FAO Training Workshop

"CHEMICAL, MICROBIOLOGICAL AND NUTRITIONAL RISK ASSESSMENT OF FOODS"

2 - 4 December 2014

Ankara, Republic of Turkey

Report

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Acknowledgements

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List of Acronyms

ADI: Acceptable Daily Intake

EFSA: European Food Safety Authority

FAO: Food and Agriculture Organization of the United Nations

FCGD: Food and Control General Department of the Ministry of Food, Agriculture and Livestock of Turkey

JECFA: Joint FAO/WHO Expert Committee on Food Additives

JEMRA: Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment

MoFAL: Ministry of Food, Agriculture and Livestock of Turkey

MRL: Maximum Residue Level

NHBS: National Household Budget Survey

PMP: Pathogen Modelling Program

TDS: Total Diet Study

TPHI: Turkey Public Health Institute

WHO: World Health Organization

I. Introduction

A three-day workshop was carried out on 2-4 December 2014 at the UTEM – International Agricultural Training Centre of the Ministry of Food, Agriculture and Livestock of Turkey (MoFAL). It has been organized by the FAO Regional Office for Europe and Central Asia in close technical collaboration with the Risk Assessment Department of the MoFAL of the Republic of Turkey and with the local operational support of the FAO Sub-Regional Office for Central Asia in Ankara. This workshop was the third event from a series of three training workshops, targeting various audiences designed and implemented within the FAO TCP Facility at the request of MoFAL. The workshop aimed to upgrade the institutional and expert capacities to apply risk assessment principles and techniques, and to facilitate an improved professional communication between risk managers and risk assessors. The targeted audiences represented technical staff of MoFAL, food safety risk managers and specialists from major stakeholders, such as health sector, statistics, academia, research.

Two training workshops entitled "Food Safety Risk Analysis for the staff of the Ministry of Ministry of Food, Agriculture and Livestock of Turkey" implemented in September 2014 have been provided by Mr Rob Theelen (expert in chemical risk assessment, Netherlands) and Dr. Eleonora Dupouy (FAO Regional Office for Europe and Central Asia) to a total of 63 professionals, including 41 technical and 22 managerial staff. The workshop agenda and related documents are available on the FAO REU website at http://www.fao.org/europe/events/detail-events/en/c/273693/.

The lead trainers in the third workshop have been Dr Jean-Charles Leblanc (Consultant FAO HQ on exposure assessment) and Professor Francis Butler (University College Dublin, Ireland). The workshop programme is attached as Annex I.

Over 50 participants both from departments dealing with food safety risk assessment and with food safety risk management, representing various departments of the Ministry of Food Agriculture and Livestock, Ministry of Health, Turkey Statistics Institution, universities and research institutes have received the training. The List of Participants is attached as Annex II.

The areas covered by the three training workshops included chemical food safety risk assessment, microbiological risk assessment, exposure assessment and role of Codex in setting science-based standard requirements. Training programmes included theoretical lectures, video projections, case studies, practical exercises and discussion on real issues of interest to Turkey.

The working language of the workshops was English with simultaneous translation into Turkish language.

II. Opening Remarks

The workshop was opened by the Assistant FAO Representative in Turkey, Ms Aysegul Akin and Ms Şenay Eken, Head of the Risk Assessment Department. They welcomed the participants and stressed the importance of the workshop in supporting capacity development of the MoFAL's staff in applying microbiological and chemical risk assessment, underlining that food safety risk assessment is key to understanding the severity of food safety problems occurring in the food chain in Turkey and thanked FAO and organizers for workshop preparation.

The participants in the workshop were also welcomed by Dr. Eleonora Dupouy (FAO), who stresses that food safety risk analysis framework is a central methodology internationally recommended to setting both national and international standards and for managing in a cost-efficient and effective way the threats to food safety in the food chain. This methodology requires a multidisciplinary collaboration, good knowledge of risk assessment techniques and skills to apply them. Professional communication between risk managers and risk assessors and adequate information for consumers are essential areas to strengthen as well. She expressed appreciation for the multi-sectorial representation in the workshop and encouraged the participants to take good opportunity of the workshop for clarifying questions they may have in relation to the practical implementation of risk assessment components. Dr Dupouy outlined further the programme of the training workshop, introduced the trainers and invited the participants to introduce themselves in a *tour-de-table*.

