Legislation, standards and diagnostics as a backbone of food safety assurance in Serbia

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Abstract

Purpose – The purpose of this paper is to analyze the current situation of multidimensional food safety assurance in Serbia, as an official candidate for European Union (EU) membership, in relation to its EU food law harmonization efforts.

Design/methodology/approach – Serbian assurance scheme was covered in this paper included food safety legislation, control and standards.

Findings – The food safety system in Serbia needs improvements in the area of effectiveness and efficiency of food safety control and inspection services, knowledge and expertise of state inspectors, governmental officials, food safety consultants and auditors. Additionally, problems related to the overlapping responsibilities of various legal authorities and inspection services have to be solved, with an improved transparency and communication between legal authorities, customers, consumers and food business operators.

Originality/value – An overview of current situation in food safety assurance in Serbia is shown.

Keywords Food safety, Standards, Laboratories, Harmonization, Legislation

Paper type General review

1. Background

Global food industry of today faces several challenges such as the development of new products and technologies, changes in consumers' demands and consumption patterns, development of tourism, environmental pollution and liberalization of food market (Varzakas *et al.*, 2006). However, food safety remains an issue of major concern. This is a direct result of increased consumer awareness of developments in science and epidemiology and series of food safety scares worldwide. The global nature of food chain requires national efforts in international context, namely in harmonization of compulsory and voluntary food safety frameworks. The modern structured food safety regulatory systems are increasingly comprehensive but not always more stringent, which is a consequence of the risk assessments nature of modern food law. Worldwide, different vertical and horizontal approaches exist when defining the food safety frameworks, but what seems to be general principles are desired simplification, shift of responsibility towards the food business operators (FBO), built-in flexibility and freedom for FBOs to meet defined requirements (Turner, 1999). Key drivers for structured food safety assurance are reform of legislation, increasing consumers' interest for food safety and globalization of food supply (Henson and Humphrey, 2009). The development of new legal requirements aims at protection of the consumer's health, increase of the economic viability, harmonization of the well-being and engendering fair trade. The law defines the role and the responsibility of stakeholders related to food such as industry, government (inspection services), scientific committees and consumers.

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Minimal food safety requirements comprise the implementation of HACCP principles and prerequisite programs defined within good practices (good manufacturing practices, good hygiene practices, good veterinary practices, good agricultural practices, etc.) Development and changes of food safety legislation worldwide occurred after Codex Alimentarius was adopted as the source of international food standards by World Trade Organization Agreement on Sanitary and Phytosanitary Measures (SPS Agreement) in 1995 (www.wto.org).

Modern food safety regulation, whether compulsory or (semi)voluntary, recognizes actual commercial governance of the global agrifood sector. Traditionally, the government agencies were predominately responsible for monitoring food safety standards and food quality attributes. However, the globalization of agrifood system and rise in private retailer standards have caused a shift from third party audits performed by independent certification bodies to second party audit performed by customers auditing their suppliers. Likewise with mandatory legal framework, voluntary standards also rely on the structured and accredited control/analytical measures to verify the compliances.

Integration of Serbia into the European Union (EU) is seen as a national priority. Stabilization and Association Agreement and the Interim Agreement on Trade between Serbia and EU was signed in 2008. This agreement gave Serbia a chance to access various EU support programmes, but also to apply for candidacy for EU membership. By signing this Agreement, Serbia committed to harmonize its legislation with the EU *acquis communautaire*. On March 1, 2012 the European Council granted EU candidate status to Serbia, and within this new chapter, intensive efforts in legal harmonization are being undertaken (Glintic, 2012). Serbia recognized the main objective of the EU food safety policy as protection of the consumer health and interests while guaranteeing the smooth operation of the single market. In order to achieve this objective, both EU and Serbia, ensure that formal food safety requirements are established and adhered regarding food and food product hygiene, animal health and welfare, plant health and preventing the risk of contamination from external substances, with appropriate labeling for these foodstuffs and food products.

