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Semi-passive RFID and beyond – Steps towards automated quality tracing in the food chain

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Abstract

Miniaturized RFID temperature loggers are a useful tool to analyze the transport chain and detect weaknesses. We adapted these devices to analyze the amount of local deviations, to prove the need for spatial temperature monitoring and to estimate the minimum number of sensors that is necessary for reliable detection of local deviations inside a truck or container. To compare the effects of different temperature conditions it is necessary to develop a scale to assess the resulting effects on product quality. Especially the question how alarm conditions should be set is of high interest. The shelf life or keeping quality model that offers a continuous scale to describe quality losses of food was applied to the recorded temperature profiles. Handling variances and unpredicted changes in quality is one of the big challenges in food supply chain management, which can be met by future quality tracking and tracing systems. Passive RFID technology offers no access during transport inside a packed container. To have permanent online access to the freight conditions active communication by wireless sensor networks is necessary. A wireless sensor system, sending a notification as soon as a quality risk is detected, could greatly improve planning processes and outweigh the higher system costs. A further crucial point is the amount of data, produced by multiple sensors per container or even per palette. Neither manual evaluation nor transmission over mobile networks with limited bandwidth or expensive rates is feasible. Temperature data have to be preprocessed by intelligent systems, which could be sited at the level of RFID, sensors or the means of transport. As application example we introduce a concept for quality assessment on tag level and our demonstrator for quality evaluation on truck or container level.

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