

DOMESTIC FOOD HANDLING PRACTICES AND FOOD SAFETY

GESTIONE DOMESTICA DEGLI ALIMENTI E SICUREZZA ALIMENTARE

CONTER Mauro¹, **POJANI** Linda², **CORTIMIGLIA** Claudia², **DI CICCIO** Pierluigi², **GHIDINI** Sergio²,
ZANARDI Emanuela², **IANIERI** Adriana²

¹ Department of Animal Production, Veterinary Biotechnologies, Food Quality and safety, Parma University, 43100 Parma, Italy. Corresponding author. Tel.: +39 521902761; Fax: +39 521902752; E-mail: mauro.conter@unipr.it

² Department of Animal Production, Veterinary Biotechnologies, Food Quality and safety, Parma University, 43100 Parma, Italy.

Abstract.

Consumers have an active role in the contest of food safety. Management of food at home is the last step of the chain “from farm to fork”, but is not the least important. Outbreaks of food-borne illness occurring in private homes are less likely to be reported, but a significant proportion of food-borne outbreaks in countries with an advanced economic development can be attributed to the home environment. This study aimed to provide information on the consumer management of refrigerated food. Overall, 1240 people have been interviewed in order to have information about domestic management of food. This study highlighted some gaps in food safety knowledge and practices that occur in domestic setting and consumers are not familiar with their role in the food safety chain. Findings from this study clearly indicate the need for greater consumer education regarding proper domestic refrigerator management, because consumers aware of safety issues can be active partners within the food chain.

Keywords: Refrigeration; domestic management; food handling practices;

Introduction

Epidemiological data from Europe, North America, Australia, and New Zealand indicate that a substantial proportion of foodborne disease is attributable to improper food preparation practices in consumers' homes (Sharma, et al., 2009). Outbreaks of food-borne illness occurring in private homes are less likely to be reported than those in commercial and public premises (Scott E. 2003; Kilonzo-Nthenge, et al., 2008). Nevertheless, data from England, Wales, the USA and Canada suggest that 12–20% of reported food-borne outbreaks have been attributed to the home. Overall, in Europe, Food and Agriculture Organization of the United Nations/World Health Organization (FAO et al., 2002) stated that the 'private home is the single location where most food-borne cases occur'. Failure to follow correct practices in the adjustment, maintenance, use or cleaning of domestic refrigerators poses a number of risks to consumers. Refrigerators form an important link in the wider chain of cross-contamination, and a significant factor in 28% of outbreaks of domestic foodborne disease (Kilonzo-Nthenge *et al.*, 2008; Ryan et al., 1996). Bacteria contaminating unwashed raw foods, leaking packages, hands, surfaces, etc. introduced to domestic refrigerators may directly contaminate other stored foods, or attach to and persist on the internal surface of the refrigerator posing risks of indirect longer term contamination during subsequent food preparation activities (Michaels et al., 2001). Many domestic refrigerators are incorrectly adjusted, operating above the recommended temperature and are therefore capable of supporting sub-optimum but significant growth of mesophilic organisms such as *Staphylococcus aureus* and *Salmonella* spp. (Jackson et al, 2007; Flynn et al., 1992; Johnson et al., 1998). Even when correctly adjusted, refrigerators can support the growth of psychotropic pathogens such as *Listeria monocytogenes* and *Yersinia enterocolitica*, which can therefore increase to clinically significant numbers in foods stored for extended periods in domestic refrigerators (Flynn et al., 1992; Johnson et al., 1998). Surveys conducted in many countries to evaluate the food safety practices of consumers have been reviewed by Redmond and Griffith (2003). Data on the food handling practices are usually limited to the collection of data concerning consumer awareness and knowledge rather than actual food

handling practices (Kennedy et al., 2005; Kosa et al., 2007; Lagendijk et al., 2008). This survey was undertaken to obtain information on the domestic meat and poultry handling practices. Specific information on purchasing, transport, storage, and freezing, practices was requested in the questionnaire. Therefore, the objectives of this study were to evaluate consumers behaviour with regard to refrigeration practices.

Materials and Methods

The survey has been carried out in Italy. A questionnaire has been designed involving 25 questions arranged in three sections: (i) demographic characteristics (gender, age, residence area, education, employment status, household size), (ii) domestic management of refrigerated food from purchase to consumption (placing, packaging, temperature, cleaning practices), and (iii) risk perception by the consumer. Face-to-face interviews have been conducted in the respondents' homes or workplaces. Each questionnaire took approximately 10 min to complete. Following the survey, a statistical analysis of the data has been conducted. All statistical analysis has been made by using SPSS (Chicago, IL) ver. 16.0.