Having in mind the above mentioned, Serbia's assurance scheme can be recognized through the following streams that are elaborated in this article: food safety legislation, food safety control and food safety standards. Special focus was placed at the level of harmonization of Serbian food safety legislation with that of the EU.

2. Material and methods

This research is based on a quality analysis of Serbian and European food safety legislation. Using descriptive approach by comparing respective requirements, the analysis of the legislation governing Serbian and European food safety has been conducted. The research was performed in the period of September 2012 up till November 2013 and covered legislation as outlined by Ministry of agriculture, forestry and water (in further text Ministry of Agriculture).

3. Serbian food industry

The agricultural production and food processing industry have been a large and indispensable part of Serbian economy. Some production indicators show that the annual production of meat and meat products is around 72,000 t, production of cheese is around 20,000 t, flour 527,000 t, fruit and vegetable beverages 215,745 t, beer 5,289,000 hl and over 39,000 t of confectionery products. In 2010, the sale of food

products within Serbia participates with 19.2 percent of the total turnover (Serbia, 2011d). According to the Serbian Chamber of Commerce, in the gross domestic product (GDP), agriculture and food processing participate with 10.6 and 6.4 percent, respectively. Agro-processing accounts for about 80 percent of total agricultural exports. The key trade partners are the EU and neighboring countries (Bosnia and Herzegovina, Former Yugoslav Republic of Macedonia). The Serbian processing and preserving industry has already undergone significant privatization and is overall more commercially orientated and competitive than the primary sector. Nevertheless, the large fragmentation, under-capitalization and slow progress towards EU certification have hampered overall competitiveness and export. Moreover, over the last 25 years, agrifood sector has been facing both positive and negative changes depending on the sector. For example, Serbian livestock husbandry declined in the volume of production of around 1.5 percent each year, resulting in marginalization of livestock product exports. Compared to 1990, in 2005 total meat production was 30 percent lower. The meat processing industry itself has started to invest in increasing capacity, technology and standards, but only a few private processing companies have achieved EU standards and comply with legal requirements. At the moment, only six Serbian meat processing plants have the approval to export meat products to the EU.

4. Food safety legislation

A strong driver for change in the Serbian food safety legislation comes from its political decision to apply for EU membership. Intention of this legal harmonization is to allow subjects in the food chain to perform their activities according to European regulatory structure. Although many changes have been made, there are specific areas associated with the food chain that require further efforts and improvements. According to the EU Commission these include movements of goods, agriculture and rural development and food safety, veterinary and phytosanitary policy (EU, 2011). Additionally, Serbia needs to continue to build institutional capacity that will enable adopted legislation to be correctly implemented and to achieve the purposes of their adoption. The progress in harmonization was achieved in 2009 and 2010, when the greatest number of laws and secondary legislations (Ordinances) regulating agriculture and food were adopted.

The current EU food safety policy is based on a series of principles established or updated at the beginning of the 2000s, which, applied in line with integrated approach "From Farm to Fork" and specifically include transparency, risk analysis and prevention, protection of consumer interests and free circulation of safe and high-quality products. In Serbia, Food Safety Law (Serbia, 2009a) was adopted in 2009 and it represents the fundament of Serbian food legislation. For most of its provisions it complies with the requirements provided in the EU general food law, outlined in Regulation 178/2002/EC (EU, 2002b). It is therefore clear that the objective of the Food Safety Law is to have high level of protection of life, health and interest of consumers, and interests of consumers. It governs conditions for the production and placing on the market safe food, duties and responsibilities of food and feed business operators, rapid alert system, emergency response and crisis management, food and feed hygiene and quality.

