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in

Sanchís V. (ed.), Líebana E. (ed.), Romagosa I. (ed.), López-Francos A. (ed.).
Food safety challenges for mediterranean products

Zaragoza : CIHEAM
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 111

2015
pages 83-88

Food-borne threats in the Med Region and the role and principles of OIE in the framework of food safety strategy

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Abstract. The food safety must guarantee to consumers that foods are produced, handled, stored and distributed in a safe manner so as to be not harmful for citizens up to their consumption since it represents for people a fundamental right. The Sanitary and Phytosanitary agreement of the World Trade Organization laid down the reference principles for food safety, animal health and zoonoses indicating the recommendations set by the World Organisation for Animal Health (OIE) and Codex Alimentarius Commission (CAC) as the international standards to be applied for safe international trade. In the framework of food safety strategy and, in particular, within the concept "from farm to fork" the Veterinary Services play a key role in protecting society and the veterinarian has two crucial functions in this context such as prevention and control of foodborne diseases of animal origin at the farm and prevention and control of food contamination along the food chain to protect the consumer. For all countries, the best way to address the problems associated with foodborne illness is to rely on integrated surveillance systems with high performance as well as a continuum commitment in the veterinary public health.

Keywords. Veterinary services – Food safety – Surveillance system – Foodborne hazard.

Principes de l'OIE et rôle des Services vétérinaires dans le cadre de la stratégie de sécurité sanitaire des aliments

Résumé. La sécurité sanitaire des aliments doit garantir aux consommateurs des aliments produits, manipulés, stockés et distribués sans nocivité pour la santé des citoyens jusqu'à leur consommation car cela représente un droit fondamental pour les personnes. L'accord sanitaire et phytosanitaire de l'Organisation Mondiale du Commerce a établi les principes de référence pour la sécurité alimentaire, la santé animale et les zoonoses indiquant que les normes internationales et les recommandations établies par l'Organisation Mondiale de la Santé Animale (OIE) et la Commission du Codex Alimentarius (CAC) doivent être appliquées pour assurer la sécurité sanitaire des aliments dans les échanges internationaux. Dans ce cadre et, en particulier, dans le concept «de la ferme à la table», les Services Vétérinaires jouent un rôle clé dans la protection de la société et le vétérinaire a deux fonctions essentielles, la prévention et le contrôle des maladies animales au niveau de la ferme et la prévention et le contrôle des aliments tout au long de la chaîne alimentaire afin de protéger le consommateur. Pour tous les pays, la meilleure façon de répondre aux problèmes associés aux maladies d'origine alimentaire est de s'appuyer sur des systèmes de surveillance intégrés performants ainsi qu'un engagement continu dans le cadre de la santé publique vétérinaire.

Mots-clés. Services vétérinaires – Sécurité sanitaire des aliments – Systèmes de surveillance – Dangers d'origine alimentaire.

I – Introduction

The amplified worldwide movement (in speed and volume) of persons, animals, foods and feedstuff could allow pathogens to spread worldwide in a very short time so as to keep the entire world constantly on the alert as an outbreak that occurs in a given location may quickly have a significant impact at the global level. The food safety must guarantee to consumers that foods are produced,

handled, stored and distributed in a safe manner in order to be not harmful for citizens up to their consumption since it represents for people a fundamental right. In addition, a healthy and safe diet improves health and productivity and lays the foundation for the development of countries while reducing poverty. According to the Statistics Division of the Food and Agriculture Organization of the United Nations (FAO) from 1961 to 2011 the average meat consumption in the world increased from 23 to 43 Kg per capita/year and milk consumption increased from 75 to 87 kg per capita/year. The projections of the Agricultural Outlook 2013, also indicate that this rate of consumption will continue to be higher than the population growth in the next ten years.

The United Nations projections show that world population could reach 9.15 billion by 2050 and indicate that global agricultural production in 2050 will be 60 percent higher compared with the years 2005/2007 raising the concern how it can be achieved sustainably. Meat production - for instance - would increase from 258 to a total of 455 million tonnes in 2050; of which a significant percentage in the developing countries. Although population growth is the most important driver of future food demand other factors should be taken into account such as rising incomes, changing age composition and changing diet which is encouraged by trends such as urbanisation and the spread of supermarkets (Alexandratos and Bruinsma, 2012).