III. Objectives and Description of the Workshop

The main objective of the training workshop was to provide participants with information, knowledge and practical training in food safety risk assessment with a focus on microbiological and chemical hazards as well as nutritional risk/benefit analysis. The workshop was practically oriented with a focus on applications of relevance for the Turkish food supply chain. The workshop addressed in particular the following:

- Principles and application of microbiological risk assessment in foods – the use of available FAO/WHO web-based tools to facilitate microbiological risk assessment;
- Principles and application of chemical risk assessment in foods – the development of health based limits and the application of chemical exposure assessment;
- Differences and similarities in approaches between chemical and microbiological risk assessment techniques.
- The principles and application of nutritional risk/benefit assessment in foods – the application of exposure assessment in determining nutritional risk/benefit as support for decision-making in risk management;
- Practical case studies in microbiological and chemical risk assessments, and nutritional exposure assessments with specific relevance to Turkey: nutritional risk assessment of iodine salt consumption in the Turkey and chemical risk assessment of Ochratoxin A exposure due to the consumption of cereals based products.
- Assess the experience and process of applying risk assessment in food safety control systems in Turkey.

The programme of the workshop was structured in theoretical and practical sessions, case studies and discussion. On the first day, the first session comprised general presentations on chemical hazards and definitions related to chemical risk assessment, legal standards and regulatory framework. The second session included presentations on the steps and principles of microbiological risk assessment. The third session was devoted to group work and the application of a risk ranking tool. After the group work, participants discussed and presented the results of their groups.

On the second day, presentations were given on dietary intakes/dietary exposure assessment methodologies, food sampling, analysis and the available international databases. As the closure of the day, a session on microbiological hazards and an introduction to predictive microbiology was

held followed by the overview on the use of the FAO/WHO Risk Management Tool for the Control of Campylobacter and Salmonella in Chicken Meat.

On the last day of the workshop, an introduction to nutritional risk/benefit assessment, complemented with detailed case studies and a practical exercises took place. The participants had the opportunity to test various risk assessment techniques and data sources introduced during the three days. The results were presented by each group and by the trainers, and the conclusions were drawn.

IV. Presentations, Discussions and Exercises

First day of the training workshop (2 December 2014)

In the first session, the presentation "*Risk assessment of chemical substances in food"* of Dr Jean Charles Leblanc described the three major parts of risk analysis, and how the process is performed at international level. The lecture gave a full picture on the whole risk assessment process with its four components, and on the role of the international organizations, committees, standards, legal frameworks and the available data sources as well. The general guidance documents for risk assessment of chemicals in food was also presented and it has been listed what kind of chemical, and nutritional hazards need to be taken into consideration from food safety perspective. The applicable data types for risk assessment, the hazard characterisation procedure of chemicals in food, the outcomes of this process were explained, just as the steps of the dietary intake/exposure estimates on a national/population level and the basic definitions in connection with these methods.

In the second session of the first day – *Microbiological risk assessment* – Professor Francis Butler listed the types of biological hazards, compared procedures for microbiological and chemical risk assessment and emphasised the specificities of the methodologies and models of microbiological risk assessment from the step of hazard identification and characterization through exposure assessment to hazard, and risk characterization. The resources for microbiological risk assessment, the general principles and the factors affecting the level of human exposure were concluded.

After the presentation, Professor Francis Butler facilitated a case study: *The use of Risk Ranger tool for qualitative microbial risk assessment*. Participants, in the form of group work, conducted qualitative risk assessment of the microbiological risks (*Salmonella sp*.) associated with poultry produced in Turkey. Based on their own experience and knowledge, participants determined one-by-one the level of the following factors in relation to the specified risk: the severity of the hazard; the level of susceptibility; the frequency of consumption; the proportion of population consuming the product; the probability of contamination of raw product per serving; the effect of processing; possibility for recontamination after processing; effectiveness of the post-processing control system; the increase in the post-processing contamination level that would cause infection or intoxication to the average consumer; the effect of preparation before eating. As the outcome of the exercise each group was able to describe the level of microbiological risk related to poultry value chain.