There are two differences between Serbian Food Safety Law and European general food law. The first is reflected in the regulation of food quality within Serbian Food Safety Law, which created overwhelming amount of legal text, by warranting product

authenticity. The second difference comes from the fact that provisions of Food Safety Law introduced HACCP concept, which is not defined in general food law in EU, but in Regulation 852/2004/EC (EU, 2004b). Likewise in Regulation 852/2004/EC, Serbian Food Safety Law also implies mandatory requirements for implementing HACCP principles to all FBOs (primary production excluded). This is an important extension to previously defined HACCP obligation for FBOs producing foods of animal origin (required in Law on Veterinary Matters (Serbia, 2005)). The HACCP obligation for all FBOs came effectively into power starting from June 2011, approximately two years after Food Safety Law came into force. In that period, time was given to FBOs to adopt necessary changes with financial support from the Serbian government and several EU funds (including bilateral cooperation between Serbia and some EU member states). HACCP concept and its implementation in food production was further elaborated in the Serbian Ordinance on the general conditions of food hygiene (Serbia, 2010k), which essentially contributes to a common legal body of adopted laws and ordinances.

Along with this law, Serbian government adopted a number of secondary legal acts specifying requirements that should be fulfilled and many of them derived from Law on Veterinary Matters and Food Safety Law. These include ordinances for general food hygiene, veterinary-sanitary conditions for the production of food of animal origin, microbiological criteria, etc. However, in Serbia a certain number of current laws and ordinances that are still in force are those originating from the period of former countries (Yugoslavia and Republic of Serbia and Montenegro) and some of them are outdated and not applicable within the modern approach of food safety regulation. It is the aim of Serbian government to overcome these differences and to facilitate the functioning of FBOs both in domestic and foreign market.

4.1 Process regulation

Basic principles, rules and prerequisite requirements for the production of food are given in the specific Ordinance (Serbia, 2010k), which has to be followed by all FBOs during preparation, processing, manufacturing, handling, packaging, transportation, storage and distribution of food to ensure a safe and nutritious product fit for human consumption. Producers have to make sure that the food is prepared, stored and sold in a hygienic way, but also they have to identify food safety hazards and to ensure that safety controls are in place within the HACCP system.

Prerequisite requirements for safe production of food of animal origin are outlined in Ordinance on veterinary-sanitary conditions, general and special hygiene conditions for the production of food of animal origin (Serbia, 2011c) being the latest and most advanced, specifying premises, waste management, temperature of hot water used for sanitation, physical barriers for waste water, etc. This adopted Ordinance is in line with European Regulation 853/2004/EC (EU, 2004a).

Requirements for catering and other premises used for preparation of food and directly supplied to customers such as restaurants, pubs, cafes, takeaways, sandwich shops are specified in Ordinance on minimal technical and sanitary and hygiene conditions for renovating and equipping of catering facilities (Serbia, 2010i), highlighting minimal requirements that objects should fulfill. Above mentioned ordinances are in general aligned with requirements related to internal structures and fittings (walls, floors, ceilings, windows, doors, working surfaces) as well as water supply, personnel hygiene facilities and toilets, ventilation, lighting and storage as defined in basic Good Hygiene Standards (GHP).

Microbial hazards. In Serbia, the microbiological criteria for foods, other than those with special dietary purposes, and obligations of FBOs are defined in Ordinance on general and special conditions on food hygiene at any stage of production, processing and trade (Serbia, 2010h). This adopted ordinance introduced novelty in microbial food safety by changing previously existing microbiological criteria both in types of microbial hazards and their respective values, obligations and responsibilities of FBOs and the manner of carrying out supervision and microbiological control. This Ordinance defines, likewise EU Regulation 2073/2005/EC (EU, 2005a), food safety and hygiene criteria. In the same fashion, if the food safety criteria are not met, the food cannot be placed on the market, and in the case that the food already reached the market, it has to be withdrawn. The non-compliance with food hygiene criteria at the specific step of the production process is considered an indication that the manufacturing process is not performed properly and corrective actions have to be applied. In order to facilitate the implementation of new microbiological criteria, Ministry adopted a guide for the implementation of this ordinance. This has brought about new demands on the accredited food laboratories that had to change their scope of accreditation and include new methods for food analysis outlined in ISO standards, as stated in the ordinance. The separate Ordinance defines microbiological criteria for special, dietary, food products (Serbia, 2010g).

