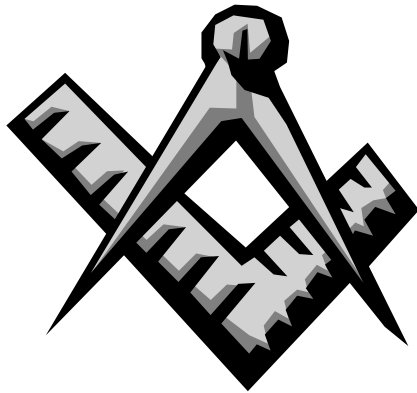


**Worldwide and European regulations
for mycotoxins & *analytical methods*
expected from**



Hans van Egmond & Marco Jonker, Brussels, 22 October 2004

“It can be measured, so it must exist”



Quote of first speaker at conference:
“Measurements, a key to competitiveness”,
25th anniversary of BCR, November 1998

“A well-known mycotoxin, such as aflatoxin B₁ is 33 million times more dangerous than the dangerous solvent carbon tetrachloride – its threshold is *0.000001 gram per kg per day*”



Naresh Magan, RTD Info 42,
August 2004



“There is no point imposing
constraining *regulations* if
only a few individuals and
laboratories are able to
monitor their application
throughout the continent”

Naresh Magan, RTD Info 42,
August 2004

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- Factors influencing mycotoxin regulations
- International inquiries on mycotoxin regulations
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- Worldwide limits for aflatoxins in food and feed
- Worldwide limits for other mycotoxins in food
- BioCop work package *mycotoxins*
- Summary



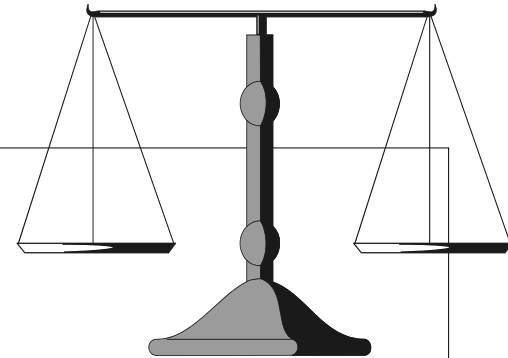
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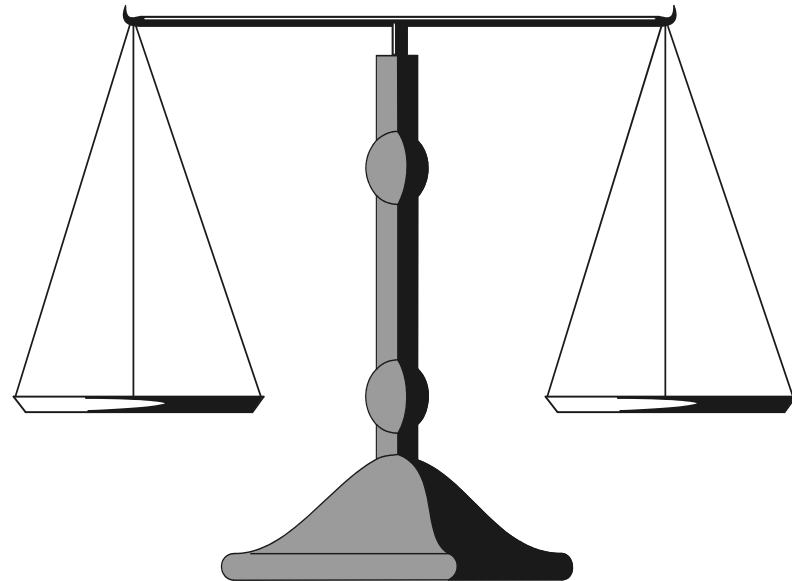


Factors influencing mycotoxin regulations

- Availability of toxicity data
- Availability of survey analytical data
- Availability of methods of sampling and analysis
- Trade contacts with other countries
- Sufficiency of food supply