Experience of Hungary in adapting Risk Ranger tool for feed safety risk ranking for the use in developing risk based monitoring plans was shared by Ms Kata Kerekes (FAO).

Second day of the training (3 December 2014)

Before the lectures, one member from each group presented the results of the risk assessment conducted on the first day with the Risk Ranger tool. It was followed by active discussion and drawing of the conclusions. The participants shared useful information in relation with the poultry production in Turkey.

The first session of the second day was delivered by Dr Jean-Charles Leblanc: *Dietary intakes/dietary Exposure Assessment methodologies*. The presentation was the continuation of the first day's session but gave more detailed and more practical information about the sources of chemical food contamination and food consumption data – comparing the cases of different methods applied on population-level, household-level, and the individual-based methods with special focus on their advantages and limitations. The characteristics of both acute and chronic exposure assessments and also the differences between the screening tools, the deterministic approach (using point estimate/using individual food consumption data) and the probabilistic model using full distributions were described with practical examples and recommendations on choosing the most appropriate tool. The available international databases and the food classification systems they use were compared. Principles of food sampling, the importance of its representativeness and the reduction of the level of uncertainty in every step of the analysis and data treatment were highlighted. The concept of nutritional risk/benefit assessment was also explained. The session was followed by questions and answers.

The second session of the day – *Microbiological hazards, growth and inactivation – introduction to predictive microbiology* – held by Professor Francis Butler gave a comprehensive picture on the evolution of predictive microbial models and on the available online tools of qualitative and predictive food microbiology such as Combase and PMP (Pathogen Modelling Program) Online. Microbiological criteria for foods and the international principles and regulations for their establishment and application were introduced as well as the practical significance of the mentioned recommendations. The theoretical part of the session was followed by a case study and the introduction of the Risk Management Simulation Tool for the Control of Campylobacter and Salmonella in Chicken Meat which is based on the Codex guidelines. The participants got insight to the modelling possibilities offered by the simulation tool, the steps of creating a new process flow and how to insert stages and edit the parameters influencing the process.

Third day of the training (4 December 2014)

In the first session – *Practical case of using NHBS data in TDS methodology for a risk/benefit assessment to food chemicals* – Dr Jean-Charles Leblanc introduced the characteristics of national household budget surveys (NHBS), the food consumption data collected in such studies and the way to transform NHBSs into individual food consumption data with the ADePT Food Security (FS) Statistics Module developed by the Statistics Division of FAO and the World Bank. The limitations and interpretations of the results were also explained followed by a case study (Cameroun TDS) explaining how to use the results of a total diet study (TDS) to conduct risk/benefit assessment, what conclusions and recommendations can be drawn from the results.

In the afternoon session, Professor Francis Butler carried out a case study using the US National Health and Nutrition Examination Survey to explain how to interpret the results and how to estimate individual nutrient intake in a population based on the outcome of the survey.

After the case studies, practical exercise were held on nutritional risk assessment (Iodine salt) and chemical risk assessment (Ochratoxin A in cereals) based on a subject of concern in Turkey. The training participants were divided into groups – based on their interest – and they conducted nutrition/chemical risk assessment using their knowledge and resources acquired during the training and with the assistance of the trainers. All groups presented the results which were followed by active discussion.

At the end of the workshop closing words of Ms Şenay Eken, Head of the Risk Assessment Department of the MoFAL of the Republic of Turkey made clear that the workshop was highly successful and be useful for the participants. Dr Eleonora Dupouy expressed appreciation for the trainers and the active participation of those present.

