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From purchase to consumption of bivalve molluscs: A qualitative study on consumers' practices and risk perceptions

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ABSTRACT

Worldwide bivalve production has increased significantly in recent years. Bivalve meat is recommended in dietary regimens due to the benefits associated with their consumption but, at the same time, is internationally recognized as a potential vehicle for outbreaks of foodborne disease. To reduce food risk exposure, consumers must pay close attention when purchasing, handling and consuming bivalves. This study aimed to collect information on consumers' perceptions and practices related to bivalve purchasing, managing and consumption at home. A focus group methodology was adopted to better understand consumers' food practices and risk perceptions regarding molluscs. Four focus groups involving 42 consumers were conducted in Veneto and Marche region. The core analysis was then applied to each focus group discussion in order to identify, categorize and rank the information collected. The most important factors that came to light during the focus groups concerned the personal reasons for preparing bivalves at home; the place of purchase; the elements guiding consumers when purchasing bivalves; the bivalve preparation, cooking and storage conditions at home; the consumption of raw molluscs and the health risks; the consumers' categories most at risk; and the production chain control by the authorities. The data reported in the article can provide useful information to public authorities working on food safety for developing effective risk communication strategies.

1. Introduction

The most recent document of the Food and Agriculture Organization (FAO) reported that world aquaculture production of fish and plants continued to grow in 2014, reaching 101.1 million tonnes (live weight) (FAO, 2016). The data show a general trend of an increase in production of farmed food fish (finfish, crustaceans, molluscs and other aquatic animals) (FAO, 2015; FAO, 2016). In Europe in 2014, shellfish farming represented approximately 60% of total aquaculture production (European Parliament, 2014). Europe produced 632,000 tonnes of bivalves in 2014; its major producers were Spain (223,000 tonnes), France (155,000 tonnes) and Italy (111,000 tonnes) (Prioli, 2008).

Bivalve meat is recommended in dietary regimens for the reduction of coronary heart disease (Chiesa et al., 2018) and support of cognitive development and vision (Bloch & Qawasmi, 2011). At the same time, bivalve molluscs are internationally recognized as potential vehicles for outbreaks of foodborne disease because of their filter-feeding activity (Lee, Lovatelli, & Ababouch, 2008; Suffredini et al., 2014) and of their exposure to elements in the aquatic environment, such as algae biotoxins and chemicals (Jacobs et al., 2015). In 2015, 'fish, shellfish, molluscs and products thereof' were included among the most common food vehicles associated with strong-evidence food-borne disease outbreaks (9.5%) (EFSA & ECDC, 2016). Among 'fish, shellfish, molluscs, crustaceans and products thereof', histamine was the leading cause of strong-evidence outbreaks (52.5%), followed by calicivirus, which includes the Norwalk-like virus (norovirus) (25.0%), and Salmonella (12.5%) (EFSA & ECDC, 2016).

The control of virus prevalence and the study of the bivalve traceability in countries where there is significant shellfish production is therefore relevant to consumer health protection (Chiesa et al., 2011; Suffredini et al., 2014). In Europe, several regulations (Reg. 854/2004, European parliament 2004; Reg. 2073/2005, European Commission, 2005; Reg. 1441/2007, European Commission 2007) have been adopted to protect consumers' health (Anacleto, Barrento, Nunes, Rosa, & Marques, 2014; Suffredini et al., 2014).

To reduce food risk exposure related to the consumption of bivalve molluscs, consumers must pay attention in their purchasing, handling and consumption, in particular applying correct procedures for the control of the microbial-related risks. For example, consumers prefer to eat oysters live/raw and clams and mussels lightly cooked (Anacleto et al., 2014).

Several studies show that consumers have a positive image of fish in

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general. Attitudes towards fish are strongly favourable, and it is perceived as a healthy food (Jacobs et al., 2015; Pieniak, Verbeke, Vermeir, Brunsø, & Olsen, 2008; Verbeke & Vackier, 2005). However, some research that focused on shellfish consumption demonstrated that consumers are confused about its risks/benefits (Hicks, Pivarnik, Richard, Gable, & Morrissey, 2013), and information about the risks is fragmented and conflicting, often provided by non-expert sources such as mass-media (Hicks, Pivarnik, & McDermott, 2008).

Risk perceptions (Fife-Schaw & Rowe, 2000), benefit perceptions (Siegrist, 2000), and their interaction (Frewer, Scholderer, & Bredahl, 2003; Schenk et al., 2008; Siegrist, Stampfli, Kastenholz, & Keller, 2008; Van Dijk, Fischer, de Jonge, Rowe, & Frewer, 2012; Verbeke et al., 2008) could lead consumers to specific food choices. The different types of perceived risks identified in the analysis of consumers' buying decisions (McCathy & Henson, 2005; Tsiros & Heilman, 2005) can be used to better understand seafood consumption (Birch & Lawley, 2012). 'Functional risk' is associated with the consumers' level of confidence with a product. Knowledge about seafood depends on a consumer's experience with a food (Fischer & Frewer, 2009; Pieniak et al., 2008; Tuu & Olsen, 2009) and increases the consumer's ability to manage the entire seafood consumption process, from selection to serving (Olsen, 2004). In the analysis of the 'psychological risk' associated with seafood consumption, less experienced consumers perceive more barriers to its consumption, including unpleasant sensory qualities (Brunsø, Verbeke, Olsen, & Jeppesen, 2009; Vanhonacker, Pieniak, & Verbeke, 2010). Regarding the perceived risks associated with a food, consumers are concerned about contaminants, treatment with hormones or antibiotics, mercury levels and whether the seafood has been handled in a correct and hygienic manner (Lobb, Mazzocchi, & Traill, 2007; Sioen et al., 2007; Vanhonacker et al., 2010; Verbeke, Sioen, Pieniak, Van Camp, & De Henauw, 2005).

