NEW TENDENCIES IN MEAT DRYING TECHNOLOGIES

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Abstract – From the very beginning of the humanity meat was one of the most consumed products, thanks to its flavor, taste an not on the last place for its value as sources of protein and a wide variety of other nutrients. The more we evolve the more food preservation problem appears. To follow the growing demands in alimentation, one should found different methods of food storage. For meat it was boiling, salting, and drying. One of the most performed methods of drying is microwaving (in vacuum, combined with convection, or others) and it opens new tendencies in drying.

Keywords – meat, drying, microwave, food, storage.

Introduction

Meat can be part of a balanced diet contributing valuable nutrients that are beneficial to health. Meat and meat products contain important levels of protein, vitamins, minerals and micronutrients which are essential for growth and development. Further processing of meat offers the opportunity to add value, reduce prices, improve food safety and extend the shelf-life. This can result in increased household income and improved nutrition. While the per caput consumption of meat in some industrialized countries is high, per caput consumption below 10 kg in developing countries must be considered insufficient and often leads to under-nourishment and malnutrition. It is also estimated that more than 2 billion people in the world are deficient in key vitamins and minerals, particularly vitamin A, iodine, iron and zinc. Deficiencies occur when people have limited access to micronutrient-rich foods such as meat, fish, fruit and vegetables. Most people with micronutrient deficiencies live in low income countries and are typically deficient in more than one micronutrient. Highly nutritious foods such as meat are particularly required for HIV AIDS infected communities and also for women and children.

Meat is defined by the Codex Alimentarius as “All parts of an animal that are intended for, or have been judged as safe and suitable for, human consumption”. Meat is composed of water, protein and amino acids, minerals, fats and fatty acids, vitamins and other bioactive components, and small quantities of carbohydrates.

From the nutritional point of view, meat’s importance is derived from its high quality protein, containing all essential amino acids and it’s highly bio available minerals and vitamins. Meat is rich in Vitamin B12 and iron which are not readily available in vegetarian diets.

If analysing meat composition it’s easy to observe that water constitutes about 40% of the entire product mass.

As result the meat is extremely perishable and its untreated preservation it’s a short time perspective.

Food preservation is employed to prevent undesirable changes in the nutritive value and sensory quality of food by controlling the growth of micro-organisms and reducing the physical, chemical and microbiological changes, which in turn improve the economic value of the product.

Microwaving drying – meat preservation method.

Meat drying is a simple but efficient food preservation activity. Dried meat can be stored under ambient temperatures for many months. Due to the low water content, microbial spoilage of the muscle proteins can be safely prevented. However, deterioration of adhering fatty tissue through rancidity cannot be stopped. It is therefore advisable to use lean meat only. Beef and buffalo meat as well as goat and certain game meats (deer, antelopes) are best suited. The same applies to meat of livestock used in some regions for meat production, such as camels or yaks. The suitability of mutton is ranked slightly lower. Pork, even from very lean muscle parts, is less suitable, as it contains higher amounts of intermuscular and mostly invisible intramuscular (within the muscle cells) fat, which is prone to oxidation and hence turns quickly rancid.

The oldest method is solar drying, at open air or special chambers. There are also drying in ovens, smoking and dehydration.

One of the most recent methods is microwave drying.

High-frequency heating is considered a thermal process which causes oscillation of water molecules, friction, and resultant heat generation. Radiation is a mechanism for heating meat by electromagnetic energy. When the electrons in atom move from a higher to a lower energy state, it sends energy as waves. These waves are not in the same energy level and frequencies. Lower energy electro-magnetic radiation (microwave, radio, TV) (Fig. 1) occurs as very long waves with frequencies ranging from 300MHz to 300 GHz.

Unlike gamma and X-rays, non-ionizing microwaves energy is sufficient to move the atoms of a molecule, but cannot change its chemical bounds. Also microwaves move at the same speed as light waves essentially.

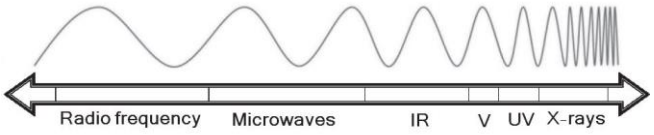

Fig. 1. The electromagnetic spectrum

Under the influence of the microwave field, water molecules (dipoles) begin to vibrate and rotate, focusing its frequency on field's electric lines. Molecules movement – is thermal energy. The more water is presented in a predetermined volume, the more molecules participating in this movement, the greater is the heat energy released. Thus, the heating occurs throughout the whole product, and the wetter areas receive greater energy. Due to this fact, occurs moisture removal, drying of the product and,

simultaneously, – humidity balancing in whole product volume. And while reducing raw material moisture drying process doesn't slow down, because thermal conductivity mechanism does not play here a key role. Meat microwave drying is short timed and relatively low temperature process that applied to foods results with a very high nutrients and vitamins preservation. As energy source of microwave energy generators serves electric power only that provides an exceptional ecological purity. The only limitation of this method is relatively low (60%) electric power to UHF field energy conversion efficiency of the microwave equipment. In this regard, it is advisable to use microwave drying method at low humidity (below 50 %), i.e. humidity range where the energy intensity of this method is lower than convection method. It is important that under the influence of intense microwave field is almost completely destroyed microflora (product decontamination), which greatly increases obtained dried product storage life and makes microwave equipment more effective industrial production mean. Drying meat by microwave radiation has a high speed and high efficiency.

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