



FACULTY OF AGRICULTURAL AND FOOD SCIENCES



Food Safety and Quality - Lebanon

Dr. Zeina Kassaify

Department of Nutrition and Food Sciences

Outline

- **Introduction**
- **Agro food sector in Lebanon**
- **Safety and Quality issues and related research**
- **Future needs**







Agro food sector in Lebanon

The agro food market is quickly emerging as one of Lebanon's most important industries

- **Mainly driven by shifts in global consumer demand, improving technical abilities as well as a wider appeal for Lebanese cuisine in Europe and North America.**

Agro food sector in Lebanon

- **Confectionary, pickles, mixed nuts and non-alcoholic beverages, represent the main agro food exports originating from Lebanon, with the US (30%) and Saudi Arabia (10%) being the main recipient markets.**



Agro food sector in Lebanon

In order to improve marketing channels and increase competitiveness in overseas markets,

Investment Development Authority of Lebanon (IDAL) has currently launched the Agro Plus program and the Export Plus programs.



Agro food sector in Lebanon

The initiative aims to boost the agricultural sector in Lebanon and supporting industrialists in areas of marketing and promotion, food safety and quality assurance.



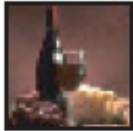
Agro food sector in Lebanon



Organic Products



Bottled Water



Wine



Jam & Honey



Dairy Products



Olive & Olive Oil



Specialty Food



Ornamental Flowers

Key Indicators

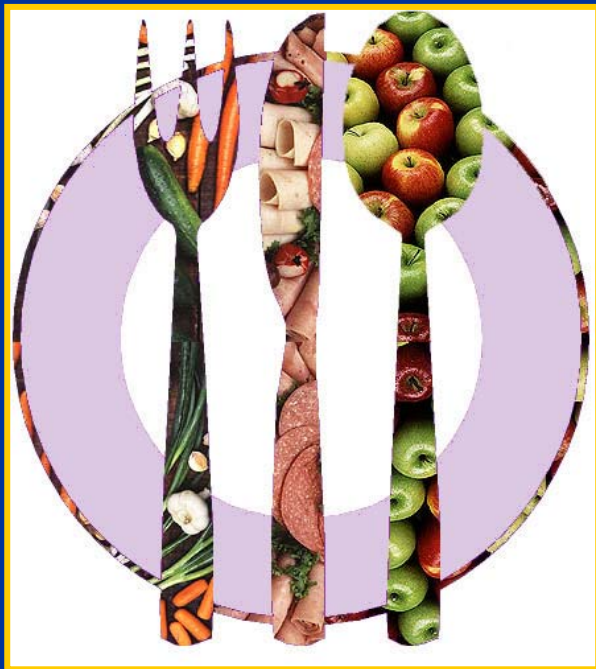
Lebanon: Agriculture & Food Indicators

Average Production of Cereals	95,000 metric tons
Average Cereal Crop Yields	2,415 kg/ha
Net Trade of Cereals (% of Consumption)	89%
Average Meat Production	35 kg per capita
Irrigated Land (% of Total Cropland)	39%
Average Daily Calorie Supply	
Total	3,256 kcal per capita
From Animal Products	460 kcal per capita

Source: Food & Agriculture Organization of the UN - World Resources 2002-2004

Recent Food Safety Issues and Related Research

Majority of research in the field at AUB or with AUB



- **Chemical safety**
- **Microbiological safety**
- **Food Laws, Food Safety Standards and Legislations**
- **Training and Community awareness**

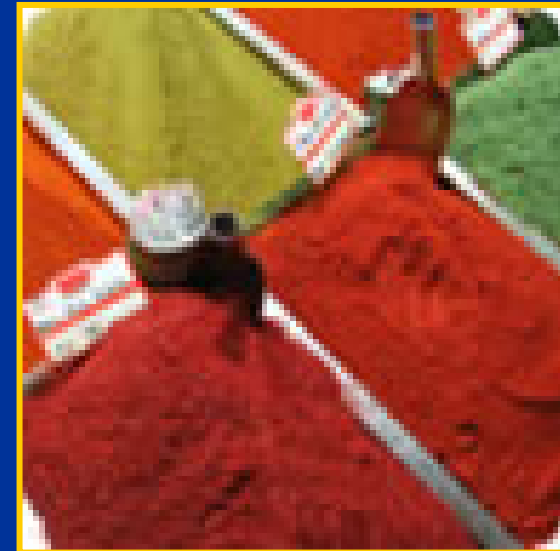
Chemical Safety

- **The contamination of food by chemical hazards is a worldwide public health concern and is a leading cause of trade problems internationally**



Sudan I

- **Sudan dyes: red dyes used for coloring solvents and found in some chilli powder imported from India and seasonings containing this chilli powder.**
- **Sudan I has been shown to cause cancer in laboratory animals.**



Sudan I

- **Prohibited in food in the UK and the rest of the EU**
- **Dried and crushed or ground chilli and curry powders coming into any EU Member State must be accompanied by a certificate showing they have been tested and found to be free of Sudan I**





Relevant work at AUB (NFSC dept.)

