

NEM/REP 1



**FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS**



**WORLD HEALTH
ORGANIZATION**

FAO/WHO Regional Meeting on Food Safety for the Near East

5-6 March 2005
Amman, Jordan

“Practical Actions to Promote Food Safety”

FINAL REPORT

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2005**

**For further information on the activities of the FAO/WHO Regional Meeting
on Food Safety for the Near East, please contact:**

The Joint Secretariat of the Regional Meeting on Food Safety for the Near East
c/o Food Quality and Standards Service
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00100 Rome - Italy
Fax. No.: + 39 06 57054593
E-mail Address: Food-Quality@fao.org

or

The Joint Secretariat of the Regional Meeting on Food Safety for the Near East
c/o Food Safety Department
World Health Organization
20, Avenue Appia
CH-1211 Geneva 27 - Switzerland
Fax. No.: + 41 22 7914807
E-mail Address: foodsafety@who.int

Web site: www.fao.org/es/ESN/food/meetings_neareast_en.stm

**Issued by the Secretariat of the FAO/WHO Regional Meeting on Food Safety for the Near
East, FAO, Rome**

NEM/REP 1

**FAO/WHO Regional Meeting on Food Safety
for the Near East**

5-6 March 2005
Amman, Jordan

“Practical Actions to Promote Food Safety”

FINAL REPORT

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

All rights reserved. Reproduction and dissemination of material in this information product for education or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to the Chief, Publishing Management Service, Information Division, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy or by e-mail to copyright@fao.org.

© FAO 2005

FOREWORD

Ensuring safe and healthy food is essential for improving human life in all countries, whether developed or developing. Rather than being a luxury of the rich, all people should have the right to an adequate supply of safe and nutritious food. The importance of safe food, whether domestically produced and consumed, imported or exported, is well known by the countries of the Near East region, as the region relies on imports for over 60 percent of its food supply, while in some countries this level can be as high as 90 percent. In some countries of the region, food exports are an important source of foreign exchange earnings, so compliance with international market requirements and quality and safety standards is essential. These standards have become increasingly complex, and at times, stringent, demanding greater vigilance and investment.

The countries of the region recognize the importance of developing practical actions and recommendations for capacity building to promote food safety in the region. Accordingly, at the request of the delegates of the region in an informal meeting at the 27th Session of the Codex Alimentarius Commission (Geneva, July 2004), following the guidance of the FAO/WHO governing bodies, in line with the suggestions made by the participants at the first and second Joint FAO/WHO Global Fora of Food Safety Regulators (GF1- Morocco, January 2002 and GF2- Thailand, October 2004), and at the kind invitation of the Government of the Hashemite Kingdom of Jordan, FAO and WHO jointly convened a Regional Meeting on Food Safety for the Near East in Amman, Jordan from 5 to 6 March 2005.

The Meeting was held as part of a series of regional events that FAO and WHO are jointly organizing to meet the needs of member countries for policy guidance and capacity building in food safety, the first of which was held in Budapest in February 2002 for the European region and the second of which was held in Seremban, Malaysia in May 2004 for the Asia and Pacific Region. Over 90 delegates from 11 member countries of the Near East Region and observers from 5 international governmental and non-governmental organizations participated in this Meeting, under the general theme of “Practical Actions to Promote Food Safety”.

The participants at the Meeting affirmed that the countries of the region recognize the need for institutional reforms toward unified national food safety agencies, broader data collection and surveillance of food-borne diseases, increased investment in food inspection services and laboratories and increased regional cooperation in the harmonization of food safety standards and regulations and in the equivalency of food safety systems. Within this context, the Meeting made numerous recommendations of practical actions to strengthen food safety systems in the region. It was generally recognized by the participants that although the convening of the Meeting itself was successful, its true success can only be measured by the degree of implementation of the recommendations of the Meeting and the improved safety of foods produced and consumed in the region.

ACKNOWLEDGEMENTS

The Joint Secretariat of the FAO/WHO Regional Meeting on Food Safety for the Near East wishes to express its sincere thanks to all those that contributed towards the success of this Meeting, in particular to the Jordanian authorities for their efficient organization of the Meeting and their warm hospitality. The Joint Secretariat also expressed its thanks to the Chair, Vice-Chairs, and Rapporteur of the Meeting for their dedicated hard work and the exceptional manner in which they conducted the meeting; all those who prepared Conference Room Documents and those who made interventions during the Meeting; and last, but not least, to the members of the press for their excellent coverage of the event.

CONTENTS

I.	Executive Summary	1
II	Introduction.....	2
III.	Opening Ceremony (Agenda Item 1).....	2
IV.	Designation of Meeting Chairs and Rapporteur (Agenda Item 2)	3
V.	Adoption of the Agenda (Agenda Item 3).....	3
VI.	Food safety and trade: the impact of food safety standards on food and agricultural trade in the Near East (Agenda Item 4).....	3
VII.	Food safety and health: the impact of current food safety systems in the Near East on human health (Agenda Item 5).....	4
VIII.	National food safety systems in the Near East: a situation analysis (Agenda Item 6).....	5
IX.	Regional, sub-regional and national cooperation in food safety in the Near East (Agenda Item 7)	7
X.	Recommendations of the Meeting.....	7
XI.	Adoption of the Report	10
XII.	Closing of the Meeting.....	10
Annex 1:	List of participants	11
Annex 2:	Provisional Agenda (NEM 05/1)	20
Annex 3:	Opening speech of Dr Hussein A. Gezairy, WHO	21
Annex 4:	Opening speech of Mr Hartwig de Haen, FAO	23
Annex 5:	Opening speech of H.E. Dr Ahmad Al-Hindawi, Minister of Trade, Jordan	26
Annex 6:	Meeting discussion papers	28
Annex 7:	Conference Room Documents	59

**Report of the FAO/WHO Regional Meeting on Food Safety
for the Near East**

Amman, Jordan, 5-6 March 2005

I. EXECUTIVE SUMMARY

A Regional Meeting on Food Safety for the Near East, jointly convened by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), took place from 5 to 6 March 2005 in Amman, Jordan, at the kind invitation of the Government of the Hashemite Kingdom of Jordan. Over 90 delegates from 11 member countries of the Near East Region and observers from 5 international governmental and non-governmental organizations participated in the meeting, which was designed to i) exchange information on food safety programmes and food control systems in the countries of the Near East region; ii) Identify practical actions to strengthen national food control systems in the countries of the region; iii) Promote the strengthening and/or the establishment of regional and sub-regional networks for the exchange of food safety related information and experiences among all stakeholders; and iv) Identify opportunities for improving regional cooperation in promoting food safety.

Countries have recognized the need for increased national attention and international, regional and national cooperation to strengthen food safety systems in the countries of the Region. Within this context, the Meeting made numerous practical recommendations to strengthen food safety systems in the countries of the Region. The key recommendations made can be summarized as follows:

- The large majority of countries of the region must urgently give higher priority to building their capacity to respond to the unacceptable burden of illnesses caused by the consumption of unsafe food.
- Governments should consider institutional reforms which work toward unified food safety agencies.
- Investment in food inspection services and laboratories must be enhanced to ensure the safety of the food which is consumed in the region and that which is produced and exported from the countries of the region.
- There is a need to establish or strengthen national food-borne disease data collection and surveillance programmes in each country of the region and to facilitate timely inter-country exchange of relevant information.
- To supplement national actions, governments of the region should make better use of resources available in the region including, for example, specialized reference laboratories, established surveillance systems, and training capacities.
- A regional task force should be created to ensure the transfer of successful experiences in various components of food safety management.
- FAO, WHO and other concerned international agencies and donors are called upon to support initiatives to address the food safety challenges and to play a more active role in developing programmes for intra-regional cooperation.

II INTRODUCTION

1. The Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) jointly convened the FAO/WHO Regional Meeting on Food Safety for the Near East (the Meeting) in an effort to facilitate discussion on practical actions and recommendations to promote food safety in the countries of the Near East region. The Meeting was held in Amman, the Hashemite Kingdom of Jordan (Jordan) from 5 to 6 March 2005 at the kind invitation of the Government of the Hashemite Kingdom of Jordan. The Meeting was attended by high ranking policy officers and technical experts from 11 member countries of the Near East Region of FAO and the Eastern Mediterranean Region (EMRO) of WHO. It was also attended by 5 international organizations as observers. A list of all participants is included in Annex 1.

2. This meeting is part of a series of global and regional events that FAO and WHO are convening to meet the needs of member countries for policy guidance and capacity building in food safety. This series includes the First and Second FAO/WHO Global Fora (GF) of Food Safety Regulators (GF1 - Morocco, 28 to 30 January 2002 and GF2 - Thailand, 12 to 14 October 2004), the "Pan-European Conference on Food Safety and Quality" (Hungary, 25 to 28 February 2002) and the "FAO/WHO Regional Conference on Food Safety for Asia and the Pacific" (Malaysia, 24 to 27 May 2004). The Meeting was convened in light of the recommendations and feedback from these events, direction from FAO/WHO governing bodies, and the request of delegates of the region in an informal meeting at the 27th Session of the Codex Alimentarius Commission (Geneva, July 2004).

3. Further aims of the Meeting were to i) Exchange information on food safety programmes and food control systems in the countries of the Near East region; ii) Identify practical actions to strengthen national food control systems in the countries of the region; iii) Promote the strengthening and/or the establishment of regional and sub-regional networks for the exchange of food safety related information and experiences among all stakeholders; and iv) Identify opportunities for improving regional cooperation in promoting food safety, taking into account the prevailing conditions in the entire food chain.

4. The Provisional Agenda for the Conference is found in Annex 2 (NEM 05/1).

III. OPENING CEREMONY (AGENDA ITEM 1)

5. The opening ceremony began with a statement from the Regional Director for the WHO Eastern Mediterranean Region (EMRO), given on his behalf by Dr Mohamed Aideed Elmi, Regional Advisor, Food and Chemical Safety, WHO EMRO. In his presentation, he reminded the Meeting of the growing food safety concern in the world and of the burden of food-borne disease has on the world population. He recalled that in 1999, the WHO EMRO Regional Committee adopted the Regional Plan of Action for Food Safety, which has led to a number of new initiatives in this regard both at the national and regional level. The World Health Resolution (WHA 53.15) which recognized the importance of food safety for public health was also mentioned. The speaker expressed his hope that the Meeting would lead to concrete actions to improve food safety in order to achieve the goal of safe food for all. The text of his address is appended as Annex 3.

6. In his opening remarks on behalf of FAO, Mr Hartwig de Haen, Assistant Director-General, Economic and Social Department, informed the Meeting of the series of regional and

global events that FAO and WHO are jointly organizing to provide fora for food safety officials to share information on national experiences in regulating and promoting food safety. He highlighted the importance of food safety for all people, in the interest of both public health and economic efficiency and competitiveness. He recalled the challenges for the countries of the region to improve the efficiency and effectiveness of their food control systems and the specific conditions of the region in relation to the importance of food imports and exports, which increase the potential of food safety risks. Mr de Haen further informed the Meeting of various actions taken by FAO, in partnership with WHO and other organizations, to assist member countries in their efforts to improve food safety and quality and reiterated his Organization's readiness to further expand its capacity building programme to assist the countries of the region in this field, if funds become available. The text of his speech is appended in Annex 4.

7. The Meeting was officially opened by His Excellency, Dr Ahmad Hindawi, Minister of Industry and Trade of Jordan, who thanked FAO and WHO for providing Jordan the honour of hosting this Meeting and for their work in improving food safety in the region. The Minister highlighted the importance for the countries of the region to influence and meet international food standards, in order to encourage increased food exports from the region, as well as to ensure the safety and wholesomeness of imported food, in an increasingly global trading environment. The critical role of the WTO SPS and TBT Agreements in this trading environment, as well as the value of implementing a risk based approach to food safety, was mentioned. The need for strengthening international and regional cooperation in order to achieve improved food safety at the national level was also emphasized. The Minister noted the importance which Jordan places on food safety, as evidenced by their hosting of this Regional Meeting and by the various initiatives currently underway to improve their national food control system, including the updating of national rules and regulations for food control. The text of his speech is appended as Annex 5.

IV. DESIGNATION OF MEETING CHAIRS AND RAPPORTEUR (AGENDA ITEM 2)

8. The Conference designated Dr Saleh Mowajdeh of Jordan as Meeting Chairperson, Dr Ibrahim S. Al-Mohizea of Saudi Arabia, and Mr Amarah Meftah of Tunisia as vice-chairpersons and Dr Fahmi Saddiq of Egypt as Meeting rapporteur. The Meeting expressed appreciation to these members for their agreement to serve in these roles.

V. ADOPTION OF THE AGENDA (AGENDA ITEM 3)

9. The Meeting adopted the proposed agenda and agreed to the timetable as presented by the secretariat.

VI. FOOD SAFETY AND TRADE: THE IMPACT OF FOOD SAFETY STANDARDS ON FOOD AND AGRICULTURAL TRADE IN THE NEAR EAST (AGENDA ITEM 4)

10. Dr Fatima Hachem, Food and Nutrition Officer for the FAO Near East Region, presented the contents of the first discussion paper on "Food safety and trade: the impact of food safety standards on food and agricultural trade in the Near East (NEM 05/2)." All the discussion papers and Conference Room Documents (CRDs) for the Conference can be found in Annexes 6 and 7. The paper addressed the importance of food and agricultural trade to the region, as well as the challenges, constraints, and impact of food safety standards to this trade. The presenter discussed the importance of the WTO SPS and TBT Agreements, as well as the

costs of compliance with these measures. The need to control both imported and exported foods, as well as examples of banned and detained food exports were also presented. The speaker also noted the increasingly important role of voluntary standards in international food trade. A number of recommendations were suggested, which are included in a subsequent section of this report.

11. The Meeting welcomed the document, thanked FAO for presenting the paper, and highlighted the essential role of both food trade and food safety in the Near East region.

12. The Meeting stressed the need for comprehensive capacity building in national food control systems. This includes adequate training on subjects such as HACCP, strengthening national food legislation and regulations, as well as increasing investments to improve the necessary infrastructure, such as food control laboratories and food inspection services. The need for awareness raising along the entire food chain and implementation of a risk based approach were also highlighted.

13. The Meeting discussed the importance for the countries of the region to be involved in the Codex process, but also the increasingly stringent standards applied by developed countries, which often deviate from those established by Codex. These standards were cited as responding to consumer demands in those countries, rather than being producer driven. The Meeting stressed that national standards for both domestic and international markets should be the same and discussed the mechanisms which are in place to regulate international food trade. The importance of the guidelines, codes of good practice, manuals and other related texts which are developed by Codex, FAO, OIE and WHO in this regard was also emphasized.

14. The Meeting suggested that common principles for food policy, including the harmonization of regional standards, should be established for the region in order to increase intra-regional trade and to protect consumers throughout the world. The development of an information exchange network for rejected shipments and other trade related information between the countries of the region was discussed. The Meeting also emphasized the importance of regional and sub-regional groupings in improving food safety.

VII. FOOD SAFETY AND HEALTH: THE IMPACT OF CURRENT FOOD SAFETY SYSTEMS IN THE NEAR EAST ON HUMAN HEALTH (AGENDA ITEM 5)

15. Dr Mohamed Elmi, WHO EMRO, presented a paper on the impact of current food safety systems in the Near East on human health (NEM 05/3). The paper addressed the issue of food-borne diseases, food-borne disease surveillance, and the need for integrated action to overcome the challenges of reducing the incidence of food-borne disease in the region. The speaker presented the results of a survey carried out by WHO EMRO on food-borne disease surveillance in the region, as well as examples of national food-borne disease surveillance systems. It was noted that few comparative studies or data on the incidence of food-borne disease in the region was available due to under reporting. A number of recommendations to improve human health through strengthening food safety were presented, which are included in the appropriate section of this report.

16. The Meeting welcomed the document, thanked WHO for presenting the paper, and highlighted the essential role of food safety in improving human health in the Near East region.

17. The Meeting emphasized the importance of raising the awareness of the public, including physicians, of the importance of reporting food-borne diseases, while at the same time increasing efforts to strengthen food-borne disease reporting and surveillance to generate data to convince the public of its importance. It was noted that all stakeholders in food safety, including veterinarians and officials from the agriculture, food control, and public health sectors, and others must share their data in a transparent manner in order to target interventions to the proper commodity or process which caused a particular food-borne disease. The Meeting noted that the incidences of food-borne disease are high, even in developed countries such as the United States of America. It noted the need to improve national food-borne disease surveillance systems in the countries of the region before a regional approach would be effective. The need to prioritize available resources for control of food-borne diseases in the light of the conditions faced by the countries of the region was also noted.

18. The Meeting noted the importance of generating and reporting accurate data to establish long-term food safety objectives. It was also emphasized that countries and international organizations must continue to work in all sectors, including primary production, to prevent food-borne diseases, rather than to wait for data and react. The Meeting also discussed the need to establish a pan-Arab food safety programme, modelled after the European Food Safety Authority in order to develop regional risk-based food safety programmes focussing on preventative actions. The possibility of sub-regional action to reduce food-borne diseases was also discussed. The importance of understanding the definitions of terms such as hazard and risk was also noted.

VIII. NATIONAL FOOD SAFETY SYSTEMS IN THE NEAR EAST: A SITUATION ANALYSIS (AGENDA ITEM 6)

19. Mr Ezzeddine Boutrif, Chief, Food Quality and Standards Service, FAO, presented a paper on national food safety systems in the Near East: a situation analysis (NEM 05/4). The speaker provided a definition of food safety and food control systems, as well as the guiding principles of a food safety system, including its shared responsibility, the concept of the food continuum, and the need for a science-based system. An analysis of the situation indicated that national food control systems vary considerably from one country to another, that several international and bilateral agencies are often involved in providing capacity building in each country, and that the political will to improve national food safety systems has been rising in many countries in recent years, due to increasing consumer and media pressure. The presentation outlined the situation regarding various aspects of national food control systems, such as food inspection, food legislation, and participation in Codex work, and provided a regional analysis and examples from the countries of the region on recent initiatives to strengthen each of these aspects. Multiple recommendations for improving national food safety systems were presented and are included in the relevant section of the report.

20. The Meeting expressed its appreciation to FAO for preparing the paper and agreed on the importance of strengthening national food control systems and the needs of the region in this regard.

21. The Meeting noted the difficulties in initiating changes in national food control systems in times of political changes in that country. It was mentioned that private sector organizations should be pro-active in their involvement in national food control matters, and that national authorities should make every effort to identify and involve all relevant

stakeholders in food safety decision making. The importance of strengthening all aspects of national food control systems, including enforcement of legislation, was emphasized, as well as the need for increased funding and political will to enable this to occur. The importance of science based measures and a well coordinated, risk based food control system, which also considers socio-economic and “other legitimate factors”, was underlined.

22. Countries of the region reported on aspects of their coordinating mechanisms in place for food safety. They indicated that although some of these mechanisms exist, often they are not put into practice effectively and hence, there is a need for a more systematic approach to coordination and cooperation. Some countries (Jordan, Saudi Arabia, and Tunisia) announced the decision taken to establish a central food and drug administration in their country to serve as the focal point in the country for national food safety risk assessments.

23. The Meeting discussed the importance of regional cooperation in training food safety specialists, border inspection, laboratory capacity and other areas of food control. The Meeting expressed their desire to develop practical, concrete actions to foster cooperation and partnerships among the countries of the region.

24. Delegates also expressed their desire to obtain information from other countries of the region regarding long-term plans for national food safety systems. The need for government agencies within a country to work together to streamline the capacity building interventions by various international and bi-lateral agencies, as well as the need for UN organizations to work together in providing assistance in improving national food safety systems was also highlighted.

25. The framework provided by the FAO/WHO publication “Assuring food safety and quality: Guidelines for strengthening national food control systems” was cited as a useful reference, as this document provides guidance on recommendations for best practices that may be utilized in strengthening national food control systems.

26. Mr Nabih Ibrahim (Egypt) presented a case study of the diagnosis of Egypt’s food safety system. The speaker outlined the strengths, weaknesses and plans for future action for each of the specific elements of their national food control system. The elements of a proposed food safety strategic plan for Egypt were presented, including actions planned to address issues such as the implementation of the following: information exchange mechanisms, Good Agricultural Practices, Good Manufacturing Practices, HACCP systems, traceability, and improved food import and export procedures. The presenter noted that many government ministries were involved during the short duration of the study, but that even further cooperation at the national level was needed.

27. The Meeting welcomed the presentation, thanked Egypt for sharing the information, and requested further information on the results of the studies which were undertaken. The Meeting noted that the results of the study are available from www.efsic.org, the Egyptian Food Safety Information Center website.

28. Ms Rima Zu’mot presented the risk based management approach for imported food control which has been implemented in Jordan (CRD 1). This system was first introduced in the Aqaba Special Economic Zone, where over 75% of food imports enter Jordan. The speaker explained that the system categorizes food products into low, medium, and high risk items, and assigns the products to undergo either analysis, inspection, or documents review

based on these criteria, as well as the historical safety record of each food manufacturer. The speaker indicated that this approach has been very successful in Jordan and has also been applied in the international airports in Jordan.

29. The Meeting expressed its satisfaction with the system developed by Jordan for import inspection and indicated its interest in applying it in other countries of the region to improve efficiency of inspection programmes and to protect consumers. It noted that the classification of foods into high, medium and low risk groups was dynamic and was based on actual statistical records for the past five years. The Meeting was informed that the United Arab Emirates uses a similar system with bar-coding of food products which facilitates the planning of food inspection activities, including an electronic reporting system that enables rapid transmission of inspection results as well as back-tracing of contaminated products and their suppliers. The delegation of the UAE indicated their readiness to share their experiences with other interested countries of the region.

IX. REGIONAL, SUB-REGIONAL AND NATIONAL COOPERATION IN FOOD SAFETY IN THE NEAR EAST (AGENDA ITEM 7)

30. Ms Fatima Hachem of FAO presented a paper on regional, sub-regional and national cooperation in food safety in the Near East (NEM 05/5). The paper listed examples of FAO/WHO cooperation in food safety and indicated the need for cooperation at other levels, including i) within and between sectors in a given country; ii) public/private/civil society cooperation; iii) between national and local authorities; and iv) international, regional and sub-regional levels. The paper presented numerous recommendations for improved cooperation, which are reflected in the subsequent section of this report.

31. The Meeting expressed its appreciation to FAO for preparing the paper and agreed on the importance of improving cooperation at all levels. Several delegates reported on the existing mechanisms for coordination of various food safety related activities at the national level and commented on their effectiveness. The Meeting exchanged information on successful initiatives to cooperate regionally and sub-regionally in food safety, including the following: i) GCC common food import policy and inspection system; ii) agreements between various countries (Egypt, Kuwait, Lebanon, Sudan, Syria; Egypt, Lebanon, Syria; Egypt, Saudi Arabia, Syria; Iraq, Jordan, Palestine; Libya, Tunisia;) for food trade; and iii) cooperation in training in food control and inspection.

32. The Meeting provided ideas for future regional collaboration including the following: i) establishment of pan-Arab standards based on Codex standards; ii) publication of rejected food shipments on the internet; iii) mutual recognition of certification; iv) development of a SCOT (strengths, challenges, opportunities and threats) matrix for all the countries of the region, identifying the strengths and challenges of each country in order to benefit from the strengths and address the challenges.

X. RECOMMENDATIONS OF THE MEETING

33. The Meeting recommended that member countries of the region should:

In the field of national food safety policy and organizational coordination:

- a) Develop effective long-term national policies, objectives, and plans for food safety, including raising the awareness of all stakeholders, including the public, of the

importance of food safety and enhancing political will and funding to strengthen all components of national food control systems;

- b) Adopt science based measures and a well coordinated, risk- based food control system, which also considers socio-economic as well as “other legitimate factors”;
- c) Build the capacity of national food safety systems to address emerging issues such as food product traceability and to prevent non-intentional food contamination;
- d) Identify and actively coordinate the involvement of all relevant stakeholders, including all concerned public institutions, the private sector and consumer groups, in food safety decision making;
- e) Be guided by and benefit from the experiences of other countries in the region that have implemented single agency systems for national food control
- f) Improve coordination at the national level of the capacity building interventions by various international and bi-lateral agencies.

In the field of involvement in Codex:

- a) Provide national Codex contact points with the facilities and office information technology necessary to enable active communication with the Codex secretariat, as well as with national stakeholders and other Codex Contact points in the region;
- b) Strengthen/establish national Codex committees to include all relevant stakeholders and to effectively prepare for and participate in international Codex work and provide the necessary means to enable it to successfully implement its mandate.

In the field of food safety legislation and standards:

- a) Work towards the enactment of basic food laws to replace the fragmented legislation currently governing food control in many countries of the region, utilizing the experience of countries which have recently adopted such food laws as a guide in this regard;
- b) Update/revise national regulations and standards to be in harmony with Codex texts, including the Codex Principles of Food Hygiene and its annex on HACCP implementation.

In the field of in-country inspection of food:

- a) Improve the technical skills of food inspectors through training and increase the funding for and professional status of food inspectors;
- b) Implement a risk based approach to food inspection and apply electronic reporting of food imports, benefitting from the experiences of Jordan and UAE in this field;
- c) Complement inspection and control of food by including coaching, guiding and auditing of food safety management systems

In the field of national food control laboratories:

- a) Encourage the private sector to establish accredited laboratories to benefit both the public and private sector and seek their official recognition;
- b) Convince government policy makers of the importance of accredited and recognized laboratories and of the need to increase funding for the same;
- c) Work towards the accreditation of food control laboratories in key analytical disciplines, such as mycotoxins, pesticide residues, heavy metals, microorganisms, etc.

- d) Ensure that national laboratory accreditation bodies are independent and their decisions are made in a transparent manner.

In the field of national food-borne disease surveillance

- a) Encourage all stakeholders in food safety, including the general public, animal health specialists and officials from the agriculture, food control, and public health sectors, to report and share their data on the incidence of disease in a transparent manner and strengthen the mechanisms for reporting and surveillance;
- b) Use this surveillance data to prioritize relevant programmes and interventions that address major food safety problems.

34. The Meeting recommended that the region should work together in the following ways:

In the field of regional food safety policy and legislation:

- a) Develop a regional mechanism to: i) ensure a sustainable regional food safety system that integrates the economy of the entire food chain and better protects consumers, ii) establish and harmonize food standards, on products of interest to the region, that are based on Codex standards where possible, iii) coordinate food control activities between the countries of the region, iv) develop jointly funded initiatives for food control activities in the region, and v) provide training in specific components of food safety;
- b) Utilize sub-regional groupings and bi-lateral partnerships to improve food safety;
- c) Along with FAO and WHO, develop a SCOT (strengths, challenges, opportunities, and threats) matrix for all the countries of the region, identifying the strengths and challenges of each country in order to benefit from the strengths and address the challenges;
- d) Establish centres of expertise in the application of GMPs and HACCP and other areas of interest.

In the field of involvement in Codex:

- a) Improve communication and consultation prior to major Codex meetings to effectively work together to address regional concerns within the Codex system;
- b) Use the FAO/WHO Regional Coordinating Committee for the Near East and other relevant regional gatherings as a means to build common positions on various Codex issues;
- c) Develop a strategic plan (three-five years) for the region in matters related to Codex.

In the field of information exchange:

- a) Develop an information exchange network for rejected food shipments and other critical trade related information;
- b) Share successful experiences in various components of food safety management;
- c) Inform each other of any changes in food standards and import/export requirements;
- d) Utilize the INFOSAN network as a means of exchanging food safety related information with food safety authorities in the rest of the world.

In the field of food import/ export inspection and certification:

- a) Work towards the application of a uniform inspection scheme for food import/exports throughout the region;

- b) Foster mutual recognition of inspection and certification systems among the countries of the region.

In the field of food control laboratories:

- a) With the assistance of FAO/WHO, identify and develop regional centres of expertise in laboratory disciplines such as pathogen serotyping, chemical contaminant analysis and microbiological analysis;
 - b) Enable these centres to serve as accredited reference laboratories, be a source of information, provide training, serve in emergency situations, and facilitate inter-laboratory testing.
35. The Meeting recommended that FAO/WHO should:
- a) Along with the countries of the region, conduct a SCOT analysis of the food safety system in every country of the region to identify where countries can benefit from each other;
 - b) Facilitate the development of regional centres of excellence/networks in areas such as food-borne disease surveillance, laboratories, inspection, HACCP, etc;
 - c) Encourage the empowerment of all stakeholders involved in food control at the national level;
 - d) Improve coordination of capacity building assistance between UN agencies, donors, and other providers in improving national food safety systems;
 - e) Harmonize the publication of the generic HACCP models developed by the WHO Eastern Mediterranean Regional Centre for Environmental Health Activities (CEHA) with the guidelines for the application of HACCP to small and less developed businesses developed by FAO and WHO Headquarters and publish as appropriate;
 - f) Update FAO's food inspection manual and disseminate the information to the countries of the region.

XI. ADOPTION OF THE REPORT

36. The Meeting discussed the draft report and made suggestions for its revision. These were taken into consideration by the Secretariat in finalizing the report.