Chemical hazards. The rules of harmful substances which may be found in food and feed include rules on food additives, pesticides and veterinary drug residues. Within the Serbian food legislation, food additives have been covered in the separate Ordinance recently adopted (Serbia, 2013c) which is updated and harmonized with EU Regulation 1333/2008 (EU, 2008). There is a positive list of the additives which may be used, the foods in which they may be used and the maximum levels allowed. Any material not listed in the positive list of this Ordinance is prohibited as a food additive. Also in the EU the legislation on food additives is based on the principle that only those additives that are explicitly authorized may be used. Most food additives may only be used in limited quantities in certain foodstuffs. If no quantitative limits are foreseen for the use of a food additive, it must be used only to achieve the desired technological effect.

Pesticides are regulated in recently adopted Ordinance (Serbia, 2010d) and is harmonized with Regulation 396/2005/EC (EU, 2005b). The veterinary drugs residues are still regulated by old Ordinance on the amount of pesticides, metals and metalloids and other toxic substances, chemotherapeutics, anabolic and other substances which may be found in food (Serbia, 1992). It is important to note that only few articles from this Ordinance are still in actual force and those mainly regulate the usage of chemotherapeutics and anabolic substances. This Ordinance needs to be replaced and harmonized with Regulation (EEC) 2377/90 (EU, 1990). Other contaminants such as nitrate, mycotoxins, metals, 3-monochloropropane-1,2-diols, dioxins and PCBs and polycyclic aromatic hydrocarbons have been regulated in recently adopted Ordinance (Serbia, 2011b). This section completely complies with Regulation 1881/2006/EC (EU, 2006b).

Another sanitary rule lately put into force specifies basic concern on food contact materials, covering both materials and articles intended to come into contact with food. Requirements for materials that are in contact with food are very broad as specified in Law on sanitary safety of general use matters (Serbia, 2011a). Ministry of Health is fully responsible to control that food contact materials are safe and that they do not transfer their parts that endanger public health or adversely affect the nature and

quality of food. However, there is no particular rule within on recommended materials similar to European Hygienic Engineering and Design Group (EHEDG) hygienic equipment design criteria.

Physical hazards. Although there is no specific rule for physical hazards, all citizens have the right to be compensated for unsafe products and/or products of lower quality, according to latest Consumers Law (Serbia, 2010j), including any physical hazard that may occur in food. Additionally, the Food Safety Law specified that the food shall be deemed unfit for human consumption when the contamination occurs by an external factor (Serbia, 2009a).

4.2 Product related regulation

The production of food of animal origin requires special attention in sense of control and inspection, as animals can suffer from a variety of diseases, and some of them can be transmitted to humans. In Serbia, the regulation and control of foods of animal origin is administratively and legislatively separated from the regulation of other kinds of foods. Food Safety Law (Serbia, 2009a), Law on Veterinary Matters (Serbia, 2005) and Ordinances (Serbia, 2010k, 2011c) gave the specific rules for all phases of production, processing, storage and distribution for food of animal origin. As already mentioned, this is in accordance with the production of animal food products in the EU. Production and storage of food of animal origin can only be carried out in approved places which are in accordance with requirements given in legislation and monitored by Directorate of Veterinary. Also specific rules have to be followed for the transportation of food.

The responsibilities for special food products intended or designed to satisfy the nutritional requirements of specific population groups, such as infants, the elderly, pregnant women, dieters, diabetics and sportsmen/sportswomen are assigned to Ministry of Health. The Ordinance on sanitary safety requirements on food supplements (Serbia, 2010a) regulates this field, covering all aspects of nutritional composition, chemical and biological contaminants.