- Validated method to screen and identify Sudan 1 in variety of products
- Screening products other than those indicated that may contain Sudan 1 and give necessary recommendations and alerts for action (Ketchup, cotton candy, food colorants, etc.)

Acrylamide

- **Researchers in Europe and North America¹, indicated that acrylamide formation is particularly associated with traditional high temperature cooking processes for certain carbohydrate-rich foods.**



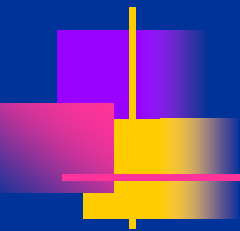
¹ *Swedish National Food Administration and Stockholm University, Norway, the United Kingdom, Germany, Canada, Japan, Korea, and Switzerland*

Acrylamide

- **The discovery of acrylamide in food is a concern because acrylamide is a potential human carcinogen and genotoxicant, based on high-dose animal studies**



¹ Swedish National Food Administration and Stockholm University, Norway, the United Kingdom, Germany, Canada, Japan, Korea, and Switzerland



Researchers at AUB (Toufeili et al.) are assessing and investigating the formation and presence of acrylamide in Arabic Bread (pita bread) (levels, dietary exposure, bioavailability)





Titanium Dioxide

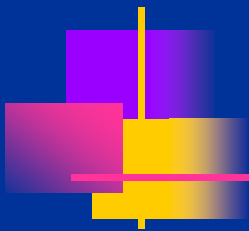
- **Titanium Dioxide has been used in foods, drugs and cosmetics since at least 1938.**

- **The color additive titanium dioxide may be safely used for coloring foods generally, subject to the following restrictions set by the USFDA: (1) The quantity of titanium dioxide does not exceed 1 percent by weight of the food.**

- A recent study at AUB by *Tannous et al.*, investigated the use of Titanium Dioxide in Tahini* produced in Lebanon to whiten it and estimated the levels and dietary exposure
- Results revealed levels to be within standards



* Tahini: a popular middle Eastern product of sesame paste that is used to make various traditional dishes



**Dietary exposure to lead, cadmium,
mercury and radionuclides. of an adult
urban population in Lebanon:**

A total diet study approach

**L. NASREDDINE^{1,2}, N. HWALLA³, O. EL SAMAD¹, J.-C.
LEBLANC⁴, M. HAMZE¹,**

Y. SIBIRIL², & D. PARENT-MASSIN²

Food Additives and Contaminants, June 2006; 23(6): 579–590

- This study was the first in Lebanon to evaluate the dietary exposure of an adult urban population to three heavy metals (lead, cadmium and mercury) and to radionuclides**

Average and maximal consumer exposure estimates to heavy metals were calculated and compared with appropriate reference values and with intakes reported from other countries.



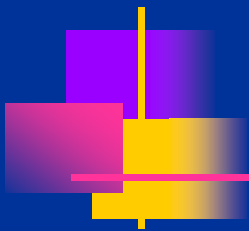
The exposure assessment conducted, places Lebanon among countries least exposed to heavy metals through the diet and it highlights the safety of the food supply from radioactive contamination





Microbiological Safety

- **The incidences of some foodborne infections are increasing worldwide**



The Assessment of the Red and Chicken Meat sectors and the elaboration of a guide for GMP and HACCP implementation in the named sectors (2005)

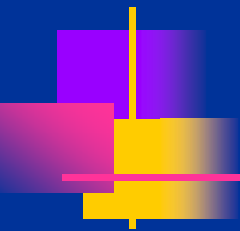
AUB (Z. Kassaify et al.), UNIDO

**UNIDO's Food Safety Panel (FSP) in
Lebanon conducted a project to assess the
Meat sector (red and poultry) through
visiting a representative number of red meat
and poultry producers**



Samples were taken from all visited locations and laboratory analyses were performed at the Faculty of Agricultural and Food Sciences at the American University of Beirut to evaluate the microbial contamination





It was found that the proper application of GMP inside the meat business operations is required to improve the quality and reduce the meat contamination levels

The Scientific Committee prepared a GMP guideline and HACCP plans relative to the meat sector in Lebanon





The Assessment of the Dairy Production Chain in South Lebanon (2005)

USJ, AUB, UNIDO

Assessment and analysis of dairy production chain in South Lebanon was executed

Dairy production in South Lebanon has been improving through various development projects lead mainly by the Ministry of Agriculture in close cooperation with several international organizations

The general lay out of the dairy production chain in South Lebanon lack basic innovation and require some alterations to ensure its wholesomeness

The dairy technical processing chain is still controlled by traditional methodology and non-scientific concepts leading to a greater cost of production.