XII. CLOSING OF THE MEETING

37. The Meeting expressed its warm thanks to the Government of Jordan for the efficient organization of the Meeting and for its generous hospitality. The Meeting also expressed its appreciation to FAO and WHO for organizing the Meeting. The Chairperson then closed the Meeting.

ANNEX 1

**LIST OF PARTICIPANTS
LISTE DES PARTICIPANTS**

**Algeria
Algerie**

M. Sami Kolli
Sous Directeur
Ministère du Commerce
46 Bd Mohamed V
Alger
Tel: 213.216.31355/213.216.31375
Email: samikolli@yahoo.fr

**Bahrain
Bahrein**

Mr Mohamed Baquer Hussain
Head
Food Inspection Unit
Public Health Department
Manama
Tel: 973.1727.3683
Fax: 973.1727.9253
Email: AALI7@health.gov.bh

**Egypt
Egypte**

Mr Mohammed Fahmi Saddik
Professor Food Hygiene
National Institute of Nutrition
Alexandria
Tel: 203.64.3552/260.2457
Fax: 203.64.7476
Email: ilsi@tedarta.net.eg

Mr Nabih Abdel-Hamid Ibrahim
Director of Food Safety Information Centre
Food Technology Research Institute
Agricultural Research Centre
Ministry of Agriculture and Land Reclamation
Giza
Tel: 202.571.2049
Fax: 202.571.8325
Email: dr.nabih@internetegypt.com

Dr Zeinab A. H. Abdel Azeiz
General Director
Food Safety and Control
Ministry of Health and Populations
3 Magless El Shaab Street
Cairo
Tel: 7948152
Fax: 7921077
Email: zeinabHalem@yahoo.com

Dr Hoda Abdel Fattah Hassan
Director of National Nutrition Institute
16 Kasr El-Aini Street
Cairo
Tel: 202.364.6413
Fax: 202.364.6467
Email: nniegypt@nni.org.eg

Dr Sohair Ahmed Gadalla
Director of Central Laboratory of Residue
Analysis of Pesticides and Heavy Metals
in Food
Agriculture Research Center
Ministry of Agriculture
Cairo
Tel: 761.1282
Fax: 761.1216
Email: sohairgadalla@hotmail.com

Mr Kamel Darweesh
Food Standard Specialist
16 Tadreeb El Modarrabeen Street
El Ameriya
Cairo
Tel: 202.284.5531
Fax: 202.284.5504
Email: moi@idsc.gov.eg

Dr Ahmed Gaballa
Scientific and Regulatory Affairs Manager
Atlantic Industries – Free Zone
Nasr City
Cairo
Tel: 202.276.7138
Fax: 202.287.7620
Email: agaballa@mena.ko.com

Iraq

Dr Wathiq Muhammad
Food Safety Programme Manager
Food Inspection
Ministry of Health
Baghdad
Tel: 790.144.7246

Mr Abdil Hussien K. Fallah
Food Safety
Health Audit Department
Ministry of Health
Baghdad
Tel: 7901.334908

Dr Hashim S. Hammodi
Food Safety Programme in Iraq
Health Audit Department
Ministry of Health
Baghdad
Tel: 7901.446606

Dr Almuaimi Haitham Sadia Ibrahim
Food Safety Programme Iraq
Ministry of Health
Al Dora City
Baghdad
Tel: 790.555.3952
Email: 20201989-2@yahoo.com
haithamalnuaimi@yahoo.com

Mr Souod Alani
Head, Food Science and Human Nutrition
Dept.
Agricultural Research and Food Technical
Directorate
Ministry of Science and Technology
P.O. Box 765 Baghdad
Tel: 515.1930
Email: souodalani449@yahoo.com

Mr Waled Khalid Ali
Food Sampling System Manager/MOH/Iraq
Health Audit Department/MOH/Iraq
00964 Baghdad
Tel: 7901.446594
Email: walleednazz@yahoo.com

Mr William Hargraves
SPS/Food Safety
Iraq Private Sector Growth Employment
APO AE 09316
Baghdad

**Jordan
Jordanie**

Dr Saleh Mowajdeh
Director-General
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325

Eng. Salem A. Quheiw
General Director Assistant
Jordanian Institute for Standards and
Metrology
P.O. Box 941287
Amman 11194
Tel: 962.6.5665276
Fax: 962.6.5681099
Email: squheiw@jism.gov.jo

Dr Fathi Hamed Ali Saleh
Head of Food Directorate
Director of Food Control
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325
Email: fathi.saleh@jfda.jo

Dr Aya Al-Salti
Animal Production Department
Ministry of Agriculture
Amman

Dr Mohammed Isam Yamani
Head
Dept. of Nutrition and Food Technology
University of Jordan
Amman
Tel: 962.6.535500
Email: myamani@ju.edu.jo

Dr Mahmoud Al Zoubi
Secretary of National Codex Committee
P.O. Box 941287
Amman
Tel: 962 6 5680139
Fax: 962 6 5681099
Email: mzoubi@jism.gov.jo

Eng. Rima Zumot
Director of Health Control Directorate
Aqaba Special Economic Zone Authority
P.O. Box 2565
77110 Aqaba
Tel: 962.3.209.1000 Ext. 2083
Fax: 962.3.209.1017
Email: rzumot@aseza.jo

Dr Mohammad Obaidat
Head of the National Society for Consumer
Protection
Amman

Eng. Zakaria Sabah
Amman Chamber of Industry
Amman

Eng. Muna Habaybeh
Food Standard Officer
Jordan Institution for Standards and Metrology
Amman
Email: munahabaybeh@yahoo.com

Eng. Ola Herzallah
Food Standard Officer
Jordan Institute for Standards and Metrology
Amman
Tel: 962.777.237579
Fax: 962.6.568/099
Email: ohertzallah@jism.gov.jo
oh2717@hotmail.com

Eng. Issa Qutheshat
Food Standard Officer
Jordan Institute for Standards and Metrology
Amman
Tel: 962.6.568.0139
Fax: 962.6.568.1099
Email: issaqutheshat@yahoo.com

Eng. Malak Abu Zeinah
Ministry of Agriculture
Amman
Tel: 962.6.686151

Kuwait Koweit

Ms Zakeyah Al-Shammari
Head of Standards Section
Public Authority for Industry
P.O. Box 4690
13047 Safat
Tel: 965.530.2670
Fax: 965.530.2625
Email: Z.Shamri@pai.gov.kw

Ms Hashmia R. Al-Enezi
Food Standards Specialist
Public Authority for Industry
P.O. Box 4690
13047 Safat
Tel: 965.530.2672
Fax: 965.530.2625
Email: h.alanzei@paid.gov.kw

Lebanon Liban

Ms Maryam Eid
Food Technology Expert
Ministry of Agriculture
Bir Hassan
Safarat St
Beirut
Tel: 961.3.567.542
Fax: 961.1.824100
Email: agrofood2002@yahoo.co.uk

Mr Atef Wafic Idriss
MENA Food Safety Associates
Syndicate of Food Industries
126 Sourati St. Lions Building No. 301
P.O. Box 113 6382
Hamra
Beirut 1103 2120
Tel/Fax: 961.134.3141/134 6218
Email: atef@idriss.net

Libyan Arab Jamahiriya Jamahiriya arabe libyenne

Prof. Dr Eng. Ahmed Shembesh
Director General
National Codex Committee
P.O. Box 80342 Tripoli
Tel: 218.21.3693070
Fax: 218.21.3693071
Email: g.manager@Incsm.org

Prof. Dr. Yusef El-Mabsout
 General Manager of the National Center on
 Food and Drug Control
 National Codex Committee
 P.O. Box 80342
 Tripoli
 Tel: 218.21.4813500
 Fax: 218.21.4809134
 Email: yelmabsout@yahoo.com

Mr Ali Al-Maktouf
 Consultant
 Ministry of Foreign Affairs
 Tripoli
 Libya
 Tel: 218.21.340461-69
 Fax: 218.21.3433011

Saudi Arabia
Arabie saoudite

Prof. Ibrahim S. Al-Mohizea
 Vice President for Food Affairs
 Saudi Food and Drug Authority (SFDA)
 Riyadh
 Tel: 966.1.4131238
 Fax: 966.1.4133528
 Email: isarm12@sFDA.gov.sa

Mr Mohamed Al Hadlaq
 Food Standards Consultant
 Saudi Arabian Standards Organization (SASO)
 P.O. Box 3437
 Riyadh 11471
 Tel: 4520000
 Fax: 4520167
 Email: alhadlaq7777@saso.org.sa

Eng. Habib M. Abd Alsamad
 Quality Control Laboratory
 Ministry of Commerce and Industry
 Riyadh 11162
 Tel: 966.1.4013265
 Fax: 966.1.402.2539

Mr Bader Bin. Al-Saad
 Agri. and Food Department Manager
 Saudi Arabian Standards Organization (SASO)
 P.O. Box 3437
 Riyadh 11471
 Tel: 966.1.452.0000/966.1.452.0166
 Fax: 966.1.452.0167
 Email: badr2424@yahoo.com

Dr Hamad A Al-Awfy
 Director General
 Laboratories and Quality Control
 Laboratories and Quality Control Department
 Ministry of Commerce and Industry
 Riyadh 11162
 Tel: 966.1.4013265
 Fax: 966.1.4022539

Sudan
Soudan

Mr Gibreel Abdellatif Ahmed
 General Manager
 Sudanese Standards and Metrology
 Organization
 P.O. Box 13573
 Khartoum
 Tel: 249.183.799179
 Fax: 249.183.799188
 Email: gibreel57m@hotmail.com

Mrs Seham Siragaldeen Mergani
 Microbiology Specialist
 Sudanese Standards and Metrology
 Organization
 P.O. Box 13573
 Khartoum
 Tel: 249.83.775247
 Fax: 249.83.774852
 Email: ssmo@sudnet-net

Mr Hamdi Abbas Ibrahim
 Director
 Standardization and Quality Control Unit
 Ministry of Agriculture and Forestry
 Khartoum
 Tel: 249.183.774.688, 771.675
 Fax: 249.183.782.027, 781.749
 Email: hamdi.20072000@yahoo.com
Hamdi163@hotmail.com

Tunisia
Tunisie

Mr Meftah Amara
 Directeur général
 Bureau de Mise à niveau
 Ministère de l' Industrie, de l'Énergie et des
 PME
 Rue 8011 Cité Montplaisir
 Tunis
 Tel: 216.7179.9728
 Fax: 216.7179.6102
 Email: mefteh.amara@email.ati.tn

Mr Moncef Cherif
 Chargé du Secteur Agro-alimentaire et de la
 coopération bilatérale
 Institut National de la Normalisation et
 de la Propriété Industrielle
 B.P. 57 Cité El Khadra
 1003 Tunis
 Tel: 216.71.785.5922
 Fax: 216.71.781563
 Email: Inorpi@email.ati.tu

Mr Mohamed Ben Fredj
 Directeur Général
 Centre Technique de l'agro-alimentaire
 12 Rue de l'Usine
 Charquia II
 Tel: 216.7194.1080
 Fax: 216.7194.0198

**United Arab Emirates
 Emirats arabes unis**

Mr Ali Omar Abdullah
 Director of Standardization Department
 Emirates Authority for Standardization and
 Metrology (ESMA)
 P.O. Box 2166 Abu Dhabi
 Tel: 791.2671.1110
 Fax: 971.2671.5999
 Email: benlfaqeh.esma@uae.gov.ae

Mr Khalid Mohammed Al Sherif
 Assistant Director
 Public Health Department
 and Head of Food Control Section
 Dubai Municipality
 Public Health Department – Food Control
 Section
 P.O. Box 67 Dubai
 Tel: 971.4.2064201
 Fax: 971.4.2231905
 Email: kmsarif@dm.gov.ae

Ms Amina Ahmed Mohammed
 Head of Food and Environment Lab. Section
 Dubai Municipality
 Dubai Central Lab. Department
 Food and Environment Lab. Section
 P.O. Box 7463 Dubai
 Tel: 971.4.3011618
 Fax: 971.4.3358448
 Email: aamohammed@dm.gov.ae

Mr Abdulmouti Alhalawani
 Standards Specialist
 Emirates Authority for Standardization and
 Metrology (ESMA)
 P.O. Box 2166 Abu Dhabi
 Tel: 971.2671.1110
 Fax: 971.2671.5999
 Email: helwani_ab.esma@uae.gov.ae

Eng. Mohamed Abdullah Abdulkader
 Accreditation Department/ESMA
 P.O. Box 2166
 Abu Dhabi
 Tel: 971.2.6761851
 Fax: 971.2.671.5999

Mr Mohamed Omar Mohamed Al Bannay
 Head of Public Health Department
 Sharjah Municipality
 P.O. Box 2356
 Sharjah
 Tel: 5650.0097/50.646.3292
 Fax: 5652.2707
 Email: al-bannay2002@hotmail.com

**OBSERVER COUNTRIES
 PAYS OBSERVATEURS**

**Italy
 Italie**

Mr Giuliano Papi
 Commercial Attaché
 Embassy of Italy
 P.O. Box 9800
 Amman
 Tel: 463.8185
 Fax: 463.0226
 Email: italcom@globalone.com.jo

Palestine

Eng. Suha Arar
 Director of Food Safety
 Environmental Health Department
 Ministry of Health Building
 Ramallah Nablus Street
 Tel: 970.2240.9829/970.9587.4933
 Fax : 970.2240.9827/9
 Email: I_Atिया@yahoo.com

Eng. Ibrahim M. Yousef Ismail
 Director
 Environmental Health Department
 Ministry of Health
 West Bank
 Email: I.Atiya@yahoo.com

Eng. Husni M. Al Najjar
 Food Safety Unit Officer
 Food Safety Unit
 Al-Sourani City
 Gaza City
 Tel: 970.5930.9363
 Tel/Fax: 970.8280.1323
 Email: Husni58@yahoo.com

Dr Bashar A. Shehada
 Food Inspector in Preventive Medicine Dept.
 Preventive Medicine Dept.
 Ministry of Health
 Al Rimal, Gaza City
 Tel: 972.5960.1693
 Fax: 972.8285.5745
 Email: bhlove2767@hotmail.com

Mr Mohamed Al Sayyed
 Director of International Cooperation
 Palestine Standards Institution
 Tel: 970.229.89650
 Fax: 970.229.64433

Mr Ayman Abu Zarour
 Food Processing Sector Manager
 Palestine Trade Center "PALTRADE"
 Al-wataniah Towers Building
 5th Floor, P.O. Box 883
 Ramallah
 Tel: 970.59.265.218/972.240.8383
 Fax: 970.52.240.8370
 Email: ayman@paltrade.org

United States of America
Etats-Unis d'Amérique

Mr Duane Spomer
 Associate Deputy Administrator
 Dairy Programs
 Agricultural Marketing Service
 U.S. Department of Agriculture
 1400 Independence Ave., SW
 Washington, DC 20250
 Tel: 202.720.9382
 Fax: 202.720.2643
 Email: Duane.Spomer@usda.gov

Mr Abdel-Razak M. Kadry, DVM, PhD
 Chief, Technical Analysis and Data Evaluation
 Branch
 Risk Assessment Division
 Office of Public Health and Science
 Food Safety Inspection Service
 Room 333 Aerospace Center
 U.S. Department of Agriculture
 1400 Independence Ave, SW
 Washington, DC 20250
 Tel: 202.690.6608
 Fax: 202.690.6337
 Email: Abdel-razak.kadry@fsis.usda.gov

Ms Susan Sausville
 Chief
 Dairy Standardization Branch
 Agricultural Marketing Service
 U.S. Department of Agriculture
 1400 Independence Avenue, SW
 Room 2750 South Building
 Washington, DC 20090
 Tel: 202.720.7473
 Fax: 202.720.2643
 Email: Susan.Sausville@usda.gov

INTERNATIONAL ORGANIZATIONS
ORGANISATIONS INTERNATIONALES

CODEX ALIMENTARIUS COMMISSION
(CODEX)

Mr Kazuaki Miyagishima
 Secretary
 Codex Alimentarius Commission
 FAO
 Viale delle Terme di Caracalla
 00100 Rome, Italy
 Tel: 39.06.57054390
 Fax: 39.06.57054593
 Email: kazuaki.miyagishima@fao.org

Ms Annamaria Bruno
 Food Standards Officer
 Codex Alimentarius Commission
 FAO
 Viale delle Terme di Caracalla
 00100 Rome, Italy
 Tel: 39.06.57052654
 Fax: 39.06.57054593
 Email: annamaria.bruno@fao.org

CONSUMERS INTERNATIONAL

Dr Abdel Fattah Kilani
Consumers International
P.O. 926692
Amman 1190
Jordan
Tel: 962.6.5156983
Email: drkilani@hotmail.com

**FOOD AND AGRICULTURE
ORGANIZATION OF THE UNITED
NATIONS (FAO)**

Mr Hartwig de Haen
Assistant Director-General
Economic and Social Department
FAO
Viale delle Terme di Caracalla
00100 Rome
Italy
Tel: 39.06.5705366
Email: hartwig.dehaen@fao.org

Ms Fatima Hachem
Food and Nutrition Officer
Regional Office for the Near East
P.O. Box 2223
Cairo
Egypt
Tel: 20.2.331.6144
Fax: 20.2.749.5981
Email: fatima.hachem@fao.org

Mr John Riddle
Information Officer
News and Multi Media Service
FAO
Viale delle Terme di Caracalla
00100 Rome, Italy
Tel: 39.06.57053259
Email: john.riddle@fao.org

Ms Susanne Gelders
FAO Consultant
1036 Rue de Febieres
01710 Thoiry
France
Tel: 33.45020.8692
Email: Susanne@Gelders.net

**UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION
(UNIDO)**

Mr Karl Schebesta
IDO/PIC/MGR
UNIDO
P.O. Box 300 Vienna
Austria
Tel: 43.1.26026/3490
Fax: 43.1.31346/3490
Email: k.schebesta@unido.org

Mr Ali Badarneh
National Programme Coordinator
United Nations Industrial Development
Organization
P.O. Box 67800 Salah El deen Street
East Jerusalem
Jerusalem
Tel: 970.2240.9413
Fax: 970.2258.52439
Email: alin@opalnet.com

**WORLD HEALTH ORGANIZATION
(WHO)**

Dr Mohamed Aideed Elmi
Regional Adviser
Food and Chemical Safety
World Health Organization
Eastern Mediterranean Regional Office
Abdul Razzak Al Sanhoury Street
P.O. Box 7608 Nasr City
Cairo 11371
Egypt
Tel: 202.276.5384/202/276.5385
Fax: 202.670.2492
Email: fcs@emro.who.int
elmim@emro.who.int

Mr Ezechiel Bisalinkyuai
Technical Officer
WHO Iraq Country Office
26 Yambu Street
Um Muthaina
P.O. Box 11821 Amman
Tel : 962.7950.53669
Fax: 962.6551.0437
Email: ezechielbirq@emro.who.int

WORLD ORGANIZATION FOR ANIMAL HEALTH (OIE)

Mr Pavlos Economides
DVM FRSH Member Food Safety Working
Group OIE
World Organization for Animal Health
12 Rue de Prony
75017 Paris
France
Tel: 35799.628842
Fax: 35722.337752
Email : pavlos_economides@hotmail.com

Jordanian Secretariat

Eng. Ahmad Al Fahoum
Food Inspector
Aqaba Special Economic Zone Authority
P.O. Box 2565
77110 Aqaba
Tel: 962.3.209.1000
Fax: 962.3.209.1017
Email: afahoum@aseza.jo

Eng. Hussam Mazari
Food Safety Officer
Aqaba Special Economic Zone Authority
P.O. Box 2565
77110 Aqaba
Tel: 962.3.209.1000
Fax: 962.3.209.1017
Email: hmazari@aseza.jo

Mr Jadid Ayman
Head of Food Plants Establishments Dept.
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325
Email: ayman.jadid@jfda.jo

Mr Daas Fuad
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325
Email: fuad.daas@jfda.jo

Mr Kliibi Ghazi
Head of Imported Food
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325
Email: Ghazi.Kliibi@jfda.jo

Mr Malhas Karam
Head of Food Laboratory
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325
Email: food.lab@jfda.jo

Mr Qaqish Safa
Head of Food Additive and Special Formulas
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325
Email: safa.qaqish@jfda.jo

Mr Qammaz Sameer
Director of Labs Directorate
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325
Email: samir.qammaz@jfda.jo

Mr Hasanin Nasr
Jordan Food and Drug Administration
Amman
Tel: 962.569.3112
Fax: 962.562.6325

Eng. Tamara Qatarneh
Certification Department and Quality
Marketing
Jordan Institution for Standards and Metrology
Amman
Tel: 777.467118
Email: Tamar_Qatarneh@hotmail.com

Dr Reyad R. Shaker
Jordan University of Science and Technology
22110 Irbid
P.O. Box 3030
Email: reyadrs@just.edu.jo

Dr Ziad W. Jarachal
Jordan University of Science and Technology
22110 Irbid
P.O. Box 3030
Email: jarachfz@just.edu.jo

Dr Basem Abdullah
University of Jordan
Department of Nutrition and Food
Technology
Amman 11943
Email: basem@just.edu.jo

Dr Salma Khalil Turan
University of Jordan
Department of Nutrition and Food
Technology
Amman 11943
Email: sturan@just.edu.jo

FAO/WHO SECRETARIAT

Mr Ezzeddine Boutrif
Chief
Food Quality and Standards Service
Food and Nutrition Division
FAO
Viale delle Terme di Caracalla
00100 Rome
Italy
Tel: 39.06.57056156
Fax: 39.06.57054593
Email: ezzeddine.boutrif@fao.org

Mr Peter Karim Ben Embarek
Food Safety Department
World Health Organization
20 Avenue Appia
CH-1211 Geneva 20
Switzerland
Tel: 41.22.791.4204
Fax: 41.22.791.4807
Email: benembarekp@who.int

Ms Londa VanderWal
Consultant
Food Quality and Standards Service
Food and Nutrition Division
Viale delle Terme di Caracalla
00100 Rome
Italy
Tel: 39.06.57055636
Fax: 39.06.57054593
Email: Londa.VanderWal@fao.org

ANNEX 2
(NEM 05/1)

FAO/WHO Regional Meeting on Food Safety for the Near East
Amman, Jordan, 5-6 March 2005

Provisional Agenda

<u>Agenda Item</u>	<u>Subject matter</u>	<u>Document Reference</u>
1.	Opening of the meeting	
2.	Election of Officers	
3.	Adoption of the Provisional Agenda and Timetable	NEM 05/1
4.	Impact of food safety standards on food and agricultural trade in the Near East	NEM 05/2
5.	Impact of current food safety systems in the Near East on human health	NEM 05/3
6.	National food safety systems in the Near East – a situation analysis	NEM 05/4
7.	Regional, subregional and national cooperation in food safety	NEM 05/5
8.	Other matters	
9.	Adoption of the draft report	CRD

ANNEX 3

In the Name of God, the Compassionate, the Merciful
Message from
Dr Hussein A. Gezairy
Regional Director
WHO Eastern Mediterranean Region
to the
FAO/WHO Regional Meeting on Food Safety in the Near East
Amman, Jordan, 5-6 March 2005

Ladies and Gentlemen, Dear Colleagues,

On behalf of the World Health Organization, I have the pleasure of welcoming you to this Regional Meeting on Food Safety in the Near East, here in Amman, Jordan, which is being held jointly by FAO and WHO. I would especially like to thank the Government of Jordan for hosting this important event as well as the Codex Regional Coordinating Committee for the Near East, the third session of which will be held at this same venue from 7 to 10 March.

Following the occurrence in recent times of a number of extremely serious large scale food emergencies, policy-makers and consumers in many countries are re-evaluating the existing food safety strategies. Many of these food emergencies have involved more than one country, such as those involving dioxin contaminations, bovine spongiform encephalopathy (BSE), foot and mouth disease and, most recently, avian flu. Issues such as the increasing application of biotechnology in food production, and the new climate in world trade and the challenges this implies, necessitate comprehensive review and indeed overhaul of current national food control systems. A future goal in food safety should be to develop sustainable, integrated, food safety systems to reduce health risks along the entire food chain, from the primary producer to the consumer.

In the WHO Eastern Mediterranean Region, the Regional Committee adopted, in 1999, the Regional Plan of Action for Food Safety. In adopting this plan, the Member States of the Region agreed to assess their current food safety infrastructure and problems at national level and to carry out a country diagnosis in order to prepare a country profile. They also agreed to develop, strengthen and implement effectively their national food safety programmes; to continue to monitor and evaluate their food safety activities, and finally to initiate a coordinated effort to improve food control systems. Emphasis was placed on the inclusion of all relevant partners in food safety programme activities, such as government departments in food safety, food control and public health, as well as industry, trade organizations, research industries and academic bodies, and, last but certainly not least, consumer organizations. Following the adoption of the plan, a number of new initiatives have been taken at national and regional level.

On a global level, food safety is becoming an increasingly important public health issue, with increased focus on the inclusion of consumers and consumer associations in decision-making processes. The 53rd World Health Assembly passed resolution WHA 53.15 on food safety which recognized, among other things, that food-borne diseases significantly affect people's health and well-being and have economic consequences, not only for individuals but for communities and countries as well. The work of Codex Alimentarius was recognized as being important for protection of the health of consumers. For future action, the Member States were urged to integrate food safety matters into information programmes for consumers, particularly in school curricula, and to initiate culture-specific

health and education programmes for food handlers, producers and consumers. In addition, outreach programmes have to be developed for the private sector in order to improve food safety at the consumer level, and collaboration developed with consumer associations and the food industry in order to attain good and ecologically safe farming, and good and hygienic manufacturing practices.

Food-borne microbiological diseases are widespread in both developed and developing countries, and thousands of millions suffer from frequent episodes of diarrhoea, in many cases resulting in serious further health consequences. While these microbiological contaminations of food represent the majority of the cases, chemical hazards also represent a significant source of food-borne illness, even though in many cases it has been proven difficult to link the disease directly with a food.

Ladies and Gentlemen, Dear Colleagues,

The role of the consumer in today's society needs careful consideration. Most developed countries have a consumer protection agency. Societies are different, and the influences on society are varied, and therefore it is important that the views of local or national consumer associations are represented at national level to ensure that the so-called 'local' interests and worries of consumers are adequately reported and addressed.

The objective of this meeting is to promote overall food quality and safety through several means: by exchanging information on food safety programmes and food control systems; by promoting or establishing regional and subregional networks for information exchange; and by identifying opportunities for improving regional cooperation in promoting food safety.

In addressing food safety issues jointly, WHO and FAO have covered a lot of ground since their early years of cooperation. It has been recognized, for example, that more collaboration is needed at country level, where food safety activities are taking place.

I expect that the technical presentations in this meeting, and your deliberations during the working sessions, will indeed lead to concrete action, as well as plans for action in your countries, in order to achieve the goal of SAFE FOOD FOR ALL.

I would like to thank our colleagues from FAO for their continuing collaboration, and the Government of Jordan for hosting this important event. Finally, it only remains for me to wish you a successful meeting, and a pleasant stay in this beautiful city of Amman.

ANNEX 4

FAO/WHO Regional Meeting on Food Safety for the Near East*Amman, Jordan, 5-6 March 2005***OPENING REMARKS**

by

Hartwig de Haen

Assistant Director-General, Economic and Social Department

Food and Agriculture Organization of the United Nations

Excellencies, honourable guests, distinguished delegates, ladies and gentlemen.

It is my pleasure to welcome you on behalf of the Food and Agriculture Organization of the United Nations to the FAO/WHO Regional Meeting on Food Safety for the Near East. This meeting is part of a series of regional events, organized by FAO and WHO, to provide a forum for food safety officials to share information and experiences on how the safety of foods may be improved. It is held in line with the recommendations of the First FAO/WHO Global Forum of Food Safety Regulators in Marrakesh, Morocco in January 2002 and the Second Global Forum convened in Bangkok, Thailand in October 2004.

Allow me to thank the Government of the Hashemite Kingdom of Jordan for its generosity in hosting the meeting, and the organizing committee for all its hard work. I would like to emphasize a few concepts that are fundamental to the discussions during this meeting: first, the critical importance of food safety; second, the challenges to improving food safety; and third, the practical actions being taken by FAO and other partner agencies to promote food safety in the region.

