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MYCOTOXINS IN FOOD FOR DIRECT CONSUMPTION IN CHILE

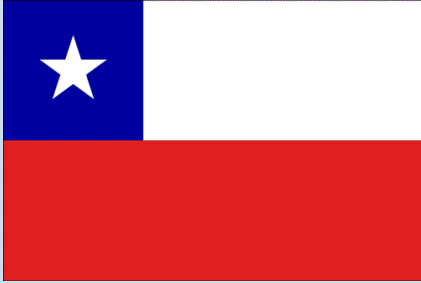
Lorena Delgado, Luis Roa, Emilia Raymond, Orialis Villarroel

Environmental Health Department, Public Health Institute of Chile

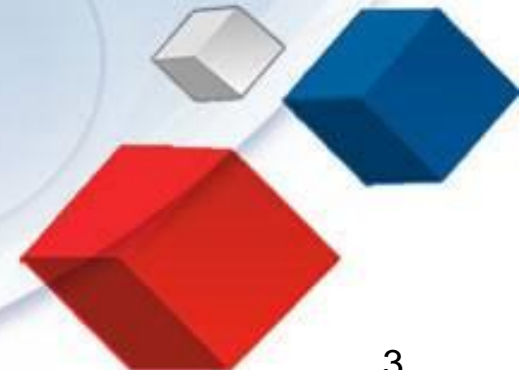
June 29th 2010

INTRODUCTION

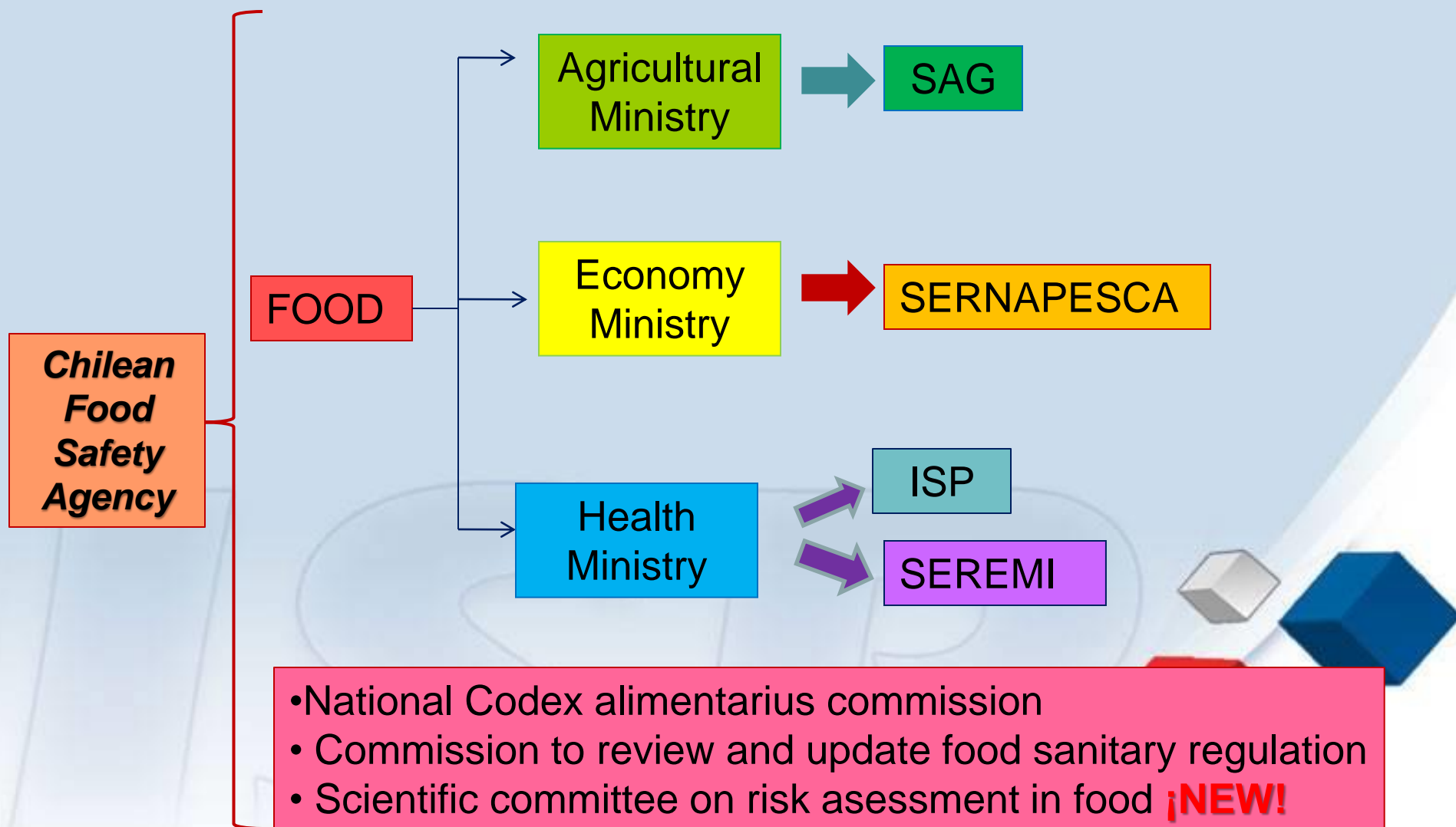
1. Chilean conditions in food control and inspection of mycotoxins
2. Chilean import situation of crops
3. Limit and regulation for mycotoxins in food and feed in Chile