During the past decades, we observed serious outbreaks of food-borne diseases, which were reported everywhere on almost all continents, revealing their extent and impact on the society and public health. For instance, a set of food safety crises like BSE and dioxin affecting Europe during the 1990s, created food scares among European citizens and loss of confidence of consumers by showing inadequacy of food safety legislation. In fact - before the European Union (EU) underwent complete revision following these crisis - the food safety legislation had some weaknesses such as fragmentation of controls, legislation focused on final products control, lack of controls on animals feeding and deficiencies in risk analysis. As earlier mentioned, these crisis led to the revision of the European legislation on food safety in the early 2000s by introducing new legislation principles such as the application of horizontal approach for all type foods, the concept from the farm to the fork, a risk-based approach along the food chain as well as some key obligations for food and feed business operators about responsibility, transparency and traceability.

The food safety systems in the world show similarities with most of the EU principles. In particular, it is worldwide recognised that for ensuring food safety of products actions are needed during the primary production at the farm level. Many food safety risks arise at the pre-slaughter or pre-harvest stages, and these can be reduced or prevented using disease prevention policies and good practices recommended by the World Organisation for Animal Health (OIE) and FAO. Moreover, it is in parallel imperative to continue improving the control measures to reduce the risks also during the food preparation, storage and distribution phases including the consumer behavior.

The Sanitary and Phytosanitary Measures (SPS Agreement) of the World Trade Organization laid down the reference principles for food safety, animal health and zoonoses indicating the recommendations set by the OIE and Codex Alimentarius Commission (CAC) as the international standards to be applied for facilitating international trade. The remaining third international organisation formally recognised by the SPS Agreement is the International Plant Protection Convention (IPPC) in charge of setting standards for plant health.

The recent severe *Escherichia coli* O104:H4 outbreaks occurred in Germany and France in 2011 - which epidemiological investigation led to the identification of fenugreek seeds imported from Egypt as the most likely source of the sprouts linked with the two outbreaks (EFSA, 2011) – confirmed that in this era of globalisation ensuring hazard-free food is a supranational matter consolidating the concept that international cooperation and initiatives are necessary for early detection and rapid response in the case of outbreaks. In this respect, foodborne diseases surveillance systems can vary from sophisticated to rudimentary from countries to countries and from region to region (Dewaal *et al*., 2010). However, valid, reliable and effective surveillance systems have been established at the national, regional and international level by demonstrating their utility through the collection of data on foodborne diseases and animal diseases to rapidly detect outbreaks.

Examples of these surveillance systems are the OIE's World Animal Health Information System (WAHIS/WAHID), the International Food Safety Authorities Network – INFOSAN- (Joint initiative WHO/FAO), the Rapid Alert System for Food and Feed – RASFF – (European Union), Foodborne Diseases Active Surveillance Network – FoodNet – (CDC/USA) and PulseNet International.

The consequence of globalisation is also affecting Countries in the Mediterranean basin that are more and more developing agricultural trade. For instance, the report published by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) - while describing differences for each country - reported that imports of bovine meat in countries in the region passed from 1,142.9 ('000 tcw) for the period 2001-2003 to 1,737.1 ('000 tcw) for the period 2009-2011 with an increasing average rate of 5.4% per year (Beaumond, 2014). These data confirm that in both shores of the Mediterranean region there was an increase in the volume of trade in the last decade for animal and animal products supporting the concept that a continuous improvement and development of harmonised national, regional and international food control strategies in line with the international standards – including food disease surveillance system - are needed.

II – Foodborne diseases

Foodborne hazard can be classified as biological, chemical or physical and within the biological hazards, foodborne diseases can be caused by bacteria (e.g. *Salmonella, Campylobacter, Listeria monocytocenes, E.Coli, Brucella, Mycobacterium bovis*), viruses (e.g. norovirus, rotavirus, hepatitis A and E virus) or parasites (e.g. *Toxoplasma gondii, Trichinella, Echinococcus granulosus* and *multilocularis*). Amongst foodborne zoonotic diseases caused by bacteria, brucellosis and tuberculosis continue to have considerable social and economic impact in Southern Mediterranean countries due to the high prevalence of these diseases maintained mostly by traditional behaviours (e.g. animal-rearing practices that support the spread of infections) (Seimenis, 2010). By contrast, the situation of these diseases in Northern Mediterranean countries had improved over the last decades due to the implementation of specific control and elimination programmes (FCEC, 2011). Although the estimation of the global impact of foodborne diseases caused by parasites is considered difficult, it is recognised that some diseases such as Echinococcosis can have significant impact in some areas. In fact, while the geographical distribution of *E. multilocularis* is limited to the northern hemisphere, the *E. granulosus* is present worldwide and can pose significant public health or economic problems in many rural areas of the world and where sheep farming is predominant such as in the Northern African countries (Acha and Szyfres, 2005; Torgerson *et al*., 2014; Willingham and Stein, 2014; Seimenis *et al*., 2006; Macpherson *et al*., 2000).