The importance of food safety

- As you know, food safety is critical for exports and imports in the Near East. As a whole, your region relies on imports for over 60% of its food supply. Indeed, in some countries this figure rises to 90%. In some of your countries, food exports are an important source of foreign exchange earnings, so compliance with international market requirements and quality and safety standards is essential. Such standards have become increasingly complex and, at times, stringent, demanding greater vigilance and investment.
- Ensuring safe and healthy food is an important precondition of food security and a crucial step towards realizing the right to food. It is essential for human life everywhere. The World Food Summit, organized by FAO in 1996, recognized that access to safe food is in itself an element of food security. Rather than being a luxury of the rich, everyone should have the right to an adequate supply of safe, nutritious food.
- Good practices aimed at improving food safety also reduce food losses and increase food availability. New technologies and practical control measures are available to improve the safety of food, thereby extending its usable life.
- WHO estimates that one in three people worldwide suffer from a food-borne disease every year, and 1.8 million die from severe food and waterborne diarrhoea. Most of these illnesses are due to microorganisms and chemical contaminants, which may occur naturally or be introduced at some point along the food chain. *Campylobacter* and *Salmonella species* account for over 90% of all reported cases of bacteria related to food poisoning worldwide.
- Throughout the Near East, food-borne diseases are perceived as an unpleasant fact of daily life. Indeed, incidents are often unreported. Although a few countries (Jordan, Kuwait, Oman and Saudi Arabia) have systems in place to track food-borne diseases, surveillance mechanisms are

generally inadequate. As a result, estimates of food-borne illnesses are scarce, making it difficult to evaluate the severity of food safety problems. Improvements in this area are clearly needed.

Challenges to improving food safety

Despite these important reasons to improve food safety, the increased availability of relevant knowledge, tools and technologies, many challenges remain. Let me mention just five:

- 1) **Adherence to food safety standards has a cost.** Depending on the step in the food chain where the standard is set, these costs are borne by food producers, processors or retailers, but finally they are also reflected in the price paid by consumers. This calls for efficiency in meeting standards to prevent some suppliers from being pushed out of business.
 - Take the example of fruits and vegetables, an important export from several Near East countries. Many of these exports are destined for markets in the EU. However, new regulations in the EU since January 2005 require fruit and vegetable imports to be traceable at all stages of production, processing and distribution, creating new challenges in many producing countries.
 - Compliance with EUREPGAP requirements has also been costly. Taking into account depreciation of these investments over time, one tomato enterprise in Morocco (operating on 10 hectares with 50 employees) estimated that EUREPGAP compliance accounted for some 12% of its farm production costs and 4% of the value of its tomato exports.
 - The EU's ban on exports of fish and fish products from the Gulf States in 1998 provides another example of the investments needed to comply with food safety standards. One survey estimated the cost of compliance at US\$250,000 per factory.
- 2) **Can we afford zero risk standards?** I am aware that zero tolerance for food contaminants with severe health impact, is the general principle on which many national standards are established. Indeed, many people take the term 'safe food' to mean food with zero risk, but zero risk is often unattainable. Rapid progress in analytical detection methods for even very low residue levels of veterinary drugs led to restrictions of food exports of animal origin from Asia in 2001 and 2002, raising new questions about the soundness of aiming for zero risk. Clearly, food must be safe for human consumption. Indeed this is the ultimate rationale of standards and regulations adopted by Codex. However, where there is a margin for practical decisions in risk management, the benefits of aiming for absolute food safety should be balanced against the real extent of potential harm to consumers as well as the often high compliance costs.
- 3) **Recent food scares have underlined how food safety problems can cross borders.** Globalization, rising trade in food and agricultural products and increasing international travel have made it more difficult for countries to respond effectively to food crises without cooperation from their neighbours and trading partners. This makes it more important than ever to deepen food safety cooperation through the development of regional networks that provide a means to share relevant information and knowledge, and enhance readiness to plan and react to food emergencies.
- 4) **In many parts of the Near East, consumer awareness about food safety remains limited.** One recent survey in Jordan has indicated how many housewives lack even basic knowledge about safe food handling and preparation techniques. Food safety could be considerably enhanced simply by raising public awareness and knowledge about food safety. Developing policies and programmes to inform, educate and communicate with consumers should therefore be an immediate priority.
- 5) **In spite of improvements to official food control systems in the region, several countries still have overly fragmented or outdated food control systems.** Strengthening the capacity of official food control agencies, the food industry and consumers, based on their respective roles

and responsibilities, is of the utmost importance. This will require clear political commitment and support for food safety, as well as substantial investment, and demand-driven technical assistance.

This meeting is just one example of ongoing efforts by FAO and WHO to improve food safety globally and here in the Near East Region.

Practical actions by FAO and partners to promote food safety

FAO is involved in a wide range of activities, many of which are carried out in collaboration with WHO, to enhance food safety. These include:

- 1) Provision of scientific advice on food safety risks to members of the Codex Alimentarius.
- 2) Organization of expert consultations on topical, open issues such as microbial risk assessment, acrylamide in foods and genetically modified foods.
- 3) Establishment of a Standards and Trade Development Facility, together with WHO, OIE, WTO and the World Bank, to support and coordinate capacity building efforts in food safety, plant and animal health.
- 4) Development of manuals and guidelines to support training and provide technical advice, for instance to strengthen national food control systems, carry out risk analysis or facilitate participation in Codex.
- 5) Implementation of an FAO/WHO Trust Fund to enhance the participation of developing and transition countries in the vital work of the Codex Alimentarius Commission.
- 6) Capacity building and technical assistance. For instance, FAO has organized five regional and sub-regional workshops in the Near East on various aspects of food safety in the past three years, and is currently supporting projects in seven countries, with several others under development.
- 7) Improving access to information. Along with the organizations responsible for international standard setting in sanitary and phytosanitary matters, FAO has developed an International Portal on Food Safety, Animal and Plant Health, which offers national governments and trading partners access to relevant official information.
- 8) Finally, FAO is committed to work with WHO and member countries to support implementation of the *Global Strategy on Diet, Physical Activity and Health*, recently adopted by the World Health Assembly to address the rising burden of non-communicable diseases through the promotion of healthy diets and lifestyles.

Conclusion

As I believe you will agree, improving food safety in the Near East is imperative for a number of reasons. Certainly, many of your countries have invested considerable resources in modernizing and improving food control programmes during the last decade. These achievements must be strengthened and expanded, not only to take advantage of trade opportunities, but also to protect public health.

Regional cooperation and information exchange at all levels can provide a means to advance this goal. FAO and WHO have convened this meeting for exactly these purposes. We stand ready to assist your countries in your efforts to strengthen capacity to better regulate and ensure the safety of food for all your citizens. In this context, one concrete area where regional cooperation may be pursued could be the development of regional or sub-regional systems for food-borne disease surveillance and food contaminant monitoring programmes. I would urge you to consider how to develop and implement such systems during the next few days.

Finally, I thank you in advance for your interest and commitment in addressing these issues during the next two days, as well as in the subsequent Codex Coordinating Committee meeting. I wish you all the best in your discussions and look forward with anticipation to the results of your work.

The Speech of
H.E. Dr. Ahmad Al-Hindawi,
Minister of Trade and Industry,
Chairman of the Board of Directors of
Jordanian Institution of Specifications and Measurements
at the opening ceremony of the
FAO/WHO Regional Meeting on Food Safety for the Near East,
Amman, 5-6 March 2005

Representative of UN Food and Agriculture Organization
Representative of World Health Organization
Secretary General of Codex
Representatives of participating countries of Codex Committee for the Near East Region
Distinguished Guests
Ladies and Gentlemen.

In my name and on behalf of the Government of the Hashemite Kingdom of Jordan, I welcome you all in Amman, the capital of your second home country to attend the coordination meetings of Food Safety for the Near East Region (FAO and WHO), and I would like to express my thanks for your acceptance of our invitation to attend the meetings, and to express thanks for all parties that participated in the preparation process of the meetings.

As you are all aware, food safety in its comprehensive meaning includes safe food of high quality that meets the expectations of customers and protects from diseases transferred by food.

All food legislations and food safety specifications are enacted for the benefit of international food trade whether in our region or at the international level. In addition, that diseases transferred by food are many and some are fatal. As well as such diseases affect both regional and international trade and industry and lead to huge losses in the economical investments of food industries and judicial conflicts among countries. Also the low quality of food harms the state's trade reputation both nationally and internationally. In addition that food damage affects the human health and wastes money which is currently the most important economical resource.

Ladies and Gentlemen,

From this stems the importance of Codex to set specifications, parameters and codes of practices to guarantee food safety, protect consumers and ensure best practices in food trade. The importance of such specifications, parameters and codes increases after joining WTO agreements; especially SPS and TBT agreements which require and acknowledge that national and regional specifications should meet international standards in order to facilitate trade exchange among states and to have smoother accessibility to the others' markets.

The new world trade atmosphere based on transparency and free movement of goods had urged the governments to set effective monitoring systems on food, and to update food safety legislations and regulations to be in line with the international specifications and codes and to be in consistent with Codex recommendations.

Ladies and Gentlemen,

The situation in the developing countries is rather different. While we notice that the industrial and developed countries have huge export capabilities due to the adoption of most recent food legislations concerning the health and safety of man, in addition to the most strict food specifications, the developing countries struggle to set food safety systems and face difficulties to meet requirements of vegetables safety of the SPS agreement. This leads to huge financial losses of such countries which in return will deprive the countries of having access to export markets due either to poor status of food safety systems or lack of clear procedures and measures for the health and the safety of vegetables. In addition those developing countries do not keep up or update food legislations and specifications along with those in the developed countries which dominate the export markets, plus the difficulties that developing countries face such as lack of technical expertise in field of food legislation and control, along with many agencies that are responsible of food safety.

Among many difficulties that developing countries face is that their needs are not taken into consideration during the process of setting international food standards and specifications due to their non-participation in setting initial basis of such international food legislations; in particular I refer to the specifications of Codex which will later increase the probability of being affected by diseases transferred by food and the chemical contamination of such food items.

Bad practices in the fields of food safety and control in stages of import, export, transportation or handling had made consumers lose confidence in the food they take.

Therefore, the topic of food safety is of top and permanent priority of agendas of governments and international organizations due to the difficulty of solving problems on the national level and being problems on the regional and international levels. Thus stems the importance of your meetings to address such issues and take appropriate solutions for such problems.

In conclusion, once again I welcome you and thank you for your participation in these meetings, and wish you nice stay. I wish you all success in your meetings and to take decisions and recommendations of high degree of importance for the welfare and safety of food of the people of our dear Region.

FAO/WHO Regional Meeting on Food Safety for the Near East*Amman, Jordan, 5-6 March 2005***IMPACT OF FOOD SAFETY STANDARD ON FOOD
AND AGRICULTURAL TRADE IN THE NEAR EAST****I. INTRODUCTION**

1. Food safety has ascended to the forefront of international trade discussions following the conclusion of the Uruguay Round in 1995. Since then, sanitary and phytosanitary standards and regulations in developed countries have become increasingly comprehensive and stringent, in some cases restricting trade and/or significantly increasing the costs of food exports from countries in the Near East Region.

2. Trade in agricultural and food products is essential for countries in the Near East. In a Region where natural resources, especially water, are scarce, meeting food needs and ensuring food security depend to a large extent on food imports; therefore, systems to control their quality and safety are vital for public health. Food exports, on the other hand, provide an important means for countries in the Region (non-oil economies in particular) to generate foreign exchange. Effective food safety systems are therefore also critical to maintain and expand market shares in food and agricultural exports.

3. Although several countries of the Region have been taking steps to develop new and improved food safety systems, the capacity and efficiency of many countries need to be improved to control the safety of locally produced and imported food for public health, and to ensure and demonstrate compliance with food safety standards in export markets. This is particularly important as the Region's exports are dominated by fruits, vegetables, olive oil and fish, for which food safety requirements are very strict and continuously changing, compared with other products, and because the bulk of these products are exported to the EU, where food standards are higher than in other markets to which the Region's products are shipped.

4. This document reviews the status of food and agriculture trade in the Near East as well as the impact of food safety standards on food and agriculture trade and recommends practical actions for governments and FAO and WHO to enhance food safety in the Region and promote agricultural and food trade.

II. FOOD AND AGRICULTURAL TRADE IN THE NEAR EAST REGION

5. Although countries in the Near East Region account for less than 4 percent of world agricultural trade; agriculture still represents a high percentage of the GDP for many of them. Food trade plays an essential role in ensuring food security and/or generating foreign exchange earnings in many countries.

6. Given the limited natural agricultural resources, especially water, and the rapidly growing populations in the Region, countries increasingly rely on imports to cover their food needs and sustain food security. Over the last 25 years, imports of food have grown by 7 percent annually, and have exceeded the value of agricultural exports. Most countries are net food importers and have large deficits in food production, particularly for cereals and vegetable oils. Approximately 30 percent of cereals used in the Region are imported. From 1997 to 1999, Algeria, Egypt, Yemen and the Gulf States imported

more than 50 percent of their requirements of wheat and wheat flour which are the main staple foods in those countries. In some countries up to 30 percent of milk and dairy products and 20 percent of meat consumed come from imports. About 30 percent of imported agricultural and food products (particularly meat, dairy, cereals, sugar, fats and oils) come from the European Union (EU) countries. Most countries, especially the non-oil economies, are facing difficulties to generate sufficient foreign exchange earnings to finance food imports.

7. Fruits, vegetables and fish are the leading food exports from the Region. During 1997-2002 exports of primary fruits and vegetables alone made up over 14 percent of the Region's total value of agricultural exports. Almost 70 percent of agricultural exports from the Mediterranean Basin countries currently go to the EU. About 85 percent of these exports are made up of fresh and processed fruits and vegetables, olive oil and fish.

8. Fish represents an increasingly important and high-value food export commodity for several countries in the Region. Morocco is the largest exporter of fish among Arab and African countries. Its main customers are the EU and Japan. The export of each kilogram of fish products is equivalent in value to the import of about four kilograms of other food products. In Mauritania, fish exports are highly concentrated on a single species – the common octopus. Exports are destined to Japan (40 percent) and the EU (60 percent). For some Gulf States, such as Oman, fish is the second largest source of export earnings after oil.

A. Intra-Regional trade

9. Countries have ratified a number of Regional Trade Agreements. The most important of which are: the Arab Free Trade Area (1996), the Arab Maghreb Union (1989) and the Gulf Cooperation Council (1981). In practice, these agreements are not fully implemented. For instance, according to the agreements between Arab countries on trade exchange facilities and transit trade; most primary agricultural commodities are exempt from tariffs, and tariff rates are subject to a 50 percent reduction for processed agricultural products such as butter, cheese, sugar, apricot syrup, and dried onions and garlic. However, in general, full tariff rates are applied and complicated administrative procedures continue to be required in most countries.

10. Intra-regional agricultural and food trade is limited in scope and largely focused on two or three countries and a few products. With the exception of Oman, the value of imports coming from within the Region is less than 10 percent for most other countries. Major constraints and challenges facing intra-Regional trade include the lack of diversity in agricultural products, non-tariff barriers, inadequate trading support services and divergent political and economic interests.

B. Trade with developed countries

11. Most countries in the Region, especially those in the Mediterranean Basin, have strong economic ties with developed countries, particularly the EU. The relative importance of the EU market for countries in the Mediterranean Basin varies significantly from country to country. More than 50 percent of exports from the Near East to the EU come from Egypt, Morocco, Syria and Tunisia. The composition of agricultural exports to the EU also differs widely. For instance, fruits and vegetables are important exports to the EU for all countries in the Mediterranean Basin except Lebanon and Syria. Fish is an important commodity for Algeria, Morocco, Oman, Tunisia, UAE and Yemen. Potatoes are an important export commodity for Egypt, while olive oil is only important for Tunisia, which accounts for more than 55 percent of its agricultural exports to the EU.

12. Several countries in the Region are involved in the Euro-Mediterranean Partnership, which aims at creating a Free Trade Area between the EU and countries in the Mediterranean Basin by 2010. To date, partnership agreements have been signed by Algeria, Cyprus, Egypt, Jordan, Lebanon, Malta,

Morocco, the Palestinian Authority, Tunisia and Turkey. Agricultural goods are not included in the free trade agreement, but are subject to preferential trade rules.

C. Challenges and constraints to food and agricultural trade

13. The high costs of complying with the standards recognized by the WTO SPS and TBT Agreements continue to create obstacles to market expansion. This is particularly acute for the small economies in the Region. In order to be able to take advantage of and defend their rights, and meet their obligations under the WTO, countries must develop their capacity to participate effectively in the WTO system.

14. Barriers to markets for fruits and vegetables in the EU and elsewhere impede exports from the Region. The Uruguay Round has not resulted in significant improvements in market access for fruit and vegetable exports from the Region. Most of the Region's exports of fruit and vegetables to the EU are subject to tariffs that vary by product, season and country of origin. During periods when imports compete with EU domestic production, higher tariffs are imposed. Tariff escalation also presents a barrier for processed food exports from the Region. Although countries like Cyprus, Egypt, Lebanon, Turkey, the Maghreb countries and others have good export potential for processed food products; they are constrained by high trade barriers in many developed countries.

III. IMPACT OF FOOD SAFETY STANDARDS ON FOOD AND AGRICULTURAL TRADE IN THE NEAR EAST

15. Many countries in the Region are facing a challenge to respond in the most appropriate way to the demands of their citizens for safe and healthy food on the one hand, and to WTO requirements for the elimination of technical barriers to trade, on the other hand. In general, most countries in the Region have limited capacity to plan and implement policies that affect food safety and trade, to implement relevant international agreements, and to take advantage of trade opportunities. Several countries face difficulties in meeting international safety and quality standards because of their weak capacity in scientific research, testing, conformity and equivalence. As a result, a major challenge in the Region is to raise the SPS and TBT standards of exports to reach internationally recognized levels, as well as the often higher standards set by developed countries.

16. Given the strong reliance of the Region on food imports, ensuring the safety and quality of imported food is a recognized concern throughout the Region. In this context, many countries regard the dumping of food that is low in quality, adulterated or close to shelf-life expiry on their markets as a serious concern. For instance, between 6 to 7 percent of imported consignments in the UAE were rejected in 2001-2003 due to non-conformity with local food safety standards. In Bahrain, 379 tons of imported food products unfit for human consumption (due to contamination with lead, mercury and cadmium or contamination with pathogenic micro-organisms) were confiscated over a six-month period in 2003. Unsafe food imports have acquired greater significance following recent food safety problems in Europe and elsewhere (such as BSE and dioxin in meat and poultry) with many countries acknowledging their limited capacity to take appropriate actions to protect their consumers in this regard.

17. In some cases, countries in the Region have imposed restrictions on imported products, which have been questioned by other countries because of lack of scientific justification. These trade concerns have included the requirement for a maximum moisture content of 5 percent for frozen poultry (considered too low by some WTO members), prohibition of beef imports with a fat content greater than 7 percent, expiry date for certain products, etc. Sometimes, countries in the Region applied zero tolerance to certain imported foods, which need now to be replaced by sanitary measures based on risk assessment. In addition, information on sanitary and phytosanitary measures is generally insufficient and often not available.

18. In terms of exports from the Region, most countries face unfavourable market access in the markets of greatest interest to them. Sanitary and phytosanitary standards applied by developed countries have represented some of the most important barriers to food and agricultural exports. For instance, from January to June 2001, 27 percent of food exports from Egypt, Jordan, Lebanon and Syria to the United States were rejected by the Food and Drug Administration due to non-compliance with the U.S. safety measures (filth, microbiological contamination, greater than permitted levels of pesticide residues or food additives) and 58 percent due to labelling problems.

19. Product bans have resulted in significant economic losses for the exporting countries of the Region. In September 1997, Iranian pistachios (the country's third most important foreign exchange earner after oil and carpets) were banned from entering the EU because of a high content of aflatoxins. Japan imposed a similar ban on Iranian pistachios in October 1998. As a result, Iran lost its 80 percent share of Japan's pistachio market.

20. Bans on food exports from the Region have also resulted in considerable difficulties to re-enter and regain market share in once important developed country markets. For instance, in September 1998, exports of Egyptian potatoes to the EU were halted because of contamination from brown rot following an EU decision requiring imports to be derived from certified disease-free areas. Following this decision, the EU considered all imports diseased unless proven to be disease-free. As a result, Egypt was obliged to submit dossiers to prove the disease-free status of its potato growing areas. However, the EC authorities recognized only 23 of the 133 dossiers submitted by Egypt claiming that it was due to inadequate documentation (illegible maps and insufficient translation from Arabic) and only five areas were granted pest-free status.

21. Although countries have sometimes been able to comply with SPS measures, often the available technical and financial resources have been inadequate, and achieving compliance has been difficult and time consuming. For instance, in 1998 the EU banned fish and fish products from the Gulf States due to failure to meet environmental and health regulations based on HACCP. Exporters suddenly lost their market share, and the public and private sector was faced with considerable costs to comply. Adopting quality management regulations based on HACCP and demonstrating compliance (including modifications and reconstruction to meet sanitation requirements, new testing laboratories, personnel training, consultant fees, HACCP documentation, etc.) is often costly and may require support from governments. The EU lifted the ban in Oman in 1999, Yemen in 2002 and UAE in 2003, once fish exports were certified as fully compliant.

IV. CONCLUSION

22. Most countries in the Region have yet to harmonize their national food safety standards with international standards, which is a complex task. As a result, they are obliged to demonstrate the equivalency of their SPS requirements with those of developed countries, which hinders access to developed country markets and increases the costs for exporters. The form and level of international standards is sometimes inappropriate and/or unachievable for countries in the Region because the current procedures through which international standards are established do not adequately consider developing countries' needs and special circumstances.

23. Countries of the Region should be prepared for the upcoming challenges related to the testing and certification of food imports and exports, including irradiated food, food derived from genetically modified organisms, traceability, organic food and the provisions of scientific risk assessment whenever there is diversion from international standards.

V. RECOMMENDATIONS TO PROMOTE FOOD SAFETY AND FOOD TRADE IN THE NEAR EAST

(i) *Recommendations for Governments*

24. Based on the above, it is suggested that Member Countries of the Region should:

a) Raise awareness among policy and decision-makers of the importance of food safety and quality for consumer protection, food trade and economic development. This should be carried out through seminars, workshops and communication campaigns targeted at senior government officials, food industry, the media and consumer associations.

b) Enable food producers and industry to take advantage of international and regional export opportunities through:

- Strengthening post-harvest distribution and marketing including transportation and shipping facilities, packaging facilities, provision of information on foreign markets and SPS and TBT requirements, and post-harvest technologies;
- Increasing awareness and capacity to meet the obligations of the SPS and TBT Agreements.

c) Use existing Regional and sub-Regional groupings to reach consensus on issues related to food and agricultural trade with a view to increasing attention to Regional trade concerns related to food safety, support efforts to pursue unfair cases before the WTO's SPS Committee, and increase bargaining power in global trade negotiations.

d) At the Regional level:

- Encourage countries to make available information on rejected food consignments and the reasons for rejection to the public domain through internet web-sites.

(ii) *Recommended Actions for FAO and WHO*

25. Within the available financial and human resources, FAO and WHO are called upon to strengthen the capacity of countries to manage food safety and improve food and agricultural trade through the provision of appropriate needs-based technical assistance, at Regional, sub-Regional and national level, as well as to help in implementing the above action plan.

Annex 1: Membership of Countries in the Near East Region in the World Trade Organization (WTO) and International Standard Setting Bodies

	World Trade Organization (WTO)	Codex Alimentarius	World Organization for Animal Health (OIE)	International Plant Protection Convention (IPPC)
Afghanistan	-	-	X	-
Algeria	Applied ¹	X	X	X
Azerbaijan	-	-	X	X
Bahrain	X	X	X	X
Cyprus	X	X	X	X
Djibouti	X	-	X	-
Egypt	X	X	X	X
Iran	Request submitted ²	X	X	X
Iraq	-	X	X	X
Jordan	X	X	X	X
Kazakhstan	-	X	X	-
Kuwait	X	X	X	-
Kyrgyzstan	-	X	X	-
Lebanon	Applied ¹	X	X	X
Libyan Arab Jamahiriya	Request submitted ²	X	X	X
Malta	X	X	X	X
Mauritania	X	X	X	X
Morocco	X	X	X	X
Oman	X	X	X	X
Pakistan	X	X	X	X
Qatar	X	X	X	-
Saudi Arabia	Applied ¹	X	X	X
Somalia	-	-	X	-
Sudan	Applied ¹	X	X	X
Syrian Arab Republic	Request submitted ²	X	X	-
Tajikistan	-	-	X	-
Tunisia	X	X	X	X
Turkey	X	X	X	X
Turkmenistan	-	-	X	-
United Arab Emirates	X	X	X	X
Uzbekistan	-	-	X	-
Yemen	Applied ¹	X	X	X
Total Members	15	24	31	21

1 In the process of negotiation to become members of the WTO.

2 Requested accession but working parties on application have not yet been established.

Source: WTO. 9 June 2004. Membership in WTO and International Standard-Setting Bodies. Committee on Sanitary and Phytosanitary Measures. G/SPS/GEN/49/Rev 6 www.wto.org

REFERENCES

Al-Mashjary, M. 2003. Presentation to METAP High Level Meeting on Economic Tools for Environmental Sustainability (Yemen, 27 June 2003) [http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/Hi+Level+Mashjary+27+June/\\$File/27+June-f-Mohammed+Al-Mashjary-Fish+PPT.pdf](http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/Hi+Level+Mashjary+27+June/$File/27+June-f-Mohammed+Al-Mashjary-Fish+PPT.pdf)

Bahrain Economic Development Board. 2003. Contaminated Food Items Seized. Press Release, 21 September 2003. <http://biz.bahrainedb.com/NewsIn.asp?Article=57714&Sn=9>

Hassib, M., Ragab, H. & Hachem, F. 2003. Trade, Market Access and Food Safety in the Near East Region. Presented to FAO-IsDB Technical Workshop on Regional Programmes for Food Security towards Sustainable Food Security and Poverty Alleviation (Jeddah, Saudi Arabia, 8-9 October 2003)

FAO. 2003. Trade Liberalization Policies, Intra-Regional Trade and Opportunities for Sustainable Agricultural Development. Paper presented to the 26th FAO Regional Conference for the Near East (Tehran, Republic of Iran, 9-13 March 2002)

FAO. 2003. Food Control Systems: Modern Approaches in the Near East Region. Report of FAO/WHO Workshop (Cairo, Egypt, 19 January 2003)

FAO. 2003. WTO Agreement on Agriculture: The Implementation Experience. Case Study on Egypt <http://www.fao.org/DOCREP/005/Y4632E/y4632e0c.htm#bm12>

INFOSAMAK/FAO. 2003. Report of Presentations and Discussions Sessions at Expert Consultation on International Fish Trade and Food Security (Casablanca, Morocco, 27-30 January 2003) <http://www.tradefoodfish.org/articles.php?pageid=art&article=article03>

FAO/WHO Regional Meeting on Food Safety for the Near East

Amman, Jordan, 5-6 March 2005

THE IMPACT OF CURRENT FOOD SAFETY SYSTEMS IN THE NEAR EAST/EASTERN MEDITERRANEAN REGION¹ ON HUMAN HEALTH

Introduction

The availability of wholesome and safe food is a basic human right and is essential for adequate human health. The problem of the consumption of contaminated food and its detrimental effect on human health has not been fully studied in the Region. However, governments should take the necessary measures to ensure the availability of safe food for all in order to sustain the health and economic development of their people.

On a global level, food safety is becoming an increasingly important public health issue, with an increased focus on the inclusion of consumers and consumer associations in decision-making processes. In 2000, the 53rd World Health Assembly adopted a resolution on food safety in which it was stated, among other topics, that food-borne diseases (FBD) seriously affect peoples' health and well being, and that these diseases have economic consequences not only for individuals, but for communities and countries as well. Further, the work of the Codex Alimentarius Commission was recognized as being important for the protection of the health of consumers.

Food-borne diseases

Generally, food-borne diseases are understood to be those diseases that are the result of exposure to pathogenic microorganisms, such as bacteria, viruses and parasites, which tend to have acute effects on human health. However, chronic, and in some cases acute, food-borne illness may also be caused by the presence of various chemical substances including residues of pesticides and veterinary drugs, unlawful food additives, mycotoxins, biotoxins and radionuclides that enter the food intentionally or unintentionally. An overview of the main types of contaminants causing food-borne disease is available as CRD3.

Food safety, food-borne disease surveillance and the need for integrated action

The 'farm to fork' concept defines a food safety system as one comprehensive entity, in which food production, supply and consumption are considered as a continuous process rather than a series of separate activities. The operational changes resulting from the adoption of this concept should make it possible to link food contaminant monitoring and food-borne disease surveillance data to better control the risks affecting human health.

The main reasons for the widespread and often large-scale occurrence of food-borne diseases are the lack of overall quality control systems, and the lack of scrupulous attention to food hygiene throughout the food production and distribution chain. Increased travel and trade heighten potential food safety problems, making the need for rapid response systems even more evident. The presence of regional, national and local monitoring and surveillance systems that facilitate the reporting, detection, rapid response, estimation of the burden of food-borne disease outbreaks and prioritization of food safety controls will strengthen both the public health as well as the trade sector.

¹ The term "Near East region" used in this document refers to the member states of the FAO Near East Region, along with the member states of the WHO Eastern Mediterranean Region.

