AGENCE FRANÇAISE
DE SÉCURITÉ SANITAIRE
DES ALIMENTS

Risk Assessment related to Mycotoxins: the *Fusarium* toxin case

Results of the « mycotoxins » Expert Panel 2003-2007

1. Motivations & Objectives

Last update at national official level:

CSPHF report in 1998 :

- Some mycotoxins have not been considered (Trichothecenes, « minor » toxins)

- Animal exposure via feed was not considered

Objectives of the present work:

- Update based on recent knowlegdes on the major mycotoxins,

- Perform risk assessment on toxins not considered in the CSHP report: trichothecenes, « minor » mycotoxins,

- Perform calculation on animal exposure.

2. Are reported for each mycotoxin group:

1. Optimal parameters for mold growth and toxin production
2. State of the art for sampling, detection and determination in food and feed
3. Effects of processing practices on toxin content in food
4. Toxicological data for human (TDI, PTWI…)
5. French population exposure via food (specific groups: adults/children, vegetarians…)
6. Effects on animal health and toxin behavior in animal products
7. Animal exposure via feed
8. Regulation or recommandation levels in food and/or feed
9. Monitoring and control plans (performance and data)
10. Recommandations

3. Which mycotoxins? *Fusarium* toxins?

1. AFLATOXINS
2. OCHRATOXINS
3. TRICHOTHECENES
4. ZEARALENONE
5. FUMONISINS
6. PATULIN
7. OTHER MYCOTOXINS

   Claviceps purpurea toxins (Ergot alkaloïds)
   Citrinin
   Alternaria toxins
   Cyclopiazonic acid
   Tremorgenic toxins from *Penicillium* and *Aspergillus* →
   Sporidesmins
   Stachybotryotoxins
   Endophyte toxins
   Phomopsins

4. Common identified facts and key points

- Natural contaminants of plants (grains)
- Production very subjected to environmental conditions
- Various and specific toxic effects for human and animals
- Various specific behavior in feed and food chains,
- Various and specific behavior in animals and animal products

>>> Risk cannot be avoided but can be limited

- Limited availability of toxicological data,
- Uncertainty on occurrence data due to sampling and analytical methods in feed and food

5.1 Trichothecenes (TCTs) : Key points

- 160 TCTs identified (4 groups)
- Selection of toxins « of interest » :
  Groupe A : T-2 et HT-2,
  Groupe B : DON, NIV,
- Occurrence in cereals and derivated products,
- Exposure (chronic) : haematologic et immunologic effects,
- Negative effects of DON et NIV for pigs
- T-2, DON et NIV classified in group 3 by IARC,
- PTDI : T-2 et HT-2 : 0,060 µg/kg b.w./d
  DON : 1 µg/kg b.w./d
  NIV : 0,7 µg/kg b.w./d,

5.2 TCTs : Recommandations

- Data from toxicological studies in accordance with International recognised guidelines to confirm TDI

- Development of reliable analytical methods for multi toxin determination in compliance with regulatory limits,

- Development of reliable analytical methods for T2 and HT2 toxin determination

6.1 Zearalenone: Key points

- Occurrence in cereals (corn) during storage and malting,
- œstrogenic activity inducing endocrine disruption in pig,
- PTDI : 0,2 µg/kg b.w./d,
- Human exposure is low (35-60% of TDI), except for vegetarians (33% of the group above)

6.2 Zearalenone: Recommandations

- Data from toxicological studies in accordance with International recognised guidelines to confirm TDI

- Data from toxicological studies on the interaction of ZEA with other toxins (TCTs+ZEA+FBs), and ZEA with other Endocrine Disruptors

- Behavior in animals and animal products (zéa et α-zéaralènol),

- Extension of monitoring and/or control plans in cereals (to wheat and wheat products)

7.1 Fumonisins (FBs): Key points

- Occurrence mainly in maize, variable according climatic conditions (year to year),
- Toxicological facts: negative effects on sphingolipid metabolism, immunity, liver
  >>> classified in group 2B by IARC,
- Various negative effects on animals : lung oedema in pigs, hepatotoxicity in sheep, leuco-encéphalomalacia in horses, growing defect in cows,
- Toxicological data on FB2,3, and 4 very limited,
- Human exposure very low (3-15 % of TDI),
- Particular attention regarding risk related to ingestion of maize by-products by horses and other animals.

7.2 Fumonisins (FBs): Recommandations

- Data from toxicological studies in accordance with International recognised guidelines to characterise the relative toxicity between FB1, 2, 3 et 4)
- Data on occurrence in cereals especially maize products for children
- Data on interaction between toxins (TCTs+ZEA+FBs)
- Revision of recommandations for feed
- Practice guidelines for using maize by-products for feeding horses

8. Conclusion: Needed informations

- Data from toxicological studies in accordance with International recognised guidelines
- Data from toxicological studies on interaction between toxins (TCTs+ZEA+FBs)
- Data on behavior in animals (toxicokinetics)
- Standardisation of sampling procedures
- Development of reliable analytical methods for multi toxin determination
- Extension of monitoring and/or control plans in cereals (mainly corn and wheat) and cereal products