TTI-MEAT SAFETY SYSTEM

SMAS

Development and application of a TTI based Safety Monitoring and Assurance System for Chilled Meat Products

QLK1-CT-2002-02545

A European Commission Research and Technology Development Project

FIFTH FRAMEWORK PROGRAMME

Quality of life and management of living resources

http://smas.chemeng.ntua.gr

Meat Chill Chain - Need for better management

It is generally recognized by the European industry, retailers, food authorities and even consumers that the weakest link that affects directly safety and quality of chilled products is the actual ***chill chain***. Over 44% of foodborne disease is due to temperature abuse.

Meat products are perishable and unless processed, packaged, distributed and stored appropriately can spoil in relatively short time. Overgrowth of incidental pathogenic bacteria like *Listeria monocytogenes*, *Salmonella sp.* and *Escherichia coli* followed by undercooking or inadequate preparation may pause a potential hazard for the consumer. Despite the proliferation of food safety regulations and the application of safety management systems such as HACCP, risk assessment studies show that foodborne disease has remained a main concern in the last decade.

Application of an optimised quality and safety assurance system for chilled distribution of fresh meat and meat products requires continuous monitoring and control of storage conditions from production to consumption. The systematic management of the chill chain and the improved evaluation of safety, quality and shelf life of meat can lead to reduced safety risk and increased quality, with a significant health and economic impact to the European society and market.

What is SMAS?

SMAS is an integrated chill chain management system, expected to lead to an optimised handling of products in terms of both safety and quality. It is based on the ability to continuously monitor the storage conditions of each product with the use of Time Temperature Integrators (TTI). TTI are inexpensive "smart labels" that show an easily measurable, time and temperature dependent change that cumulatively reflects the time-temperature history of the food product. TTI response can be correlated to meat safety and quality status at any point of the distribution chain providing an effective decision tool.

The SMAS project

The acronym SMAS summarizes the long title of the 3 year (2003-2006) action project "Development and application of a TTI based Safety Monitoring and Assurance System for Chilled Meat Products", co-ordinated by the National Technical University of Athens (NTUA). Funded by the EC (project number *QLK1-CT-2002-02545*), it is part of the key action of Food, Nutrition and Health. The project basis consists of validated predictive models of predominant meat pathogens growth and kinetics of the response of selected TTI, all applied in an expanded TTI application scheme that translates TTI response to meat microbiological and quality status.

7 Institutes/Companies are members of the SMAS project, working on its main interrelating workpackages with the ultimate purpose to deliver an effective chill chain decision and management tool.

The main tangible goal of the SMAS project
is to develop a reliable and practical decision and management tool
for an optimized handling of meat products in terms of both safety and quality

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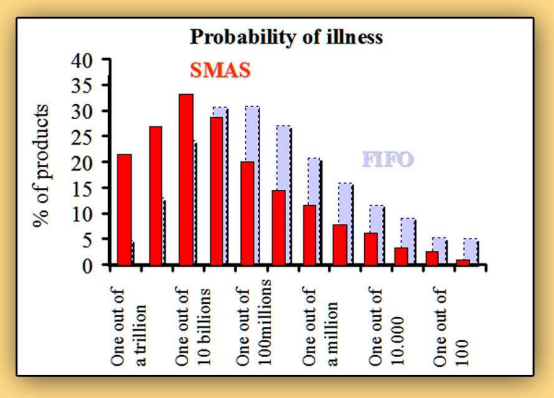
Main goals of SMAS

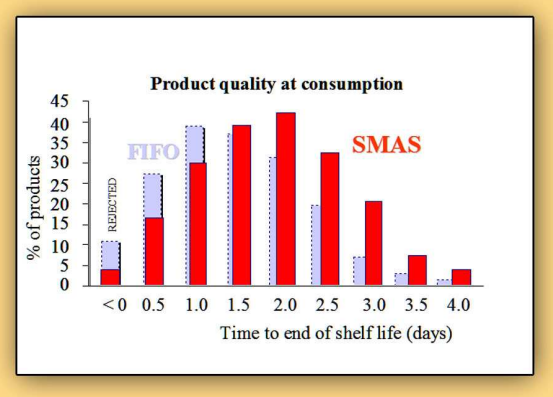
The aim of this research project is to study reliable and practical Time Temperature Integrator (TTI) systems and establish their applicability as safety monitors of meat products from manufacture to consumption. The project will capitalize and expand on the scientific state of the art approach of mathematical modelling of dominating meat pathogens and translate this knowledge to TTI.

The major expected achievements of the project will be:

- Accurate, validated mathematical models for safety and quality related microorganisms of ready to cook meat products. They will provide the meat industry with a tool for product development and safety assurance and the European authorities with a quantitative means for meat product risk evaluation.
- The development and study of an assortment of Time Temperature Integrators (TTI) suitable for meat safety monitoring. These TTI will provide the meat industry and retail business with effective tools to monitor the chill chain.
- Improved distribution logistics and management of the meat chill chain from the application the Safety Monitoring and Assurance System (SMAS). SMAS could replace the current "*First In First Out*" (FIFO) practice and lead to risk minimization and quality optimization.
- Increased ability of the meat sector to control its weak link, the chill chain
- Fulfilment of consumer expectations that extra efforts and state of the art technology, represented by the use of TTI active labels and SMAS, have been employed to guarantee him low risk-high quality meat products.
- Wide availability of state of the art information, from the project and other reliable sources (i.e validated mathematical models for pathogen growth, data for pathogen prevalence and concentration, distribution temperature profiles, dose response data, inactivation models, TTI and SMAS application) for Risk Assessment of specific meat products, through the establishment of an effective Internet site (http://smas.chemeng.ntua.gr)

The contribution of SMAS in the chill chain management can be visualized as a minimization of risk for illness and optimisation of the meat product quality at the time of consumption





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EC FIFTH FRAMEWORK Programme – Quality of life and management of living resources Key Action 1. Food, Nutrition and Health - Area 1.1. Development of safe and new and/or improved manufacturing processes and technologies - Thematic priority 1.1.3. Quality monitoring and traceability throughout the food chain

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