V. Workshop Evaluation

At the end the workshop has been evaluated through a questionnaire.
The evaluation questionnaire covered three sections: I. Programme, II. Technical aspects, III. Logistic aspects and at the end two open-ended questions gave the opportunity to the participants to express their opinion and provide comments. The sections contained different questions and statements which could be rated using the evaluation scale of four ratings: not satisfactory, satisfactory, good, excellent.
The participants expressed satisfaction with the training workshop both technically and from the logistic point of view. A special emphasis was put by the participants on the importance and value of the practical approach provided by the lecturers and the opportunity to work together with colleagues from different departments and experts from other organizations. While working together, discussing and interacting, the participants revealed gaps and uncovered areas which could possibly stand in the way of the development of a strong food safety system in Turkey. Participants acknowledged that the workshop sessions were beneficial in terms of received information and knowledge on the procedure of the risk assessment framework which will contribute to their future work and which broadend their professional view.

The summary of the training evaluation provided by the participants is presented below :

Please evaluate the following aspects of the training workshop	**NOT SATISFACTORY**	**SATISFACTORY**	**GOOD**	**EXCELLENT**
PROGRAMME	%	%	%	%
Overall programme, topics addressed in sessions	3.8	15.4	73	7.5
Usefulness of theoretical background , information, concepts, approaches, techniques		19.2	69	11.5

	NOT SATISFACTORY	SATISFACTORY	GOOD	EXCELLENT
TECHNICAL ASPECTS	%	%	%	%
Presentations on chemical and nutritional risk assessment	3.8	23.1	61.5	11.5
Usefulness of practical exercises, case studies on chemical and nutritional risk assessment	3.8	23.1	53.8	19.2
Presentations on microbiological risk assessment	3.8	7.5	65.4	19.2
Usefulness of practical exercises, case studies on microbiological risk assessment	3.8	11.5	57.7	23.1
Would you be able to apply the information and skills from the workshop in your work?	15.4	26.9	42.3	15.4
Was the workshop successful in contributing to a better understanding of concepts and notions related to the application of risk analysis to assess chemical, microbiological and nutritional risks related to food safety?	3.8	19.2	57.7	11.5
Has the workshop helpful to identifying the technical gaps in risk assessment capacity that would require further capacity building?	7.5	26.9	46.1	15.4
Quality of simultaneous translation		15.4	57.7	15.4
LOGISTIC ASPECTS	**NOT SATISFACTORY**	**SATISFACTORY**	**GOOD**	**EXCELLENT**
Quality of coffee breaks		15.4	46.1	38.5
Quality of lunches		3.8	53.8	42.3
Venue of the workshop and conditions for the training	3.8	19.2	57.7	19.2

In general, the participants evaluated most of the questions with rating "good" or "excellent". Among the technical questions the usefulness of practical exercises, case studies on risk assessments got the highest rating followed by the ones on the presentations on chemical and microbiological risk assessment and the usefulness of theoretical background, information, concepts, approaches, techniques. The participants also found the catering and the venue of the training very satisfactory.

Summarizing the answers for the first open-ended question *"1. What are the three most important lessons/take home messages from this workshop?"* the following statements can be highlighted:

- It has been a detailed training with practical studies
- The similarities and differences between chemical and microbiological risk assessment
- The national database needs evaluation
- In case of lack of data what should be done to conduct risk assessment

The feedback received for the second open-ended question *"2. Please indicate topics of interest to be addressed by further capacity development training workshops"*

- Practical studies on effective use of national data

- How to conduct nutritional risk assessment
- More detailed information about all three subjects
- More case studies and practical applications

Other comment provided by one participant:

- The training would have required more time.

Some quotes from participants evaluation are presented below:

"*Multidisciplinary participation and lecturers with diverse background and experience made the workshop technically strong and efficient* " (Ms Senay Eken, Head of Risk Assessment Department, MoFAL).

"*It is a very well planned training, useful both for risk assessors and risk managers. I work on risk management side at the MoFAL. I always should read and follow on the risk assessment reports from international bodies such as EFSA, JECFA, JEMRA, etc. The topics presented by tutors are very helpful to understand in detail this kind of reports and also improve my knowledge on what kind of questions shall be raised to our Risk Assessment Department. We have learned how we can use the limited national data for risk assessment and also how to apply these data for food safety risk management. I would like to underline that the great value of this training is its practical side. I think all participating stakeholders coming from various sectors have taken very important, high quality and very refined information to use in their work*" (Dr. Betul Vazgecer, Food Engineer in the General Directorate of Food Control, Food Establishments and Codex Department, MoFAL).

