



Retail food stores' internet-based own-check databank records and health officers' on-site inspection results for cleanliness and food holding temperatures reveal inconsistencies



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ARTICLE INFO

Article history:

Received 5 April 2013

Received in revised form

19 June 2013

Accepted 25 June 2013

Keywords:

Official control

Own-check

Retail food store

Inspection

Temperature

Cleanliness

ABSTRACT

Official food control inspects retail food stores (food stores) regularly for compliance with food safety regulations. The health officer (inspector) inspects the food store's own-check (self-verification) and facilities and operations. The own-check inspection is usually performed on-site and includes the examination of own-check documentation. The chain-store groups (grocery multiple retailers) studied have developed an internet based own-check databank for documentation of own-check data for their own use, and also to enable official food control to make inspections via the internet. The chain-stores aim to speed up and possibly decrease the number of on-site inspections made by the official control in food stores. The purpose of this study was to investigate the accuracy and reliability of the own-check databank from the view of official food control.

Fourteen food stores that represented three different national chain-store groups in a local municipality in Finland were included in the study. The own-check documentation from a 3-month period with regard to the receiving of products, cleanliness and temperatures of the refrigeration equipment was inspected by the official control via the internet based own-check databank. This was followed by an on-site inspection for comparison. The frequency of non-compliance for cleanliness recorded by the inspector on-site was significantly higher than the frequency of non-compliance recorded in the databank (Fisher's exact test, $p < 0.05$). On-site inspection observed non-compliance in temperatures (aberration >3 °C for at least 30 min) of refrigeration equipment for minced meat and processed fish products, determined by temperature data logger (24 h measurement), in 57.1% (8/14) of the stores. In contrast, no non-compliance regarding those same refrigeration equipment was recorded in the databank during a 3-month period. Discrepancies between the inspection results of cold holding and cleanliness in the databank and the on-site inspections were observed in food stores representing all three chain-store groups.

The observed differences between the databank data and the on-site inspections, suggest that the frequency of on-site inspections should not be decreased or substituted by off-site databank inspections. Issues of on-site inspection and off-site databank inspection are discussed. Further, the study revealed serious problems in maintaining and monitoring of the temperature in refrigeration equipment in food stores.

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1. Introduction

Retail food stores ensure the fulfilment of food safety requirements by executing own-checking (self-verification) according to an own-check plan tailored for the individual store. The

execution of the plan is documented and accessible for official food control for inspection (Anonymous, 2004). The purpose of the official food control is to verify that the food business operators (FBOs) fulfil the requirements of the food safety regulations by performing inspections of the FBO's own-check documentation, facilities and operations (Anonymous, 2004).

Chain-store groups (grocery multiple retailers) in Finland have developed an internet based own-check databank in which the food stores document their respective own-check plan and the

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execution of the own-check. The purpose of the databank is to collect electronic own-check data, which reduces the need for hard copy documentation and is easily accessible for the individual stores. The databank enables making summaries and trend analysis in stores and at chain-store group level, which increases the usability of the own-check documentation (FGTA, 2012).

The own check databank has been accessible to the local food control authorities since 2009, but the databank has not been used actively by inspectors. The Finnish Grocery Trade Association (FGTA) organized training in the use of the databank during 2012 to increase inspectors' knowledge of the databank and to increase the use of the databank by inspectors. This in turn was expected to increase the utilization of the databank, speed up the on-site inspections and possibly decrease the number of on-site inspections made by official control.

The own-check databank comprises own-check areas that are considered to be important for food safety and which are possible to measure and document. Own-check areas that are included in the databank are e.g. receiving of products, waste management, pest control, temperature control of refrigeration equipment and cleanliness (FGTA, 2012). These own-check areas are relevant for food safety and they are measurable visually or by instrument.