The use of genetically modified organisms (GMOs) in food production is another issue that caused a prompt interest and concern about food safety. Rapid developments in food technology, biotechnology and molecular biology have permitted the artificial transfer of genetic material from one organism to another, including across species boundaries. The authorization, labeling and traceability of GMO derived food has been the subject of the GMO law that has been adopted in 2009 (Serbia, 2009b).

Labeling of food products has been outlined in Ordinance from 2004 (Serbia, 2004), which requires food to be marked or labeled with certain requirements such as: the name of the food, list of ingredients, the amount of an ingredient which is named or associated with the food, appropriate durability indication, special storage conditions or instructions for use, lot identification, manufacturers' name and address, packer or retailer and place of origin. Nevertheless, this Ordinance has been recently updated and changed with new Ordinance on this matter (Serbia, 2013a). Labeling of allergens which was missing in the previous Ordinance was updated and this is in line with EU legislation.

Another important aspect in regulation of food labeling is the use of nutritional and health claims. At the moment, Serbian Ordinance is in accordance with EU Directive as nutritional labeling is optional. However, in Serbia only 24 nutritional claims that might be used on food products were determined, while EU list of nutritional claims are expanded to 29 claims (Regulation 1924/2006 (EU, 2006a)). The missing claims

are those related to omega-3-fatty acids, monosaturated and polysaturated fats. Only health claims for dietary products are adopted (Serbia, 2010g). As a consequence, there are many health claims used on Serbian food products without any possibility of control.

5. Food safety control

5.1 Food safety inspection

In accordance to the provisions in the Food Safety Law (Serbia, 2009a), Ministry of Agriculture and Ministry of Health are responsible for the organization of official control and for ensuring effective and efficient co-ordination between directorates responsible for food control. Specific responsibilities between these two Ministries are delineated and defined (Serbia, 2009a). Veterinary, phytosanitary and agricultural inspections, within specific Directorates/Departments of Ministry of Agriculture, are responsible to ensure food safety in primary production stage, processing and wholesale stage, imports and transit stage and in export stage (Table I).

The Directorate of Veterinary with the Veterinary Food Safety Inspection is responsible for inspection of veterinary and sanitary conditions in slaughterhouses, processing facilities, for animal products and animal feed productions, for all stages in the production, according to Ordinance (Serbia, 2010b). Official controls of food of plant origin are carried out, at the level of production, processing and wholesale stage, by the Department of Agriculture Inspection, whereas official controls of food of plant origin, at the primary production level, import, transition and export stage, are carried out by Phytosanitary Inspection, within the Directorate of Plant production.

Finally, official controls of mixed food (containing ingredients of both plant and animal origin) at the level of production, processing and wholesale stage and export stage are shared by Veterinary and Agriculture inspections, whereas official controls of this food at the level of import and transit stage are carried out by Phytosanitary and Veterinary Inspection (Table I). Due to the numerous legislations created in a very short period of time, the shortcomings are realized in the implementation phase. This was for example the case with the official control of mixed food. In order to clarify which inspection is responsible for specific mixed food and what is the jurisdiction of each inspection, the Minister of Agriculture enacted in 2010 separate Ordinance (Serbia, 2010c) with delineation and definition of the responsibilities of all three inspections. An examples of mixed food and responsible inspectorate according to new Ordinance (Serbia, 2010c) is presented in Table II.

According to the Food Safety Law, Ministry of Agriculture should establish a Food safety Agency for food safety risk assessment authorized to take different advisory responsibilities including those related to risk assessment, risk communication, publication of guidelines, recommendations for food safety education and trainings, etc. Up to date, this body has not been established and the activities in this field are still far below expectations.

