
Introduction

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Biographical notes: Roberto Setola received his Laurea in Electronic Engineering (1992) and PhD in Computer Science (1996) from the University of Naples. Since 2004, he has been with the University Campus Bio-Medico where he is currently an Associate Professor of Automatic Control, Director of the Complex System and Security Lab, and Director of the second-level Master in Homeland Security. He has been the Coordinator of the EU-project SecuFood on Food Defence. He wrote several books and more than 100 scientific papers about modelling, simulation and control of complex dynamic systems, homeland security and critical infrastructures protection.

Roberta Onori holds a degree in Biology at the 'Sapienza' University of Rome and holds a post graduate Master of Science in Statistic and Health Management. Her research interests include the identification of emerging risk in the field of food production and the implementation of traceability system in food and feed chains, particularly on genetically modified organism (GMO) issues. She takes part in national official bodies involved in food safety assessment and to EFSA activities for GMO risk assessment.

Since antiquity the need to provide populations with adequate quantities of food, generally referred to as food security strategies, has been one of the drivers for social, technological and political activities and also one of the reasons behind several wars. With the coming of industrial production into the developed countries, the problem to have enough food has become less and less critical, even if it is still present in large parts of the world.

However, once guaranteed the availability of the food, the next step is assuring that it is 'safe'. This represents the goal of the food safety activities that are devoted to allow food 'wholesomeness'. With this aim, in the last decade, food safety legislations and regulatory prescriptions were coming into force. These norms were formulated with the aim to help food producers to provide food for the consumers in the best way preventing any adulteration or contamination, all along the supply chain from the farm to the fork, so

as to prevent and contrast unscrupulous operators when they try to illegally manipulate food with the aim of obtaining illicit profits.

In spite of its availability, food remains a primary need for any man and consequently any abnormal event related to food has a strong media impact, with consequent large economical and social impacts, as dramatically emphasised by the cow disease and aviary flu phenomena, just to cite recent episodes. This consideration could be exploited as done, likely only in very few cases, by enemies with the aim to achieve some illegal goals that can vary from the exhibitionism to revenge, from extortion to terrorism. How to prevent, contrast and counteract such types of manipulations of food is the aim of food defence.

Even if at first look, food defence appears as a subset of food safety (in essence both are devoted to prevent illegal manipulation of food), and consequently a component of food security strategies, it has a peculiarity that imposes to consider strategies and solutions different from those generally adopted for food safety. Indeed, the threats that refer to food defence are performed, at first approximation, against food operators (rather than performed 'by' food operators).

This special issue explores the strategies adopted to prevent criminal, and specifically, terrorist attacks against food supply chains from theory to practice, reporting the expertise and vision from different countries including the USA, Canada, Far East and Europe.

Articles cover a range of different subjects and disciplines. In this framework, the article from Havas and Salman discusses the principal areas of global concern that impact food security in terms of access, availability, and wholesomeness. This article analyses their inter-relations and concepts for monitoring and implementing food security via food safety and food defence programmes.

On the other side, Dalziel's paper provides a comprehensive overview of food defence scenarios in the food supply chain and a critical review of current assumptions on the assessment of food defence threats and vulnerabilities. The author identifies three major assumptions underlying food defence: a 'real and current' threat to the food supply chain by terrorist organisations; the easiness to do it; and the feasibility to extrapolate from food safety incidents, the effects of such an attack if were to occur. The author's conclusions reconsiders critically food defence scenario and highlights how the lack of any sort of publicly-available threat assessment leads to questionable assumptions on the intention of terrorist organisations to utilise the food supply chain as a vehicle for disseminating harmful contaminants.

The paper of Stinson et al. investigates the differences in household attitudes on food defence and food safety. Data are taken from a large, six-nation, internet-based sample of approximately 1,000 each in Germany, Italy, Japan, Spain, the UK, and the USA. In all the investigated countries, this study found substantial similarities about food defence and food safety concerns, while there are evident differences in perceptions about activities and costs that should be afforded to improve food defence.

In terms of risk communication, the paper from Eggers et al. discusses consumer-focused strategies related to food terrorism. For evaluating semi-structured telephone interviews with US adults, the authors use a method based on a mental models approach to risk communications. Based on interviews results, authors develop guidelines for consumer-focused food terrorism risk communications strategies.

Concerning risk characterisation, the paper from Alvarez et al. presents a strategy to perform a gap analysis about food threats according to the results of the project

‘Security of European Food Supply Chain’ (SECUFOOD), co-funded by the European Commission under the programme ‘Prevention, preparedness and consequence management of terrorism and other security-related risks’. A methodological approach is provided to evaluate the risk associated with food terrorism by improving the food supply chain risks analysis in terms of: potential threats, vulnerability of the system, and effectiveness of counter measures. The approach is based on: identifying the hazards (biological and chemical agents); considering the feasibility of the different attacks, taking into account the accessibility and manageability of the contamination agents (likelihood); the vulnerability of the specific product and supply chain’s step; and the possible consequences.

Food defence requires detection tools to efficiently screen large volumes of food for, among other agents, the microbial pathogens, Settingington et al. propose in their paper an immunomagnetic separation methodology for *Escherichia coli* O157:H7. The entire procedure requires only 35 min and shows potential for extraction and concentration of microbial pathogens from food matrices, eliminating overnight enrichment steps, and could be paired with nearly any rapid detection method for practical applications in food defence, food and water safety, and clinical diagnostics.

The articles of this special issue provide suggestions for future research needs in the areas of: investigating the efficacy of the proposed approaches, testing the validity of the suggested measures, and the development of innovative strategies and tools.

It is evident that this special issues has raised more questions than answers but, it provides a better understanding of the nature of food defence issues, and a contribution for a constructive debate on such topic on a scientific basis rather than driven by emotional motivations.

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