Results and discussion

Overall 1240 interviews have been performed. Socio demographic characteristics of surveyed participants are listed in Table 1.

Table 1: Socio demographic characteristics of the studied population samples.

Number of subjects	1240
Gender ^a	
male	61.8
female	38.2
Age class (years) ^a	
< 18	2.0

18-30	27.4
31-45	31.7
46-60	24.3
>60	14.6
Number of people at home ^a	
1	17.0
2	21.3
3	33.4
4	18.5
>4	9.8
Children at home ^a	
Yes	63.5
No	36.5
N° of children at home (if any) ^a	
1	28,3
2	40,3
3	25,3
4	4,8
>4	1,3
Age of children (if any) ^a	
0-10	29.7
10-20	34.0
20-30	24.3
>30	12.0
Education level ^a	

primary school	16.0
secondary school	20.0
college	39.0
university	25.0
Job category ^a	
employee	30.0
executive	19.0
retired	20.0
student	13.0
housewife	18.0

^a Data are presented as percentages

Regarding the second part of the questionnaire, the majority of the interviewed people (38.1%) do the shopping twice a week, following a purchase order. In particular, 38.1% of consumers follows the disposition of the shelves, 37.8% follows a personal order and only 24.1% leave the refrigerated/frozen food at the end. Moreover, less than half of respondents used a cool bag during shopping. Interestingly, only 18% of people do the shopping as the last step before going home. Regarding domestic management of refrigerated food, the majority of respondents (60.9%) place the food randomly into the fridge and some half of them do not separate raw food from cooked products. The majority of respondents (69.9%) were aware of the correct temperature range (2-5°C) of the household refrigerator units, but they seldom (44.4%) or never (38.7%) checked the temperature anyway. Frozen food are stored into the original packaging, but some 33% of consumers remove the packaging before to store the product into the freezer. Of the interviewed people 70.2% of them declared that they clean their hands after touching raw foods. For the third part of the questionnaire, related to the risk perception from the consumer, interestingly, the majority of people (74.4%) affirmed that the food management at home is important, but the

remaining 25.6% had never thought about this issue. The major risk perceived by the consumers is the presence of bacteria (88%) followed by the presence of chemicals such as dioxin (49%).

The results of this survey indicate a low level of food safety knowledge in a representative sample of householders in Italy. However, this situation is not unique, since a similar level of food safety ignorance has been identified in similar studies conducted in Ireland or in Australia (Bolton et al., 2005; Jay et al., 1999). For example, 20.0% of householders in the current study knew that the correct refrigeration temperature was 1-5°C, the corresponding figure for Australia was 26.3% (Jay et al., 1999). Similarly, only 18.0% of householders reported they frequently monitored the temperature of their refrigerator, compared to 22.4% in Ireland or 15.5% in the Australian study (Bolton et al., 2005; Jay et al., 1999).

Outbreaks of foodborne illness, especially in the home, occur as a result of improper food hygiene practices in which cross-contamination in combination with inadequate storage or cooking was implicated in many instances (Olsen, et al., 2000). It is impossible to completely exclude food pathogens from the kitchen; however their spread, growth and survival can be controlled with correct food storage and regular cleaning and disinfection of food contact surfaces. Some surveys reports the role of refrigerator as a significant niche for persistence and dissemination of foodborne pathogens (Azvedo *et al.*, 2005; Jackson *et al.*, 2007). In our study, 80.0% of consumers were aware of the correct temperature inside the fridge, but 38.7% of them don't checked it at all. This percentage is in agreement with those reported in other studies (James, et al., 2008; Kosa, et al. 2007; Redmond & Griffith, 2003). If food is held over time at temperatures allowing to bacterial growth, there is a potential risk in terms of food safety because a more rapid growth of spoilage microorganisms or food pathogens is allowed, if they are present, such as *L. monocytogenes* or *Salmonella* spp. Moreover, their ability to attach to many kinds of surfaces (glass, rubber and stainless steel) and to produce biofilm have been demonstrated (Di Bonaventura *et al.*, 2008). The levels of contamination observed could be influenced by the method of food placing into the fridge. In fact, even against a high level of education, 60.9% of respondents adopted personal criteria to

food placing, disregarding the risk arising from cross-contamination. Raw meat, poultry and fish should be stored separately from other ready to eat foods to avoid cross-contamination. Furthermore, 29.8% of householders do not wash their hands after touching raw food, increasing the likelihood of cross-contamination. This study highlighted some gaps in food safety knowledge and practices that occur in domestic setting. In conclusion, result obtained from the present survey revealed that consumers are not familiar with their role in the food safety chain and that they allow numerous opportunities for microbiological contamination of food. Findings from this study clearly indicate the need for greater consumer education regarding proper domestic refrigerator management.

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