Rapid alert system has not been completely established, although it has been introduced in the Food Safety Law. At the beginning of 2013, a crisis regarding presence of aflatoxins in milk occurred (Kos *et al.*, 2014; Škrbić *et al.*, 2014), which showed a complete failure of the system and surely suggested issues with transparency. Rapid alert system was ineffective with no coherent and consistent public communication about the recall or withdrawal of pasteurized milk (or any other implicated dairy products). As the Ministry of Agriculture was not able to solve the

Ministry	Department/ Directorate	Inspectorate	Production stage Primary production	Production, processing and wholesale stage	Import and transit stage	Export
Ministry of agriculture, forestry and water	Directorate of Veterinary	Veterinary inspection	Food and feed of animal origin	Food and feed of animal origin Mixed food	Food and feed of animal origin Mixed food	Food and feed of animal origin Mixed food
	Directorate of plant protection	Phytosanitary inspection	Food and feed of plant origin	–	Food and feed of plant origin Mixed food	Food of plant origin
	Department of Agricultural Inspection	Agricultural inspection	–	Food of plant origin and non-alcoholic beverages Mixed food	–	Mixed food Wines and spirits
Ministry of Health	Department of Inspections	Sanitary inspection	–	Novel food, dietetic supplements, food for babies – supplements for mothers milk, dietetic supplements and salts, additives, aromatics, enzymatic preparations of other than animal origin and accessories of other than animal origin, drinking water in original packing, water for public supply of drinking water	Novel food, dietetic supplements, food for babies – supplements for mothers milk, dietetic supplements and salts, additives, aromatics, enzymatic preparations of other than animal origin and accessories of other than animal origin, drinking water in original packing, water for public supply of drinking water	Novel food, dietetic supplements, food for babies – supplements for mothers milk, dietetic supplements and salts, additives, aromatics, enzymatic preparations of other than animal origin and accessories of other than animal origin, drinking water in original packing, water for public supply of drinking water

Table I.
Designated responsibilities for food safety inspection according to Serbian food safety law

Table II.
Examples of mixed food and responsible inspections at different food production stages (Serbia, 2010e)

Examples of mixed food	Production, processing and wholesale stage	Import and transition stage	Export stage
Milk caramels	Agriculture inspection	Phytosanitary inspection	Agriculture inspection
Ice-cream	Veterinary inspection	Veterinary inspection	Veterinary inspection
Mushrooms soup	Agriculture inspection	Phytosanitary inspection	Agriculture inspection
Meat soup	Agriculture inspection	Veterinary inspection	Veterinary inspection
Pastry filled with meat or meat products	Agriculture inspection	Veterinary inspection	Veterinary inspection
Milk chocolate	Agriculture inspection	Phytosanitary inspection	Agriculture inspection
Mayonnaise	Agriculture inspection	Phytosanitary inspection	Agriculture inspection

problem at its source and with pressures from dairy industry, Ministry decided to adopt a new Ordinance (Serbia, 2013b), which regulates only the matter of aflatoxins in milk, and which allows higher amount of aflatoxin M1 to be present in milk (0.05 μg/kg was replaced with 0.5 μg/kg of aflatoxin M1 for raw milk, heat-treated milk and milk for manufacture of milk based products). The new adopted Ordinance started to be valid from the moment of publishing in Official Gazette of Republic of Serbia, being March 1, 2013. The origin of aflatoxin in milk was easily traced back to contaminated feed.

In the aftermath of this crisis several conclusions can be made:

(1) No risk analysis was performed in Serbia to establish MRLs of aflatoxins (nor for any other contaminant) and the MRL of 0.05 μg/kg of aflatoxin M1 in milk was taken over from EU legislation, while the context of Serbian milk production and other legitimate aspects were not taken into account. The harmonization with Commission Regulation 1881/2006 (EU, 2006b) was therefore prone to errors.

(2) The old MRL criteria defined in the previous Ordinance (Serbia, 1992) was 0.5 μg/kg of aflatoxin M1 (and B1), just as it is now after crises-induced modification. This implies that the old required level of protection was not changed based on the scientific evidence, nor was this done with the latest change.