A recent publication classified – for the purpose of the paper - diseases and foodborne diseases of animal origin into four groups: (i) diseases that are mainly an animal health problem but can have foodborne public health implications; (ii) diseases that are both an animal health and foodborne public health problem [*e.g. Paratyphoid Salmonella,* including *Salmonella* Enteritidis *and S.* Typhimurium]; (iii) diseases that are primarily or only a public health concern [*e.g. Campylobacter jejuni /coli* and *Escherichia coli* O157:H7]; and (iv) diseases that are only an animal health problem and have no public health significance but some of these diseases pose a food-related public health concern in terms of biological residues [e.g. residues in treating Coccidial infections in poultry] (Berman and Shimshony, 2013).

However, data published in the literature or presented during dedicated conference demonstrates that, regardless of the type of classification that may be used, foodborne diseases occur worldwide and are of concern in both developed and developing countries.

A total of 5,363 food-borne outbreaks were reported in the European Union in 2012, resulting in 55,453 human cases, 5,118 hospitalisations and 41 deaths. Amongst the causative pathogens of the most of reported outbreaks were *Salmonella* and *Campylobacter* (EFSA, 2014).

The Center for Disease Control and Prevention (CDC) in the USA estimates that each year 48 million Americans are affected by foodborne diseases causing 128,000 hospitalizations and 3,000

deaths. Amongst the pathogens which cause the most illnesses, hospitalizations, and deaths each year there are Norovirus, Salmonella non-typhoidal, *Listeria monocytocenes*, *Campylobacter* spp. and *E. coli* (STEC) O157 (CDC, 2011).

Brazilian Ministry of Health has registered - between 2000 and 2013 – a total of 8,857 foodborne outbreaks with 163,425 infected people and 112 deaths due to foodborne illnesses (Ritter and Tondo, 2014).

In the 2nd Congress on the foodborne diseases in the Maghreb region - held in December 2011 in Hammamet (Tunisia) it was reported that foodborne disease outbreaks were reported in Algeria, Morocco and Tunisia. In Algeria in the period ranging from January 2010 to October 2011 a total of 169 outbreaks affecting 5,697 people and causing 9 deaths were registered. In Morocco, from 1992 to November 2011 a total of 19,625 cases of foodborne diseases were reported with 5,688 hospitalizations and 221 deaths. Finally, in Tunisia, 121 outbreaks were notified from January 2012 to November 2011 affecting 1,244 persons. Epidemiological investigations of these outbreaks in the Maghreb region identified some of the risk factors such as: (i) problem in the maintenance of the cold chain during storage of food; (ii) cross-contamination; (iii) use of raw materials of questionable quality; (iv) insufficient heat treatment; and (v) significant delay between preparation and consumption of food.

III – Veterinary services in the food safety strategy

In the framework of food safety strategy and, in particular, within the concept "from farm to fork" the Veterinary Services play a key role in protecting society. In this context, the objectives of animal and human health are converging and the veterinarian has two crucial functions: (i) prevention and control of foodborne diseases of animal origin at the farm; and (ii) prevention and control of food contamination along the food chain to protect the consumer since veterinarians are well equipped to assume this unique role.

To this end, Veterinary Services should conduct surveillance at all stages along the food chain: (i) control at the farm (animal health, animal feed, antimicrobial use, identification and animal traceability, animal welfare); (ii) meat inspection (ante and post mortem inspection in the slaughterhouse); (iii) animal welfare in the slaughterhouses; (iv) control during the phases of preparation, storage and distribution of animal products; and (v) certification of animal products for international trade.