"*I am a university Professor in Public Health Nutrition. My main topics of interest are public health, food security, food safety, nutritional problems, nutritional assessment, food and nutrition policies. I attended lots of workshops on risk assessment. I think this is one of most successful and well planned training. Facilitators are well experienced, very friendly, they made the training valuable, the case study activities were excellent. Also the profile of the participants – specialists on various food safety related areas- made the training program very interactive. Due to these factors to my opinion the workshop could be ranked as of high quality and interesting. I think all the participants felt satisfied and felt more familiar with risk assessment. I am very happy for having been involved in this training program. I will share the case studies with my students.*" (Prof. Gülden Pekcan, PhD. Hacettepe University Faculty of Health Sciences Department of Nutrition and Dietetics).

VI. Conclusions and recommendations

The workshop contributed to strengthening the food safety system of Turkey and raised institutional and expert capacities to apply risk assessment principles by using both international and national scientific data.

The training workshop had a series of intensive sessions relating to the principles of microbiological and chemical risk assessment, predictive microbiology, complimented by group work using a risk ranking tool – 'Risk Ranger' to assess the risk associated with Salmonella in poultry produced in Turkey, and also a practical case study of interest for Turkey on benefit-risk assessment of iodine consumption and chemical risk assessment of ochratoxin A in cereals. A further group session covered the application of the FAO/WHO Risk Management Tool for the Control of Campylobacter and Salmonella in Chicken Meat.

There was a high level of interest among the participants in the material covered and a very active contribution both in plenary and in working group sessions. There was very active engagement in the group work using Risk Ranger and FAO/WHO Risk Management Tool. Participants were of the view that these readily available tools gave them the opportunity to undertake practical microbiological risk assessments in their own professional work. It was noteworthy that there were a number of participants from Turkish universities, and these saw real applicable and practical opportunity to incorporate the workshop material into their own teaching programmes.

Participants generally had a good background knowledge of the subject area and there was an active question and answer session at the end of each of the presentations where participants further explored the material being presented. Participants have well captured how the risk assessment steps should be done. They have also well understood how the complexity of the process requires multidisciplinary scientific competences presented together around the expertise table in order to answer, in a collective way and in the most appropriate way, to the food safety assessment requests that may be raised by risk managers. In particular, it has been well captured by participants that one of the main prerequisite for such best risk assessment practices is the need for having relevant data sources on food consumed in the country, such as food consumption data and food composition data on nutrients and chemicals in order to provide strong scientific basis in the formulation of advices/recommendations which are at the end of the process to be used by risk managers in the implementation of appropriate consumer protection policies related to food safety hazards.

Recommendations:

- Consideration may be given to organize a risk analysis workshop targeting key food industry stakeholders to raise industry's awareness and knowledge in food safety assessment and management matters.
- Further training in advanced risk assessment techniques for those participants who have responsibility in their professional capacity for undertaking quantitative risk assessment of foods produced and consumed in Turkey. Topics that may be considered would include:
    - introduction to probabilistic risk assessment
    - topics in predictive microbiology, particularly covering microbial growth and inactivation, development and implementation of microbiological criteria for the control of pathogens in foods
    - practical operational risk assessment to nutritional and toxicological issues of concern for Turkey
- It is recommended the MoFAL obtains the latest available data from national food household survey in close collaboration with the Turkish Statistical Institute that should be used for risk assessment purposes;
- It would be beneficial the MoFAL establishes close collaborative connections between all organizations and stakeholders involved in food safety related issues and explore the establishment of a national food safety network to ensure that the risk analysis process is integrated in the official food safety control system
- In the closing remarks, Mr Senay Eken, Head of Risk Assessment Department, MoFAL expressed the wish for Turkey to get involved in a global project on Total Diet Study, underlying that such study would be indicative on most weak spots in food chain of Turkey and on priority actions and areas of focus by food safety risk managers to achieve safe and quality food and efficient consumers' public health protection.

