfactory results if there is no adequate meat hygiene in place. In the interest of food safety and consumer protection, increasingly stringent hygiene measures are required at national and international trade levels. Key issues in this respect are Good Hygienic Practices (GHP) and Hazard Analysis and Critical Control Point Schemes (HACCP), which are discussed in detail in the manual. Extensive knowledge on hazards that microorganisms cause is indispensable in modern meat processing. Thus, along with technological aspects of meat processing, the manual includes reference to related aspects of meat processing hygiene, including causes for meat product spoilage and food borne illnesses as well as Meat Processing Technology ix cleaning and sanitation in meat processing. For the purpose of consumer protection and the quality control

of meat products, simple test methods are provided that can be carried out at the small enterprise level without sophisticated laboratory set-ups. However, some of these procedures have to be understood as screening methods only and cannot supplement specific laboratory control, which may be officially required. As the authors, we have endeavoured to incorporate in this publication a series of practical topics, which are important in meat processing but which are usually not sufficiently referred to or not found at all in meat processing handbooks. This includes the handling and maintenance of equipment and tools, workers' appliances, workers' safety in using equipment and tools, meat processing under basic conditions, traditional meat drying, preparation of natural sausage casings from intestines of slaughter animals, the comprehensive listing and description of nonmeat ingredients, the manufacturing of meat products with high levels of extenders and fillers, as well as sources and processing technologies for animal fats in meat product manufacturing. This much-needed practical advice and information will also provide incentives towards product diversification to meat processors. This manual was designed in the first place as a guideline for practical meat processing activities, with focus on the small- and medium-scale sector. The technical content, therefore, was written to make it clearly and easily understood by processing artisans. However, in a number of cases it was necessary to provide more scientific background information for the explanation of technical measures recommended. The description of these mostly physical/chemical aspects is attached to the respective topics but clearly marked in grey or blue boxes. Readers who do not require the additional information will have no problems in understanding the content of the chapters without reading the text in those boxes. Readers who want an overall view of the topic will find the necessary details in the boxes.

Minced meat products



The typical desirable taste and odor of meat is to a great extend the result of the formation of lactic acid (resulting from glycogen breakdown in the muscle tissue) and organic compounds like aminoacids and di- and tripeptides broken down from the meat proteins. In particular the aged ("matured") meat obtains its characteristic taste from the breakdown to such substances. The "meaty" taste can be further enhanced by adding monosodium glutamate (MSG) (0.05- 0.1%), which can reinforce the meat taste of certain products (see page 73). MSG is a frequently used ingredient in some meat dishes and processed meat products in particular in Asian countries.

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