(3) The current MRL is in agreement with MRL set by Codex Alimentarius limit for aflatoxin M1 in milk being 0.5 μg/kg. Although motivated by political decision to join EU the competent authorities in Serbia should have understood that EU MRL on aflatoxin of 0.05 μg/kg in milk was in the EU appropriate, not only in view of public health, but also in the view of feasibility considerations. According to a large amount of occurrence data ($>$7,000 in 1999) this level is in the EU achievable following the ALARA (As Low As Reasonable Achievable) principle. The same principle should have been applied in Serbia and no matter the outcome of the crises should not result in ad-hoc change of the set MRL.

At the moment, feed production in Serbia is regulated by two Ordinances (Serbia, 2010e, f). However, they have to be updated with the new findings and harmonized

with EU Directive 2002/32/EC, as some of the requirements are still different (e.g. maximum content of aflatoxin B1 in feed for dairy cattle was set to be 0.005 mg/kg in Directive 2002/32/EC (EU, 2002a), while this was set to be 0.01 mg/kg in Serbian Ordinance on feed quality).

Certain competences for food safety are shared with the Ministry of Health and its Sanitary Inspection mainly in the field of control and inspection of novel food, dietetic supplements, baby food, and salts for human ingestion and production of additives, aromatics, enzymatic preparations of other than animal origin and accessories of other than animal origin, as well as the entire life cycle of bottled water (table water, mineral water and spring water), and tap water. Ministry of Health is also in charge for prevention, surveillance and collection of data connected with the foodborne diseases among other infectious diseases, for the control of sanitation in public facilities and facilities for the production and trading of food. Ministry of Health together with public health institutes are responsible for technical assistance in the area of risk assessment.

One of the main tasks for Serbia in the field of implementation and enforcement of food safety legislation is to adopt adequate legislation that corresponds to EU Regulation 882/2004/EC (EU, 2004c). The aim of this Regulation is to improve the consistency and effectiveness of control in EU. It lays down the general rules regarding official controls to determine compliance with the EU legislation, aimed at preventing, reducing or eliminating risks to human and animal health to an acceptable level, as well as guaranteeing fair practices in food trade while protecting the rights of consumers. Currently this kind of legislation is lacking in Serbia, which poses an additional obstacle to successful application of the food safety legislation, as there is no official control of the level of compliance with regulations (Celebicanin, 2012; Glintic, 2012).

Ministry of Agriculture is obliged to issue annual reports concerning its work, including activities performed by their inspection services. Review of reports from previous years revealed no specific data concerning any training of inspectors (Serbia, 2012). On the other side, in the last five years EU members organized several workshops for both inspectors and FBOs covering various food safety area. In spite of these activities and initiatives, deployment of knowledge on the field is still insufficient. Effectiveness of inspection services is only visible through their annual reports covering basic indicators such as total number of controls from the field, number of samples taken with the number of nonconforming samples, penalties, and judicial proceedings (Serbia, 2012). There is no analysis in terms of food safety trends, hygiene process indicators, food safety outbreaks, etc. Celebicanin (2012) being the representative of Veterinary inspection service, reported that the Ministry of Agriculture with its departments still have not prepared the national control plan, but they plan to do it. The major problems that the Ministry of Agriculture faced during implementation of new food safety systems are insufficient number of veterinary officers and inadequate personnel policies, poor infrastructure and equipment (Celebicanin, 2012).

5.2 Food safety diagnostics

Globalization of food production and trade increases the risk of international incidents involving food contamination, and therefore adequate laboratory services have become an essential part of a national food control system to verify the safety (and quality) of food (Al-Kandari and Jukes, 2009). Laboratory services have key importance in active support of food safety assurance. Their role is found in official monitoring, inspection

sampling, industry commissioned analysis, investigations of foodborne outbreaks and consultancy in analytical data interpretation. It is however important to note that Serbian accredited laboratories only recently got international recognition, as Accreditation Body of Serbia became a member of International Accreditation Forum in December 2011 and full member of European cooperation for Accreditation in May 2012 (www.ats.rs).

