Development and application of a Safety Monitoring and Assurance System (SMAS) for chilled meat products

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Summary:
The weakest link that affects directly safety and quality of chilled products is the actual chill chain. Meat products, unless processed, packaged, distributed and stored appropriately can spoil in relatively short time, pausing a potential hazard for the consumer. Application of an optimised management for chilled distribution requires continuous monitoring and control of storage conditions from production to consumption. A novel chill chain management policy, coded "Safety Monitoring and Assurance System" (SMAS) is proposed, allowing to give priority to products in such a way that, compared to the First In First Out (FIFO) current approach, risk at consumption time is minimized and quality optimised [1,2]. SMAS is being developed and evaluated in the European Commission RTD project QLK1-CT-2002-02545 (http://smas.chemeng.ntua.gr)

Methods:

The main cornerstones of the system include (a) validated models of microbial growth of pathogens and Specific Spoilage Organisms (SSO) for each different meat product, (b) information on the initial prevalence and distribution of the SSO, N_o (c) continuous temperature monitoring of the chill chain with Time Temperature Indicators and (d) correlation of sensory acceptability to a specific level of microbial load, N_S, that signals the end of the product shelf life. These elements are integrated in the SMAS algorithm, allowing for the estimation of the actual remaining shelf life and the risk assessment of each product unit, at selected points of the chill chain.

Results & Discussion:

In order to prove the effectiveness of SMAS, the Monte Carlo method was applied and a realistic distribution scenario was assumed, including all stages of transport and storage. Two decision points were selected, namely the product split at the distribution center to the export or local market, and the stocking of the retail cabinets. In both cases, products with the higher microbial load and risk were promoted first, instead of random rotation (FIFO). The results suggest SMAS policy substantially reduced risk probability and minimized products of high risk, optimizing, at the same time, quality distribution.

References:

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