Annex I: Workshop Programme

Training Workshop

Chemical, Microbiological and Nutritional Risk Assessment of Foods

2 December 2014

09:00 – 09:30	Opening address: Representative of the Ministry of Agriculture, Turkey Assistant FAO Representative in Turkey
9.30-10.10	**Introductory session** *Facilitator: Dr. Eleonora Dupouy* Introduction of trainers and participants Presentation of training objectives and expected outcomes (FAO) Initial test for participants General outline of the training, discussion of aspects and issues to be addressed during the training
10.10 - 10.30	Coffee break
10.30 – 11.30	**Chemical risk assessment** *Facilitator: Dr Jean Charles Leblanc* Authorized chemicals in the food chain: pesticides and veterinary drugs, determination of ADI, authorization of use, MRL, legal standards and legal framework, international MRLs, control framework
11:30-12:30	**Chemical risk assessment** *Facilitator: Dr Jean Charles Leblanc* Environmental contaminants, TDI and maximum limits, regulatory framework, other chemicals in food. Questions and answers/discussion
12:30 – 14.00	Lunch
14.00 – 15.00	**Microbiological risk assessment** *Facilitator: Prof. Francis Butler, Ireland* Steps and principles of microbiological risk assessment : - (i) hazard identification - (ii) hazard characterization - (iii) exposure assessment - (iv) risk characterization
15.00 – 15.20	Questions and answers/discussion

15.20 – 15.45	Coffee break
15:45 - 17.00	**Case study** *Facilitator: Prof. Francis Butler, Ireland* The use of Risk Ranger tool for qualitative microbial risk assessment Initial qualitative risk assessment by participants of the microbiological risks associated with poultry produced in Turkey End of day questions and answers session

3 December 2014

9.30 - 10.30	**Exposure assessment in chemical risk assessment** *Facilitator: Dr Jean Charles Leblanc* Principles of chemical contaminant exposure assessment Assessing residue levels in product Assessing food consumption International food consumption databases
10:30-11:00	Questions and answers/discussion
11:00-11:20	Coffee break
11.20 – 12.30	**Exposure assessment in chemical risk assessment** *Facilitator: Dr Jean Charles Leblanc* Practical exercise on chemical risk assessment based on a subject of concern in Turkey
12:30 – 14.00	Lunch
14.00 – 14.45	**Microbiological risk assessment** *Facilitator: Prof. Francis Butler, Ireland* Microbiological hazards, growth and inactivation – introduction to predictive microbiology
14:45-15.15	Practical exercise/case study , growth of *Listeria monocytogenes* in cheese
15.15 – 15.35	Coffee break
15.35 – 17.00	**Microbiological risk assessment - Case Study** *Facilitator: Prof. Francis Butler, Ireland* Application of the FAO/WHO 'Risk Management Tool for the Control of Campylobacter and Salmonella in Chicken Meat' for poultry produced in Turkey End of day questions and answers session

4 December 2014

9.30 - 10.30	**Introduction to Nutritional risk / benefit assessment** *Facilitator: Dr Jean Charles Leblanc* Principles of nutritional / benefit assessment Assessing nutrients' levels in product Assessing food consumption and intake of the nutrient of concern International food consumption databases
10:30-11:00	Questions and answers/discussion
11:00-11:20	Coffee break
11.20 – 12.30	**Exposure assessment in nutritional risk/benefit assessment** *Facilitator: Dr Jean Charles Leblanc* Practical exercise on nutritional risk assessment based on a subject of interest in Turkey
12:30 – 14.00	Lunch
14.00 – 14.45	**Case study the US National Health and Nutrition Examination Survey** *Facilitator: Prof. Francis Butler, Ireland* Using the US National Health and Nutrition Examination Survey to estimate individual nutrient intake in a population
15.00 – 15.20	Coffee break
15.35 – 16.35	**Case study in nutritional risk / benefit assessment of interest in Turkey** *Facilitator: Dr Jean Charles Leblanc and Prof. Francis Butler* Detailed case study of an example of a nutritional risk / benefit assessment of relevance to participants
16.35 – 17:00	Review of principles learned – final test/assessment for participants
17.00 – 17.30	Certificates handing, closing remarks, end of the workshop

Annex II: List of Participants

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