Laboratories accredited methods specified in international standards (ISO, IDF), methods outlined in domestic legislation and methods referenced in other sources (books and published articles). Besides accredited, laboratories offer unaccredited methods within their scopes, notifying the clients of the accreditation status. However, there are situations where accredited laboratories offer more than 40 percent of unaccredited methods raising a concern on the validation status for these methods.

In line with the Food Safety law, the Ministry of Agriculture established a Directorate for National Reference Laboratories. Nevertheless, up to date, no operational activities and duties assigned to this Directorate have been performed.

6. Food safety standards

In concurrence with the development of various food safety standards, the Serbian food legislation introduced a requirement within its regulations requiring implementation of a HACCP based food safety systems. FBOs who mainly exported food to the EU, were the first to start implementing HACCP system, but they were confronted with a dilemma who should verify its effective implementation. In most countries, the national or local inspection services are responsible for verification of HACCP system. Due to lack of competence of the inspections services in Serbia, certification bodies started providing third party HACCP audits and certification (Barnes and Mitchell, 2000; Djekic *et al.*, 2011; Gagnon *et al.*, 2000). All HACCP audits offered by domestic and foreign certification bodies in Serbia fall under unaccredited scheme. Recognized global certification bodies were performing this type of audit in line with guidelines for auditing HACCP based food safety systems issued by the Dutch Accreditation Council.

Along with HACCP certification, the most common food industry certifications in Serbia cover audits against ISO 22000, ISO 9001, BRC and IFS standards. These standards increasingly encompass a variety of quality attributes where various actors in the agrifood chain, including retailers, consumers, and social activists, seek products that are differentiated not only by that product's physical characteristics but also by its production practices (Hatanaka *et al.*, 2005).

There is a trend of integrated management systems and combined audits of two or more management systems. Reason for increased demand in certification is trade within a country or across borders that requires a mechanism to ensure and recognize that the conformity of a management system is on an acceptable level (Gyani, 2008). The decision to adopt a food safety assurance scheme is usually an outcome of simultaneously acting forces applied by external parties such as the final consumers, the intermediate consumers or by a company's own management (Tzelepis *et al.*, 2006). An independent assessment by an expert and a fully accredited organization provides additional value to the industry it serves as well as supporting and complementing the role of the food-law enforcement agencies (Tanner, 2000). In previous years, Serbian food producers were financially supported to comply with these standards from both governmental (Serbia, 2008) and non-governmental funds (USAid, SIEPA and EU funds).

The opening of global markets through the World Trade Organisation (WTO) and its predecessors has permitted the formation of global oligopolies in food retailing. Certification facilitates the ability of retailers to develop their own product standards throughout the food supply chain, while reducing their direct responsibility for the monitoring process, and minimizing their liability in case of food safety problems. At the same time, retailers reduce their transaction costs since they have the power to shift the burden of the system's costs to other stakeholders and to producers (Hatanaka *et al.*, 2005).

7. Conclusion

Along with harmonization and updating with the EU regulations, it is important take into account issues typical for the country. It is of particular importance to improve inspection procedures, knowledge and expertise of state inspectors, governmental officials, food safety consultants and auditors, through continuous training. The risk assessment (and the complete risk analysis) and precautionary principle should serve as a basis for food safety legislation, and own circumstances in which the overall food law needs to exist. The transparency and risk communication between all stakeholders must be improved.

The usage of the regulations by the FBOs needs to be considerably improved. At the first place, the awareness of FBOs to adopt and respect the principles of HACCP has to rise. The responsible Ministries have to put additional effort for hygiene improvements in small establishments, that have well-recognized difficulties due to the shortage of staff, lack of food safety knowledge and of financial means. The process of transition to a modern food safety system is "painful," but this process is inevitable.

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