Food-borne disease surveillance

Surveillance is the 'routine collection of data for public health action'. The chain of events that must occur for an episode of an illness to be captured as a laboratory-confirmed case and be reported to infectious disease surveillance systems in the public health care system is as follows: 1) food is contaminated, resulting in persons becoming ill; 2) if the illness is of sufficient concern, some persons will seek medical care; 3) the attending health care provider (when sufficiently concerned about diagnosing the illness properly) obtains a specimen from some ill persons and submits to a clinical laboratory for diagnostic purposes; 4) the clinical laboratory tests as appropriate and confirms the incidence of food-borne pathogens; 5) and the laboratory-confirmed case is reported. If any step of this process is missed, the case will not be reported accurately.

The main types of food-borne disease surveillance are syndrome- or laboratory-based. Surveillance activities can, and should, take place at all levels of the previously described chain of events, though not necessarily on a continuous basis. Aggregated information about exposure, prevailing illnesses, and pathogen-specific diseases can be collected at an occasional basis, for strategic or planning purposes. However, the surveillance system must operate in such a way that emerging patterns and outbreaks are identified.

Although not feasible for all countries, laboratory surveillance is more precise than syndrome-based surveillance as many diseases share the same symptoms. Further, laboratory analysis provides an opportunity for sub-typing for increased specificity. The complexity of the food supply and consumption chain makes the collaboration of microbiologists to identify the organisms and epidemiologists to analyze the findings essential. This process becomes more effective when microbiologists from human, veterinary, and food-related institutes all work together in food-borne disease surveillance.

The data from disease surveillance should allow for the estimation of the percentage of cases that are food-borne, and more specifically, the number of cases that can be attributed to specific food commodities. This information is required in food safety risk management, as additional transmission routes also exist for most food-borne pathogens such as through water, animal contact or from the environment. Also, risk managers can better target controls when the specific pathogen food commodity combination can be established.

Food-borne diseases in the Near East

In the countries of the Near East region, food-borne diseases with symptoms such as diarrhoea and even fever are a fact of daily life and are generally perceived as a mild and self-limiting episode. Medications, if used at all, are bought over the counter and disease episodes go unreported. Some diseases like diarrhoea and cholera are traditionally seen as water-borne, rather than food-borne, diseases and if reported, may be recorded as such. Medical attention is often only sought too late, when the disease has become extremely debilitating and only drastic treatment might be effective. Certain regional or local habits, such as the consumption of raw and cooked salads, and certain specific food preparation techniques, such as the preparation of cheeses from raw milk, enhance the opportunity for microbiological contamination and thus the spread of food-borne diseases.

Many factors contribute to the high incidence of food-borne disease in the region. Good manufacturing practices (GMPs) and quality assurance systems such as HACCP have been introduced to the food production and catering sector in all countries of the Near East region, but are generally not widely applied. Street food vending tends to be an important food source for a large part of the population in a number of the Member States, and often the vendors have little or no formal education in food handling practices.

Food-borne disease surveillance in the Near East region

Data on food-borne disease incidence in the region tends to be sparse, since most countries of the region have no systematic surveillance or even an adequate reporting mechanism in place for food-borne diseases, at least not one that communicates with food safety authorities. Even if a notification system exists in the country, these diseases are not actively reported.

Accordingly, the incidence of food-borne diseases is often not reflected in the setting of any national food safety strategies. Research papers on specific subjects such as vulnerable populations or newly emerging pathogens tend to be published, but in general it is hard to obtain a general picture of the prevalence of food-borne diseases in any given country in Near East region, or in any country of the world.

However, some Member States of the Region do have well functioning health systems, good public health laboratories, and stable surveillance system and have developed information and communication systems which allow them robust responsive systems in the event of disease outbreaks. The health system is supported by other existing infrastructure such as, water supply, good sanitation system, and public education level. These countries do report outbreaks.

The health information systems are based on mandatory notifications, outbreak investigation and sentinel surveillance, and hospital records. The mandatory notification of FBD suffers from a number of limitations such as difficulties in outbreak detection, identification of single case, and characterization of long term trends.

The food-borne diseases that are included in the reporting list of the countries of the region are cholera, bloody diarrhoea, other diarrhoeas, shigellosis, amoebiasis, food poisoning, salmonellosis, typhoid and para-typhoid, brucellosis, viral hepatitis A, intestinal and pulmonary tuberculosis, echinococcosis, giardiasis, toxoplasmosis, fasciolniansis, and other infections (see table 1). Creutzfeldt-Jakob disease has recently been added to the list, but is only reported by one country in the region thus far. More countries report cholera and general food poisoning outbreaks, but very few countries of the region report diseases such as salmonellosis.

Due to the variances in the level of food-borne disease reporting between countries, comparisons of the level of FBD in the countries of the region is not meaningful. Countries with more advanced FBD surveillance systems will report a much higher number of FBD, even though there may very likely be fewer diseases in countries with a more developed food control system, including an improved FBD surveillance system (See Figure 2).

Table1. Number of countries in which FBD are included in reporting system

Food-borne diseases by type	Number of countries of the region reporting FBD
Cholera	22
Food poisoning outbreaks	22
Typhoid Fever	18
Acute diarrhoea	16
Brucellosis	15
Bloody diarrhoea	14
Hepatitis A	7
Salmonellosis	6
Giardiasis	5
Shigellosis	5
Amoebiasis	3
Helminths	3
NCJD	1
Toxoplasmosis	1
Fascioliasis	1

Table 2. The Number of FBD reported by country.

COUNTRY	Number of reported food-borne diseases
Afghanistan	2
Bahrain	14
Djibouti	4
Egypt	10
Iran	10
Iraq	10
Jordan	10
Kuwait	13
Lebanon	11
Libya	10
Morocco	7
Oman	10
Pakistan	5
Palestine	7
Qatar	9
Saudi Arabia	11
Somalia	2
Sudan	5
Syria	5
Tunisia	7
UAE	16
Yemen	5

The countries of the region can be divided into three main groups regarding the status of food-borne disease surveillance in that country.

Group one consists of Afghanistan, Djibouti, Mauritania, Pakistan, Palestine, Somalia, Sudan and the Republic of Yemen. These countries are the least developed in terms of food-borne disease surveillance and food safety infrastructure. Other supportive infrastructures, such as sanitation and water supply are weak and inadequate. The food-borne disease-related priorities in these countries are to reduce occurrence of acute diarrhoeas.

Group two countries, including Algeria, Egypt, the Islamic Republic of Iran, Iraq, Jordan, Lebanon, Libyan Arab Jamahiriya, Morocco, Oman, the Syrian Arab Republic, and Tunisia, have adequate disease surveillance in place in which common food-borne diseases are included. Substantial progress has been made in recent years in improving the general food safety infrastructure in these countries. For example, Jordan finalized a sentinel study on the burden of food-borne disease in September 2003. However, much remains to be done in the field of food safety, including an adjustment of national food safety priorities to also deal with specific food pathogens.

Group three countries, consisting of Bahrain, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates, possess adequate basic infrastructures in food-borne disease surveillance and other supportive environmental structures and programmes are functional. Their priority concern is largely food chemical contaminants and hazard analysis, including bacteriological and viral analysis. However they do not report their surveillance data or information on food contaminant monitoring to the WHO Regional Office as there is no mechanism for the regional collection of this data.

Results of WHO EMRO survey on food-borne disease surveillance in the region

The WHO EMRO office recently requested information from several countries of the region on 1) the status of their food-borne disease surveillance system, 2) whether the system is integrated into their overall national disease surveillance system, 3) the prevalence of food-borne disease in their country, and 4) whether food-borne disease statistics have been used for establishing and evaluating

priorities in FBD prevention and control. Several countries of the region responded, including Afghanistan, Iran, Jordan, Lebanon, Libya, Oman, Pakistan, Saudi Arabia and Somalia. Afghanistan, Iran and Somalia reported that FBD surveillance does not exist. Data from Jordan, Lebanon, Libya, Oman and Saudi Arabia is illustrated in table 3 to 7 below.

According to the preliminary report (2003) of a burden of food-borne disease sentinel study in **Jordan**, 2.5% of 80 stool specimens cultured were positive for *Salmonella spp.*, and 16.2% were positive for *Shigella spp.* Using a series of calculations based on the total population of Jordan (5.3 million people in 2002) and laboratory surveys, it was estimated that for one month (in late summer), at least 271 cases of salmonellosis, 1899 cases of shigellosis, and 854 cases of brucellosis occurred in Jordan. The Ministry of Health Statistics in Jordan estimated the incident rate (per 100,000 people) of notifiable FBDs as shown in Table 3.

Table 3. Average incidence rate (per 100,000 people) of food-borne diseases in **Jordan** for the period 1998-2002

FBD	2002	1998
Bloody Diarrhoea	4.8	12.7
Typhoid and Paratyphoid	0.6	1.4
Hepatitis A	10.2	16.9

According to the Ministry of Health, **Lebanon**, the national disease surveillance system reported the following cases of five different FBDs for the year 2003 (Table 4):

Table 4. Lebanon notified FBDs (2003)

Brucellosis	193
Dysentery	158
Food Poisoning	68
Typhoid Fever	891
Viral Hepatitis A	616

The **Libya** Ministry of Health reported the number of food poisoning cases registered in hospitals for 2001-2004 as shown in Table 5:

Table 5. Food Poisoning Cases, Libya

Year	Number of Cases
2001	297
2002	278
2003	129
2004	779

According to the Ministry of Health, **Oman**, the notifiable FBDs for 1985-2002 are as shown in Table 6:

Table 6. Oman FBD incidence rate from 1985-2002

FBD	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002
Shigellosis (Bacillary Dysentery)	4276	2540	2449	2636	1738	1388	1427	1582	1523	1158
Amoebiasis (Amoebic Dysentery)	3787	5393	512	6969	5567	4388	4387	4312	5047	5440
Acute Gastroenteritis and Diarrhoea	----	273920	78823	162535	135506	97036	105435	112212	109065	112904

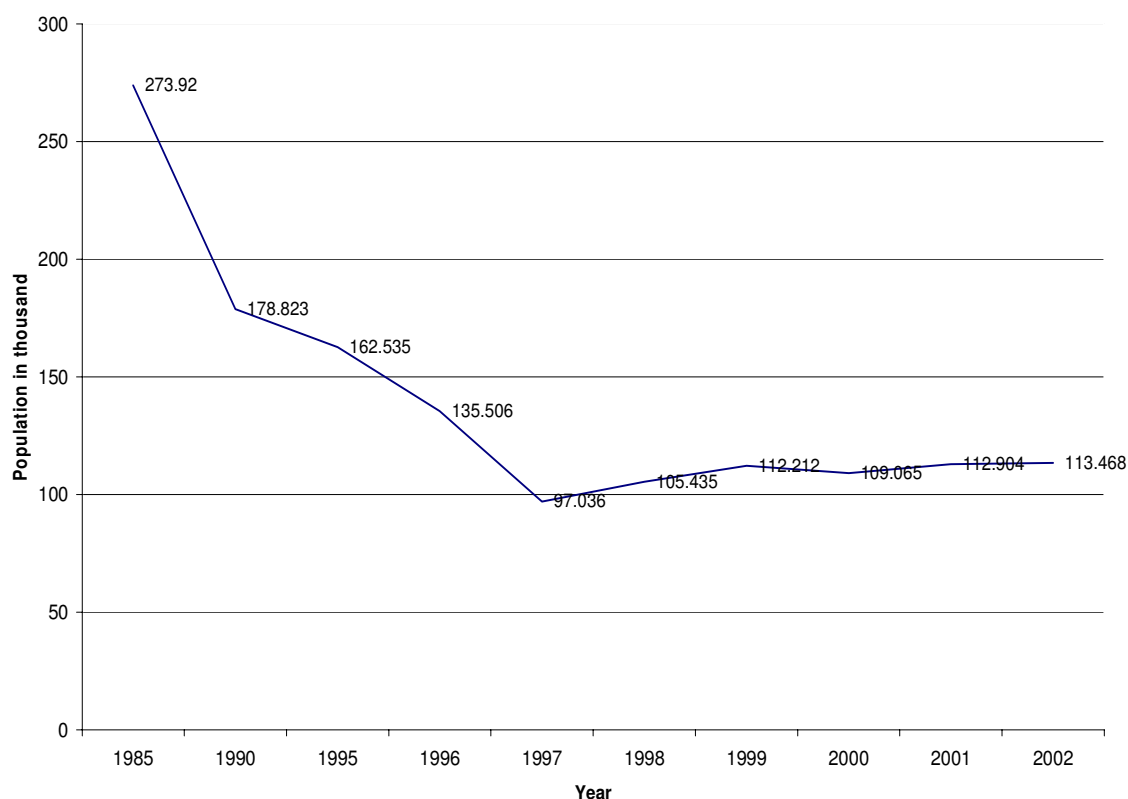
According to the Ministry of Health, **Saudi Arabia**, the prevalence rate of the food-borne disease and poisoning outbreaks for 2001-2003 are as shown in Table 7.

Table 7. Prevalence rate of the food-borne disease and poisoning outbreaks in Saudi Arabia

FBD	2001	2002	2003
Hepatitis A	14.72	13.65	9.55
Typhoid and Paratyphoid	1.76	1.82	1.83
Amoebic Dysentery	13.3	21.39	10.57
Salmonellosis	9.24	11.85	10.07
Shigellosis	2.83	2.2	2.22
Food Poisoning Outbreaks	11	12	16

Despite the difficulties of obtaining accurate FBD surveillance data in the Region, it appears that there is a decline of FBD incidence in Gulf States (see data above from Saudi Arabia and both above and below from Oman). This was likely due to a number of interventions, such as increased sanitation, milk pasteurization, canning foods, herd vaccination, economic development, improved housing, use of refrigerators, safe water supply, food monitoring and improved consumer information. For example, as shown in Figure 1, acute diarrhoea and other gastroenteritis incidence declined in Oman from the year 1985 until 2002. Similarly, there is a significant decline of FBD incidence in Jordan, Saudi Arabia and Lebanon.

Figure 1. Acute Gastroenteritis and Diarrhea / Oman 1985-2002



Source from the Ministry of Health, Oman 2005

Examples of national food-borne disease surveillance systems

Egypt² boasts an epidemiology training programme in operation since 1992. A serious food-borne illness outbreak on a cruise ship in 1996 justified the launch of a programme on vessel sanitation,

which has been extended to include hotels and restaurants. Disease surveillance has seriously been addressed since 1999, but its implementation is still problematic due to the great number of vertical programmes, limited laboratory capacity and widespread underreporting.

In Jordan², the food-borne disease surveillance system is based on syndromic surveillance, with an ongoing shift towards laboratory- based surveillance. Presently, operational research is ongoing to establish the incidence of salmonella, shigella and brucella, and to improve administrative and logistical procedures in the food-borne disease surveillance system. A need has been stated for increased and improved collaboration with the private, as well as the agricultural sector. Under-reporting affects the results of the surveillance system, and the ongoing research will give a measure of the proportion of underreporting through a population- based survey into the health care seeking behaviour for fever and diarrhoea patients.

In Lebanon² the notification of a number of food-borne diseases is obligatory. In 2001, of the 92 reported 'food poisoning' cases, there were 17 episodes identified. After investigation, it became evident that there were 112 cases in total, of which 84 were hospitalized. The episodes were due to salmonella (5), shigella (1), faecal contamination (2), chemical contamination (1), nothing found (4), not tested (5). An episode could also be due to more than one contaminant. The vectors identified were raw meat (5), cooked meat (1), sandwiches (3), sweets (1), other (3) and unspecified (4).

Saudi Arabia has had a food-borne disease surveillance system with obligatory notification since 1975. In 2003, 16 outbreaks were reported and investigated. Outbreaks generally peak in the hot summer months.

In a review of all reported food-borne disease cases from 1997 till 2003², the total laboratory results show a large percentage of Salmonella cases, 47.17% in total.

Laboratory result	Number of cases	Percentage
Salmonella	6525	36.06
Salmonella (B)	2010	11.11
Negative organism	3034	16.77
Staph. Aureus	1962	10.84
Staph.aur.enter.	864	4.78
Mixed organism	1212	6.70
E.coli	1078	5.96
Bacillus cereus	801	4.43
Shigella	607	3.35
<i>Total</i>	<i>18093</i>	<i>100.00</i>

In the same review in Saudi Arabia, it was found that the food items typically causing illness in a home setting, fresh milk and fresh laban, do not cause any disease in public settings. Chicken and meat account for a large number of cases in both setting, with chicken shawerma only being available in public settings. The total number of the cases reported for home settings is almost double the number of cases in public settings. For more results, see table below.

² Presentations at the Global Salm-Surv pre-level 3 and level 3 Training Courses on Food-borne Diseases Surveillance, WHO/EMRO, Cairo, Egypt, July 2003 and February 2004

Food item	Home		Public	
	Number of cases	Percentage	Number of cases	Percentage
Chicken	248	15	379	37
Chicken shawerma	0	0	233	23
Meat	272	16	193	19
Fresh laban	398	23	0	0
Fresh milk	294	18	0	0
Egg	72	4	65	6
Cheese	70	4	24	3
Rice	167	10	38	4
Fish	40	2	11	1
Others	142	8	68	7
<i>Total</i>	<i>1703</i>	<i>100</i>	<i>1011</i>	<i>100</i>

In addition, in the review in Saudi Arabia, an analysis of the contributing factors shows that the main causes for contamination levels to persist in foods are the improper maintenance of storage or cooking temperatures. Infected food handlers actually contribute very little to the total number of cases, as does inadequate cleaning of utensils. For more detailed figures see table below.

Contributing factor	Home	Public
Inadequate cooking	7	47
Inadequate reheating	15	9
Inadequate thawing	5	20
Keeping food at room temperature	16	17
Preparing food a day or more before serving	8	11
Inadequate cleaning of equipments	9	4
Use of untreated food	34	-
Inadequate refrigeration	13	17
Infected food handlers	1	3
Unknown	2	5

Further data on incidents of food-borne diseases which have been collected from presentations at (regional) meetings, publications and research papers is available as CRD4.

Regional challenges

While great care should be taken not to draw regional conclusions from isolated local, provincial or national examples, it may nevertheless be stated that trends can be observed in the Near East region that demand greater attention by the countries' respective food safety systems. The food safety issues facing the countries of the region vary greatly, depending on national income status, status as an exporting or importing country, national infrastructure, educational level, and level of the provision of consumer information.

Some of the main challenges related to food safety and human health include:

1. Poor epidemiological characterization of food hazards, food-borne diseases and its direct and indirect impact on public health;
2. Inadequate public health infrastructure including laboratories
3. Weak leadership role of the health sector in the development of food safety policy, plans and programmes as an essential public health function

The challenges related to specific groups of food-borne diseases and food-borne diseases include the following:

Microbiological contamination is a fact of the region, as is often stated; however, the data to corroborative facts to underline this statement are hard to collect. Data on the full spectrum of known food-borne pathogens and their prevalence in the respective daily diets of the countries are not available.

Chemical contamination, either through misuse or abuse of substances or by environmental pollution is another fact, and regrettably inadequately and inconsistently addressed by all relevant authorities.

Antimicrobial resistance will become a severe threat to public and animal health in the near future unless stringent measures are taken to not only control the use and misuse of antimicrobials, but also to educate the general public and the concerned professional groups in the consequences of their present habits.

Zoonoses continue to threaten public and animal health, and as a consequence affect trade greatly. The need for inter-sectoral action cannot be stated enough for this specific area.

Food-borne disease surveillance systems, where existent, do generally operate in a rather reactive manner. The final goal of such a system would be to become pro-active by enabling the users to project future scenarios and take relevant public health or other measures. Since these measures generally lie outside the sphere of influence of the food-borne disease surveillance system itself, there is a great need for interaction and collaboration with the rest of the food safety system.

Conclusion

The impact of food safety systems in the Near East region on human health is difficult to determine. Comparative studies are not available; an overview of neither pathogens nor disease incidence is available for most countries; and trends in disease incidence are generally not available yet due to the rather recent commencement of data collection. The initial increase in the incidence of food-borne disease can mainly be contributed to improved data collection mechanisms rather to a decrease in food safety, and should therefore be considered with caution.

Member States must continue to work towards putting food safety firmly in their national public health agenda. The establishment of integrated food monitoring and food-borne disease surveillance systems requires effective collaboration and coordination with all stakeholders from the health, agriculture and trade sectors. The burden of FBD in the region is still very high and efforts must be undertaken to reduce the effects of food-borne disease on human health.

Recommendations

In view of the above-described challenges related to food safety and human health, governments of the region should:

- work to strengthen the place of food safety on the national public health agenda
- enhance their capacity to plan and carry out a national food-borne disease surveillance programme
- enhance their ability to collect data on the incidence of contaminants in food, including exposure assessments.
- undertake risk assessments on food safety hazards of particular importance to their country, or develop the capacity to do so if needed.
- develop mechanisms to facilitate communication and cooperation between all relevant food control authorities. These should include food inspection services, food control laboratories, food-borne disease surveillance systems and food contaminant monitoring systems.
- create a mechanism for implementing necessary corrective measures to reduce the load of food-borne diseases and improve human health

- develop the scientific and technical capacity to prevent, control and manage trans-boundary risks to human, animal or plant health.
- create a rapid food-borne disease alert system
- strengthen national food control systems (strengthen food control management, modernize food legislations, improve inspection services, etc) to support improvements to food-borne disease surveillance systems.

References

WHO/EMRO, Dec 2002, Food safety, food-borne diseases, and the need for integrated systems. Report on the Regional consultation of food-borne disease surveillance.

WHO, 2002. WHO Global Strategy for Food Safety. Safer food for better health. <http://www.who.int/fsf>

WHO/EMRO, July 1999. Technical Paper on Food Safety. Presented to the 46th Session of the Regional Committee for the Eastern Mediterranean. <http://www.emro.who.int/fos>

FAO/WHO Regional Meeting on Food Safety for the Near East
Amman, Jordan, 5-6 March 2005

NATIONAL FOOD SAFETY SYSTEMS IN THE NEAR EAST
- A SITUATION ANALYSIS

Introduction

A national food safety system can be defined as the set of regulatory and non-regulatory institutions involved in activities aiming at ensuring the safety of the national food supply. It includes the official 'food control system', which is defined by FAO/WHO¹ as being "*the mandatory regulatory activity of enforcement by national and local authorities to provide consumer protection and ensure that all foods during production, handling, storage, processing and distribution are safe, wholesome and fit for human consumption; conform to safety and quality requirements; and are honestly and accurately labelled as prescribed by law*". It also includes voluntary quality assurance programmes implemented by food producers and processors to ensure the safety of their products; the food safety risk assessment activities undertaken by relevant academic and scientific institutions; and the activities of professional, industry and consumer associations aimed at promoting food safety.

Three main guiding principles govern modern food safety systems and directly impact on their effectiveness, namely: the realization that food safety is multi-sectoral; that food safety should be addressed throughout the farm to fork food continuum; and any decision, measure or approach should be science based.

The multi-sectoral challenge

One of the particularities of food safety is that it requires professionals from different disciplines, often with different objectives, to work together towards a common goal of protecting the health of the consumer and promoting fair practices in food trade. Therefore, in most countries, the responsibility over food safety and quality is shared between a number of government departments and institutions which often include the Ministries of Agriculture, Health, Trade, Industry and others. The effective involvement of these ministries and institutions in a well-coordinated and complementary way poses a real challenge for national food safety managers.

The food continuum

It is now widely recognized that it is impossible to provide adequate consumer protection by merely sampling and analyzing the final food product. The introduction of preventive measures at all stages of the food production, processing, transportation, handling and distribution chain is essential to achieve food safety and is economically sound. Many, but not all, potential food hazards can be controlled along the farm-to-fork food continuum through the application of good agricultural practices (GAPs), good manufacturing practices (GMPs) and good hygienic practices (GHPs), along with the application of Hazard Analysis Critical Control Point (HACCP) system.

¹ 'Assuring food safety and quality: Guidelines for Strengthening National Food Control Systems', FAO/WHO, 2003. Full document available at ftp://ftp.fao.org/es/esn/food/guideFCS_en.pdf

Science as the basis – risk analysis

Whereas the application of science in the setting of standards is common practice, the use of science as the basis for decision making in food safety is less common. One of the main challenges in food safety today remains the application of risk analysis as a structured methodology for decision making, involving risk assessment, risk management and risk communication. In many developing countries, the lack of adequate data on the exposure of different population groups to various food contaminants constitutes a serious barrier to the application of food safety risk analysis.

National food safety systems in the Near East region

The status and performance of food safety systems in the Near East region varies considerably from one country to another, reflecting the existing differences in economic conditions and in agricultural and food sector development between the countries of the region. In recent years, an increasing number of these countries have made serious efforts to update and strengthen their food safety systems and infrastructures. Some countries have engaged in profound reform of their food safety system by moving towards the integration of some of the functions of the system and in the introduction of modern risk-based approaches to food safety management. These efforts have led to a relative improvement in the effectiveness of the food safety systems in protecting the health and economic interests of consumers and in enhancing food export capabilities of a number of countries. The situation is, however, far from being adequate as many serious problems continue to persist.

Organization of food control services

In most countries of the Near East region, responsibility over food safety is shared among several agencies. Issues directly related to public health, such as food hygiene and sanitation and food-borne disease surveillance are dealt with by the health authorities at central and local/municipal levels, while matters related to food production, processing and distribution including the control of the quality and safety of foods of animal origin fall under the authority of the Ministry of Agriculture. In the Gulf States, because of the relatively limited importance of the agricultural sector in the overall economies of these countries, and the concentration of food-related operations in urban areas, the main responsibility over food control lies with the municipal authorities.

Throughout the Region, efforts have been made or are underway to reform and improve food control systems. For instance, in Algeria, the government, with assistance from FAO, WHO and UNIDO, is carrying out a detailed study of the existing food control system and facilities with a view to recommending a national strategy to improve the efficiency of the current system and address the existing problems. Under the Technical Cooperation Programme² (TCP), FAO is also assisting the country in the establishment and functioning of a National Codex Committee. In Jordan, special effort has been made by the Government in recent years to re-organize and streamline the food control activities at national and provincial level through the establishment of a Food and Drug Administration with authority over the control of the safety of foods and drugs in the country. In Morocco, under a FAO/TCP project³, the government has developed, in 2004, a 5-year "Road Map" for the integration of the food control system in the country and the creation of an agency that serves as the central regulatory authority in food control and coordinates the overall food control activities in the country. Attached to this agency, but organically independent, a scientific committee will be created to serve as the country's focal point for food safety risk assessment. In Lebanon, under a UNIDO-executed project, a new draft food law has recently been developed which provides for the establishment of the Lebanese Food Safety Agency to implement the food law. Chapter IV of this draft food law covers the scope, tasks, organization and operation of the Lebanese Food Safety Agency. The draft is under consideration by the concerned ministries and institutions in the country. In Saudi Arabia, in 2003, the Government established the Food and Drug Administration which is responsible for the enforcement of the food and

² TCP/ALG/3003 – Appui à la création et au renforcement d'un comité national Codex.

³ TCP/MOR/0168 (A): Appui à la création de l'Agence de la qualité et de la répression des fraudes

drug legislation in the country. The establishment of food standards remains with the Saudi Arabia Standards Organization (SASO). In Tunisia, the National Agency for the Control of Food and Environmental Safety has been created with the objective, among others, of coordinating the relevant activities among the various agencies involved. Other countries, such as Kuwait, Oman and Syria have made special efforts to revive already existing coordinating mechanisms (inter-ministerial committee, food control council, etc.) to improve efficiency and minimize duplication or gaps. In Yemen, under a new FAO/TCP project⁴, a new national codex committee is under creation with coordinating responsibilities not only on Codex matters but also on national food control activities.

In most countries of the Gulf Cooperation Council (GCC) and in particular in the United Arab Emirates (UAE), the municipal authorities play a central role in food control management. Other relevant ministries are involved mainly in the development of food legislation (regulations, standards) and in quarantine services. There is a definite trend towards the harmonization of the food safety systems in the different member countries of the GCC, starting with the food legislation and gradually covering the other aspects of the system.

In Egypt, Iran, Libya and Mauritania the multiple agency system model prevails to a large extent with a tendency to focus the consultation and collaboration process at the level of the development of food legislation (including food regulations and standards) leaving the tasks of enforcement to the concerned ministries/authorities, each in its area of competence.

It is evident that a great effort is under way in many countries of the region to reorganize their food control systems with a view to making them more efficient and less complex. This effort needs to be continued and strengthened in respect of the application of the three basic principles cited earlier, and further expanded to cover other countries of the region. The tools issued by FAO and WHO in this field (see references) could provide a useful support.

Food laws, regulations and standards

In general, food legislation in the countries of the region is characterized by a set of fragmented enactments under the mandates of the Ministries of Agriculture (for animal products, plant protection and animal health quarantine), the Ministry of Health (Public health law, food hygiene/sanitation law, etc.), the Ministry of Commerce/Trade (food import and export control), the Municipal authorities (retail markets, food services, etc.) and others. Only a few countries (Jordan, Saudi Arabia) have recently enacted new food laws that cover all foods, and integrate the work of all concerned agencies. However, a number of other countries are actively working on the establishment of such a single food law. In particular, Lebanon, with support from UNIDO and UN/ESCWA, has developed a draft food law to improve the efficiency and capacity of its food control system to meet present day requirements. This has been undertaken through a thorough review of the role and function of the main players, the establishment of a national coordinating mechanism, and the training of a core group of trainers. These efforts have resulted in a new draft food law which is now under consideration by several governments (Lebanon, Morocco, Oman, Pakistan and Syria).