Weighing the various factors: not trivial



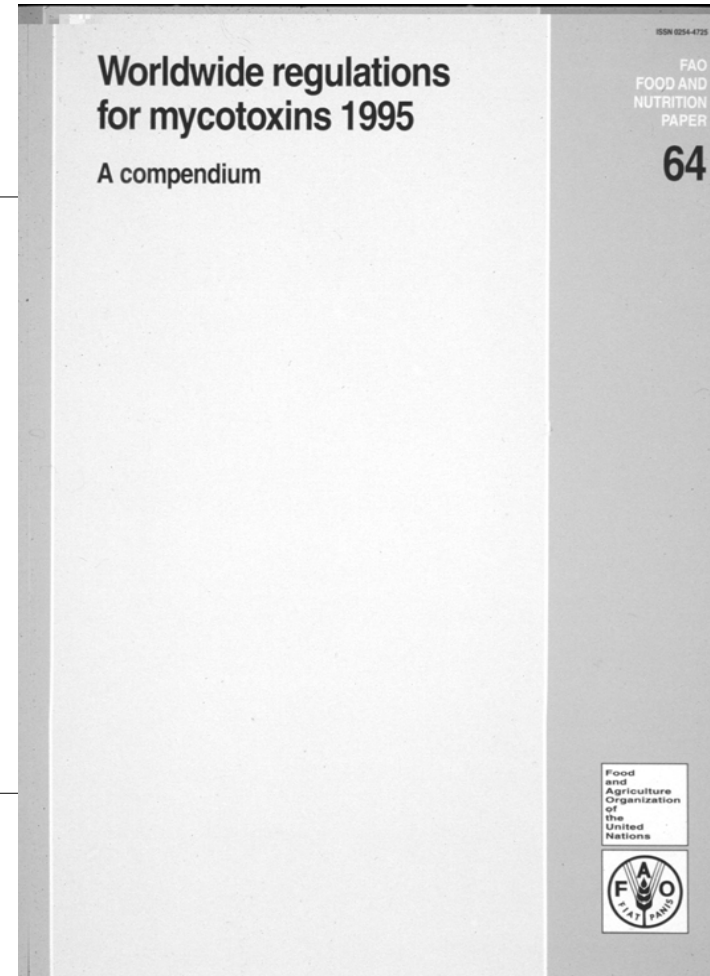
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Inquiries on mycotoxin regulations

- Worldwide inquiries in 1981, 1987, 1995 and 2002/2003, resulting in various publications
- Inquiry 1995 published as FAO FNP Paper 64 (1997)



International inquiry 2002/2003

Questionnaire February 2002

For an Update of
“Worldwide regulations for mycotoxins 1995”
FAO Food and Nutrition Paper 64

- Inquiry 2002/2003: FAO-contracted activity of RIVM
- Information: Dutch Embassies and personal contacts
- Details asked a.o. about tolerance limits, legal bases, responsible authorities, methods of sampling and analysis
- Results: regulations exist in 100 countries and for 13 toxins
- FAO Food and Nutrition Paper: in print

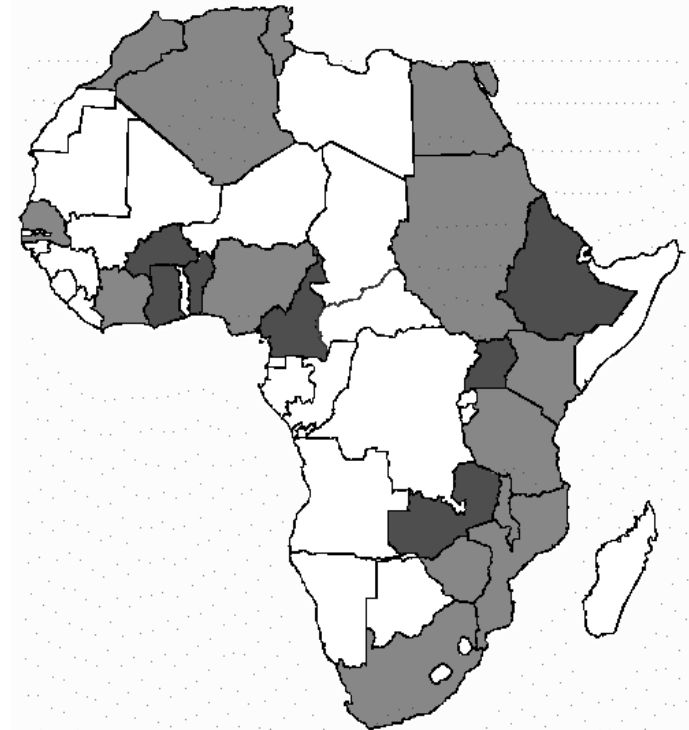
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Africa

- 15 nations with known regulations (59 % of inhabitants of the region)
- Majority of countries: regulations unknown or non-existent
- Several countries indicate regulations should be developed
- Regulations mainly for AFB₁
- Most detailed: Morocco



Asia/Oceania

- 26 nations with known regulations (89 % of inhabitants of the region)
- Regulations for total aflatoxins dominate in food, regulations for AFB₁ dominate in feed
- Harmonized regulations in Australia & New Zealand
- Most detailed : China and Iran



Latin America

- 19 nations with known regulations (92 % of inhabitants of the region)
- Harmonized aflatoxin regulations in MERCOSUR
- Aflatoxin regulations mostly set for total aflatoxins
- Most detailed regulations: Uruguay