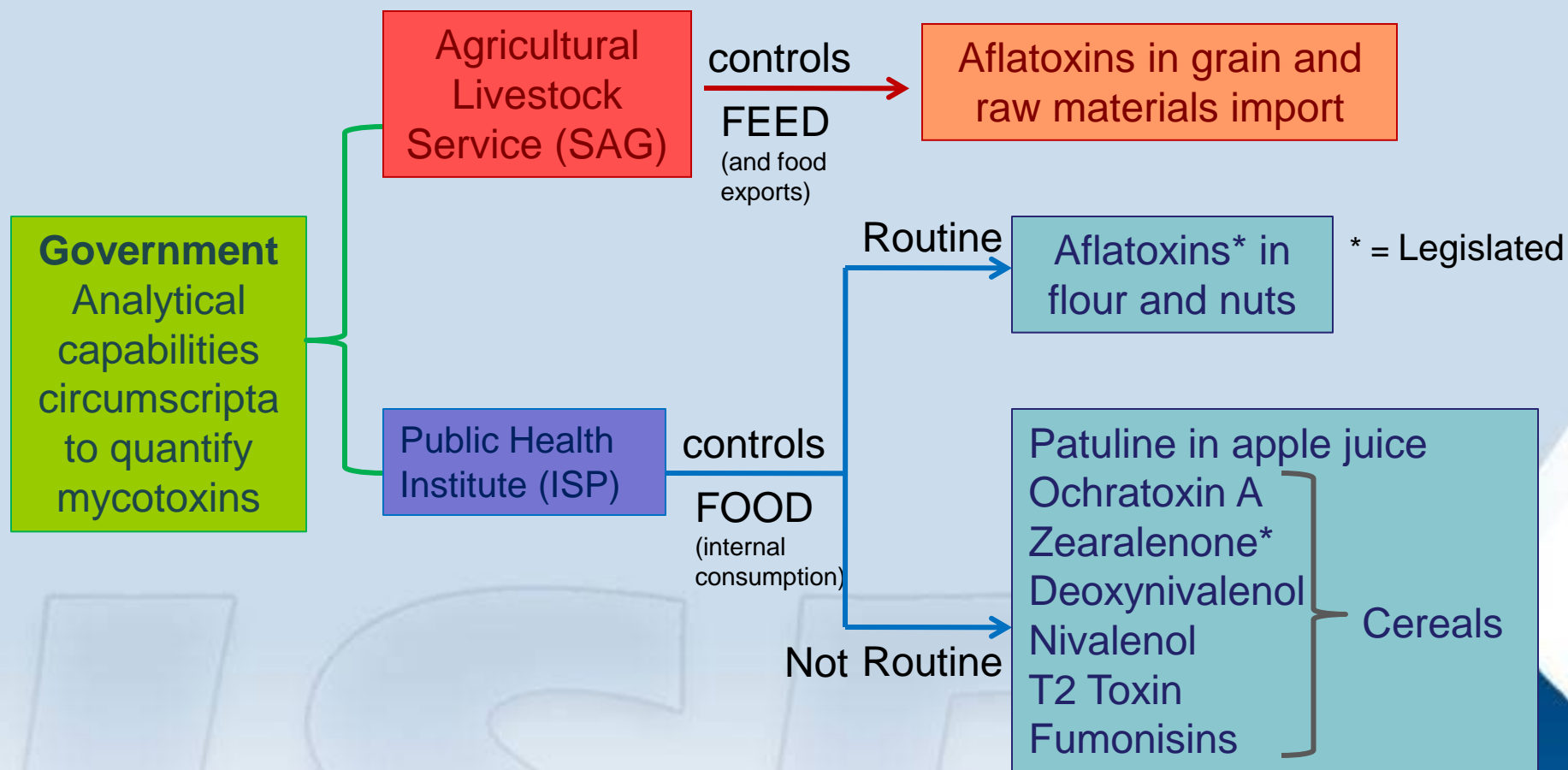
1. Chilean conditions in food control and inspection of mycotoxins