Food standards are generally issued by the national food standard organization which always covers not only food, but also other consumer products. Most countries of the region have established strong standards organizations, with the assistance of UNIDO and other international organizations. These organizations often participate in Codex work and contribute indirectly in the effectiveness of the food control.

Some other countries, such as Jordan, recently revised their food laws, harmonized their food safety standards with Codex and moved towards a food safety system based on risk analysis. These reforms have reduced laboratory analysis costs by half and decreased clearance process time due to a semi-automated archiving system for tracking and reporting of food products.

⁴ TCP/YEM/3003 - Strengthening the Food Control System and Establishing a National Codex Committee

At the sub-regional level, it is opportune to make a special mention of the on-going effort in the GCC countries to develop a common food control regulatory system with harmonized procedures for inspection, testing and compliance. The sub-region has already embarked in the implementation of a common entry policy for imported food products. In the Arab Maghreb Union, efforts to put in place a common food regulatory system and a common market among the member countries are still in an embryonic phase.

The national standards setting institutions for the majority of the Near Eastern region are mostly independent of the food control authorities. Whereas there is a general representation of the various professions in the development of standards, there tends to be a lack of consideration of the complete set of actors, i.e. agriculture, health, trade, industry and consumers in the setting of priorities for standard development and in contributing to their elaboration.

Harmonization with Codex Alimentarius standards in order to comply with WTO requirements is ongoing or has been finalized for those countries⁵ that are either members or observers of WTO.

Food inspection

Field inspection work is usually carried out by officially recognized food inspection agents attached to different authorities (Ministry of Agriculture, Ministry of Health, Ministry of Trade, Municipal authorities, etc). Most of these agents have been trained in carrying out classical food inspection tasks at retail sale level and have little, if any, knowledge of modern risk-based approach to food control. A few countries, however, have initiated programmes to prioritize inspection procedures and improve cost-effectiveness. For instance, in UAE, inspection systems for domestic and imported foods utilize customized computer software covering the entire inspection operations, which enhances access to information, focuses attention on high risk foods, accelerates the clearing process for food imports, increases incentives for better performance and improves overall food safety. A similar system has been developed by the Aqaba Port Authority in Jordan for the inspection of all food products imported by Saudi Arabia. It is in the practice of food inspection work that overlapping (or gaps) in the tasks of the mandates of different corps of inspectors may be seen.

Quality assurance

There is a growing acceptance and increasing use of Good Manufacturing Practices (GMP), Good Agricultural Practices (GAP) and the Hazard Analysis and Critical Control Point (HACCP) system throughout the region. In a number of countries, quality management regulations based on HACCP have been adopted for fish and fish products to regain access to importing markets such as the European Union countries. Steps have been taken in other countries to ensure quality assurance and good production practices for major food export commodities, often in consultation with, or supported by, importing countries. In addition to food safety related processing requirements, issues such as regulations specifying growing locations and other production requirements have been developed.

Although GMP and quality assurance systems such as HACCP have been introduced throughout the Region, they are not fully integrated in the domestic inspection systems which continue to focus primarily on end-product control. In a number of countries, many industries apply HACCP on a voluntary basis in order to improve food safety domestically as well as increase their share of export markets. In Oman, Tunisia, UAE and Yemen, quality management regulations based on HACCP have been adopted for fish and fish products to regain access to importing markets (ex. EU market). In addition, Tunisia has introduced provisions for the application of HACCP by the fish industry in its food safety legislation. Some countries, such as Lebanon, Morocco, Oman, and UAE have or are developing legislation and guidelines on GMP and the HACCP system. The Islamic Republic of Iran has introduced legislation requiring HACCP certification for food exports and has strengthened its national capacity to

⁵ See table in NEM 05/2

monitor and control residues (pesticides, animal drugs and chemical residues) in foodstuffs with FAO assistance.

Steps have been taken in other countries to ensure good production practices (GAP, GMP and HACCP) for major food export commodities, often in consultation with, or supported by, importing countries. For instance, in Egypt, regulations specifying growing locations and other production requirements have been issued for potatoes and peanuts, and are being prepared for vegetables and fruits in order to meet European Union (EU) standards.

Food Control Laboratories

Despite the efforts made by many countries of the region to establish modern facilities and acquire modern equipment and supplies, the laboratory services of most of the countries of the region are in constant need of continuous improvement of capacity and capability. Laboratories have limited scientific and technical expertise, financial resources and equipment, have difficulty in obtaining necessary reagents and reference materials and lack internationally recognized accreditation. These are all major obstacles to improved analytical capabilities in the region.

In the Gulf States, a particular effort was made during the 1980s and up to this date, to continuously develop and update their laboratory services for food control. The accreditation process of these laboratories has been progressing slowly mainly because of the lack of suitable accreditation bodies in many countries of the region. Only a few laboratories in Egypt, Iran, Morocco, Tunisia and UAE have received accreditation for certain analysis, from external auditors.

Food contaminant monitoring and food-borne disease surveillance

Although some countries have adequately functioning mechanisms for reporting food-borne diseases, most countries of the region have no reporting mechanism in place, at least not one that effectively communicates with national food control authorities. Additionally, underreporting is common. As a result, the incidence of food-borne diseases is often not reflected in the setting of national food safety strategies. Food safety measures are not given the priority they deserve with regard to chemical and microbiological contaminants of relevance to the region.

Participation in Codex work

All countries of the Near East region are members of the Codex Alimentarius Commission except Yemen. Their participation in Codex work, however, is very erratic and certainly not as effective as it could be in protecting their interests. With the assistance of FAO, Morocco has established a well functioning National Codex Committee which has enabled the country to significantly improve its participation in Codex work. Similar efforts are underway in Algeria, Lebanon, Syria, Tunisia and Yemen. The FAO/WHO Trust Fund on Codex established late 2003, could help in improving the participation of the region in Codex sessions. However, the requests received so far from the eligible countries of the region are still limited to have a real impact of the meeting results.

Recommendations for action at national level

It is recommended that national food control/food safety authorities undertake the indicated activities in each of the following areas:

Coordination, national food safety strategies

1. raise awareness among policy and decision-makers of the importance of food safety and quality for consumer protection, food trade and economic development.

2. minimize duplication and clarify the roles and responsibilities of relevant institutions, and prepare a national food safety profile indicating the role of each institution in the overall national food safety system.
3. develop a national strategy for food safety based on a holistic approach that includes the three aforementioned guiding principles for food safety: multi-sectoral involvement, the farm to fork food continuum and a scientific basis.

Harmonization of legislation

4. take the necessary action to revise or update their food legislation in accordance with international food safety agreements and standards (notably Codex Alimentarius), and taking into account cultural habits and other specific local needs of consumers and food producers.

In the field of food inspection

5. modernize, strengthen and maintain the capacity of food inspection services for all food products in all locations within the country by clarifying the mandate and responsibilities of the respective food inspection services and ensuring that they reflect the national food safety strategy and regulations.

In the field of laboratory services

6. improve infrastructure by providing adequate equipment, instruments and technology to support the application of modern techniques and processes in food analysis.
7. improve their ability to conform to basic analytical quality assurance requirements and ensure that quality assurance systems meet international standards.
8. seek the accreditation of at least one national food control laboratory according to international standards to provide exporters with validated export certificates.
9. develop laboratory protocols and standard operating procedures at the national level.
10. train laboratory personnel in modern analytical techniques.

In the field of food quality assurance

11. adopt systems for good agricultural practices and on-farm food safety practices.
12. strengthen the technical and managerial capacity of food processors in implementing good hygiene practices, good manufacturing practices and the use of quality assurance systems.
13. address areas such as street food by conducting special programmes to educate street food (and other) vendors in safe food handling.
14. encourage self-regulation and control through the establishment of relevant associations.

Participation in Codex work

15. establish national mechanisms for consultation on Codex issues and for preparing national positions on subjects related to Codex that involve all stakeholders (including consumers).
16. ensure participation of appropriate technical experts in Codex meetings.
17. promote sustained participation in the work of technical committees of particular relevance to national interests.

Information exchange/rapid alert

18. build national capacity to identify and prioritize food safety issues through risk analysis.

19. develop mechanisms to facilitate communication and cooperation between food inspection services and other institutions involved in food control, particularly food control laboratories and food-borne diseases surveillance and food monitoring systems.
20. create a rapid alert system and mechanism for communication with food control authorities and for implementing necessary corrective measures.
21. develop and implement communication strategies that take into account priority issues to be addressed and communication channels available.
22. develop a transparent system for collecting data on rejected food consignments in international markets.

References

FAO. 2003. Food Control Systems: Modern Approaches in the Near East Region. Report of FAO/WHO Workshop (Cairo, Egypt, 19 January 2003).

FAO. 2003. Trade Liberalization Policies, Intra-Regional Trade and Opportunities for Sustainable Agricultural Development. Paper presented to the 26th FAO Regional Conference for the Near East (Tehran, Republic of Iran, 9-13 March 2002).

FAO. 2003. WTO Agreement on Agriculture: The Implementation Experience. Case Study on Egypt <http://www.fao.org/DOCREP/005/Y4632E/y4632e0c.htm#bm12>.

FAO/WHO. 2001. Summary Report of the FAO/WHO/ILSI Regional Workshop on Risk Analysis: Exposure Assessment (Cairo, Egypt, 27-28 January 2001)

Gelders, S. Microbiological Contamination of Foods – Current Status and Need for Action. Presentation to the AFC/WHO/FAO Inter-country Workshop on Emerging Food safety Issues and Consumer Protection (Amman, Jordan, 28-30 October 2001).

Hassib, M., Ragab, H. & Hachem, F. 2003. Trade, Market Access and Food Safety in the Near East Region. Presented to FAO-IsDB Technical Workshop on Regional Programmes for Food Security towards Sustainable Food Security and Poverty Alleviation (Jeddah, Saudi Arabia, 8-9 October 2003).

INFOSAMAK/FAO. 2003. Report of Presentations and Discussions Sessions at Expert Consultation on International Fish Trade and Food Security (Casablanca, Morocco, 27-30 January 2003) <http://www.tradefoodfish.org/articles.php?pageid=art&article=article03>

WHO. 1999. Technical Paper on Food Safety. Presented to the 46th Session of the Regional Committee for the Eastern Mediterranean (July 1999) <http://www.emro.who.int/nfs/FoodSafety-TechnicalPaper.pdf>

FAO/WHO Regional Meeting on Food Safety for the Near East

Amman, Jordan, 5-6 March 2005

REGIONAL, SUB-REGIONAL AND NATIONAL COOPERATION IN FOOD SAFETY IN THE NEAR EAST

Introduction

Individual achievements in the field of food safety, while desirable and necessary, are of little use and will not be truly sustainable if they are not coordinated and integrated with the activities and achievements of others. Cooperation in food safety at national, sub-regional, regional, as well as international levels presents many challenges, but provides many opportunities for synergistic benefit. Effective cooperation and coordination in food safety, as in any subject, begins at the local and national levels and builds up to the sub-regional, regional, and eventually the international levels. All actors involved in food safety at all levels can learn from, as well as assist, one another, which will allow all stakeholders to benefit from the improved levels of food safety, and thus improved human health and economic development. Cooperation in food safety is particularly important in the Near East Region, where on average, food imports make up 60% of the region's food supply and comprise up to 90% of food consumed in some countries. Countries of the region, as well as all actors at the national level, depend on each other to protect the safety and quality of their food supply.

Assuring food safety requires cooperation

The multidisciplinary nature of food safety and quality work requires the cooperation of many professionals: food scientists, toxicologists, public health workers, microbiologists, chemists, legal advisers, and many others. Assuring food safety and quality, therefore, demands cooperation among the various stakeholders to develop, agree upon, and effectively implement a carefully formulated common vision which encompasses the objectives of the different stakeholders.

Many challenges can hinder effective cooperation, including competing interests of those involved and perceived lack of time to effectively cooperate. However, through a network of cooperation, stakeholders can utilize the resources available throughout the network, rather than duplicating activities or expertise available elsewhere in the network. This reduces unnecessary inputs, shares labour, improves the quality of ideas, and generally increases the output of the cooperation. A great deal of cooperation already occurs in the area of food safety, but this cooperation can be enhanced in a number of specific ways to benefit all those involved.

FAO/WHO cooperation in food safety

FAO and WHO work together in many different ways in the area of food safety. A report on cooperative activities related to capacity building, as well as the provision of scientific advice, will be presented as Agenda Items 3 and 8 in the subsequent Third Session of the FAO/WHO Regional Coordinating Committee for the Near East¹. FAO and WHO work together in the following ways in an effort to improve food safety and quality in their member states:

¹ Agenda and working documents available from: <http://www.codexalimentarius.net/web/current.jsp?lang=en>

- 1) through the Codex Alimentarius Commission, in the establishment of international food standards and related texts;
- 2) through expert bodies such as the Joint FAO/WHO Expert Committee on Food Additives and Contaminants (JECFA), the Joint FAO/WHO Meeting on Pesticide Residues (JMPR), the Joint Expert Meetings on Microbiological Risk Assessment (JEMRA) and various expert consultations on subjects such as biotechnology, for the provision of scientific advice to Codex as well as FAO/WHO member countries;
- 3) by jointly conducting international, regional, and at times national events to assist in various aspects of food safety capacity building;
- 4) by jointly developing tools designed to assist in various aspects of food safety and quality; and
- 5) by providing funding for increased participation in the activities of the Codex Alimentarius Commission.

This meeting is one example of the cooperation between FAO and WHO in the area of food safety at a regional level. Although the coordination mechanisms must be continuously improved, FAO and WHO strive to work in a complementary manner to work toward a common goal of improving food safety and quality. FAO and WHO are working to continuously improve the communication between and among headquarters and the regional and national offices.

FAO and WHO are working towards improving their cooperation in food safety at the country level. A joint FAO/WHO capacity building programme will be implemented (in three countries in Asia) in the upcoming months. This was a result of a joint FAO/WHO needs assessment mission to the countries involved in the project. Improved communication and coordination between FAO and WHO at the country level is also needed for the nomination of participants to attend meetings, as information is not always accurately communicated to the interested parties and as a result, countries may not be properly represented at FAO/WHO events.

While this cooperation between FAO and WHO requires continual strengthening, the principles of this cooperation and the lessons learned can also benefit national governments. Three important aspects of this cooperation at the national level will be discussed in the following sections.

Cooperation at local and national levels

Regional, sub-regional, and even international cooperation in food safety cannot be effective and sustainable without a solid foundation of local and national cooperation and coordination. There are many important aspects of cooperation for national governments to consider.

1) Cooperation within and between sectors

Food safety, by its very nature, involves many different traditional sectors and ministries of national government structures. Ministries of health are concerned with protecting human health, while ministries of agriculture are generally responsible for the production of food and agricultural products. Ministries of trade and industry are generally concerned with increasing trade opportunities and improving the output of the nation's farms, fisheries, and processing facilities. While each of these sectors have different objectives for achieving food safety and different interests, the common vision of food safety for the advancement of their country should be held in mind in all their policies and activities. Ministers and politicians concerned with each of these sectors must be convinced of the importance of food safety to their respective sector so that they will work to prioritize food safety matters and will enable improved cooperation between these sectors. These different sectors can actually complement each other when cooperating in the area of food safety. The different interests of each provide a check and balance to ensure that approaches to food safety are effective to protect human health, prevent consumer fraud, protect the interests of small farmers and food processors, improve the overall economy of the country through increased export opportunities, and still be economically

feasible. National governments should encourage effective interaction both between ministries and within ministries, despite the difficulties faced in doing so.

Food safety also plays an integral role in achieving national food security. Food safety is inherent in the definition of food security and also has many benefits to improving food security². Accordingly, those concerned with improving national food security should also work towards improving food safety.

Food safety also plays a critical role in promoting tourism to a country. One report of a food-borne disease outbreak can cause people to be less likely to return or to visit a certain location, which can have serious economic repercussions. Tourists may even visit a location because of the food that is served there. In this case, the safety of the food is especially important. In this respect, food safety officials should work with tourism officials to ensure that food is safe, as well as to generate increased political and economic support for ensuring food safety.

Food chain approach to food safety

National governments are increasingly interested in implementing a “food chain approach” to food safety, as this approach focuses on preventing food safety issues, rather than on end product control³. This concept underlines the value of integrating the control of plant and animal health with food safety. This concept can be very effectively applied in the countries of the region, as inspection of imported foods, plants, and animals could be streamlined to fit under one inspection system, rather than employing separate inspectors for each of the sectors. FAO held an expert consultation on *Biosecurity*⁴, which affirmed the value of this approach to controlling sanitary and phytosanitary risks.

In order for countries to effectively implement a food-borne disease surveillance system and to link these diseases to their causative food agent, officials from public health laboratories, health care workers and food control officials must all work together. In order for this system to be truly effective in monitoring and controlling these risks to the food supply, information on animal and plant diseases, as well as environmental contaminants should be shared so that integrated control measures can be taken. All the personnel involved in these systems should be trained in the proper detection and reporting of these diseases, so that the information is accurate and useful.

In 2002, the Ministry of Health of Jordan, in collaboration with WHO, the Centers for Disease Control, USA, and Health Canada initiated a study for establishing the burden of acute gastroenteritis infections as well as fever of unknown origin, in order to quantify typhoid and brucellosis prevalence. The additional goal of the study was to strengthen or create the required infrastructure for the purpose of the study as well as food-borne disease surveillance. By conducting operational research, and strengthening the components of the system, the burden of disease could be established. The model of this study was developed with the intention of developing guidelines for undertaking similar studies in the other countries of the region, with the intended dual objectives similarly formulated: establishing the burden of a certain food-borne disease or symptom and strengthening the food-borne disease surveillance system as such.

National Codex structures

Governments must ensure that their respective national Codex structures effectively provide information to all national stakeholders. Codex contact points must ensure that information is disseminated to all ministries and stakeholders involved. National governments of the region must also

² More information on this concept is available from: http://www.fao.org/es/ESN/food/meetings_mrt_en.stm

³ A paper on FAO's strategy for a safe and wholesome food supply to be presented at FAO's Committee on Agriculture (COAG 2005) will soon be available from: http://www.fao.org/unfao/govbodies/eims_search/conference_search_en.asp?meeting_id=4

⁴ FAO Technical Consultation on Biosecurity (Bangkok, January 2003) <http://www.fao.org/biosecurity/>

coordinate their national positions for Codex meetings, provide input before the meetings, and work to more effectively provide national data to the FAO/WHO expert bodies (JECFA, JMPR and JEMRA) so that the recommendations made by these bodies accurately reflects the situation in the countries of the region.

Coordination of participation at regional and international activities

National governments must ensure that the various sectors involved in food safety are informed of international and regional events of interest to that sector and that the most relevant people attend the events, so that the national preparation, contribution, and follow-up is effective and useful. The ability to coordinate this participation also indicates the ability of government to more generally coordinate improvements to national food control systems.

2) *Public/private cooperation*

While cooperation between the various sectors involved in food safety is essential, cooperation among the various types of actors involved in food safety is also important. The countries of the region are increasingly recognizing the importance of involving industry and civil society in food safety discussions. This is evidenced by the composition of national delegations to Codex meetings, which often include representatives of consumer groups, civil society, industry, and academia/research, in addition to government officials. While it is the responsibility of governments to regulate and to provide an enabling environment for food safety, the food industry is ultimately responsible for the production of safe food for consumers. This cooperation between different stakeholders can take the form of sharing financial and human resources and also encompasses cooperation in the implementation of activities and policies.

3) *Vertical cooperation*

In addition to the importance of national governments effectively participating in regional and international activities, which will be addressed in the subsequent section, national governments must also cooperate with local, municipal, and regional authorities within their country. This is especially true in the area of street foods where many governments are working with city authorities to control the safety of these foods. Local food-borne disease surveillance and food contaminant monitoring data must also be shared with national governments in order for effective control measures to be implemented.

Regional and sub-regional cooperation

The global nature of food and agriculture continues to increase, further outlining the importance of regional cooperation. Especially in the Near East region, people and animals tend to cross national borders with great frequency, and may not always be carefully controlled. Because of the large volume of food and agriculture trade, regional cooperation to improve the safety of food and agricultural products is essential.

Governments which are working towards more effective cooperation at a national level have the opportunity to cooperate sub-regionally, regionally, and eventually, at an international level. Many of the same concepts of national cooperation can be applied to regional cooperation. Countries of the region may have competing interests, making cooperation challenging, yet there are many benefits to regional cooperation, including pooling of resources, sharing of competencies, and increasing synergy.

Countries of the Near East region have affirmed the benefits of sharing experiences and learning from each other. As previously noted, FAO and WHO have implemented various regional and global events which have allowed the countries to come together to discuss the issues facing the region in the area of food safety and ways to work through these issues. Many countries of the region have

successfully undertaken improvements to their food safety systems in recent years, and these experiences, as well as the lessons learned, can be of great value to other countries.

While differences do exist, many of the countries of the region have comparable food and agriculture production systems, related cultures and food preferences, and similar weather patterns. Sub-regional groupings, such as the Gulf Cooperation Council, Maghreb countries, and others are extremely important in this regard as the countries in these sub-regional groupings are more alike in these and other characteristics, and also share common borders. These sub-regional groupings are able to implement more targeted projects and have an established political relationship, which makes implementing joint activities more feasible and sustainable. In designing regional projects, it is imperative that the sustainability of these projects is taken into consideration.

At times, regional collaboration can appear to be of greater benefit for the lesser developed countries in the group than those that are more developed. However, due to the global nature of food safety concerns, countries which share borders and are trading partners must work together to ensure the safety of all products as diseases or contaminants in one country can easily affect other neighbouring countries.

Specific areas for regional cooperation

Codex related activities

The FAO/WHO Regional Coordinating Committee for the Near East (CCNEA) will be meeting in its Third Session from 7 to 10 March 2005. While the initiation and continuation of this committee is an important accomplishment in the coordination of the countries of the region in the international Codex system, the active participation of the countries of the region in the activities of this committee and of the entire Codex system must increase in quantity and quality. Countries must work to more actively prepare their positions for all Codex meetings so that the needs of the region are reflected in the texts adopted by Codex and the policies adopted.

Countries of the region must also work together to ensure that accurate data from the region is considered in FAO/WHO expert bodies providing scientific advice, and that experts from the region are involved in this process. The Near East region has many experts in these areas and valuable data to provide, but must work to more actively provide this information. A database of these experts should be developed so that this information can be easily accessed and utilized when necessary.

Coordination of input to WTO

Because of the importance of food trade to the region, the decisions of the WTO, especially the SPS Committee, greatly affect the economic and health status of the countries of the region. Governments of the region should work together towards reaching a consensus on issues related to food and agriculture trade with a view to increasing attention to regional trade concerns related to food safety, support efforts to pursue unfair cases before the WTO's SPS Committee, and increase bargaining power in global trade negotiations.

Develop regional centres of expertise

Countries of the region should work together to identify the relative strengths in each country and then to match these strengths with those countries requiring assistance in a particular area. Regional centres of expertise can be developed in areas (discussed in subsequent sections) such as training, laboratories, street foods, and other areas of regional interest.

Capacity building efforts

Various countries of the region have a great deal of expertise in specific subjects such as HACCP, GMPs, biotechnology, food inspection, etc and can provide training for officials from other countries in their area of expertise. Some of the countries of the region are recipients of technical assistance projects, while other countries of the region are capable of providing technical assistance and capacity building support to other countries. The providers of this assistance, as well as the recipients, must better coordinate their efforts so that projects are not duplicative and reflect the actual needs of the country receiving the assistance.

Harmonization of legislation and equivalency

Efforts should also be made to harmonize food safety legislation in the region in order to facilitate inter-regional trade and to ease inspection policies. It should also lead to the establishment of equivalency between the food control authorities of the region.

The concept of equivalence has been recognized in the SPS Agreement and is also being encouraged at the international level by Codex, with a view to using pooled resources more effectively, avoiding duplication of inspection and testing, and ensuring that health and safety requirements are met effectively. This will also serve as an important means of facilitating trade by recognition of the standards and certification systems of the exporting country to provide for an equivalent level of protection against health risks as those of the importing countries and also lead to reduced rejection rates and provide for reduced inspection of export products in overseas markets. Equivalence agreements are normally signed between the importing and exporting countries individually. However, if such agreements are developed at (sub)-regional level, in the form of regional agreement for recognition of the equivalence of specified SPS measures of all countries in the region, it would not only benefit trade within the region but also give strength to negotiating equivalence agreements with third-party countries.

Food inspection

The GCC countries have implemented a sub-regional common border inspection policy⁵ which allows food products entering any border post in the sub-region to be accepted in any country in the sub-region. This approach reduces duplication of efforts and streamlines food trade. Other sub-regional groupings should be encouraged to implement such a policy.

It is also important for countries of the region to share information with each other and work together to ensure that sub-standard food products which are rejected from one border post are not sent to another border post and then accepted there due to a lack of inspection.

Laboratories

The expertise of the region in specific analytical laboratory techniques, such as mycotoxins, heavy metals, pesticide residues, microbiological contaminants, biotechnology, etc could be shared through the establishment of a network of accredited regional reference laboratories. Such a network would enable countries to benefit from the facilities available in other countries to reduce costly duplication. The organization of a regional proficiency testing programme for the key food contaminants of the region is an important element in the development of food analytical capabilities in the region and should be given serious consideration. The above-mentioned centers of expertise could be designated to develop such a programme, with international and bilateral assistance.

⁵ Report of FAO/WHO Regional Workshop on Food Control Systems (Cairo, January 2003) where this system was presented: ftp://ftp.fao.org/es/esn/food/meetings/2003/egypt_report.pdf

Certification and accreditation

Facilities for certification and accreditation in different areas, such as export certification, HACCP and ISO 9000 should be developed within the region, irrespective of the country of operation. A country which has recognized experience in one area could assist other countries of the region in this field.

Food-borne disease surveillance, food contaminant monitoring

Once a food-borne disease surveillance and food contaminant monitoring system has been effectively implemented at a national level, the countries of the region should agree on the designation of one appropriate institution that would collect all this information and data, analyze it and produce a periodic report on the situation in the region as a whole. Countries should make their national report available to this institution. This type of reporting allows for the eventual development of a rapid alert system, which would benefit all countries of the region. Scenarios for (regional) response should be prepared in advance of a possible outbreak or recall, rather than responding to such an event. Effective mechanisms for communication with food control authorities and for implementing necessary corrective measures must also be continuously strengthened.

Regional risk assessment body

The countries of the region may be interested in risk assessments on specific pathogen commodity combinations or other issues which affect the region that have not yet been addressed by international risk assessment bodies. National governments may not have adequate resources to implement these risk assessments, but the governments of the region could pool their resources and expertise to conduct these needed risk assessments. The safety assessments conducted by FAO/WHO can, of course, serve as a basis for such regional effort. The European Food Safety Authority⁶ also conducts such regional risk assessments and the mechanism used in this regional institution could serve as a model for the countries of the Near East.

Special research projects

The expertise in the academic and research institutes of the region should be utilized to implement projects of interest to improve food safety. In particular, subjects related to the safety of local and traditional food products and ways of improving their quality (including nutritional) and safety would be of great relevance. Similarly, research on the shelf life of strategic food products, under the prevailing weather and cold chain conditions in the region, would be of benefit to all countries.

Conclusion

Effective food safety systems require cooperation and collaboration at all levels. It is obvious that without collaboration in such fields as Codex work, harmonization of legislation, inspection, and others, it would be difficult for the region to reach the level of performance in food safety that their population deserves. Efforts are needed by governments and other stakeholders to promote this type of activities. FAO and WHO and other provider agencies stand ready to provide this support where needed.

Recommendations

The text contains suggestions for recommendations which may be considered by the meeting when formulating its recommendations for member governments and FAO/WHO on this subject.

⁶ <http://www.efsa.eu.int/>

ANNEX 7
Conference Room Document 1
English only

FAO/WHO Regional Meeting on Food Safety for the Near East
Amman, Jordan, 5-6 March 2005

RISK MANAGEMENT APPROACH ON IMPORTED FOOD CONTROL
(prepared by the Delegation of the Hashemite Kingdom of Jordan)

1. Introduction

Following Jordan's accession to the WTO in April 2000, fundamental restructuring was undertaken in the food safety domain, namely issuing the first Food Act and adopting risk management approach within Jordan's strategic framework; Recognizing that the domestic food market very much depends on imports, a risk management approach was primarily to be implemented on food imports, arriving via the port of Aqaba where over 75% of imports are admitted to Jordan. The traditional imported food control system imposed a 100% sample collection and laboratory analysis on all food imports to Jordan regardless of their health hazard, with no systematic product traceability nor recorded history on importers performance. The system was completely in a manual form, time consuming and without measurable tools to administer the official staff performance and trader's complaints and violations track. Minimal information was collected on handwritten sheets without any structured template forms to be filled out or electronically stored data for further statistical analysis for risk managers and policy makers.