Accurate information and knowledge about the risks of bivalves to consumers is relevant in helping them make more informed choices. According to several studies, understanding the basis of consumers' decisions about seafood choices is important to developing the most appropriate messaging regarding the benefits and risks associated with seafood consumption (Yaktine & Nesheim, 2007).

The study presented in the article is part of a research project funded by the Italian Ministry of Health. The project was divided into three phases. In the first phase, experts and stakeholders defined and ranked the most dangerous and risky behaviours related to the bivalve production chain (Crovato, Pinto, Arcangeli, Mascarello, & Ravarotto, 2017). In the second phase, Italian consumers' points of view on bivalve management and consumption were investigated. In the third phase, a communication material aimed at providing accurate information to consumers was produced and disseminated. In the present paper, the second phase of the research project is described.

The present study has a twofold aim:

- Acquire knowledge on the consumers' perceptions towards the risks associated to the bivalve consumption; and
- Highlight the behaviours and opinions that are more consistent among the consumers and use the information collected for developing a communication material understandable and meaningful to the public.

2. Methods

2.1. Qualitative research methods

Qualitative research methods, thanks to their ability to collect exploratory data and provide excellent insights about special audiences' behaviour, are very suited to satisfy information needs regarding a defined area of interest. These methods are applied in many fields and with different objectives, from the identification of market opportunities, to the generation of ideas and hypothesis, the exploration of concepts, and the investigation of consumers' perspectives (Pacheco et al., 2018). Many are the uses of these techniques in consumer studies (Banović, Krystallis, Guerrero, & Reinders, 2016), in the investigation of consumers' perception of food products (Esmerino et al., 2017; Gambaro, 2018; Pinto et al., 2018; Pontual et al., 2017; Soares et al., 2017), and in food science, food consumption and commercialization (Jervis & Drake, 2014).

However there are few applications of these methods specifically in the field of food safety.

A potential limitation of these techniques concerns the generalization beyond the entire population: it is not possible generalize the study's findings basing on few facts or small number of instances outlined from small groups of people.

2.2. Focus group procedure and consumer recruitment

The focus group, thanks to its ability to stimulate the participants' reactions to new information while they are expressing their thoughts, was identified as the most appropriate method able to collect in-depth information about the practices adopted by consumers in the purchase, manipulation and consumption of bivalve molluscs.

Nielsen et al. (2009) indicate that attitude formation can be ideally studied in a focus group setting, since respondents are motivated to form new attitudes because of the interaction with other participants and external stimuli with new information about the subject. According to standard focus group procedures (Morgan, 1998a, b; Morgan & Krueger, 1993), four focus group discussions were facilitated. Since official data on the consumption of bivalve molluscs for each Italian region were not available, the two geographical area with the most relevant production of bivalve molluscs and with the oldest tradition of bivalve fishing were selected (Bille et al., 2015; Mipaaf 2009; Prioli, 2008): the Veneto region (in northeast Italy) and the Marche region (in the middle eastern part of Italy). The participants were selected through convenience sampling based on accessibility, willingness to participate, current address, and responsibility for food purchasing in the family unit. In order to achieve the research goals, no other criteria were adopted in the sample selection. The age range was 20–80, with no predetermined age quotas. Two focus groups involving 20 consumers were conducted in the Veneto region (in the cities of Padova and Chioggia), and two focus groups involving 22 consumers were conducted in the Marche region (in the cities of Tolentino and Ancona), for a total of 42 participants.

2.3. Topic guide and interview procedure

The topic guide consisted of four main parts, developed using the data collected in the first step of the research project (Crovato et al., 2017). The first part investigated the kinds of bivalves most often consumed, the consumption frequency and the main motivations. The second part collected information about the places where the consumers usually buy bivalves (i.e., fish shops, supermarkets, self-harvested, peddling trucks), how the consumers chose the products, and the factors most relevant to consumers when purchasing the bivalves. The third part collected information on the consumers' management of the bivalve molluscs at home (cleaning, cooking, consuming). Finally, the last part investigated the consumers' risk perceptions related to this food. During the meetings, each part of the topic guide was introduced by the mediator, with the support of audio-visual materials, with the aim of encouraging discussion among the participants.

2.4. Data analysis

The focus group discussions were audio recorded, and a verbatim transcription for all the meetings was generated. According to the Grounded Theory framework (Chamberlain, 1999), core analysis (Pidgeon & Henwood, 1997), based on inductive content analysis (Elo &