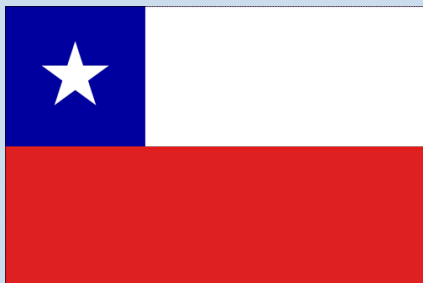


1. Chilean conditions in food control and inspection of mycotoxins



1. Chilean conditions in food control and inspection of mycotoxins

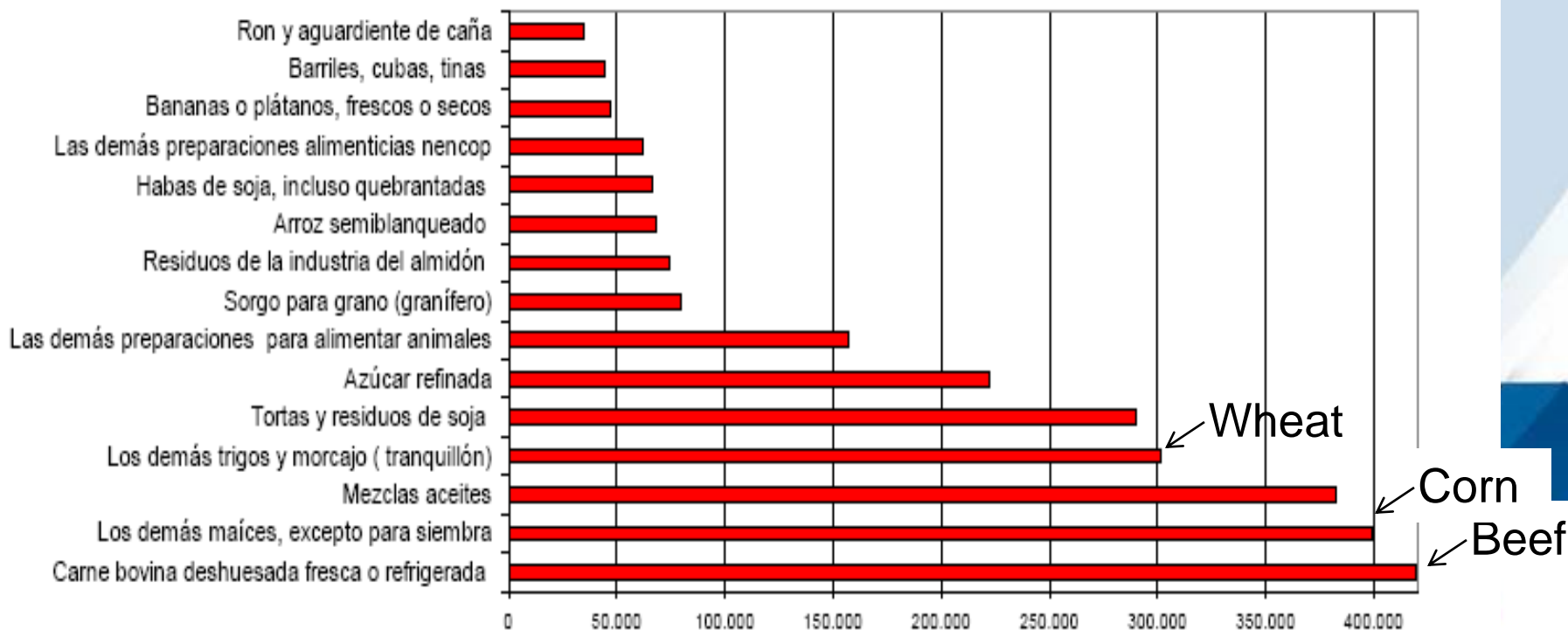




