7. Product Management and Process Control

A New Approach to Food Safety — HACCP

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Hazard Analysis and Critical Control Points (HACCP) represents a new food inspection strategy for the future and is being studied by the U.S. Department of Agriculture for possible implementation in the United States.

HACCP is a simple system of process control and is an effective means of identifying potential hazards in food systems. Its objective is to insure that safe, wholesome and unadulterated food reaches the consumer and depends upon the identification of potential hazards and the establishment of Critical Control Points (CCP's) in the food system.

Hazard characteristics of food systems must be assessed and risk categories established. The potential for microbial abuse should be determined by identifying microorganisms of concern, classifying sensitive ingredients, and establishing sampling plans and analytical methods. Establishment of CCP's such as time/temperature, sanitation and prevention of cross contamination — and procedures to rapidly and continuously monitor CCP's insure control of health hazards.

Corrective actions to eliminate hazards created by loss-of-control at CCP's should be documented. Verification procedures to assure that CCP's are under control and effective must be established.

TRIGLYCERIDE CHANGES DURING TWO ELABORATION PROCESS OF SPANISH CURED HAM

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The development of the organoleptic characteristics of cured ham is related with the breakdown of protein and lipids. The determination of triglycerides, main components of neutral lipids, allows a new knowledgment of lipid changes produced in cured ham process. Two elaboration process were studied, short (6 months) and long (12 months); samples of subcutaenous fat and muscle (semimembranosus, biceps femoris) were taken, lipids were extracted by the FOLCH et al. (1957) method and neutral lipid fraction was obtained by an aminopropilsilica minicolumn, this fraction was analyzed by high temperature capillary gas chromatography. POO, POS, POL, OOO, SSO and PPO were the main triglycerides observed. Muscle samples showed lower POL percentages than subcutaneous fat. In salting step were observed the more important changes with similar results for fat and biceps femoris samples (decrease of OOO and increase of POO), but both triglycerides showed an increase in semimembranosus samples; these results were observed in both process. No significative differences were observed between the two process at the end of curing process.

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AMINOACIDS EVOLUTION DURING TWO ELABORATION PROCESS OF SPANISH CURED HAM

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Protein degradation is an important process during the elaboration of cured ham. As a result of the proteolytic activity aminoacids are released and they contribute to development of organoleptic characteristics. The elaboration of cured ham can be performed by short (4-6 months) and long (12 or more months) procedures, affecting to different quality of ham. In this work two elaboration process were studied (6 and 12 months), samples of two muscles (semimembranosus , biceps femoris) were taken at different steps of curing process; aminoacids were extracted with 0.6 M perchloric acid and an aliquot was taken for derivatization that was carried out with 3 M n-butanol/HCl and heptafluorobutyric anhydride, the derivatives were analyzed by capillary gas chromatography. The results obtained showed differences between the aminoacid profiles of fresh and cured hams. It was observed an increase of tyrosine and lysine percentages in cured hams of the two process studied. Significative differences between process were found for alanine and aspartic acid in semimembranosus muscle. Similar final concentrations were observed in the two curing process.

Production Management and Process Control

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The Danish pigmeat industry, with an annual production of 16 million pigs, has for a number of years employ a quality strategy as the main basis for retaining its competitiveness in the world markets.

The main components in this strategy have been a continuous improvement in the quality of Danish slaughterpi and an extensive use of measuring equipment and computer technhology for control and sorting of the raw materia Measurement and selection of raw materials become an important basis for trading based on quality rather than volumes and prices.

The decision to aquire an ability to supply high quality products tailored to individual customer requirement leads to demands for the future production management systems, particularly in the areas of planning, coordinati and logistics.

The raw material costs dominate the direct production costs. It is therefore the major task for producti management to utilise the raw materials in the best possible way, and at the same time to satisfy the customer needs for receiving products of the required quality at the correct time and place.

The current possibilities in the Danish pork industry are illustrated, based on the equipment for measurement selection and product control in use today. Future possibilities e.g. for further application of informati technology and for quality management based on certification according to ISO 9002 are indicated on the basis current development projects in Denmark.