Cleanliness and temperatures of refrigeration equipment, in particular are important factors to be monitored by the FBO and the official control. Lack of cleanliness may lead to the contamination of unpacked products or products that are being handled at a service counter and non-compliance of temperature holding may be the sole reason for a product to become unsafe. Several studies indicate that temperature abuse is a frequent non-compliance in restaurants (Guiducci, Copeland, Dorsey, & Edelstein, 2011; Phillips, Elledge, Basara, Lynch, & Boatright, 2006; Reske, Jenkins, Fernandez, VanAmber, & Hedberg, 2007), but also retail food stores have been reported to have problems with cold holding (Likar & Jevšnik, 2006; Lundén, 2013). Temperature abuse is also categorized as a critical violation (Guiducci et al., 2011; Newbold, McKeary, Hart, & Hall, 2008) and it has been recognized as a contributing or risk factor for outbreaks (Buchholz, Run, Kool, Fielding, & Mascola, 2002; EFSA, 2012; Evira, 2011a, p. 69; FDA, 2009). The own-check system must therefore be able to recognize temperature abuse and to react quickly to it.

The regulations require the official control to verify that the FBO fulfils food safety requirements by using appropriate control methods (Anonymous, 2004). In addition to on-site inspection, it is also possible to inspect own-check documentation on-line at the office (document inspection) (Anonymous, 2012), which the internet based own-check database enables. Information concerning the usability and effectiveness of document inspection is very limited to the knowledge of the authors. Official control should have efficient control methods in use to identify food safety violations and to intervene in such cases. Possible new control methods or tools should be evaluated for their effectiveness and their equivalence to parallel control method.

The development of internet based solutions for own-check documentation and inspection of the own-check documentation is proceeding and the use of those by official control may increase. New control methods should be investigated at an early stage in order to recognize benefits and challenges. The possible substitution of a certain number of on-site inspections with off-site document inspections is a change that should be investigated in relation to food safety, detection of frauds, and reliability of control methods.

The aim of the study was to investigate the reliability of the databank by performing databank inspections and on-site inspections in retail food stores. The results received by the inspection of the own-check documentation in the databank and the

inspection on-site were evaluated for their equivalence. The inspections concentrated on the compliance of cleanliness and cold holding temperatures. Further, issues of on-site inspection and off-site inspection are discussed.

2. Material and methods

2.1. Retail food stores

Fourteen retail food stores (grocery shops) in the area of a local food control unit (Food and Environmental Health Unit, Region of Espoo, Finland) were chosen for the study. The inspections were made by one inspector to minimize possible differences in the inspection procedures. The three largest chain-store groups in Finland were represented in the study (7, 5, and 2 stores, respectively).

2.2. Inspection of own-check documentation in the databank

The inspections were performed in January–March 2012. The own-check documentation from a 3-month period for the receiving of products, cleanliness and the temperatures of the refrigeration equipment was inspected via the internet based own-check databank at the inspector's office. The adequate frequency of own-check entries, entries recording possible non-compliances and corrective actions were inspected. The adequate frequency of own-check entries is defined in the retail food store guide, which is prepared in collaboration with the National Food Safety Authority (Evira).

2.3. On-site inspection

The on-site inspection of each food store was performed within one week after the databank inspection of the respective store. Predesigned inspection forms were used. The inspections concentrated on the cleanliness of the store and the cold holding temperatures of minced meat and processed fish products. Cleanliness and cold holding temperatures were included in the study because of their important role in food safety and also because they are measurable: cleanliness is inspected visually and cold holding temperatures by instrument. Both are also possible to inspect on-site at any time contrary to receiving of products. Surfaces that appeared to be unclean only due to activities during the inspection day were not considered to be non-compliant. Minced meat and processed fish products were selected because they require quite low holding temperatures (max 4 °C and 3 °C, respectively) and processed fish products in particular, constitute a high risk due to possible *Listeria monocytogenes* growth. The temperature of the refrigeration equipment was determined for a 24 h period by a temperature data logger (Thermochron iButton DS 1921LF51), which was located close to the back wall of the refrigeration equipment. The surface temperature of six products in each refrigeration equipment was measured using an infrared thermometer (Testo 826-T4) strictly following the manufacturer's instructions for temperature measurement of surfaces. The temperature of the refrigeration equipment as indicated by the fixed temperature device was recorded by the inspector at the on-site inspection. A temperature aberration was considered a non-compliance when the recorded temperature exceeded the upper temperature limit over 3 °C for at least 30 min. The temperature–time combination was chosen because the regulation stipulates that the temperature of the product can exceed the upper temperature limit with a maximum of 3 °C for a short period of time (Anonymous, 2011). Duration of the short time period is not defined in the regulation. Cleanliness was evaluated visually on predefined targets. The on-site inspections were preannounced.

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