2. *Chilean import situation of crops*

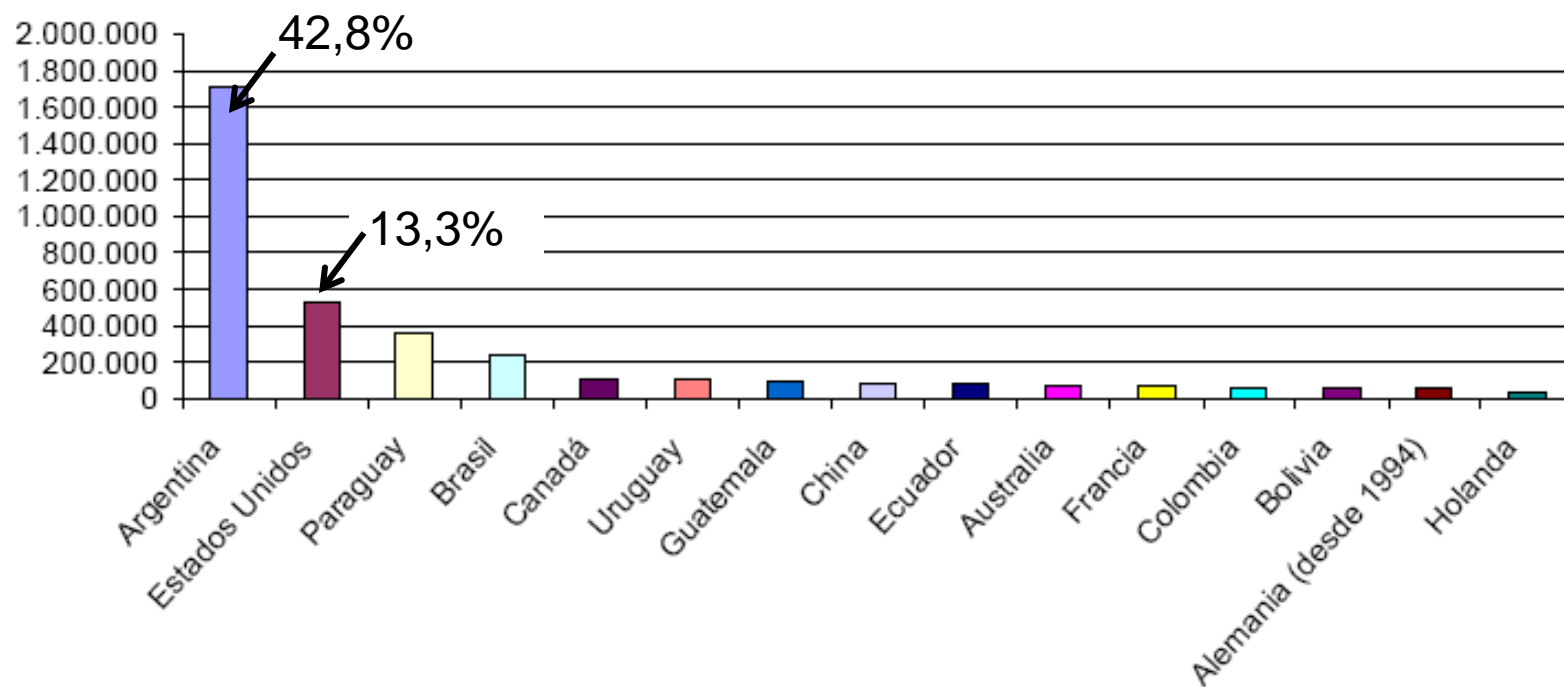
2. Chilean import situation of crops

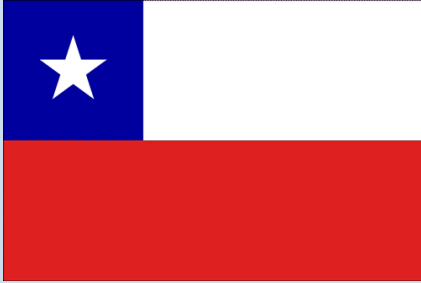
Mainly agriculture, livestock, forestry products
imported Thousands US \$ 2008