2. Risk Based System Concept

Monitoring of imported food for compliance with national/international safety and quality standards and other requirements is based upon a risk management approach of control. The system places emphasis on those products determined to be high-risk food products in terms of human health based upon known and potential food hazards associated with these foods. Monitoring of lower risk or no risk food products will be maintained at a surveillance level to assure consistent compliance by importers, shippers and exporting enterprises. Such Risk Based System allows for some refinements and improved effectiveness to the food control process. It calls for an assessment of the risks associated with the known or potential hazards of food. This process takes into consideration before the control measures are applied, the nature of the hazards, and the impact on the consumer in terms of severity, which results in a clear idea of what should be examined for which types of hazards based on a priority system associated with the severity of the risk to the consumers. It allows for the allocation of resources to be clearly devoted to the most important areas of consumer protection. It enhances the effectiveness of the control measures by having a predetermined automated plan of what consignment entries will be sampled and what they will be tested for, while not spending scarce resources on entries which have little to no impact on the health of the consumer.

Recognizing Jordan's limited financial resources to undertake a full lengthy risk assessment, instead, a thorough benchmarking study was carried out referencing to various international organization researches and government risk assessments. The literature was studied by a national specialized team, designed and structured with some refinements based on practical experience, climatic and further cautious criteria to acquire public acceptance.

Criteria based on the public health risk associated with various foods or other compliance or procedural factors were utilized to select food entries for appropriate monitoring, where food products have been categorized into three groups; High, Medium and Low-risk groups. Control is exercised electronically through the computerized Selectivity Module of the Automated System for Custom Data (ASYCUDA) which was massaged into a closed cycle to adapt food categories and their selectivity criteria. Food entries entered into the ASYCUDA system are identified by their Harmonized system-HS code for clear and accurate management by food control officials and importers throughout the clearance procedures.

For archiving and tracking purposes, a Food Import Management Information System (FIMIS) was engineered, programmed and deployed successfully on September 2002 as an information electronic archiving database to assist food officials in identifying risk areas and analyzing raw data utilizing Online Analyses Processing (OLAP) into a meaningful policy decisions, regarding the safety of imported food products.

The system will provide information useful in communicating and coordinating Jordanian activities with international efforts to improve the overall safety and quality of food trade, particularly in the region.

2.1 Food Categories Classification

Food categories include those of high level of public health risk, those that represent a moderate level of risk and those that represent a low level of risk. High-risk foods will be monitored (sampling and analysis) at the highest level of surveillance, while moderate risk products will be monitored at a lower level of surveillance. Low risk products will be monitored at the lowest level of surveillance.

Food items have been classified for health and safety control purposes in three categories based on the possible health risk associated with each food category. As demonstrated below; the first food category includes foodstuff items with the highest risk and exposure to contamination and the third food category includes foodstuff items with the lowest risk and exposure to contamination.

A) High risk food products:

- 1 - Frozen novelties; Dairy and Milk and milk by-products; Fluid and Dried
- 2 - Cheeses from pasteurized milk and Cheeses from un-pasteurized milk
- 3 - Frozen Dairy products; Ice-cream and Processed Eggs; Liquid, Frozen and Dried
- 4 - Products containing eggs; Mayonnaise
- 5 - Bakery; Frozen and Ready to serve (i.e. Bakery & Cakes containing milk & eggs)
- 6 - Yellow Cheeses; Cooked
- 7 - Meat (incl. Poultry) products; Cooked, Dried, Smoked, Salted, Cured and Fermented.
- 8 - Infant cereals, cereal-substitutes & Baby formula
- 9 - Special food products; Dietary purposes
- 10 - Nuts and nut products, Coconut; Flaked and Dried
- 11 - Sesame, Sesame paste (Tahineh) and Peanut butter
- 12 - Raw Vegetables; Pre-cut, Packaged
- 13 - Raw, fresh Vegetables and mushrooms (e.g. tomato, eggplant; Preserved in oil.
- 14 - Low acid foods; Retorted (e.g. Mortadella)
- 15 - Acidified Low acid foods; Aseptic processing, modified atmosphere packaging
- 16 - Low acid foods; preserved and semi-preserved (e.g. Exotic foods)
- 17 - Marine products; Pickled, Spiced and Marinated (salted)
- 18 - Ground raw Meat products (e.g. Sausages and hamburgers)
- 19 - Marine products; Salted, Dried, Smoked, Cured & Fresh chilled, Frozen & Cooked
- 20 - Meat (including Poultry) products; Raw fresh chilled & Frozen – including offal

B) Medium risk food products:

- 1- Chocolate; primary manufacture (from cocoa beans)
- 2- Bakery products; Ready to serve (i.e. not containing milk & eggs as dried crumbs)
- 3- Mineral, spring water; Bottled and Malt beverages
- 4- Chocolate (including all types) and Cocoa and cocoa derivatives
- 5- Milk and milk by-products; Liquid Condensed and Evaporated
- 6- Jams and Sugar Confectionary (i.e. Candies, Ha'loum and Halawa)
- 7- Food Supplements and Frozen novelties (non-dairy)
- 8- Coffee whiteners, whips and creams
- 9- Fruits fresh; Processed or Dried
- 10- Vegetables; Fresh, Dehydrated and Dried
- 11- Spices and Soups; Dried and Yeast and bacterial cultures
- 12- Mixes and bases; Dried (e.g. Cake mixes, Jelly, Custard and Caramel)
- 13- Eggs in shell (table serve) and Butter
- 14- Fillings and Toppings and Gelatine desserts and puddings; Dried
- 15- Flour and Starch, Chips and Breakfast cereals (e.g. Corn flakes)
- 16- High Acid foods; Retorted or hot filled or Aseptic processing (e.g. Ketchup & Mustard)
- 17- Biscuits, Wafers and Cakes and Chewing gum (all types)
- 18- Fruit Juices and Concentrates and Fruits; Dried (e.g. Dates and dry figs)

C) Low risk food products:

- 1 - Carbonated Beverages
- 2 - Coffee and Tea (all types and shapes)
- 3 - Dairy products; Jameed
- 4 - Sugar and sugar syrups, Honey and black honey and Molasses
- 5 - Oils, Fats, Margarine and Butter blends
- 6 - Fruits; Fresh and Frozen
- 7 - Grains and grain derivatives (except flour)
- 8 - Salt and Vinegar
- 9 - Vegetables; Frozen and Beans
- 10 - Alcoholic drinks and Distilled Liquors
- 11 - Carbonated beverages concentrates, Flavour extracts and Food Additives
- 12 - Pasta, spaghetti and couscous
- 13 - Dried Herbs (e.g. mint & oregano)

* In cases where an imported food item is not listed in the above food categories, it shall be treated as a food item falling in the high risk category until a final classification is determined.

2.2 Selectivity Criteria and Levels of Inspection

- The national team worked alongside an international food trade consultant on setting the selectivity criteria taking into consideration a caution margin throughout the first few years of implementation and agreeing by consensus that the document review process will be mandatory regardless level of inspection.
- Selectivity criteria and levels of inspection based on the food categories classification shall be:
 - 80-100% of foodstuff consignments falling within Category One (high-risk category), shall be subject to inspection and sample collection for laboratory analysis.
 - 25-50% of foodstuff consignments falling within Category Two (medium-risk category), shall be subject to inspection and 50% of foodstuff shipments subject to inspection shall be further subject to samples collection for laboratory analysis via an electronically programmed method.

- 5-10% of foodstuff consignments falling within Category Three (low-risk category), shall be subject to inspection and sample collection for laboratory analysis electronically.

Selectivity Criteria	Red Channel Lab. Analysis	Yellow Channel Cargo Inspection	Green Channel Document Review
High Risk foods	80-100%	-----	0-20%
Medium Risk foods	15-25%	15-25%	50-70%
Low Risk foods	5-10%	-----	90-95%

- Imported food entries that are subject only to document review and found to be satisfactory without cargo examination or sampling are expected to clear the health inspection requirements within one working day.
- Imported food entries that are subject to document review and cargo examination are expected to clear the health inspection requirements in three working days. Imported entries that arrive in containerized reefer shipments may require 2-3 additional working days in order to arrange for the cargo to be off-loaded for appropriate examination when necessary.
- Despite what has been stated concerning levels of inspection and sampling collection based on food categories, an additional 10% of all food consignments shall be subject to inspection via the Random electronic method, whereby sample collection for laboratory analysis from such consignments will be left for the decision of the "Inspection and Sampling Committee" based on the sensory inspection results.
- Pertaining to banned food that have been officially declared prohibited to enter Jordan will neither be inspected nor samples collected for consignment.
- Concerning automatically detained food; i.e.
 - 1- Foodstuff items with evidence to continuous non-compliance with health and safety requirements
 - 2- Foodstuff items entering Jordan for the first time; where consignments will be subject to inspection and laboratory analysis for five successive shipments, and in case they were found in compliance with health and safety requirements, the detention will be lifted and foodstuffs will be subject to the regular risk-based food control inspection levels.
 - 3- Foodstuff items rejected from other countries.
 - 4- Foodstuff items that have been notified upon by other countries or related international organizations.

Clearance of such foodstuff items will be carried out ONLY after compliance with conditions of document review, inspection and laboratory analysis results stating fitness for human consumption.

2.3 Incentives and Penalty scheme

Incentives for foodstuff consignments in compliance with health & safety requirements:

- In cases where five successive foodstuff shipments for the same food item classified in first, second or third category and obtained from the same manufacturer/source and have proved compliancy with health and safety requirements after being inspected and having passed laboratory analysis, then:
 - A- All foodstuff consignments shall be subject to inspection.
 - B- Sample collection for laboratory analysis purposes will be carried out on one consignment out of four consignments which have been inspected.
 - C- Same foodstuff item obtained from same manufacturer/source shall be given such benefit as long as it complies with health & safety requirements.

Whereas, where a foodstuff consignment was not found to be in compliance with health and safety requirements, then benefits given shall be withdrawn and the consignment will be subject to the regular risk-based food control inspection levels until evidence of compliance is proved for the next successive five shipments.

3. Implementation Phase-Action Plan

The risk-based food control system has been discussed and investigated thoroughly among all related national line authorities since September 2000 where the final approval of the system was issued by the National Food Council in July 2001.

A comprehensive, time bound implementation plan was prepared and accomplished covering the following main themes:

- ✎ Issue the first Food Law of Jordan which will adapt to the new system concept on December 2001;
- ✎ Construction of a refrigerated inspection food centre for reefer shipments examination and portion sample collection with suitable transportation vehicles to the food laboratory, where it was launched on 17 Nov. 2002 and has been able to host approx. 40% of the actual reefer containers;
- ✎ Substantial renovation of the existing food laboratory in Aqaba with newly installed equipment and sufficient training on quality assurance programme and laboratory methodology of analysis working towards accreditation to ISO 17025;
- ✎ Renovation of ample office space for the food clearance centre to serve all related national agency officials with required logistics at the Port zone where channelling, document review and all other paper procedures take place;
- ✎ Provide necessary portion field sampling equipment with practical training sessions and introducing the sampling number code concept;
- ✎ Unifying and harmonizing the health certificates required submission on port of entry according to food groups and Introducing a new concept of third party accredited single Health Certificate and E- certificate approval as beginning of year 2003;
- ✎ Revising and updating some of the national standards and regulations; i.e. Shelf life standards, sample size as well as the temperature for reefer cargos regulations;
- ✎ Develop a systematic unified form for the clearance procedures of all imported food consignments to be filled out by national line agency representatives;
- ✎ Develop risk channelling protocol with the associated food groups electronically utilizing tools of ASYCUDA software. Thus, enabling importer agents to file the entry forms electronically to be further assessed throughout the clearance procedures.
- ✎ Design and structure a database archiving system that captures all import data, certificates, test analysis results with statistical tools to enable data analysis for a solid based risk management system, providing sets of reports on various parameters.

The risk based imported food control system was officially launched at Aqaba port of entry on 20 May 2002 and extended to the rest of Jordan borders of entry during 2004

4. Performance Assessment

- * From 20 May 2002, where the risk based system for imported food control was officially launched, until 31 January 2005, imported food consignments were processed as follows:

Food Consignments	Value	Percent%	Timeframes (Day :Hr :Min)
Total Number of consignments	17428	100%	-----
Red channeled consignments	9718	56.0%	24:01:00***
Yellow channeled consignments	1015	6.0%	05:20:00**
Green channeled consignments	6695	38.0%	01:14:00*
Number- Rejected consignments	70	0.4%	-----

* 50% of the green channel shipments (median) were cleared in (00:19:43)

** 50% of the yellow channel shipments (median) were cleared in (03:02:05)

*** 50% of the red channel shipments (median) were cleared in (20:24:44)

- * The main food types were meats, poultry and milk, dairy products, followed by grains, fish, fruits
- * Over 3500 reefer containers were inspected in the food inspection centre (Nov 2002 to Sept 2004)
- * Activating an electronic certification programme for animal origin products; where over 145 electronic health certificates have been issued for meat products imported from New Zealand since 17 November 2003 and from Australia mid October 2004. Thus, providing means of trustful and accurate documentation without the need of authorization from Embassies at country of origin
- * Long before RBS for food imports was implemented; there was no capture of actual timeframes of consignments clearance. Thus creating many delays with no means of detecting the liability - whether on public or private sector- (with 100% sampling and laboratory analysis); clearance time frames varied between 10-30 days with blurred and fuzzy responsibility. Since the Launch of the RBS; set clearance timeframe were anticipated for each channel and following 18 months of real practical operation where officers are documenting channelling and final health clearance time by day and time (hour: minutes); ASEZA was able to gather raw data (during the period 1 January-31 September 2003) and subject them to further statistical analysis on SPSS detecting the actual clearance timeframes highlighting spots of malfunction from both the public and private sector contributing to clearance delays and drawing a clear roadmap of accountability and responsibility of each stakeholder involved.
- * Aqaba Special Economic Zone Authority has issued the SOP- Standard Operating Procedures- for all phases entailed with health clearance of imported food consignments. Additionally, drawing out the detailed procedural flow chart and publishing the "Food Importers Guide" bilingual manual early 2004 - available electronically on www.aqabazone.com website.

5. Results and Conclusions

With the implementation of such a risk management approach for imported food control programme, Jordan was able to:

- ⇒ Decrease by about 50% of redundant sampling and test analysis
- ⇒ Drop the amount of bulk samples into reasonable portions to fit the lab analyses
- ⇒ Reduce timeframes required for clearance of imported food consignments
- ⇒ Resources oriented towards enhancing inspection methodologies and proper field cargo examination, portion sampling and more thorough laboratory tests to assess the safety and quality of imported foods
- ⇒ Establish the first electronic national database information system to build a strong data collection, tracking records, well analyzed trends, enhanced reporting and notification with equal incentive-penalty programme based on merit

- ⇒ Systemize transparent clearance procedures where stakeholders acknowledge their responsibility and accountability
- ⇒ Build a model for the region that can assist many developing countries to reach a risk management control approach with fairly reasonable resource allocation corresponding with globalization requisites

Jordan believes that risk management approach is the gateway towards a fair, transparent and merit-based treatment in the International food trade while maintaining science based decisions towards improved Consumer Safety & Quality Protection measures.

Conference Room Document 2
English only

FAO/WHO Regional Meeting on Food Safety for the Near East
Amman, Jordan, 5-6 March 2005

RISK MANAGEMENT APPROACH ON FOOD COMPLIANCE - MODEL STRATEGY
(prepared by the Delegation of the Hashemite Kingdom of Jordan)

1. Introduction

In January 2001, the geographical area surrounding the Port of Aqaba (where about 75% of food imports occurs), became the Aqaba Special Economic Zone (ASEZ) of an area 375km², administered by a legal independent Authority, which has complete mandate over the administration of the activities within the zone

The Aqaba Special Economic Zone (ASEZ) offers businesses and residents a planned environment consisting of high quality infrastructure, facilities, and support services, as well as an attractive package of incentives and liberal policy environment to help increase your operating efficiency.

The Aqaba Special Economic Zone (ASEZ) is a private sector-driven development initiative that maximizes private sector participation in a duty free, tax-advantaged and flexible regulatory operations environment with a vision to make the zone a leisure destination and trade hub in the region

The Authority has jurisdiction over all common areas of responsibility associated with law and order, security, trade and development, public health, and public administration, among other responsibilities. For this purpose, ASEZA law no. 32/ 2000 came very powerful and thus memorandums of understandings were signed to submit responsibilities on phases to the zone authority avoiding duplication and redundancy of work done between the official government authorities.

As a member of the WTO, Jordan has accepted the responsibility of the terms of Membership. This means that the measures imposed in protecting the public health against hazards associated with food from imported sources must not be trade restrictive, arbitrary, or disguised technical barriers to trade. Measures are also to be scientifically justified using risk assessment methods acceptable at the international level.

2. Purpose

The objective of this document is to develop an integrated Risk management strategy for the Food Compliance system model implemented in Aqaba Special Economic Zone - Jordan to be undertaken by the Health Control Directorate at Aqaba Special Economic Zone Authority.

3. Food Compliance - Risk management Concept:

Based on the objective of Aqaba Special Economic Zone Authority to implement a risk management approach of food compliance in the zone as been introduced in 1999 by Codex Alimentarius to the international community and following the benchmarking process carried out with various regional and international models and in light of the actual findings in the zone;

Aqaba Special Economic Zone Authority has designed the system according to the following criteria:

- 3.1:** Adopted All Definitions of food safety risk analysis related to this document based on the Codex Alimentarius formal published texts;
 Additionally has defined risk categories:
 High-Risk Business= Where potential exists to put vulnerable groups (i.e. infants, frail elderly, pregnant & the sick) or large number of consumers at serious risk due to the nature of food, manner of food preparation or processing, facilities provided and control system in place
 Medium- Risk Business= Where high-risk, ready to eat foods are not prepared, but the scale of business is large such as (Shellfish, fish, raw and cooked meat, cooked poultry, cooked chill and freeze meals, milk, eggs, cooked rice and pasta & foods containing these ingredients)
 Low-Risk Businesses= Where the potential to cause harm to consumers is low
- 3.2:** Adopted the Risk Categorization of activities as demonstrated below

Activity Type	Risk Category
Primary Producers:	
Honey	Low
Natural water/ Ice	High
Poultry	Low
Manufacturers & Packers	
Alcoholic Drinks	Low
Baby Foods	High
Bakery	Medium
Caterer	High
Cereal products	Low
Chocolates	Medium
Confectionary	High
Sweet/Sugar Confectionary	Low
Cook Chill	High
Crisps	High
Delicatessen foods	High
Fish Processing/ Smoking	High
Other Fish Processing; freezing	Low
Food Additives	Low
Fruits & Vegetables; Ready	High
Fruits & Vegetables; Further cook	Medium
Ice cream	High
Jams & Jelly	Low
Meat Products	High
Milk Products	High
Oils & Fats	Low
Soft drinks	Low
Warehouses; No packing	Low
Warehouses; Food Packers	Medium
Distributors, Retailers & Transporters	
Alcoholic Drinks	Low
Bread Shop	Medium
Coffee Shop	Medium
Cold Store	Medium
Dry Goods	Low
Fish & Fish products	High

Flour Confectionary; Bread	Low
Flour Confectionary; Egg & Cream	High
Frozen Foods	High
Fruits & Vegetables	Medium
Ice Cream	High
Meat & its products; Raw Meat	Medium
Meat & its products; Cooked Meat	High
Milk & Milk products including local labneh & Cheese	High
Oils & Fats	Low
Soft Drinks	Low
Sugar Confectionary; Sweets and Cakes	Medium
Sandwiches & Salads	High
Delicatessen	High
Falafel, Foul & Humos Shop	High
Health Food Shop	Medium
Newsagent/Gift shop	Low
Nuts Roasts & Spice Mills	Low
Fishmonger	High
Greengrocer/ Fruits & vegetables	Low
Grocery	Medium
Grocery; with Greengrocer	Medium
Supermarket	High
Department Store	High
Food Stalls	
Vending machine; High Risk perishables	High
Vending machine; Non-High Risk stable	Low
Food Stall Chilled High Risk foods	High
Food Stall Fruits & Vegetables	Low
Food Stall Raw Meat/ Fish	Medium
Food Stall Cooked Meats/ Shawermah	High
Food Stall Candy Floss	High
Food Stall Chip Van	High
Food Stall Ethnic Food	High
Food Stall Ice Cream	High
Food Stall Pop Corn	Low
Food Stall Juices	High
Food Stall Tea/ Coffee	Medium
Service Sector	
Restaurant/ Canteen	High
Canteen (hot & cold drinks & sandwiches); with Grocery	High
Hotel; Serving Meals	High
Hotel; No meals or restaurants	Medium
Pre school; Serving Meals	High
Pre school; Snacks Only	Medium
Schools; Serving meals	High
Schools; Ready to eat foods	Medium
Meals-on-Wheels	High
Take Away/ Outside catering	High
Passenger ferry; Kitchen facilities	High
Guest House; Serving meals	High
Holiday/Labor Camp	High
Public House; Serving food	High
Public House; Not serving food	Medium

Nursing Home; Long term care facility	High
Hospital	High
Prison	High
Manufacturers Selling primarily Direct to Consumer	
Bakery; Flour products Only	Medium
Butcher/ Poulterer	High
Butcher; with Grill restaurant	High
Bakery; with Confectionary	High
Ice cream	High

Note: Food Businesses could fall into more than category; then should be treated on the basis of highest risk category. Any deviation from the above Risk Categorization shall be justified on the record of the specific activity; where certain activity may obtain lower categorization due to its history “Gold List/Black List” Concept

- 3.3: Adopted the routine frequency of inspection - Grading system matrix as follows:

Jordan- ASEZ/Year	A 100-90% B 75-89% C 74-60% D 59-45% E 44-30%
High Risk	A= 3 times (13 weeks) B= 4 times (10 weeks) C= 9 times (5 weeks) D= 13 times (3 weeks) E= 26 times (2 weeks)
Medium Risk	A= 2 times (16 weeks) B= 3 times (13 weeks) C= 6 times (7 weeks) D= 9 times (5 weeks) E= 17 times (2 weeks)
Low Risk	A= 2 times (20 weeks) B= 3 times (16 weeks) C= 5 times (9 weeks) D= 6 times (7 weeks) E= 13 times (4 weeks)

- 3.4: For the purpose of system automation and easier data manipulation, ASEZ was categorized into fourteen coded plots based on closeness and density of economic activities thus enabling the proper coding for each food activity in a specified area/region
- 3.5: Adopt the violation code based on the Jordan Food law No. 79/ 2001, summarized in:

Sanctions/ Penalties	Cases subject
Clause 22-A: ✦ Imprisonment of min. 3 months- max.12 months OR; ✦ A Fine of min. JD 1000-max. JD 3000 OR both penalties	* Clause 17-A: Handled Adulterated/Fraud Foods AND Unsafe for Human Consumption: - If it contains a toxic or harmful agent, excluding pesticides or contaminants for which a maximum residue limit has been established by international or national standards or technical regulations for that food and that residue has been found in that food to be within the established limits - If it contains a food additive that is not permitted in that food - If it is rotten, decayed, putrid or deleterious material whether

	<p>whole or in part, taking in account the technical regulations and standards for the food</p> <ul style="list-style-type: none"> - If it is handled under conditions or circumstances which may cause the food to become unsafe or unsuitable for human consumption - If it is a product of a diseased animal or an animal that has perished by means other than by slaughter and its product is not fit for human consumption - If it is packed in a container made of a material that is not approved for such food packaging - If it is exposed to radiation and its radiological activity rate is above the maximum permitted limits established at the international levels - If it contains hormones, chemicals, veterinary drugs or the residues of any of these agents and the residue levels exceed established maximum residue limits established by international or national standards or technical regulations, or there is no standard or technical regulation permitting their use or the residue of these non-permitted agents in food - If the shelf life of the food is expired according to the label and was proved unfit for human consumption by laboratory analysis <p>If it contains a food additive that is approved for that food but has been added in amounts that exceeds the established maximum permitted limits as determined by international or national standards or technical regulations</p>
<p>Clause 22-B</p> <ul style="list-style-type: none"> ✦ Imprisonment of min. 2 months- max.6 months <p>OR;</p> <ul style="list-style-type: none"> ✦ A Fine of min. JD 250- max. JD1000 <p>OR both penalties</p>	<p>* Clause 17-B: Handled Adulterated/Fraud Foods:</p> <ul style="list-style-type: none"> - If it contains a food additive that is approved but not permitted for that food as determined by the technical regulations - If any of its ingredients is removed, changed or reformulated unless stated in the label and such processes had been approved within the terms and instructions issued by the FDA general manager - If a substance is added to it and the substance diminishes the food's nutritional value with the aim of benefiting economically or when added in order to conceal a certain defect or shortage or to add bulk or weight to the food. - If the shelf life of the food is expired according to the label and there was NO prove that the food is unfit for human consumption by laboratory analysis - If it was handled in conditions abusing the scientific principles of food handling <p>If it was breaching the quality standards determined by the technical regulations</p>
<p>Clause 22-C</p> <ul style="list-style-type: none"> ✦ Fine of min. JD 250- max. JD 500 	<p>* Clause 18: Handled Misbranded/Cheated Foods:</p> <ul style="list-style-type: none"> - If it is not harmful imitation of another food unless the label states clearly that it is an "imitation" before mentioning the name of the original food directly and the label has been approved by the concerned authority for use before the food's handling - If the food is filled or prepared in a misleading manner - If the food contains any artificial flavor, color or permissible food additive, and the label does not reveal those facts and the presence of such substances does not comply with the contents of this food - If the label is false or misleading

	<ul style="list-style-type: none"> - If the label does not state the following: <ol style="list-style-type: none"> 1. Name of the Food. 2. Name and address of the manufacturer, packaging party 3. Statement of contents in terms of weight or measure or count. 4. Statement of ingredients in the order of their preponderance. 5. Storage method when the food is made of substances that require certain storage conditions. 6. Date of production or validity (expiration date) when the food is considered to have a limited shelf life - If the label includes words, expressions or data that are not readable or understandable for the lay person within the usual conditions of handling <p>* Who promote, disseminate, or participate in disseminating misbranded food</p>
<p>Clause 23</p> <ul style="list-style-type: none"> ✦ Imprisonment of min. 12 months to max.36 months <p>OR;</p> <ul style="list-style-type: none"> ✦ A Fine of min. JD 1000-max. JD3000 <p>OR both penalties</p>	<ul style="list-style-type: none"> * A person who handles any food before being licensed and approved for handling by the provisions of this law * A person who disposes of food while under seizure according to the provisions of this Law * A person who re-opens a shop that has been shut down according to the provisions of this Law * A person who re-handles food that has been decided to be destroyed * A person who handles any expired food * A person who introduces changes to the expiry period of any food other than stated in the original label of this food * A food that was handled before licensing the activity according to the instructions issued by the Minister (Clause 15)
<p>Clause 24</p> <p>A Fine of min. JD 25-max. D250</p>	<ul style="list-style-type: none"> * Violations in cases not mentioned above

* Note: 1st & 2nd Sanctions above:

Clause 22-D: If a violation is repeated for a second time, the violator shall be subject to twice the minimum penalty stipulated in the Provisions of this Article. If a violation is repeated more than twice, the violator shall be subject to twice the maximum penalty and shall be prohibited from resuming practice for an minimum of 12 months

Clause 22-E: For the purpose of this law, the violation committed within the same year where penalties are imposed

Clause 20: Notwithstanding what was stated in any other legislation, the Minister/Chief shall have the right, according to declared timeframe, to:

1. Issue a written order to prohibit the handling of foods which are misbranded or adulterated or which prove to hazardous or potentially hazardous to health or unfit for human consumption.
2. Prevent the display of foodstuff in a manner that violates the food safety requirements or subject such foodstuff to contamination.
3. Issue a written order to withdraw from the market within a period he specifies any food that falls under the provisions of clauses (1,2) of this paragraph.
4. Issue an order for seizure of such food under the provisions of Clauses (1,2 and 3) in this Paragraph and which prevents disposing therewith. In such cases, the Minister has the right decide the site where the food is to be kept until the Court reaches a decision thereabout.
5. Authorize in writing any of the Directorate's employees to inspect the food place and to collect, without charge, samples of imported or locally produced food for the purpose of testing and analyzing it to determine its suitability for human consumption and compliance with the food standards or technical regulations, all at the expense of the owners or possessors, except for *fees*

for samples of handled food items taken for the purposes of periodic control activities of the Directorate.