Hazard assessment and microbial testing revealed that the application of international guidelines related to hygiene and good manufacturing practices could be very effective in improving production conditions





Mycotoxins (Aflatoxins AFM1 in Dairy &

Aspergillus flavus in sesame)

Aspergillus flavus and aflatoxins in sesame seeds
(Kassaify et al.)

- Many countries limited the exposure to aflatoxins by imposing regulations on commodities intended for use as food and feed
- In the study, several varieties of sesame seeds were screened (raw, roasted and in sweets) for the presence of *Aspergillus flavus*

- Investigating the growth of the mold and production of aflatoxins at different storage conditions
- Establish guidelines for handling and storage and food safety regulations





Aflatoxins M1 in Lebanese Dairy Products

Zeina Kassaify & Hussein F. Hassan

**Department of Nutrition & Food Science, Faculty of
Agriculture & Food Science, American University of Beirut,
Beirut, Lebanon (2007)**

Milk samples from different sources (sheep, goat and cow) and different dairy traditional products characterized by their distinct processing methods have been collected from fifteen farmers and manufacturers in the Bekaa region of Lebanon

**Samples were
analyzed for their
AFM1 content using
competitive ELISA**

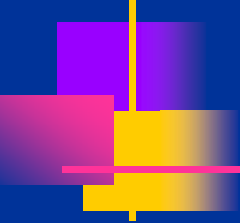




The intake of dairy products and the exposure to AFM1 was assessed

Milk source, pasteurization, seasonal and processing effects were studied.

Altogether only 21% of dairy products tested were contaminated with AFM1 slightly above the EU limits (50 ng/L) mainly in the fall season



Antibiotic Residues in Poultry Products and Cow's Milk

Zeina Kassaify and Pamela Abi Khalil

- **The rapid growth of the dairy and poultry sectors in the Middle East and particularly in Lebanon has been noticeable in the recent years.**
- **This has led to the extensive use of antibiotics to enhance the health and productivity of animals.**

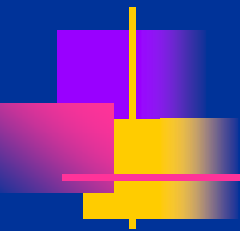
- **This study is aiming to assess the extent of use of antibiotics in the dairy and poultry operations in Lebanon.**
- **Recommend the strict regulation by the government to warrant their safety and efficacy**





Food Borne Illness Data

- **Knowledge about the current levels of Foodborne disease in the nation is required to develop a strategy to reduce food-related risks**

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- **Examples: assessed the microbiological safety & quality of two kinds of popular fast foods in Lebanon; the Shawarma, which is boneless meat or chicken on a skewer, and Lahm-bi-Ajeen, which is pizza-like dough with minced meat, onions and tomatoes on the top**
 - **Tahini and Halawa (sweet made up of tahini) can be source of *Salmonella* and other pathogens**

- **Establish an effective pasteurization method for tahini**
- **Microbiological profiling for these products and help to establish a HACCP system and enforce food safety laws**



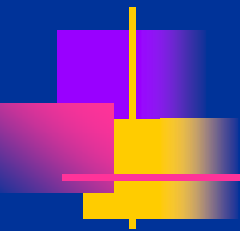


Food Safety Laws and Legislations in Lebanon

- **LIBNOR is the Lebanese Standards Institution that was established in 1962**
- **Recently, the government in cooperation with the United Nations Industrial Development Organization (UNIDO), the American University of Beirut (FAFS) and other non-government organization has established a draft for a comprehensive food safety law**

- It awaits now the final approval and signature from the Lebanese Parliament

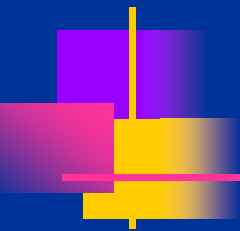


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- **The work of the Panel was coordinated by UNIDO**
 - **Quality and safety activities were initiated with UNIDO seed money**
 - **Then funded under the project "Strengthening Human and Institutional Capacity for Upgrading Safety, Quality and Standards Of Lebanese SMEs " financed by the Government of Italy to UNIDO**



Needed Future Work

- **Set up laboratory-based systems covering both outbreaks, sporadic cases and for monitoring contamination of food by chemicals and microorganisms**
- **Finalize and enforce food legislation or basic food safety laws**
- **Set Microbiological standards for specific Mediterranean/middle Eastern foods and sauces**

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- **A coherent system for reporting, identifying and tracing incidences and outbreaks from major food borne illnesses is lacking now in Lebanon**
 - **Data is not available (years of war, etc.)**
 - **Our aim at AUB is to work with government, international organizations and non government organizations to establish and enforce such a system**
 - **Consumers awareness campaigns with respect to specific Food safety issues**



Strategies/Opportunities:

- **Surveillance, outbreak investigation, research, risk assessment, regulation, guidance, enforcement, coordination, and education are the broad strategies**



THANK YOU