2. Chilean import situation of crops

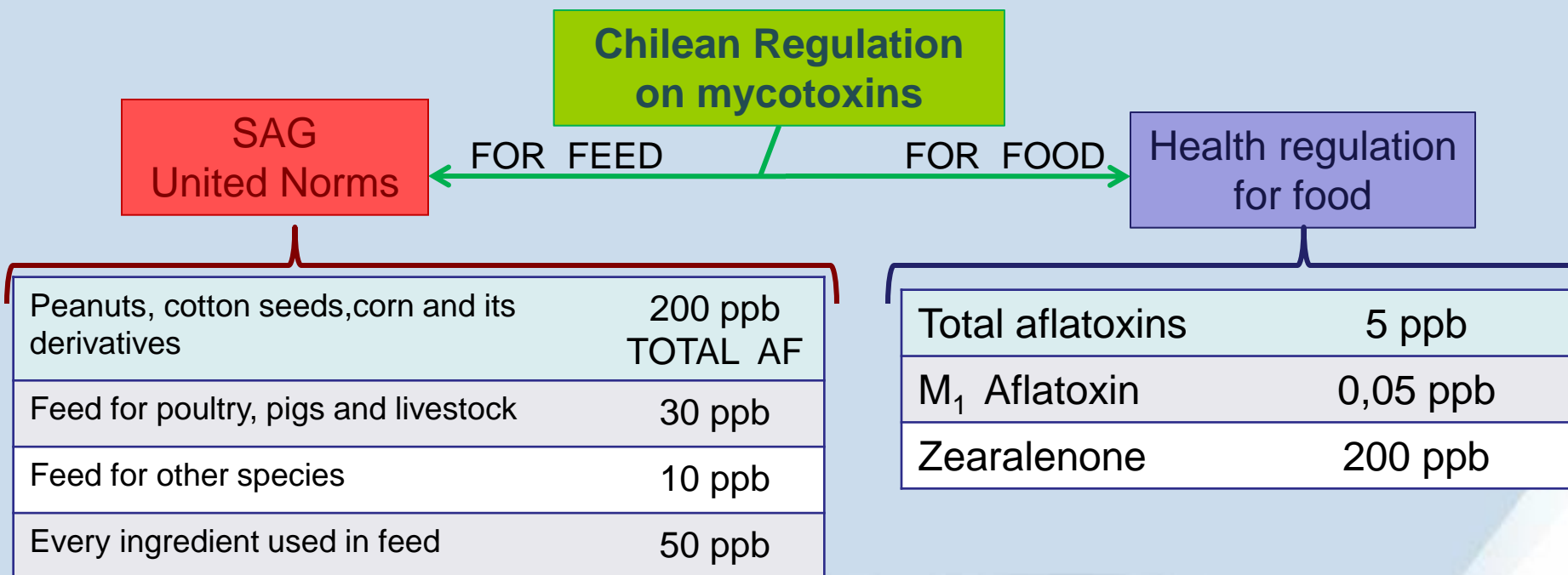
Imports of Agriculture, livestock, forestry products by country of destination
Thousands US \$ 2008





3. Limit and regulation for mycotoxins in food and feed in Chile

3. Limit and regulation for mycotoxins in food and feed in Chile



In Chile, legislation about limits for mycotoxins in feed or food does not indicate the analytical methodologies accepted.

As for **mycotoxicosis**, the **Chilean standard** about veterinary inspection of cattle **establishes the rejection of cattle in the presence of acute or chronic mycotoxicosis**, both in the channel as in the viscera of the animal, clinic or morphologically detected in the post-mortem inspection



Aim:

Determine the presence and quantify the quantity of different mycotoxins:

Aflatoxins

Patulin

Zearalenone

Ochratoxin A

Nivalenol

Deoxynivalenol

T2 toxin

in food for direct consumption in Chile.



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PÚBLICA DE CHILE**



MATERIALS AND METHODS

Materials and methods

Mycotoxins project:

Study of food residues and contaminants Public Health Institute of Chile

- During 2008 was performed by the Institute of Public Health a pilot study about determination of veterinary drug residues, pesticides residues and **mycotoxins in food**.
- During 2009 this study continued, incorporating the analysis of heavy metals and nutritional labeling.

