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Training of SMEs for frozen food shelf life testing and novel smart packaging application for cold chain monitoring

Taoukis P., Tsironi T., Giannoglou M., Platakou E.
Laboratory of Food Chemistry and Technology, School of Chemical Engineering, National Technical University of Athens, Iroon Polytechniou 5, 15780 Athens, Greece
taoukis@chemeng.ntua.gr

Introduction

Periodic consumer complaints and regulatory actions confirm to the processors that the product that reaches the consumer is often not of the same quality as the one leaving their manufacturing facilities. Application of an optimized quality and safety assurance system for the chilled and frozen distribution of products requires continuous monitoring and control of storage conditions, from production to consumption. Time-Temperature Integrators (TTI) are inexpensive, active "smart labels" that can show an easily measurable, time-temperature dependent change that reflects the temperature history of a food product to which it is attached (Taoukis & Labuza, 2003). A TTI based system could lead to realistic control of the cold chain, optimization of stock rotation and reduction of waste and efficient shelf life management.

In the IQ-Freshlabel European project enzymatic and photochemical TTI were developed and tested for frozen products. Methodology was developed for selection of the optimum TTI design of specific frozen fish products and their application was validated in cold chain simulating trials and in pilot studies (Giannoglou et al., 2014). The IQ-Freshlabel project aims at promoting the influence of smart labels application on waste reduction, food quality and safety in the European supply chains by among others, training SMEs within the European meat and fish industry. The organisation of workshops on intelligent labels addressed to potential end-users from the European industry as well as to consumers and the presentation of different applications of reliable technologies supports the EU policy related to the new drafted regulations on intelligent packaging.

Often SMEs within food industry do not have access to novel technologies enabling them to meet new demands from customers. The IQ-Freshlabel project increased the availability of smart labels application for a wider range of food industry and extended the state-of-the-art knowledge for the use of smart labels. Involved associations of food producers benefited from the project results and provided numerous food producing SMEs with reliable information about the application of the intelligent labels. Therefore the innovative technologies are more available for food producing SMEs assuring them higher competitiveness.

Training methodology

Training activities in Greece intended to educate the staff of the SME-AGs (National Hellenic Association of Frozen Foods-PASEKT) and the SMEs regarding the properties of the developed TTI and their utilisation within food packaging, transport, storage and sale. The training activities were addressed at first to SME-AGs that afterwards conducted training to their members.. The workshops involved two phases: shelf life modelling of frozen seafood and TTI theory and application.

Training material

The SME-AGs were trained by the RTD performers in order to acquire the necessary knowledge regarding the novel TTI technology, their activation, their application in the food chain for given food products, their advantages and disadvantages as well as further research developments needed. During the trainings, the SME-AGs received various training material helping them to understand TTI.

Training material was developed, including an extended training manual for frozen seafood shelf life testing and application of TTI, PowerPoint presentations and printed tutorials. The materials included a comprehensive assessment of the requirements for the EC regulations affecting the traceability of the cold chain within the frozen food processing sector.

The RTD performers designed the trainings to be very close to industrial implementation and to answer the needs of the SME-AGs and SMEs as well as all their questions and clarify all their doubts. Practical demonstrations of the activation of the TTI were carried out during the trainings in order to provide the participants a visual and clearer idea of the TTI operation.

The developed training materials, adapted to the meat and fish producers' needs in terms of content and language were distributed to the training attendees and published on the IQ-Freshlabel website.

Training workshops

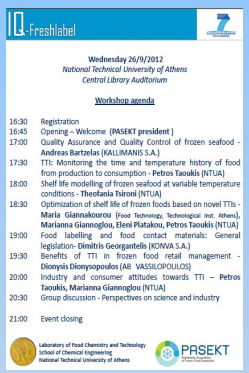
The training of the technical scientific Working Group on Quality Assurance of National Hellenic Association of Frozen Foods was performed on 5th July 2012 in Athens by the National Technical University of Athens. Thanks to the trainings performed on a "train the trainer" basis, the SME-AGs had the possibility with help of the RTD performers to customize the training material to answer exactly the needs of their SME members and increase successful implementation of IQ-Freshlabel smart labels by the food industry after end of the project.

The training sessions for SMEs provided information on the following topics:

- ✓ Comprehensive assessment of the requirements for the upcoming EC regulations affecting the traceability of the cold chain within the meat and fish processing sector.
- ✓ Technological principle and properties of TTI and information material about the characteristics of the developed IQ-Freshlabel labels starting with the project website and the project leaflet.
- ✓ Information package compiling and analysing all the available information on the technical requirements for the developed indicators from the major applications in the frozen food industries.
- ✓ Instructions for using IQ-Freshlabel TTI for multiple applications.

Smart Labels' Training for the Frozen Food industry in Athens

PASEKT as National Hellenic Association of Frozen Foods, counts with members like Frozen Food Industries, Importers and Distributors of Frozen Fish, Meat, Poultry and Vegetable. PASEKT, with the assistance of NTUA organized the Workshop "Smart packaging: Cold chain management for frozen food quality" held on 26/9/2012 at the Multimedia Auditorium of the Central Library of the National Technical University of Athens.

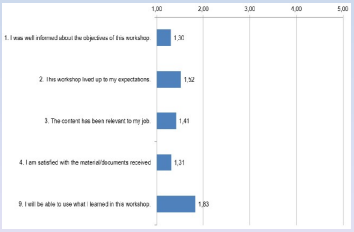


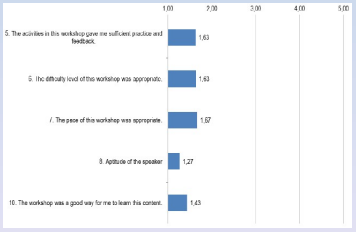
43 participants were trained in Greek language on TTI application and use for frozen food products. The study involved two phases: shelf life modelling of frozen seafood and TTI theory and application. The key objective of the workshop was to build participants' capacities to understand and use TTI for frozen food products. A Certificate of attendance and training on the topic of application of smart labels for frozen foods was received by each trainee.

As a result, opinion exchange took place during the Workshop and it was a good opportunity to deepen understanding and identifying problems in the cold chain and their causes. The potential of using TTI and the requirements were discussed and the expectations of manufacturers and retailers were considered.

Evaluation of the training

All trainees filled an evaluation form for the training Workshops. The training organised by PASEKT and NTUA in Greece was evaluated by the attendees as "very good" with an average evaluation mark of 1,50 on a scale from 1 (very good) to 5 (very bad). The examples presented, the stakeholders' attitude discussion and the experimental background were evaluated as most valuable aspects of the training.





The outcome was an increase in the technological level of both the SME-AGs and the SMEs in the addressed sectors. As a result of the training procedure, opinion exchange took place during the workshops and it was a good opportunity to deepen understanding and identifying problems in the cold chain and their causes. The potential of using TTI and the requirements were discussed and the expectations of manufacturers and retailers were considered.

References

■ Giannoglou M., Touli A., Platakou E., Tsironi T., Taoukis P.S, (2014). Journal of Food Science (in preparation) ■ Taoukis P, Labuza TP. (2003), 'Time temperature indicators'. In: Novel Food Packaging Techniques. R. Ahvenainen (ed.). Woodhead Publ., Cambridge, UK.

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