An essential component of food safety strategy is the capacity for countries to prioritise pathogens responsible for foodborne illness. An appropriate surveillance system should be in place in order to allow the Competent Authority to obtain information for ranking pathogens and give priority in designing targeted surveillance. Countries that have a national surveillance system integrated "from farm to fork" may have access to the necessary information to quickly detect foodborne disease outbreaks or food safety hazards, (potential or ongoing occurrence along the food chain) for identifying the contaminated foods and activate recall mechanism as appropriate (e.g. from the market).

In this respect, it is likewise evident as inter-sectorial collaboration between all the actors involved in the food safety is crucial to make this system efficient and effective. Each country should have this inter-sectorial collaboration regulated through an appropriate and updated veterinary legislation establishing roles, responsibilities, rights and obligations of the different actors in the food chain which represent one of the pillar for ensuring good veterinary governance.

Additional essential components of food safety strategy are the identification and traceability of animals and animal products from the farm to the table since it is the link between the health of animals, food safety and organoleptic characteristics related to their foods. Animal traceability and traceability of products of animal origin should be linked for identifying contaminated foods in the market or food safety hazards throughout the food chain in order to provide answers to possible

incidents quickly and effectively. In parallel – if a functional traceability system is in place, unjustified trade barriers between countries may be avoided since it provides safety guarantees of imported and exported foods.

As stated earlier, one of the activities of the OIE is to produce scientifically based standards on animal production food safety being complementary to the Codex Alimentarius Standards for food safety. To this end, in 2002, the OIE created a permanent Working Group on Animal Production Food Safety with the objective of coordinating food safety activities of the OIE and formulating recommendations in this field. This Working Group includes internationally recognised experts also from FAO, World Health Organisation (WHO) and the CAC to ensure an harmonised and consistent work on food safety to avoid overlapping and the contradictions in setting international standards. The Edition 2013 of OIE Terrestrial Animal Health Code contains relevant Chapters in this respect such as identification and traceability of animals, control of biological hazards of animal health and public health importance through ante- and post-mortem meat inspection, control of antimicrobial resistance, control of hazards in animal feed and Salmonella in poultry.

The OIE Terrestrial Animal Health Code also contains a dedicated chapter on the role of the Veterinary Services in food safety with the aim of providing guidance to Member Countries in regard to the role and responsibilities of the Veterinary Services in food safety and for assisting them in meeting the food safety objectives laid down in their national legislations and assure good governance in this field.

IV – Conclusions

For all countries, the best way to address the problems associated with foodborne illness is to rely on integrated surveillance systems with high performance as well as a continuous political commitment in the veterinary public health. This can be achieved through the collaboration of international partners and Organisations working together with the primary objective of protecting the consumers by considering that data collection and targeted food safety policies are priorities.

At present, the infrastructure and the capacity to coordinate and implement national programmes for foodborne diseases varies from country to country and – most of the time – they are not integrated to cover the entire food chain. The availability of reliable, relevant and rapid information is the cornerstone for any surveillance system to facilitate the decision-making process. In addition, timely access to accurate information on the type of contamination, the distribution of products and the number of human cases allow a rapid and adequate response to avoid the dissemination of products and the spread of disease.

International Organisations have an important role to play in promoting the integration and harmonisation of surveillance systems to ensure food safety at national, regional and global level. Today, products can be dispatched in several countries in less than 24 hours with the risk of distributing contaminated foods from country to country very quickly. Therefore, the exchange of information between all stakeholders to establish a good network to ensure food safety should be transparent and rapid in order to quickly detect outbreaks or food safety hazards along the food chain in a given country so as to put in place appropriate control measures to protect the consumers all over the world.

The OIE and CAC had been coordinating their efforts to ensure food safety in the framework of their respective mandates by formulating complementary international standards. In particular, the OIE sets standards relevant to animal production food safety, covering hazards that arise on-farm and at slaughter, with a primary focus on measures applicable at the animal production level while CAC elaborates standards pertinent from primary production to marketing and consumption. Even if different international organizations are in charge of setting specific standards along the food chain, it is undoubtedly recognised the key role played by the Veterinary Services along the steps of the food chain in the continuum "farm to fork" to ensure food safety to the consumers, especially the safety of foods of animal origin.

Therefore it is critical for countries to adhere to the international standards and upgrade their legislation in order to quickly respond to the new challenges on food safety due to globalisation. It is also important to encourage inter-sectorial collaboration at the national level and to support a regional approach in addressing food safety issues (e.g. Mediterranean region) and implement an effective data management system able to generate reliable data for the decision makers on a regular basis.

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