Mycotoxins
samples
2008 -2009



156, collected from
supermakets of the
central zone of Chile



Materials and methods

Mycotoxins
samples
2008 -2009



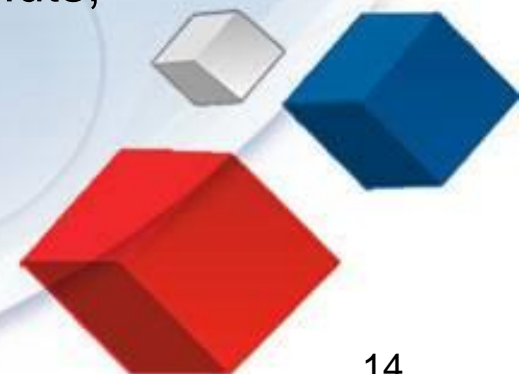
156, collected from
supermakets of the
central zone of Chile

| Matrix | n | Mycotoxins |
|-----------------------------------|----|-------------------------------|
| Nuts fruits | 47 | Aflatoxins, OTA |
| Fruit Juices | 40 | Patulin |
| Maize, wheat and rice products | 69 | AF, DON, NIV, OTA, T2, ZEN |

Nuts fruits: Almonds , Figs, peanuts, japanese tipe peanuts, Hazel nuts, raisins and pistachios,

Fruits Juices: Apple, cramberries, plum, peach, strawberries, kiwi, blueberries, grape.

Maize, wheat and rice products: Flour, cornflakes, breakfast cereals.



Materials and methods

Mycotoxins
nº Analysis
2008 -2009



326

| Mycotoxins | Nº analysis | Extraction methods |
|----------------|-------------|------------------------|
| Aflatoxins | 79 | Mycosep 224 |
| Patulin | 40 | Mycospep 228 |
| Deoxinivalenol | 24 | Multisep 227 |
| Nivalenol | 24 | |
| T2 | 34 | |
| Zearalenone | 37 | Immunoaffinity columns |
| Ochratoxin A | 88 | |

Quantification
methods

HPLC

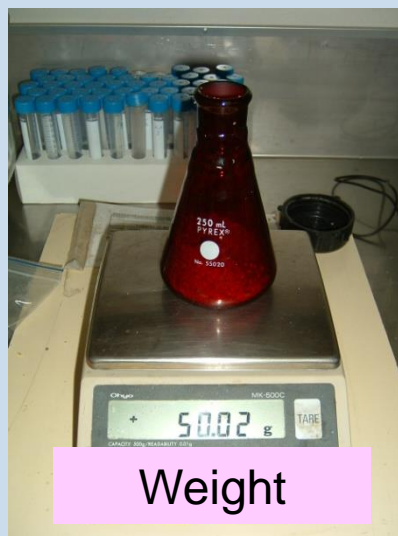
LC/MSMS

Materials and methods

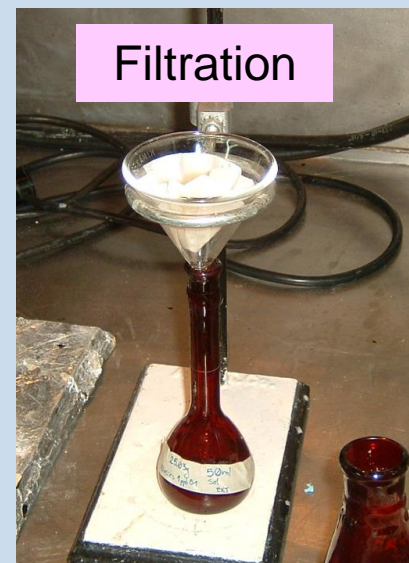
Most of the analytical method used were the one proposed by the Japanese expert, Dr. Hisashi Takeda and the ones showed at Japanese training course «Mycotoxins inspection in food». Both activities were according to the «Food safety enforcement program» project between Chile-Japan 2007-2009



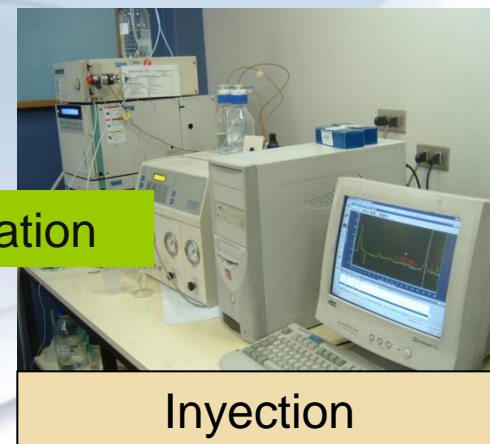
Materials and methods



EXTRACTION
(Blender or
shaker)



