A New Challenge for Cereal Production and Processing Chains:
Development of a Food Quality Management System for the Control of Mycotoxins
Global Socio-Economic Context (1)

Public Health Issues
- Impact of mycotoxins on human and animal health
  *(carcinogenic, mutagenic, teratogenic, immunosuppressive, …)*
- High level of use of cereals in both food and feed

Economic Impact
- High Postharvest Losses
- Reduced animal productivity
- Significant economic losses in both domestic & international trade
Evolution of Safety Regulations

- WTO agreement on sanitary and phytosanitary standards
- *Codex alimentarius*: Joint FAO-WHO body
- EU regulations (inside Europe and for Exporting Countries)
- Regional regulations (e.g. MERCOSUR)
Most considered mycotoxins

Current Worldwide Importance

- Aflatoxins (*peanut, nuts, dried foods, soybean, ...*)
- Ochratoxin A (*coffee, coca, cereals, ...*)
- Fumonisins (*corn, sweet corn, ...*)
- Trichothecenes (*cereals, ...*)
- Zearalenone (*corn, cereals, ...*)
Diagram of whole cereal chain

SOCIO ECONOMIC & TECHNICAL CONTEXT

LOCAL CONSUMPTION
REGIONAL TRADE
EXPORT MARKET

PRE-HARVEST

POST-HARVEST: DRYING-CLEANING-STORAGE

MILLING

BY-PRODUCTS

ANIMAL FEEDING

HUMAN FOOD

DERIVED FOODSTUFF
meat, milk, eggs...

FARMERS

SMEs & cooperatives

Traders

Multinational groups
Global Issues on Food Supply Chain

- Food Supply Chain is Very Complex

  *Complex Commodity Flow Diagrams*

  *Different Stakeholders*

- Importance of Socio-Economic, Cultural and Institutional Constraints

- Notion of Quality Perception by the Chain Actors

  ✧ Need for Adequate Social Organisation
  ✧ Need for Formal Relationships Between Chain Actors
Global Issues on Mycotoxins (1)

- Contamination by Molds and Mycotoxin Formation Possible in Any Point of the Supply Chain
  
  *both in Production and Post Harvest Steps*

- Mold Growth and Synthesis of Toxins Dependent on Agroclimatic, Ecological and Physiological Conditions

- Detoxication of Contaminated Commodities Difficult and Sometimes Impossible

☞ Need for Proper Pre and Post Harvest Processes, Adequate Equipment and Sound Handling Practices
Global Issues on Mycotoxins (2)

- Evaluation of contamination based on the analytical determination of mycotoxins

  *Conventional methods (HPLC, TLC, …) are expensive, need sophisticated equipment and trained analysts*

- Need for food safety management tools along the whole chain

  *Lack of accurate and inexpensive analytical techniques for in situ routine control*

  *Lack of Good Practices (GAP, GMP, GSP, GHP, …)*

- Need for a HACCP based approach along the food chain
Urgent need for a systematic/pro-active, cost effective approach, rather than, relying entirely on expensive, wasteful end-point testing/segregation

Through

A Food Quality Management System taking into account the socio-economic context, the organisational and technological capabilities of stakeholders
... towards innovative food safety management
MYCOTOX Project

Development of a Food Quality Management System for the control of Mycotoxins in cereal production and processing chain in Latin America South Cone Countries

Partners

- Europe: France, UK, Sweden (scientific advice)
- Southern Cone: Brazil, Argentina, Uruguay, Chile
- Complementary Partnership
  - Universities
  - National Research Institutes
  - Regional Body as Interface between Those and All Chain Actors Including Private Sector (PROCISUR)
**General objective**

To improve the competitiveness of domestically and internationally traded cereals by controlling the occurrence of mycotoxins in maize and wheat products used as human food and animal feed.
Project Objectives

Specific objectives

1) Development and standardisation of effective analytical tools (sampling, sample preparation & analysis) for mycotoxin determination in cereals and by-products

2) Mycotoxin hazard analysis of the domestic and international maize and wheat production and processing chains

3) Development and validation of effective mycotoxin control measures at specified critical control points

4) Development of a Food Quality Management System for the control of mycotoxins in cereal production and processing chains
WP1
Development and Standardisation of Effective Analytical Tools for Mycotoxin Determination in Cereals and By-Products

WP2
Risk Assessment of Human Exposure to Ochratoxin A

WP3
Evaluation of Milling Procedures as Potential CCPs
Project Activities (2)

WP4
Hazard Analysis of Mycotoxins

WP5
Identification and Validation of Mycotoxin Control Measures

WP6
Development of a Food Quality Management System
Relations between the WorkPackages

- WP1: Development and standardisation of effective analytical tools for mycotoxin determination in cereals and animal products
- WP2: Risk assessment of human exposure to ochratoxin A
- WP3: Evaluation of milling procedures as potential CCPs
- WP4: Hazard analysis of mycotoxins
- WP5: Identification and validation of mycotoxin control measures
- WP6: Development of a Food-Quality Management System

AT LABORATORY

ON FIELD
Dissemination of Project Outputs

To the Scientific Community
- Peer-Reviewed Papers, Workshops and Seminars

To the Chain Actors and Professional Organisations
- Large Dissemination Papers (GAP, GMP, …)
- Training
- Participatory Workshops

To the Traders and Regulatory Bodies
- Sectorial Papers
- Focused Workshops (e.g. Rapid On-Field Analytical Techniques)

External Strategy
- Participation in European and International Networks and Clusters on Mycotoxins
Prospects

- Adaptation and Validation of the Developed Methods
  - to Other Contexts
  - to Other Commodity Chains
  - to Other Contaminants

- Identification of new partnerships (EU, Mercosur, other regions)

Topics & Partners, Elaboration of Project Proposals