6. Prohibit the storage of any imported food in the Kingdom or the free zones if found to be unfit for human consumption.
7. Prohibit any processes, which modify the foods stored in the free zones that may result in the falsehood of data on the label, excluding the manufacturing processes that have been approved

• **3.6:** Legal Actions taken upon violations shall be as following:

Phase one- Improvement Notice (تنبيه)

Phase Two- Warning Notice (انذار)

Phase Three- Violation order (مخالفة)

Phase Four- Closure of establishment

Specific cases were detected and documented as shown below to create systematic means:

Violation	Action
Display of food unfit for human consumption and/or expired shelf life	violation
Food stored in toilet rooms	violation
Rodents & insects (cockroach, ant, fly, mice) in the food premises	warning
Opened garbage & refuse containers	warning
Food and / or packages damaged or destroyed	warning
No declaration of expiry / production dates on identification label	warning
Unclean equipments , utensils, tools, machines, surfaces	warning
Poor personnel hygiene	warning
Toilet close to the kitchen	warning
Poor cooling & freezing of refrigerators	warning
Food storage in aluminum utensils	warning
Carcass display outside the refrigerator	warning
Unclean rinse water	warning
Unclean refrigerator	warning
Unwrapped /uncovered food	warning
Unclean food premises esp. in critical places	warning
No health certificates	warning
Prepared of food items outside the food premises	warning
Presence of litter & unnecessary articles	notice
Staff not wearing appropriate working aprons and gloves	notice
No window sieves	notice
Improper arrangement / isolation of food in refrigerators	notice
Display of food items outside the food premises	notice
Pets inside the food premises	notice
Unclean stores	notice
Poor maintenance of fixtures & sewage drains	notice
Poor maintenance of floors, walls, ceiling and store area	notice

- **3.7:** Adopted the designed generic inspection report that shall apply to all food activities according to the key legend matrix identifying inspection criteria according to the food activity type.

The inspection report is evaluated using 100 point scoring system of the inspection as below:

Inspection Report Sections	Scores
Section A: Food	9
Section B: Food Protection & Preparation	19
Section C: Personnel	13
Section D: Food Equipment & Utensils	18
Section E: Water	4
Section F: Sewage	3
Section G: Plumbing & Fixtures	3
Section H: Toilet rooms & Dressing facilities	6
Section I: Solid Waste & Refuse Disposal	3
Section J: Vermin Control	7
Section K: Floors, Walls & Ceilings	4
Section L: Lighting and Ventilation	4
Section M: Operations	7

- **3.8** Based on ASEZ Business census data, an initial first round of on-site verification took place between September and October 2003 and revisited in May 2004 to capture all activities on a unified data pool and evaluate the average initial grade of the activity to determine the regular frequency of inspection schema per risk category. Food Inspectors shall commerce based on the data obtained and update consistently during the field inspections. Until the Post audit Automation project is completed and fully functional by end 2005, inspection results shall be documented manually on “Inspection Report” and data shall be entered electronically on excel sheets designated per each activity/ geographical location for traceability purposes and interpreted via access application on an active and live shared folder created within the main food servers for the food inspection unit team
- **3.9** Implementing Food Safety Awareness programme
 With distinguished ASEZA Food character and “*Do it Right... Protect your Bite*” slogan, The materials (i.e. Phase one concluded in five themes) were disbursed starting May 2004 targeting various audience segments (Food managers and handlers, consumers including housewives and children, tourists and official channels)
 This is important to create the corporate image of ASEZA especially Health & Food Control work role model with a precedence educational objective prior to drawing accountability and liability thus increasing consumer confidence and elevating industry capacity for economic benefits in food trade
 Food Inspectors were subject to extensive training prior to their field inspections and will be subject to more upon introduction of the automated system of the post audit and inspection activities

 Plan of Awareness Activities is:
 3.9.1 Basic Food Awareness Campaign (i.e. “Food Safety Truth”, “Temperature Chart”, “Kitchen Tips”, “To go & Serve” and “Kids Food Zone”)
 3.9.2 Advanced Food Safety Awareness Campaign with more detailed features and measures with themes on FBD and HACCP as well as

3.9.3 Food Safety Training- Coaching programmes Campaign (i.e. Introduction of HACCP system, school class on food safety, etc)

3.9.4 Certification of Food managers/ Food handlers within the zone via regular one-two days of orientation workshop performed by Food Inspection unit trainer

Awareness Campaign information can be accessed on:

http://www.aqabazone.com/environment/E_Food_Control_Aware.html

- **3.10:** Adopt the Work plan phases for preparation, launching and implementation of the risk based system of food compliance in ASEZ illustrated in this Concept document and mapped on detailed plan matrix as track record of the system model conception summarized in:
 - 3.10.1. Recruiting and training of food inspectors; August- October 2003
 - 3.10.2. Field trips to create the inventory of food related activities in the zone per location; October- December 2003 – Still On going
 - 3.10.3. Classifying each type of activity according to the associated health risk as recommended in the risk categorization table
 - 3.10.4. “Clean Up campaign” to promote the very basic concepts January -Feb 2004
 - 3.10.5. Food Safety Awareness – Phase one campaign including workshops for food managers/food handlers in ASEZ; March-July 2004
 - 3.10.7. Regular inspection system while developing automation concept & architecture Starting 3rd mid 2004
 - 3.10.8. Automation of the whole post audit and inspection system; undergoing. To be launched by October 2005

4. Risk management Model - ASEZ Findings

- **4.1** ASEZA Food Inspection team was able to analyze the current risk level situation in the zone concerning the food sector
- **4.2** Over 850 Food activities were identified in the zone, of which 43% classified high risk, 44% medium risk and 13% low risk
- **4.3** Highest number of food activities are Groceries followed by Restaurants and Supermarkets which a rapid increase of activities over a short period of time
- **4.4** Most of the food activities grading were ranging between grade B and grade C (60-89%) which indicates the need for better and thorough inspection activity alongside coaching enforcement and public awareness
- **4.5** Classified food activities based on their standard type until December 2004:

Activity Type	No. of Activities
Alcoholic drinks	13
Bakery	10
Bread Shop	11
Butcher	32
Butcher with Grill	4
Canteen	28
Canteen with Grocery	32
Cereal Products	1
Coffee shop	34
Department Store	2
Falafel & Humos	34
Fishmonger	12
Frozen foods	6
Greengrocer	31
Grocery	302
Grocery with Greengrocer	2

Hotels serving meals	22
Hotels; No meals	20
Ice	2
Ice Cream	3
Milk & Milk products including local labneh & cheese	2
Natural water	1
Newsagent; Gift shop	3
Nuts roasts and Spices mill	23
Passenger ferry; Kitchen facilities	3
Poulterer	11
Preschools; Ready to eat food	1
Rail buses facilities; Sandwiches	2
Restaurant	103
Schools; ready to eat foods	33
Sugar Confectionary; Sweets	5
Supermarket	69
Warehouses; No Packing	15
TOTAL	871

- **4.6** Food Activities detected risk Category until December 2004:

Risk Cat	No.	%
High	387	43.3
Medium	395	44.7
Low	89	9.9
Closed	18	2.1
Total	889	100

- **4.7** Food Activities Grading results until December 2004:

Grade	No.	%
A	21	3.1
B	176	22.6
C	448	45.4
D	120	14.5
E	3	0.5
Closed	24	2.8
Removed	32	3.2
N/A	65	7.9
Total	889	100

FAO/WHO Regional Meeting on Food Safety
for the Near East
Amman, Jordan, 5-6 March 2005

Conference Room Document 3
English only

Causes of food-borne disease / food poisoning

CHEMICALS
BACTERIA
FUNGI
PARASITES
VIRUSES
PRIONS

INFORMATION
NOTES



Introduction

Food-borne disease or food poisoning occurs as a result of consumption of food contaminated with either biological or chemical agents. These can also be grouped as infective agents and toxic agents.

Toxic agents:

These can be described as chemical substances or agents which can be naturally occurring in the food, be a by-product of microbial (bacterial toxins, mycotoxins) or algal growth (biotoxins), residues of veterinary drugs and pesticides used in primary production, contaminants from the environment, industrial by-products or accidents such as heavy metals, dioxin, PCB's, radioactive substances or substances leaching from packaging materials

Infective agents

Bacteria:

These microbiological agents are long known for their use in food preservation e.g. fermentation but are also the primary cause of food spoilage and important cause of food and waterborne disease. Food plants and animals can be colonized and/or infected with bacteria during primary production and this is an important source of contaminated foods. Food can also be contaminated with bacteria from the environment via water, air, contact surfaces, insects, rodents etc. Observance of good agricultural practices, good hygienic practice and good manufacturing practices are critical to minimize their introduction to the food chain.

Viruses:

These very small particles are thought to be responsible for a large proportion of food-borne disease. They require a host in order to grow and multiply but are capable of survival outside a host for periods of time. They are most often spread by person to person contact or faecal contamination of food and water.

Parasites:

Parasites are sometimes considered to be a problem in tropical regions or areas with poor sanitation. However, outbreaks of food-borne disease caused by parasites in recent years have highlighted the widespread nature of the problem. Globalization of food trade has also been a factor in parasitic food-borne disease with some protozoan parasites capable of producing very resistant forms (oocysts) which can survive outside the host for long periods of time.

Prions:

Compared to those previously mentioned prions are a recent addition to the list of agents that cause food-borne disease. The first data describing bovine spongiform encephalopathy in cows was only published in 1987 and it was 1994 before the first possible case of nvCJD was reported. Much research has been undertaken in the past 10 years and the risk of contracting nvCJD from beef products has been estimated to be very low. Yet the fatal nature of the disease means that the detection of even one animal positive for BSE within a country has huge economic consequences.

Toxic/chemical agents

Exposure to chemicals in food can result in acute and chronic toxic effects ranging from mild and reversible to serious and life threatening. These effects may include cancer, birth defects and damage to the nervous system, the reproductive system and the immune system. Chemical substances of most concern include pesticide residues, antibiotic residues, hormone growth promoters, and heavy metals. Chemical substances that constitute food-borne hazards can be categorized as follows:

- industrial and environmental contaminants;
- biologically derived substances and contaminants;

- contaminants produced during processing;
- improperly used agrochemicals;
- improperly used additives.

Although microbiological contamination causes more food-borne illness, consumers tend to be most concerned about chemical contamination of their food supply. The recent contamination of agricultural products in Europe with dioxin confirmed the general public's fears of chemical contamination of the food supply. For many chemical contaminants, low levels of consumption are both unavoidable and harmless. Because the period of time between exposure to chemicals and any negative health impact tends to be long, it is difficult to definitely attribute disease actual foods.

The protection of public health from chemical hazards has been long been based on the outcomes of safety assessments risk assessments. FAO and WHO have been addressing the issue of chemical contamination for over 40 years, through risk assessment bodies such as the joint FAO/WHO Expert Committee on Food Additives, JECFA¹, and the Joint FAO/WHO Expert Meeting on Pesticide Residues, JMPR². The assessments are the basis for international guidelines and national regulations.

A short overview of different toxic or chemical agents which can occur naturally or be found as contaminants in foods is provided below.

Industrial and environmental contaminants

This group comprises a wide range of substances such as heavy metals, radionuclides, PCB's, dioxins, nitrites/nitrates etc.

Heavy metals, such as arsenic, cadmium, cobalt, copper, lead, mercury can contaminate crops and animals through environmental exposure to natural sources, but also through environmental and industrial pollution. Mercury for example is commonly associated with large fish species such as tuna, shark and swordfish. Mercury finds its way into the environment through industrial pollution such as the combustion of mercury containing coal in power plants and older chlor-alkali plants, which use mercury to convert salt to chlorine gas and caustic soda. Lead is often associated with canned foods, acidic foods and drinking water and it comes from vehicle emissions, smelting and paints among others. Cadmium is often found in molluscs and crustaceans and crops such as grain. Cadmium is released into the environment through the emissions or wastes form manufacturing facilities of cadmium containing products such as cadmium pigmented plastics, cadmium stabilized polyvinylchloride (PVC) products, cadmium alloys etc. or the improper disposal of nickel-cadmium batteries.

Radioactive substances such as Caesium 137 or Iodine 131 may contaminate food through industrial accidents, fall-out, and natural sources.

Nitrites/nitrates are often associated with fertilizers and agriculture run-off and can contaminate vegetables and drinking water. **PCBs** and **dioxins** are by-products of fires, including bonfires, and some manufacturing processes. The manufacture and general use of PCBs stopped in the 1970's and their use is now banned. The major industrial releases of dioxins are subject to environmental controls. However, PCBs and dioxins are long-lasting environmental contaminants. The highest concentrations are found in fatty foods such as liver and oily fish. The main sources of dioxins in the diet are from meat, meat products and milk and dairy products

¹ Joint FAO/WHO Expert Committee on Food Additives (JECFA) <http://www.who.int/pcs/jecfa/jecfa.htm> or http://www.fao.org/es/ESN/Jecfa/index_en.stm

² Joint FAO/WHO Expert Meetings on Pesticide Residues (JMPR) <http://www.who.int/pcs/jmpr/jmpr.htm> or <http://www.fao.org/ag/agp/agpp/pesticid/>

Substances such **vinyl chloride monomers** can be introduced to food through leaching from packaging materials such as PVC. As a result many countries now have limits regarding the level of residual monomers that are permitted in food packaging and contact materials.

Biologically derived substances and contaminants

Mycotoxins are fungal metabolites produced by number of fungal species. They can have serious effects on human health. when ingested, inhaled or absorbed through skin and cause lowered performance, sickness or death in man as well as animals and birds. There are over 200 kinds of mycotoxin, produced by about 150 different fungi, but only a small number occur in foods and feeds at levels likely to cause concern. Acute effects of mycotoxication include headache, fever, nausea, diarrhoea, vomiting, weakness, tremors, convulsions and in some cases death. Long term effects include cancer and genetic and birth defects.

Mycotoxins are produced when fungi infect agricultural crops particularly cereals and oilseeds and nuts during the growth of the crop and/or during post-harvest storage. They may also occur in milk, meat and associated products as a result of animals eating mycotoxin contaminated feedstuffs.

The main mycotoxins affecting humans are as follows:

Ergot alkaloids (St Anthony's fire)

- Reports of this date back to the Middle Ages.
- Associated with cereals infected with *Claviceps purpurea*.

Aflatoxins

- Produced by strains of *Aspergillus flavus*
- Associated with nuts, cereals, etc.
- There may be carryover from animal feed to foods of animal origin for humans. An example of this is aflatoxin M1 in milk.
- Aflatoxins are acutely toxic, and have also been shown to be carcinogenic (they cause cancer) for humans.

Fumonisin

- These are produces by *Fusarium* spp
- Found worldwide primarily associated with maize

Patulin

- These are produced by *Penicillium* spp, and *Aspergillus* spp
- They are mainly associated with apple and apple based products

Ochratoxin A

- This is produced by *Aspergillus ochraceus* and *Penicillium verrucosum*
- Mainly associated with barley and wheat, but also other cereals, vines, coffee, spices, nuts, figs.

Table 1 provides an overview of conditions for fungal growth and mycotoxin production.

Bacterial toxins are the mechanism by which some pathogenic bacteria produce disease. Bacterial toxins take 2 forms: endotoxins and exotoxins. Endotoxins are cell associated lipopolysaccharides (LPS) only produced by certain bacteria known as Gram negative bacteria. They can cause fever, septicaemia and even death. These toxins are very heat resistant and are associated with bacteria such as *Escherichia coli* and *Salmonella*. Exotoxins are soluble proteins secreted by growing bacteria. Examples include the following: Tetanus toxin – *Clostridium tetani*; Diphtheriae toxin - *Corynebacterium diphtheria*; Shiga toxin - *Shigella dysenteriae*; *Botulinum* toxin – *Clostridium botulinum*; and *Staphylococcus* toxin. They are produced by both gram positive and gram negative bacteria and are extremely toxic even at high

dilutions. Toxin production and secretion is related to environmental factors such as temperature, salt, pH, amino acids, iron etc.

Bacteria also produce by-products which can be toxic to human health. An example is histamine which is produced by a number of spoilage bacteria and is often associated with cheese and fish.

TABLE 1: CONDITIONS FOR FUNGAL GROWTH AND MYCOTOXIN PRODUCTION

Mould	Mycotoxin produced	Conditions for growth		Conditions for mycotoxin production	
		Temp °C	A _w	Temp °C	A _w
<i>Aspergillus flavus</i>	Aflatoxin B ₁ , B ₂	10 (min) ~30 (opt) 43 (max)	0.82 (min) 0.99 (opt) 0.998 (max)	15 (min) 20 -30 (opt) 37 (max)	0.87 (min)
<i>Aspergillus parasiticus</i>	Aflatoxin B ₁ , B ₂ , G ₁ , G ₂	10 (min) 30 (opt) 43 (max)	0.83 (min) 0.99 (opt) 0.998 (max)	15 (min) 28 (opt) 37 (max)	0.87 (min)
<i>Fusarium sporotrichioides</i>	T2 toxin	2 (min) 22.5 – 27.5 (opt) 35 (max)	0.88 - > 0.99	-	-
<i>Fusarium graminearum</i>	Deoxynivaleno Zearaleone	24 – 26(opt)	0.9 - > 0.99	-	-
<i>Fusarium moniliforme</i>	Fumonisin B ₁	2.5 - 5 (min) 22.5 – 27.5 (opt) 32 -37 (max)	0.87 - > 0.99	-	-
<i>Penicillium verrucosum</i>	Ochratoxin A	0-31	0.80 (min)	0 – 31 can get high prod at 4	0.86 (min)
<i>Aspergillus ochraceus</i>	Ochratoxin A	8 (min) 25 - 31 (opt) 37 (max)	0.79 (min)	15 (min) 25 - 28 (opt) 37 (max)	0.88

- no information available

Reference: FAO/WHO. 2001 Manual on the application of the HACCP system in mycotoxin prevention and control. Food and Nutrition paper 73

Marine biotoxins are produced by dinoflagellate algae. These toxins are secondary metabolites and it is not clear why they are produced. The most important are shellfish toxins and ciguatoxins. To date, five groups of shellfish toxins have been distinguished, namely:

- i. paralytic shellfish toxins causing paralytic shellfish poisoning (PSP);
- ii. diarrhoeic shellfish toxins causing diarrhoeic shellfish poisoning (DSP);
- iii. amnesic shellfish toxins causing amnesic shellfish poisoning (ASP);
- iv. neurotoxic shellfish toxins causing neurotoxic shellfish poisoning (NSP); and
- v. azaspiracid shellfish toxins causing azaspiracid shellfish poisoning (AZP).

Ciguatoxins cause ciguatera fish poisoning (CFP). PSP, DSP, ASP, NSP and AZP are caused by human consumption of contaminated shellfish products whereas CFP is caused by the consumption of

subtropical and tropical marine carnivorous fish that have accumulated ciguatera toxins through the marine food chain.

Natural substances that are toxic are produced by many plants that are staples in the human diet contain substances. Among the best known naturally present food-borne hazards are cyanide in cassava, alkaloids in potatoes, psilocybin in poisonous mushrooms. Generally, there are few cases of disease due to poisoning since the hazards are well-known, and foods are avoided, or preparation or processing techniques have been developed over the generations that make the food safe. Special plant breeding programmes have reduced the level of toxic substances sufficiently to make the food safe. Outbreaks tend to mainly occur in cases of extreme hunger or other emergency circumstances, when preparation is compromised.

Plants such as cassava contain high levels of cyanogenic glucosides, which are substances that decompose to release hydrogen cyanide that is highly toxic. Correct processing and cooking of cassava eliminates this potential health problem. Solanine is an alkaloid found in the sprouts and green skin of potatoes. Cooking potatoes does not eliminate the toxin, therefore these parts of potatoes should not be consumed. The alkaloid causes gastrointestinal illness and neurological disorders. A range of other substances may be found in what are commonly consumed foods. For example, legumes may contain substances such as protease inhibitors and haemagglutinins that prevent growth, but cooking easily destroys these substances.

We must recognize that our knowledge regarding natural toxins is still developing, and that we may discover that substances are present in our food which previously, as a pure chemical substance, were classified as toxic. Not enough is known of the interaction of substance in the human body, of the actual toxic effect of substances that hitherto were regarded as poisonous. Recently there was great concern when it was discovered that acrylamide is being formed during the baking or frying of high-carbohydrate foods such as baked potatoes, biscuits, and bread. As a chemical substance, acrylamide is classified as a probable human carcinogen, but at this stage the extent of the risk to humans of acrylamide in food formed during baking or frying is still unknown. The advice most governments therefore issued to the general public therefore tended to be that consumption of baked and fried foods should be moderate, within a varied and healthy diet, until more is known about this substance and its effects.

Improperly used agrochemicals

Pesticides are substances that are used prevent the destruction of crops by pests such as fungi (fungicides), rodents (rodenticides), herbs (herbicides), insect (insecticides), etc. Pesticides are widely applied in agriculture, horticulture, food processing, and food service establishments. Improper use may results in residues being carried over into food and animal feedstuffs, and thus can affect the safety of food. A wide range of pesticide formulations, such as organochlorine and organophosphorous substances, methyl bromide, dithiocarbamates, etc. has been registered for agricultural usage, and in many countries residue limits or tolerance levels have been established for pesticides in food. In order to be registered, a pesticide is subjected to a review and approval process based upon intended use and properties of the pesticide, including an assessment of risks to human health, domestic animals, wildlife, plants, groundwater, beneficial insects and other environmental effects. A further issue is the potential risk to humans when handling and preparing pesticides for use on crops and in premises. Pesticides are highly toxic in concentrated form, and occupational exposure may result in serious risks to health. Levels of pesticides found on fresh fruits are often alarmingly high. Some crops require extensive intervention to control pests; hence residue problems may occur if good agricultural practices are not applied to actively minimize the risks. This includes correct application of the appropriate dose.

Maximum residue limits (MRLs) have been set by the Codex Alimentarius Commission for pesticides in food commodities. Foods listed shall not contain more than the MRL (in mg/kg) of the pesticide

residue. MRLs are based upon public health, occupational health and environmental safety considerations; and assist in ensuring the minimum amount of pesticide is used.

Veterinary drugs are used in animal husbandry to treat or prevent disease and infection in food-producing animals, or included in animal diets as growth promoters. Poor management or improper use may result in residues in meat after slaughter, or in milk, seafood, or other animal products. The development of antibiotic resistance is a further concern, and has resulted in many countries banning the use of those antibiotics that are also used for human medicine, to treat farm animals. All veterinary drugs are approved for specific applications, and withholding periods (minimum time period between treatment and slaughter) are set to enable the drug concentration to fall to an acceptable level before the animal is slaughtered. By applying a withholding period, the food-producing animal has the opportunity to reduce the drug level to below the approved MRL (maximum residue level).

Other agrochemicals that may contaminate food if used incorrectly include growth promoters, fumigants, fertilizers, plant growth regulators

Improperly used additives.

Many additives are used in food production, processing and preservation. Evaluations have been undertaken at national level and also by JECFA at the international level to provide the basis for regulations to ensure that these are used correctly and do not pose a hazard to human health. Food additives include colouring agents, flavouring agents and enhancers, antimicrobials, antioxidants, stabilizers, anti caking agents, texturizing agents, thickeners, sweeteners, emulsifiers etc. to name but a few. Incorrect or unauthorized use of additives can be a potential cause of food poisoning. A recent example was the use of Sudan 1 dye in a batch of chilli powder produced in India. This is not a permitted food additive as it can lead to an increase risk of cancer. The contaminated chilli powder was subsequently used in the manufacture of Worcester sauce which was subsequently used as an ingredient in a wide range of products in the UK which were subsequently exported to a number of markets mainly in Europe.

Other potential sources of contamination come from the cleaning agents, detergents, sanitizers, solvents, processing aids, filter aids etc which may be used in the processing facility.

Contaminants produced during processing

In some cases the way in which a food is processed or preserved may lead to the production of toxic agents. For example, during the curing of meat using nitrites, under certain conditions not yet fully understood, the natural breakdown products of proteins known as amines can combine with nitrites to form compounds known as nitrosamines. There are many different types of nitrosamines, most of which are known carcinogens in test animals. Fortunately, not all cured meat products contain nitrosamines and when present, they usually are in very minute amounts. Another example which has recently been in the news is acrylamide. Acrylamide can be produced in certain starch-based foods, such as potato chips and French fries when they have been cooked at high temperatures. Acrylamide has been categorized as a probable cause of cancer in humans and studies and assessments are underway to better categorize the risk to human health. Other contaminants in this group include polynuclear aromatic hydrocarbons which are produced during certain cooking practices e.g. charcoal grilling, smoking. Nitropyrenes can also be produced during cooking. Another contaminant recently in the press was chloropropanols. The exact conditions required for the formation of chloropropanols in foods are still unclear although model systems suggest that they can form when glycerol reacts with hydrochloric acid at high temperatures or with salt in the presence of other acids, such as citric and acetic acids, at high temperatures. Studies to date indicate that in most cases the levels in food tend to be low but work is ongoing to determine the public health risk associated with these contaminants.

Infective agents

Infective agents are a major cause of food-borne disease. In developing countries it is estimated that more than 1.5 billion episodes of diarrhoea occur per year in children under the age of 5 years, causing 3 million deaths per year. It is not clear to what extent contaminated local water supplies are responsible for these diarrhoeal diseases, and to what extent food-borne disease contribute to the total incidence figures. In industrialized countries, food-borne infections with for instance *Salmonella*, *Campylobacter* or enterohaemorrhagic *E. coli* do show an increasing trend, and it is estimated that up to 10% of population in these countries suffer annually from food-borne diseases.

Disease as the result of exposure to food-borne infective agents constitutes an often neglected public health problem. Detection of food-borne disease, and subsequently the identification of the cause of that disease, is often a difficult process. Underreporting is common, the symptoms are often perceived as mild, as a normal occurrence, and most diseases tend to be self-limiting. The reported incidence of food-borne diseases worldwide is estimated to be only a very small proportion of the real incidence. The presence of food-borne pathogens in a country's food supply affects the health and well-being of the local population, visitors and consumers of food imported from that country. Thus apart from the physical suffering of the patients there generally are considerable economic consequences. These include food losses, decreases in food exports, loss of time at work, cost of hospitalization, and decreased revenues from tourism industry. These consequences seriously affect the local economy and eventually public expenditure, thus perpetuating and aggravating the burden of the diseases.

The lengthening of food production chains, and the increase of international trade and travel give new opportunities to pathogens to cause and spread diseases further. Despite our increased knowledge of the sources of the organisms, and the factors contributing to the disease, there seems to be little decrease in numbers affected, and the socio-economic impact of food-borne diseases remains very high. One reason given for the fact that food control is under-budgeted is because surveillance is inadequate and thus the extent of the burden of food-borne disease is not fully understood by policy makers. Another reason is that a consistent and coordinated effort by industry and government is required, for instance by the application of quality assurance mechanisms, and consistency and coordination regrettably are difficult goals to attain.

Among the vast group of illnesses that are food-borne, gastroenteritis is the most frequent clinical syndrome. Gastroenteritis can be attributed to a wide range of micro-organisms, including bacteria, viruses and parasites. Usually, the incubation period is short, from 1 or 2 days to one week. Different degrees in severity are observed, from a mild disease which does not require medical treatment to the more serious illness requiring hospitalization, long-term disability or death. The outcome of exposure to food-borne diarrhoeal pathogens depends on a number of host factors including pre-existing immunity, the ability to trigger an immune response, nutrition status, age and non-specific host factors such as environment, climate etc. As a result, the incidence and severity of food-borne diarrhoea is much higher in some particularly vulnerable segments of the population, including children under five years of age, pregnant women, immuno-compromised people (i.e. patients undergoing organ transplantation or cancer chemotherapy, AIDS...) and the elderly. Serious complications may result from these illnesses including intestinal as well as systemic manifestations, like haemolytic uremic syndrome (HUS) (kidney failure and neurological disorders) for 10% of all *Escherichia coli* O157:H7 infections with bloody diarrhoea, Guillain-Barré syndrome (nerve degeneration, slow recovery and severe residual disability) after *Campylobacter jejuni* infection, reactive arthritis after *Salmonella* infections. Several authors have estimated that long-term complications may occur in 2% to 3% of all food-borne disease episodes.

While diarrhoea is the most common syndrome following the consumption of a contaminated food, some diseases are more serious. Clinical manifestations of listeriosis include bacteraemia and central nervous system infections, especially in patients with an impairment of T-cell mediated immunity

(neonates, the elderly, immuno-compromised patients) and abortion in pregnant women, with an overall case-fatality rate of 25%. Food-borne botulism is a result from the potent toxin by *Clostridium botulinum* (bacteria) that causes paralysis of skeletal and respiratory muscles which, when severe, may result in death in 8% of cases. In addition to the consequences of toxoplasmosis on the foetus (birth defects), *Toxoplasma gondii* (parasite) is also the most frequent cause of lesion in the central nervous system in patients with AIDS. Hepatitis A (virus) is an infectious disease for which age is the most important determinant of morbidity and mortality, with severity of illness and its complications increasing with age. The duration of illness varies, but most cases are symptomatic for three weeks.