DILUTION
(PBS) for IAC

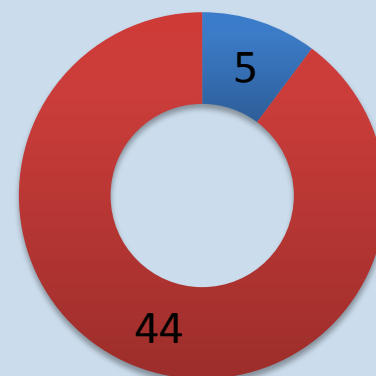
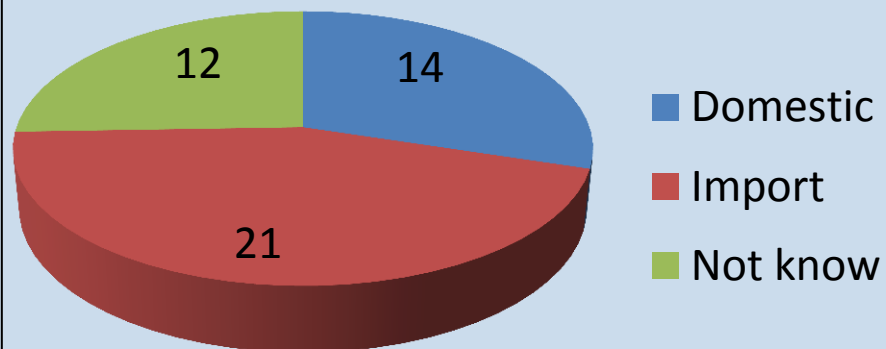


RESULTS

- Dried Fruits
- Fruits Juices
- Maize, rice and weath and its derivatives
- * Summary

Results: Dried Fruits

Sample source

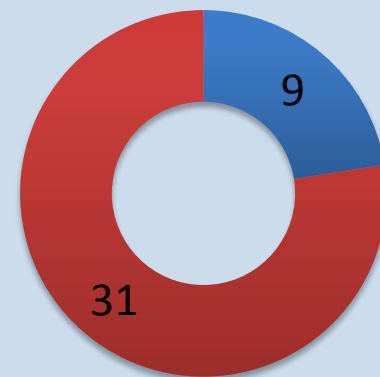
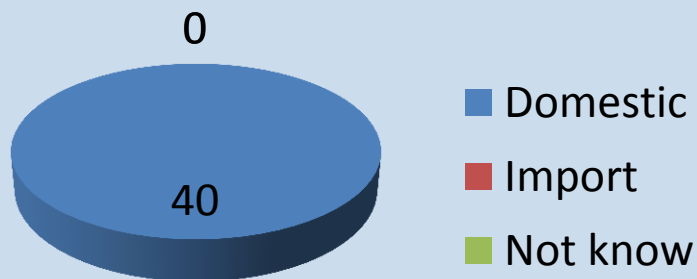


■ Positive ■ Negative

| Mycotoxin | +(Total) | Matrix | Range |
|--------------|----------|-----------------------|--------------|
| Ochratoxin A | 4(19) | Raisins | 0,04-3,4 ppb |
| Aflatoxins | 1(3) | Japanese type peanuts | 33,0 ppb |

Results: Fruit Juices

Sample source

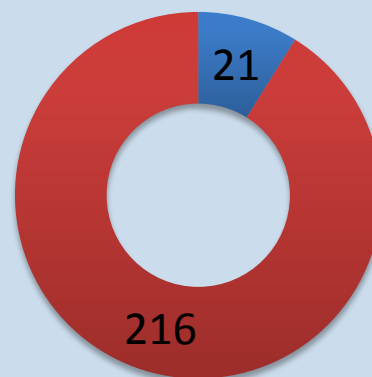
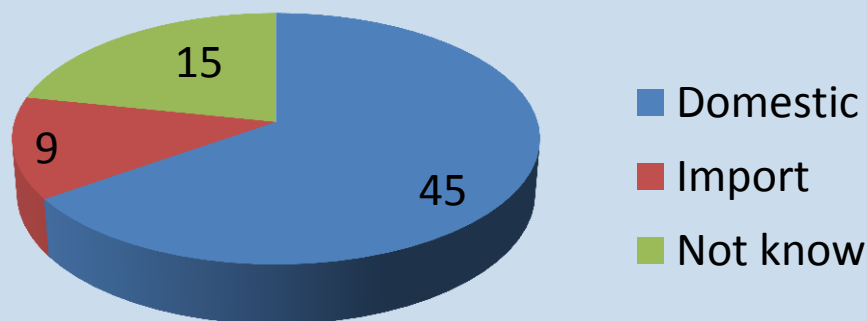