Research on Application of Texture Soybean Protein in Meat Stuffed Product

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Texture soybean protein possesses fibrous texture and masticability. It is an excellent vegetable protein. As with the case in China which is the major soybean producer of the world and its population rely heavily on soybean protein as the important source of food protein. Texture soybean protein could improve food's nutritional value, increase Chinese people's ingestive amount of protein and regulate food structure.

On the basis of study of characteristic of texture soybean protein, this paper stretches forward the treating process of texture soybean protein, as well as the selection of binding agent and proportion to be applied by orthogonal test method. It also determined the content of the main oligosaccharide in the air-inflating material before and after it being treated by gas chromatography and the additive quantity in the meat stuffed product. The result indicates that texture soybean protein possesses good water holding capacity, oleophilic capacity and emulsifying. The water-recovery ratio is 1:4. The air-inflating material is decreased by about 80% in the treated texture soybean protein and is free of soybean odor.

Adding texture soybean protein from 10% to 15% and binding agent into meat stuffed product could enrich product quality, improve nutritional value and reduce product costs. It is clear texture soybean protein is an ideal protein additive material in the meat stuffed products such as sausages, etc.

Optimum Stress Relaxation Test Conditions for Beef Products

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The objectives were: (1) to evaluate the effects of various test conditions on stress relaxation data for three beef products - whole muscle, ground and finely comminuted meats; (ii) to evaluate the suitability of various models to describe the test results; and (iii) to standardize stress relaxation test parameters for various beef products. One product from each of the three broad classes were taken - finely comminuted (frankfurter), ground beef (hamburger), and whole muscle (corned beef). Cylindrical specimen of meat products, 10, 15 or 20 mm in diameter (D) and 10 mm in length (L) were prepared. These were compressed to 10%, 20% or 30% of their original height for 9 min. The stress relaxation test data was normalized by dividing the force by cross sectional sample area and strain to get modulus values. The data was fitted in three models - maxwell model with two elements, and Peleg (1979) and Nussinovitch et al. (1989) models. Both sample size and compression ratio affected model parameters. Maxwell model with two elements satisfactorily predicted the data. For a finely comminuted product, modulus values were higher at 30% compression than at 10% and 20%. The difference between different sample sizes was smallest at 20% compression. A D/L of 1.5 and any compression ratio are recommended for muscle foods; D/L = 1.5 and 10% or 20% compression for ground beef; and D/L = 2 and 10% or 20% compression for finely comminuted meats are optimum test conditions.

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Simultaneous Heat and Mass Transfer During Beef Carcass Chilling

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This paper describes the development of a simultaneous heat and mass transfer during beef carcass chilling. The specific objectives are: (i) to develop heat and mass transport models for predicting the temperature and moisture profiles during beef carcass chilling; (ii) to validate these models using heat and mass transfer data of frankfurters during cooking; and (iii) to generate temperature and moisture profiles for 'round' section. Two dimensional heat and mass transfer models were developed. The carcass was divided into 5 zones - round sirloin, loin, rib and chuck; and heat and mass transfer in the vertical direction was neglected. The models were solved using finite element techniques including variation method, Green's theorem and Crank-Nicolson central difference method for time increment. The model predicted the temperature and moisture profiles of frankfurters within 2.5% during cooking. It also predicted successfully the temperature and moisture profiles of a 'round' section of a beef carcass during chilling. Temperature at the surface was lowered to 0 °C in 5 hours, and the average centre temperature was 3.5 °C after 10 h. Average mass loss from the 'round' was 0.05% of original moisture content after 10 h. Moisture loss from the carcass surface was 72 to 83%.

Integral quality assurance in slaughtering and cutting

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Integral quality assurance from the farmer to the consumer is a challenge for livestock and meat industry. Quality assurance means basically that potential quality problems are identified and appropriate control measures are taken in all stages of the meat chain. In this paper an overview is given of new developments in identification, information and quality control.

To optimize the overall production chain identification, process and product data can be collected by Electronic Data Interchange (EDI). Interactive implantable chips, video imaging and voice recognition are possibilities for automatic communication to provide relevant and real-time information for management and employees. By using data processing systems activities such as planning, costing and product handling can be carried out more efficiently.