The main reasons for the occurrence of food-borne diseases are the lack of scrupulous attention to food hygiene from farm to table, and the lack of overall quality control systems. Most food-borne illness agents enter the food chain via primary contamination from infected animal or plant foods or secondary contamination from insects or rodents or any other animal; contact with polluted environment (water air, soil, container, etc...); and non-observance of good agricultural, good hygiene and good manufacturing practices.

Food-borne infective agents include bacteria, viruses, parasites and more recently prions. More details are provided in the following pages.

Bacteria

Bacteria are small unicellular organisms which can grow very quickly under suitable conditions (double in 20mins). In terms of food bacteria can be divided into “useful” bacteria, spoilage bacteria and pathogenic bacteria. Certain bacteria such as the lactic acid bacteria have long been used in food preservation e.g. fermented foods. Spoilage bacteria don’t normally cause disease although some are opportunistic pathogens. Spoilage bacteria are not usually consumed in food in high enough numbers to cause disease as they have generally caused sufficient organoleptic changes to the food to make it unacceptable to the consumer. Controlling the growth of spoilage bacteria is used as a means of shelf life extension and reduces loss of food. However, limiting their growth can in some situations leave niche for pathogens to grow. In such cases the food can look okay but could be a potential cause of disease e.g. vacuum packaged fish contaminated with *Listeria*.

Pathogenic bacteria cause disease in humans, animals, plants. They can be present in food in sufficient numbers to cause disease without food being spoiled i.e. there are no visible indicators that the pathogen is present. Pathogenic bacteria have different mechanisms of producing disease. Some cause an infection by invading the cells. Others cause an intoxication by the production of either exotoxins (*Bacillus cereus*, *Clostridium botulinum*) or endotoxins (*Salmonella*, *Escherichia coli*). Other pathogenic bacteria produce a toxin mediated infection in which case the toxin is produced inside human body. More information on specific pathogenic bacteria is provided in the following pages.

Bacteria infection is caused by the ingestion of living bacteria. The number of bacterial cells required to cause infection is different for different bacteria. Infection usually occurs following bacterial growth in the food. Bacteria grow by dividing which is known as binary fission. The time taken for 1 bacterial cell to become 2 depends on the bacterial species and the environmental conditions. In order to grow bacteria need nutrients, water, a suitable pH and temperature, suitable atmospheric conditions and time. An understanding of the conditions required for bacterial growth is critical to their control. There are 2 forms of bacterial cell – a vegetative cell which is the normal form and a spore which is only produced by some species of bacteria. Spores are usually very heat resistant and an important consideration in food processing.

BACILLUS

Important species: *Bacillus cereus*

Why is it important? It causes two types of food poisoning as a result of toxin production: an emetic toxin (preformed in the food) that causes vomiting; and an enterotoxin (produced in the intestine) that causes diarrhoea. This toxin producing bacteria is often associated with reheated foods.

Ecological niche: Ubiquitous in nature. Normal inhabitant of soil.

Foods with which it is most frequently associated: Found in a wide range of foods including meat, milk, dairy products, vegetables, fish, rice dishes, sauces, pastas, dried mixes, spices.

Characteristics and growth conditions:

- Gram-positive rod shaped bacterium
- Aerobic, but also grows well anaerobically - lower toxin production under anaerobic conditions
- Spore former (central spores) – heat resistant spores are an important factor in food-borne illness
- Motile
- Produces 2 types of toxin: an emetic toxin in foods which is highly stable and survives high temperatures, exposure to enzymes (trypsin, pepsin) and pH extremes. An enterotoxin which is produced in the intestine; this toxin is acid and heat labile.
- Growth temperature: 4° to 48°C (optimal 28 - 35°C).
- Growth pH: 4.9 - 9.3 (optimum 6.8 - 7.2)
- Growth $a_w \geq 0.91$

Illness: Rapid-onset **emetic syndrome** is characterised by nausea and vomiting, which begin one to five hours after contaminated food is eaten. Slow-onset **diarrhoeal syndrome** is characterised by diarrhoea and abdominal pain which occurs 8 to 16 hours after consumption of contaminated food. Recovery from both is usually rapid and all people are thought to be susceptible. Symptoms may vary among individuals.

Dose: Large numbers ($>10^5$ /g of food) required to produce toxin or cause infection. Small numbers of *B. cereus* in foods are not a direct hazard to health.

Issues relating to control:

Survival: Vegetative cells readily killed by heat (D value at 60°C = ~1 min)

B. cereus cells die in yogurt when pH reaches 4.5. Spores are moderately heat resistant and can survive pasteurization (D value at 100°C = 2.7 – 3.1 mins). High fat/oil and low a_w increase heat resistance.

Spores survive for very long periods in dry foods. Spores activated by a variety of treatments – e.g. heat shock (exposure to several hours of elevated but sub-lethal temperatures)

Heat activation is reversible if spores then return to lower temperature (i.e. unsuitable for growth)

Spores are hydrophobic – difficult to remove during cleaning – Can allow contamination of food during processing

Emetic toxins are very to heat and extremes of pH. It can survive a pH of 2–11 and for 90 mins at 126°C.

Enterotoxin is less resistant and is inactivated after 5 mins at 56°C.

Inactivation: Effective prevention and control measures depend on inhibiting spore germination and preventing the growth of vegetative cells in cooked, ready-to-eat foods.

Effect of temperature on spores varies according to strain ($D_{85} = 33.8 - 106$ min) and environment ($D_{95} = 1.5 - 36.2$ in distilled water and 1.8 – 19.1 min in milk)

Inactivated by 0.1M acetic, formic and lactic acids in broth.

Growth inhibited by $>7.5\%$ salt

Modified atmospheres can be used to control growth of *B. cereus*

Nisin is commonly used in dairy products to prevent outgrowth of spores.

Growth is inhibited by sorbic acid (0.26% at pH 5.5), potassium sorbate (0.39% at pH 6.6), benzoate, EDTA and polyphosphates.

0.2% calcium propionate prevents spore germination in bread.

Sensitive to most chemical disinfectants used in food industry.

Spores are more resistant to radiation than vegetative cells.

Note: Some strains capable of growing at refrigerated temperatures have recently been reported.

BRUCELLA

Important species: *Brucella abortus*. Other species include *B. melitensis* (sheep and goats), *B. suis* (pigs), *B. ovis* (sheep), *B. canis* (dogs) and *B. neotomae*

Why is it important? *B. abortus* is a costly and contagious disease of cows and cattle that can also infect humans. It is the causative agent of brucellosis. It causes abortions in cows and sterility in bulls among other symptoms and can cause acute or chronic illness in humans. *B. melitensis* however has the highest pathogenicity of *Brucella* spp. *B. melitensis* and *B. suis* are also considered as emerging pathogens in cattle, thus extending their opportunities to infect humans. *Brucella* is also a bioweapons concern.

Ecological niche: The main reservoir for *B. abortus* is cows and cattle. It is also found in some wild animals;

Foods with which it is most frequently associated: Unpasteurized (raw) milk or cheese or other dairy products.

Characteristics and growth conditions:

- Gram-negative, pleomorphic rods
- Aerobic
- Fastidious—many strains of *B. abortus* require increased CO₂ for growth particularly for primary isolation
- Non motile
- Facultative intracellular
- Survive and replicate in host macrophages
- Zoonotic
- LPS endotoxin in the cell wall is the main virulence factor.
- Highly infectious

Illness: In the acute form (<8 weeks from illness onset), nonspecific and "flu-like" symptoms including fever, sweats, malaise, anorexia, headache, myalgia, and back pain. In the undulant

form (<1 year from illness onset), symptoms include undulant fevers, arthritis, and epididymo-orchitis in males. Neurologic symptoms may occur acutely in up to 5% of cases. In the chronic form (>1 year from onset), symptoms may include chronic fatigue syndrome, depression, and arthritis.

Those working with animals and animal products are at greatest risk and brucellosis is often found to occur more frequently among slaughter house workers, meat inspectors, farmers, animal handlers, veterinarians, and laboratory workers.

Dose: Relatively few bacterial cells are needed to cause infection (as few as 100 cells is a sufficient number to cause disease) depending on the species. *B. melitensis* is the most infectious to man in that 1-10 colony forming units are thought to cause disease followed by *B. suis* (1000-10,000), *B. abortus* (100,000), and finally *B. canis* (>1,000,000 in an immuno-compromised individual).

Issues relating to control

Survival: Stable during production; Sensitive to direct sunlight and so it is destroyed in the environment over time
B. abortus has been observed to survive in faeces at pH 7.6 for 14–35 days and at pH 7.2 for 56 days
B. abortus survives in soil in winter for 125 days
B. melitensis has been observed to survive in urine for 3-4 days, moist faeces for >75 days and soil for > 300 days depending on soil type.
B. suis has been observed to survive in cattle faeces at room temperature for 120 days and soil for 4–37 days depending on water content.

Inactivation:

D55°C = 60 minutes
 D60°C = 3 minutes
 D65.6°C = 0.0002 minutes
 Z-value = 4.3 °C

CAMPYLOBACTER

Important species: *Campylobacter jejuni*, *Campylobacter coli* are most often associated with disease but *Arcobacter* spp. can also be important. Both pathogenic and non-pathogenic strains exist and it is often difficult to differentiate them.

Why is it important? Becoming one of the main causes of food-borne disease. Usually causes gastrointestinal illness – Campylobacteriosis - (diarrhoea) in humans. Can also cause systemic illness, reactive arthritis, Guillain-Barré syndrome (GBS). Death rarely occurs. Some species cause abortions in animals. Children and young adults most frequently affected.

Ecological niche: Intestines of wild animals, Farm animals (cattle, sheep, pigs), Birds (chickens), Domestic pets, sewage. Seasonal variation in occurrence. Can also be found in water supply

Foods with which it is most frequently associated: Raw chicken, raw milk, non-chlorinated water

Characteristics and growth conditions:

- Gram negative, S curved spiral rods
- Exists as vegetative cells only – it is not a spore former
- Motile – polar flagella
- Reported to produce some toxins
- Microaerophilic sensitive to high oxygen conditions (*C. jejuni*: 3- 5% O₂ and 2 – 10 % CO₂)
- Growth temperature >30 – 45°C (optimum 42 °C)
- Growth pH 4.9 – 9 (optimum 6.5 – 7.5)
- Growth a_w: ≥ 0.987. Optimum a_w is 0.997. Will grow in 1.5% salt (NaCl) but not > 2%
- Is slow growing compared to other bacteria (generation time of 1 hour under optimum conditions)

Illness: Campylobacteriosis occurs 1–10 days after ingestion of bacteria. Symptoms include muscle pain, headache and fever followed by watery diarrhoea, abdominal pain and nausea. It can last up to one week and is usually self-limiting. Can affect any age group but most often found in infants and young adults. Infection

occasionally followed by arthritis or GBS (~1% of cases). On rare occasions may cause non-enteric disease such as invasion of bloodstream.

Dose: Infective dose thought to be small and some studies suggest that 400-500 bacteria may cause illness in some individuals. But usually 1000 to 10000 cells needed to cause illness.

Issues relating to control:

Survival: Relatively sensitive to environmental stresses (e.g., 21% oxygen, drying, heating, disinfectants, acidic conditions).

Can survive on hands and moist surfaces for up to 1 hour.

Numbers decline slowly at normal freezing temperatures, but freezing does not instantly inactivate cells.

Can survive in faeces, milk, water, urine for 3–5 weeks at 4°C

Survives well in modified atmosphere and vacuum packaging but poorly at atmospheric oxygen concentrations

Survives better at refrigeration than room temperature.

Inactivation: Easily inactivated by heat (D₅₅ = ~1min; D₆₀ = 0.2– 0.3 mins)

Susceptible to low pH – Die-off in foods < pH 4

Sensitive to oxygen

Appears to be sensitive to drying but under some refrigeration conditions can remain viable for weeks.

Reduced by freeze-thawing

Inactivated by frozen storage <-15°C over a period of time

Sensitive to NaCl concentrations above 1% and death occurs >2%

Sensitive to ascorbic acid and some spices

Susceptible to disinfectants such as chlorine.

Sensitive to gamma radiation and ultraviolet radiation as used in water treatment units.

Note: Despite ease of heat inactivation and oxygen sensitivity *Campylobacter* appears to be able to survive environmental stresses as it is an increasingly important cause of food-borne illness. Under adverse conditions *Campylobacter* is said to undergo a transition to a “Viable but non-culturable” state.

CLOSTRIDIUM

Important species: *Clostridium botulinum*, *Clostridium perfringens*

Why is it important? *Clostridium botulinum* causes botulism, recognized as a food-borne disease since the late 1800's. There are 4 forms of disease (food-borne, infant, wound and animal botulism) caused by 7 types of botulism toxin. While the incidence is low the disease is very severe and can be fatal if not treated immediately and properly. Two groups of *C. botulinum* are important in food: Group I-Types A, B, F (proteolytic strains) and Group II-Types B, E, F (non-proteolytic strains). Because they are proteolytic Group I organisms generally cause spoilage of contaminated food.

C. perfringens causes 2 types of food poisoning – a common form known as type A (diarrhoea and abdominal cramps) and a rarer form called necrotic enteritis which can be fatal. *C. perfringens* poisoning occurs much more frequently than botulism

Ecological niche: *C. botulinum* (esp. type A) is widely found in soils faeces marine sediments (the type varies from country to country) Types B, C, D and E appear to be animal parasites. *C. perfringens* is considered ubiquitous in the natural environment.

Foods with which it is most frequently associated: Canned corn, peppers, green beans, soups, beets, asparagus, mushrooms, ripe olives, spinach, tuna fish, chicken and chicken livers and liver pate, and luncheon meats, ham, sausage, stuffed eggplant, honey, lobster, and smoked and salted fish. *C. botulinum* is often associated with home canned foods. Meats, meat products, and gravy are the foods most frequently implicated with *C. perfringens* poisoning but it can occur in any prepared foods that are then temperature abused.

Characteristics and growth conditions:

- Gram-positive rods
- Anaerobic (but can grow in presence of low levels of oxygen)
- Sporeformers (spores are heat resistant)
- Produce toxins. -*C. botulinum* produces a potent neurotoxin. *C. perfringens* produces an enterotoxin.
- *C. botulinum* is motile
- *C. perfringens* is nonmotile and encapsulated

Growth	<i>C. botulinum</i> Group I	<i>C. botulinum</i> Group II
T	12 - 50°C (varies with strain type) optimum 35 - 40°C	3.3 - 45°C optimum 18 - 25°C
pH	4.6 - 8.9 (varies with strain type)	
a _w	≥0.95-	

- *C. botulinum* is produced at pH down to 5.2 and at a lower pH in certain foods e.g. pH 4.85 in potato

Growth	<i>C. perfringens</i>
T	12 - 50°C (optimum 43-45°C)
pH	5.5 - 9 (optimum 6 - 7.5)
a _w	≥ 0.95

- *C. perfringens* does not readily form spores in food. These are mostly formed in the intestine. It sporulates well at pH 6 - 8.
- The enterotoxin is produced during spore formation. Occasionally the toxin is produced in food but large numbers of cells are required and so food with toxin is usually spoiled.

Illness: *C. botulinum*. Classic symptoms of food-borne botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. These are all symptoms of the muscle paralysis caused by the toxin. If untreated, these symptoms may progress to cause paralysis of the arms, legs, trunk and respiratory muscles. In food-borne botulism, symptoms generally begin 18 to 36 hours after eating a contaminated food, but they can occur as early as 6 hours or as late as 10 days. It is thought that all people are susceptible to food-borne intoxication. Infants with botulism appear lethargic, feed poorly, are constipated, and have a weak cry and poor muscle tone. Muscle weakness and loss of head control can reach a point where infant appears "floppy." Infant botulism occurs 3-30 days following ingestion of spores which germinate and produce toxin in the intestine.

C. perfringens. Symptoms occur 6-24 hours after eating contaminated food and include profuse watery diarrhoea and abdominal pain. Recovery is usually rapid, within 24 hours. All people are thought to be susceptible but the severity of symptoms may vary among individuals.

Dose: *C. botulinum*. Botulism toxin is very potent and low concentrations can cause illness. It is estimated that the dose required to kill humans ranges from 0.1–1.0 µg. In cases of infant botulism implicated honey samples have contained 10^4 – 10^5 spores / kg.

C. perfringens. Large numbers are required to cause illness, at least 10^6 / g food.

Issues relating to control:

C. botulinum:

Survival: Spores are resistant to freezing (not defined for vegetative cells).

The vegetative cells are killed by a few minutes exposure to 60°C.

The spores survive drying and are very resistant to heat

The toxin is stable at low pH but inactivates quickly at pH 11.

Toxins may be slightly more heat stable at lower pH values and are resistant to freezing.

Inactivation: For spores the D_{100} for Group I *C. botulinum* is 25 min and for Group II is <0.1mins, D_{121} for Group I is 0.1–0.2 mins and for Group II is <0.001 mins.

A 12 D process, controlling group I spores, has been adopted for the canning of low-acid (pH>4.6) foods. This is the equivalent of heating to 121°C for 3 min.

Thermal death of spores is accelerated at extremes of pH (<5.0 and >9.0)

The toxin is inactivated by treatment at 85°C for 1 min, 80°C for 6 min or 65°C for 1.5 hours.

Nitrite is important in control of *C. botulinum*.

Lactic acid bacteria used in starter cultures inhibit *C. botulinum* in meat products.

Nisin is widely used in dairy products

Liquid smoke appears to be effective for fish but not meat.

A range of commonly used preservatives (e.g. Sorbates, parabens, nisin, phenolic antioxidants, polyphosphates, ascorbates) can be useful in the control of *C. botulinum* as part of a hurdle approach. However the interactions of various preservatives when used in hurdle technology are

complex and combinations for food use need to be validated.

Spores are inactivated by ozone and chlorine (more effective at low pH), hydrogen peroxide and iodophors. Normally chlorinated water should inactivate the toxin.

C. botulinum spores are the most resistant bacterial spores to radiation and doses used in food preservation do not effectively eliminate the toxin.

The toxin is not inactivated by irradiation.

C. perfringens

Survival: Vegetative cells are readily killed by heating, are very susceptible to freezing and decline slowly under refrigeration.

Vegetative cells are not very tolerant of low water activity.

Spores are very heat resistant and some spores survive boiling for 1 hour.

Spores very resistant to freezing, refrigeration and desiccation.

Inactivation: D_{60} for vegetative cells = 5.4 – 14.5 mins

D_{100} for spores varies between strains from 0.31 min to >38 min.

Heating food to between 70 and 80°C followed by cooling will induce germination of spores.

C. perfringens enterotoxin is inactivated by heating for 5 min at 60°C.

C. perfringens will not grow at <12°C (a very important means of control)

Cells will die after several days below pH 5.0 and above pH 8.3

6-8% NaCl inhibits growth.

While *C. perfringens* growth is inhibited by sodium nitrite and sodium nitrate, the levels required exceed those permitted in foods.

The application of several hurdles enables control of growth of *C. perfringens*.

Susceptibility of spores to irradiation varies according to strain.

ENTEROHAEMORRHAGIC ESCHERICHIA COLI

Important species: *Escherichia coli* O157:H7 and non-O157 shiga toxin producing *Escherichia coli* (STEC)

Why is it important? *E. coli* are part of the normal microflora of man and many strains are non pathogenic. However, some are pathogenic and these can be divided into 4 groups:

- Enteropathogenic *E. coli* (EPEC);
- Enteroinvasive *E. coli* (EIEC);
- Enterotoxigenic *E. coli* (ETEC); and
- Enterohaemorrhagic *E. coli* (EHEC).

In recent times the toxin producing forms of *E. coli* have become an important cause of food-borne illness. They can cause severe illness such as hemorrhagic colitis and haemolytic uremic syndrome, which can be fatal particularly in young children and the elderly. Non-O157 shiga toxin producing *Escherichia coli* (STEC) are a diverse group of organisms with varying pathogenic potential. By definition all STEC produce 1 or 2 toxins but might not possess other factors critical for pathogenicity.

Ecological niche: Intestinal tracts of domesticated and wild animals and their faeces.

Foods with which it is most frequently associated: Beef (esp. ground beef), milk, leafy green and salad vegetables, potatoes. May also be transmitted via faecal-oral route person to person or food handling.

Characteristics and growth conditions

- Gram-negative
- Rod shaped
- Facultative - Can grow in presence or absence of oxygen
- Produce toxins
- Most strains are motile
- Growth temperature: 8 – 45°C (optimum 37 °C).
- Growth pH 4.4 – 9 (optimum 6 - 7)
- A_w 0.955 (optimum 0.995)

Illness: EPEC, which is rarely food-borne, causes infant diarrhoea 1–3 days after ingestion. EIEC

causes a dysentery-like syndrome. 8 – 24 hours after ingestion. ETEC is a cause of travellers' diarrhoea. It is caused by the production of a cholera-like toxin and symptoms occur 8 – 44h after ingestion. EHEC (STEC and *E. coli* O157:H7) invades the gut and then produces a toxin. This can lead to a bloody-diarrhoea syndrome, kidney disease and even death. Resulting conditions include Haemorrhagic colitis (HC), Haemolytic Uraemic Syndrome (HUS). Any age group can be affected but disease most often occurs in young children and the elderly.

Dose: Foods with very low numbers of cells - 0.3 – 0.4 EHEC cells/g - have been implicated in disease but it has been estimated that ingestion of 10^5 cells gives a 50% probability of disease. For other pathogenic *E. coli* the minimal infective dose for adults is probably 10^6 /g.

Issues relating to control:

Survival: *E. coli* O157:H7 survives well in chilled and frozen foods. At low temperatures cells enter a viable but non-culturable state.

It is more acid resistant than other *E. coli*. Prior exposure to acidic conditions can increase acid tolerance further. Has also been shown to survive stomach pH (1.5) for longer than 3 hours.

Can survive for weeks under dry conditions and in dried food products e.g. dried meat.

Inactivation: Rapidly inactivated by heating to 71°C so pasteurization is effective

D value at 60°C is 30–45 seconds

Inactivated by proper cooking

Thermal resistance is higher in foods with a high fat content.

Freeze thawing can reduce numbers but this effect is strain dependent.

Inactivation by decreasing pH is dependent on the acidulant and the temperature. Usually more effective at warmer temperatures.

Sensitive to UV and gamma radiation.

While commonly used disinfectants such as chlorine are effective, their efficacy may be reduced in the presence of solids or organic matter.

LISTERIA

Important species: *Listeria monocytogenes* is the most important pathogenic strain. Not all strains of *Listeria* are pathogenic.

Why is it important? Listeriosis is a relatively rare but potentially fatal disease. Invasive listeriosis is a life threatening systemic infection. Those at risk include pregnant women and their foetuses, neonates, the elderly and immunocompromised people. There is also a non-invasive form – gastroenteritis but there is little available information on the occurrence of this milder form. Most healthy people do not seem to be affected by *Listeria*.

Ecological niche: widely distributed in the environment and has been isolated from a variety of sources, including soil, vegetation, silage, faecal material, sewage and water. Ubiquitous in the natural environment i.e. soil, water. Prevalent in intensive animal/bird farming practices.

Foods with which it is most frequently associated: Found in a wide range of foods. Milk, semi-soft and soft mould-ripened cheeses, smoked fish, modified atmosphere packaged vegetables, hot dogs; pork tongue in jelly; processed meats; pâté; salami; butter; cooked shrimp; salads ; raw vegetables; and cole slaw. Ready-to-eat food products

Characteristics and growth conditions

- Gram-positive
- Facultative anaerobe – growth is optimal under microaerophilic conditions
- Non-spore forming rod
- A typical tumbling motility at 20–25°C, but not at 35°C
- Psychrotrophic and grows over a temperature range of 0° to 45°C (37°C). Some reports indicate a minimum temperature of -1.5°C
- Growth pH 4.4 - 9.4
- Growth $a_w \geq 0.92$

Illness: The invasive disease is normally associated with people with weakened immune systems and can occur 1– 90 days after ingestion of cells. Symptoms include “flu” like symptoms, diarrhoea, vomiting, septicaemia, meningitis and

abortion. In most cases patients require hospitalisation and the fatality rate is 20–30%. There may be long term effects such as neurological problems. Non-invasive listeriosis can occur in anyone consuming a high number of cells. Symptoms occur 12 h to 7 days after ingestion and include diarrhoea, fever, muscle pain, headache, cramps and vomiting.

Dose: The infective dose is not really known but it seems that in most cases of invasive listeriosis 100 to 1000 cells are required. In cases of non-invasive listeriosis, a higher dose has been implicated, at least $> 10^5$ and more often around 10^{11} cells.

Issues relating to control

Survival: Resistant to various environmental conditions, such as high salinity or acidity, which allows it to survive longer under adverse conditions than most other non-spore forming bacteria of importance in food-borne disease and contribute to its widespread distribution.

One of the most thermally resistant vegetative cells -has caused some concern in terms of effectiveness of pasteurization.

Listeria can survive in wet conditions for many months and up to 2 years in dry soil or dust.

Inactivation: *Listeria* are killed by the heat treatments in most normal processing operations but its heat resistance varies according to strain type and food matrix. The commonly reported $D_{60^\circ\text{C}}$ is 2.6 mins but it may be greater e.g. $D_{60^\circ\text{C}}$ of strain Scott A is 5.29 min in chicken slurry, 8.32 mins in beef slurry and 5.02 mins in carrot slurry. Can grow at low temperatures (3°C) and survive down to 0°C or just below.

Listeria can survive and grow at a pH down to 4.4 but it seems that the type of acid and the storage temperature influence the effect of pH

Sensitive to commonly used disinfectants in absence of organic matter. In presence of organic matter many disinfectants are ineffective.

Similar resistance as other Gram positive bacteria to gamma radiation but more sensitive than other Gram positive bacteria to UV radiation.

Recent evidence suggests that *L. monocytogenes* may have a ‘viable but non-culturable’ state

MYCOBACTERIUM

Important species: *Mycobacterium bovis*

Why is it important? *M. bovis* is the cause of tuberculosis in cows, cattle and other animals (bovine tuberculosis). However it can also infect humans and can be transmitted via raw milk and meat. Humans can also be a reservoir for this bacteria. Note: The primary cause of tuberculosis in humans is *M. tuberculosis*. Humans are the only reservoir for this latter bacterium. The proportion of human cases caused by *M. bovis* compared to *M. tuberculosis* is not well documented.

Ecological niche: The main reservoir is cattle; however humans and a wide range of mammals are susceptible to the bacterium e.g. farmed deer, farmed wild boar, goats, llamas, alpacas, pigs, dogs and cats. number of wild animals (European badger, the brush-tailed possum, buffalo, bison and several species of wild deer) can also act as reservoirs.

Foods with which it is most frequently associated: Unpasteurized milk and raw meat and raw meat products.

Characteristics and growth conditions:

- Gram-positive slightly curved rods
- Aerobic
- Very slow growing – as the foods it is associated with generally have a short shelf life there is unlikely to be any significant growth in the food and
- Non spore forming
- Non motile
- Does not produce toxins.
- Fatty coat or capsule which protects it from digestive juices
- Zoonotic

Illness: Tuberculosis is the general name for a group of diseases associated with the presence of *Mycobacterium* spp. - pulmonary (lung) tuberculosis is the most important but almost any organ can be affected. Infection is generally acquired by inhalation from dust, aerosols. Gastrointestinal infection occurs as a result of ingesting *M. bovis* and is called intestinal tuberculosis or tuberculosis enteritis The bacteria can migrate from the intestine and infect other organs in the body. Infected people may not

develop symptoms as their immune system can usually control the bacterium, sometimes throughout life. However inactive bacteria can become active again later in life, particularly if the immune system is weakened. In airborne infections and in immunocompetent people the incubation period can be years, while in immunosuppressed people it may be months. Cases of the gastrointestinal form can occur after reactivation of infections that must have occurred many years earlier. Symptoms include chills, weight loss, abdominal pain, diarrhoea or constipation. Other symptoms depend on the organs infected. Symptoms may last for months or years.

Immunosuppressed or immunocompromised people are thought to be particularly at risk e.g. HIV/AIDS patients. Children also appear to have a higher risk of infection. The course of the disease is long term and may result in death.

Dose: Need high numbers need to be ingested to cause infection – millions of cells. In contrast as few as 10 cells can cause infection when inhaled.

Issues relating to control

Survival:

Relatively susceptible to high temperatures.

Inactivated by sunlight

Can persist and remain infective in the environment for long periods.

Survival is better under cool conditions e.g.

survived in cow faeces for 5 months in winter and 2 months in summer

Survives well in dry conditions

Inactivation: Inactivated by normal pasteurization temperatures i.e. 63.5°C for 30 mins and 71.7°C for 15 secs. In milk (Major factor in the establishment of milk pasteurization standards). Pasteurization has been very effective in many countries in eliminating this as a human health problem. It has been used in conjunction with an animal disease control programme.

In meat products the D_{61°C} = 1 minute, while D_{55°C} = approx 10 minutes. Treatment at 65°C for 1 minute gave a 5 D kill.