■ Positive ■ Negative

| Mycotoxin | +(Total) | Matrix | Range |
|-----------|----------|-------------|-----------------|
| Patulin | 9(13) | Apple juice | 6,4 - 175,6 ppb |

Results: Maize, rice and wheat and its derivatives

Sample source



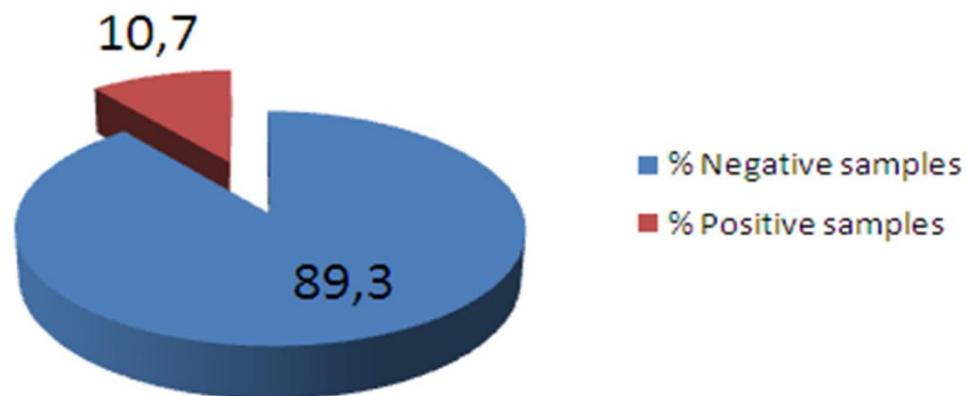
■ Positive ■ Negative

| Mycotoxin | +(Total) | Matrix | Range |
|----------------|----------|-------------------|-----------------|
| Ochratoxin A | 3(14) | Rice | 0,2 – 0,7 ppb |
| | 3(10) | Wheat flour | 0,02 – 0,3 ppb |
| | 9(30) | Breakfast cereals | 0,2 – 0,7 ppb |
| | 1(1) | Wheat bran | 8,1 ppb |
| Zearalenone | 1(9) | Wheat flour | 4,8 ppb |
| | 1(3) | Maize | 86,1 ppb |
| | 2(6) | Wheat | 11,9 – 13,1 ppb |
| Deoxynivalenol | 1(10) | Breakfast cereals | 94,0 ppb |

Results: Summary

| Mycotoxin | Positive samples | Matrix affected | Maximum value founded |
|------------------|------------------|----------------------|-----------------------|
| Total aflatoxins | 1 | Japanese type peanut | 33 ppb |
| Patulin | 9 | Apple juice | 175 ppb |
| Deoxynivalenol | 1 | Breakfast cereal | 94 ppb |
| Zearalenone | 4 | Maize | 86 ppb |
| Ochratoxin A | 20 | Wheat bran | 8 ppb |

Results of mycotoxins analysis



CONCLUSIONS

- From the total of analysis performed (326), 35 samples were positive, and from them, 3 were above the international limits established by Codex Alimentarius. Some of these mycotoxins who presents values superior to the allowed by this regulation, don't have allowed limits in the Chilean legislation, this reflects the need to consider include on it.

- *Further analysis must be performed to determinate if the trend observed about the presence of mycotoxins in food of direct consumption in Chile is confirmed with a larger number of samples or in a specific matrix.

REFERENCES

- Kumagai et.al. *Aflatoxin and Ochratoxin A contamination of retail food and intake of these mycotoxins in Japan*. Food Additives and Contaminants Vol 25 n°9 , September 2008, 1101-1106
- 49.2.19A Method “AOAC Official Method 994.08 Aflatoxins in Corn, Almonds, Brazil nuts, Peanuts, and Pistachio nuts” Multifunctional Column (Mycosep) Method.
- A rapid multiresidual determination of type A and type B trichothecenes in wheat flour by HPLC-ESI-MS. Food Additives and Contaminants, March 2005, 22(3): 251-258
- Japanese Official Analytical Method for Patulin (Notification N° 369, Ministry of Health, Labour and Welfare, 2003)





Thank you very much for listening
¿Questions?

- Muchas gracias