In quality control blood analyses can serve as a tool for a animal health monitoring and surveillance system. Improvements in hygiene, pathogen and antibiotic sensors can contribute to rapid product and process information.

The female veterinary meat inspectors of Finland - how to manage in the working environment

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A questionnaire was mailed to all veterinary inspectors of Finland. Out of 50 inspectors of red meat, 41 responded (84%). There were 18 men, 22 women among the respondents, and one who's gender remained unknown. The women were several years younger, 59% were under 40, than the men, which of 11% were under 40. Men had more post graduate degrees in general hygiene than women and they were more eager non-scientific publishers than women. They had more often permanent work and they had staid longer in their position than women. The present report draws attention to the differences between the male and female meat inspectors in their attitudes to their work. Both female and male veterinary inspectors had occasionally disagreements involved with hygiene with the management of the slaughterhouse. In these cases the male inspectors were helped more often by the authorities than the females. There were not enough laws and regulations concerning hygiene according to female respondents. Women experienced more stress because of their work than men and their work environment less safe than men. In addition women felt that they had less knowledge and capability to influence the hygiene in comparison to what men thought. The differences in opinions between the female and male veterinary inspectors can be partly explained by the fact men having more education. The longer working periods of the male inspectors may affect these feelings of stronger professional competence. However we can pose the question if this also reflects to the cultural roles of men and women.

Process evaluation by expert ranking described for production of cooked sausages type Frankfurter

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Sensoric and hygienic properties, compound, price respectively costs of foodstuff depend on several technical, technological and organizational aspects of production management.

For the production of cooked sausages type Frankfurter there was carried out an evaluation of the influence of process details and process steps on these parameters by expert ranking. For all aspects of survey frequency and seriousness of faults were determined. The resulting data were combined to a new parameter - "scale of risk - R" ($1 \leq R \leq 30$). R was calculated for all surveyed parameters. Finally, a total scale of risk was designated for the production process of cooked sausages type Frankfurter.

The results showed that selection and combination of raw material represent the most important reserves of production management. "Filling" and "expedition" of sausages are of minor risk. The studies give reason to conclude that "scale of risk" is a suitable parameter for localization and evaluation of weak points in the process of production.

Pressure In Meat Products During Heating

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The most frequent cause of sausage casing break and disturbance of cans tightness is pressure formation in meat products during heating.

The complexity of the problem is in the fact that pressure formation is caused by all the technological measures aimed at improving of water-binding capacity and swelling properties of forcemeat. There are reducing the amount of added water, the use of fresh-killed meat, increasing the quantity of added salt cutting in vacuum, etc..

Modern devices for sausage forming make it possible to create the given surplus pressure of stuffing in them which contributes to improving the indices of finished products.

The influence of internal and external head- and mass-exchange on the amount of internal pressure in sausage products was studied. The influence of sausage casing toughness and sizes on the nature of mass-exchange processes and in the end on the amount of internal pressure was determined.

The received data make it possible to regulate purposefully the amount of internal pressure in sausage products during cooking.

Vibrational Self-Cleaning Filter For The Cleaning Of Inedible Fat

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The cleaning of inedible fat, broth, sewage, etc., containing a large amount of scattered particles is an urgent problem. To solve it, self-cleaning vibrational filter has been developed. It includes a body with inlet and outlet pipes for suspension and precipitate, a filter partition consisting of external bed and elastic filter material (e.g. fibre and porous rubber) internal bed. Between these filter beds there is a device in the form of a sieve with conic holes for cleansing of filter partition. Filter partition is established at the cylinder entrance; the cylinder is put on springs and is connected with a vibrator. Laboratory and model device experiments gave positive results. For example, after filtration of inedible fat the content of ether unsolved particles decreased from 0.6-0.5% to 0.3-0.2%; filtration of fat taken from cleansing devices decreased the amount of ether unsolved particles from 20% to 3-4%. Choking up of the filter as well as its capacity decrease have not been observed for two hours. On the basis of experiments made, optimum amplitude and the frequency of vibration, section area, filter partition cell dimensions, cone angle of a nozzle, etc., were determined. The experiments having been made, self cleaning vibrational filter was developed. It has the capacity to clean 0.5 m^3 h of inedible fat from particles which dimensions are over 20 mcm.