THE GROWING IMPORTANCE OF ASPECTS OF FOOD SAFETY AND FOOD PHYSICS IN THE INDUSTRIAL FOOD PRODUCTION

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ABSTRACT

In the paper information is given about some special questions of aspects of food safety and application of principles of food physics in the agro-food sector. The role of food safety has been developed significantly in the last 2-3 decades. The food production and processing of quality food and safe food are of primary importance. Food production is based on the principles of GAP, GMP and GHP, and different methods and tools (e.g. HACCP, ISO-9000-2000, TQM, ISO-22000) for quality control, safety and quality assurance are in use. Today the agricultural production and the industrial food processing are focused dominantly on the quality, and one of the basic requirements in the agro-food sector is the safety.

There are different methods and techniques to produce safe food. The up-to-date food technologies and quality measurements involve the application of different physical methods – high pressure, pulsing electrical field, nondestructive techniques (e.g. NMR, NIR-NIT) for chemical composition determination, radiation techniques etc. – as well. Using ionizing and non-ionizing radiation technologies it is possible to fulfil e.g. the following expectations: decrease of the microbial contamination, increase of the storability, improve of the sensory properties.

INTRODUCTION

The quality food never goes out of style. Today the production of quality food and safe food is of primary importance, although safe food and quality food is not the same! Quality food should be safe, but safe food can be not really quality one (e.g. not good sensory properties.) So

safety – in the whole chain, from farm to fork - is only one requirement of the quality in the food processing and consumption.

FACTORS DETERMINING THE QUALITY OF FOOD PRODUCTS

Safety is a basic requirement, meaning no harmful effects from the food, eaten by humans. The other factors determining the quality of the food products are the following:

- sensory properties (value of pleasure)
- quantity , volume
- chemical composition
- packaging, labelling
- special (microbiological, toxicological, radiometrical) parameters

HAZARDS FROM EATING FOOD

There are different hazards (risks) from the foodstuffs. The opinion concerning the rank of hazards in case of experts and the public is perfectly different.

To the food experts and nutritionists the rank of hazards from eating food is the following:

- microbial safety
- over-nutrition
- non-microbial safety (contaminants, natural toxins, agrochemicals, food additives)

To the public the rank of hazards from eating food is the following:

- pesticides
- new food chemicals
- chemical additives
- familiar hazards (fat and cholesterol, microbial sopoilage, junk foods)

PRINCIPLES OF FOOD PROCESSING AND FOOD QUALITY CONTROL

Today the foood production and industrial food processing are based on principles of GAP, GMP and GHP(1)(2)(3). GAP means good agricultural practice, GMP means good manifacturing practice and GHP means good hygiene practice. In case of food processing GMP involves GHP, there is no GMP without GHP.

Quality control and quality assurance in the food sector are based on principles of HACCP, ISO-standards, TQM. HACCP (hazard analysis, critical control points) is a system for safety. ISO standards – e.g. ISO-9000/2000, ISO-22000 – and TQM (total quality management) are different tools for the quality control and safety. ISO is a static model, TQM a dynamic one.

TECHNOLOGIES FOR PRODUCTION OF SAFE FOOD

Earlier a lot of different techniques and technologies – partly physical ones - were used to produce safe food. E.g. smoking, dehydration, chilling, freezing, ohmic processing, aseptic technique, microwave pasteurisation. Recently some new directions – e.g. microwave sterilisation, pressure sterilisation, pulsed technologies, application of electrical and magnetic fields – are in use.

The development of these new technologies and the successful application of these new techniques in the modern food processing are in close connection with the development of food physics, a subscience covering the field of food science and applied physics(4)(5)(6).

RADIATION TECHNIQUES IN THE AGRO-FOOD SECTOR

Various radiation techniques – ionizing and non-ionizing ones – are is use in different fields of food sector, not only in the production and processing, but in quality control or food investigations, as well(7)(8). Let us mention a few ones:

- nuclear techniques, ionizing radiation technologies (e.g. gamma sources, X-ray equipments, electron accelerators)
- non-ionizing radiation methods (e.g. light-techniques, IR, UV, laser, SYNERGOLUX technique)

- radiostimulation and radiomutation in agriculture
- isotope techniques, tracer techniques
- radioanalytical techniques (e.g. activation analysis, XRF)
- nuclear measurement techniques (quantity, level, thickness etc.)
- radiometrical control of the food chain, radioecological measurements

EXPECTATIONS OF THE MODERN FOOD PRODUCTION

Such expectations are e.g. the following:

- decrease of the microbial contamination
- increase of the storability
- improvement of the sensory properties

These requirements can be fulfiled using different radiation methods. In general these techniques are environment-friendly ones and useful from economical point of wiev, as well.

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