North America

- 2 nations with known regulations (100 % of inhabitants of the region)
- Canada: detailed tolerances for *Fusarium* damaged kernels (% FDK) and for ergot (% by weight)
- USA: detailed tolerances for fumonisins ($B_1+B_2+B_3$) in a wide variety of foods and feeds



Europe

- 39 nations with known regulations (99 % of inhabitants of the region)
- EU harmonized limits exist for:
 - total aflatoxins and AFB₁ in various foodstuffs and AFB₁ in baby food
 - AFM₁ in milk and baby food
 - ochratoxin A in various foodstuffs and baby food
 - patulin in fruit products and baby food
- Low limits applied, especially for baby food

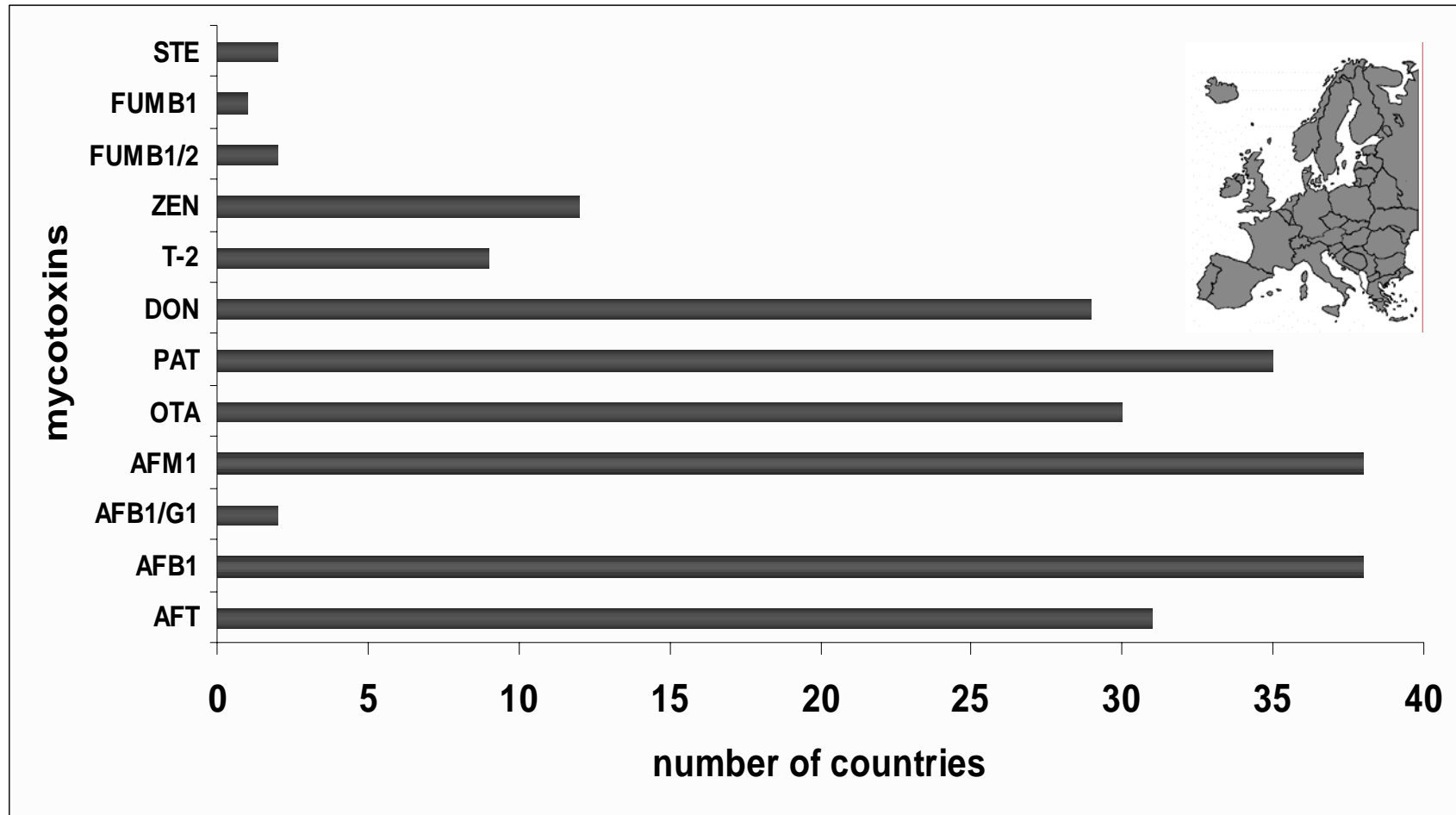


Europe - regulations in development

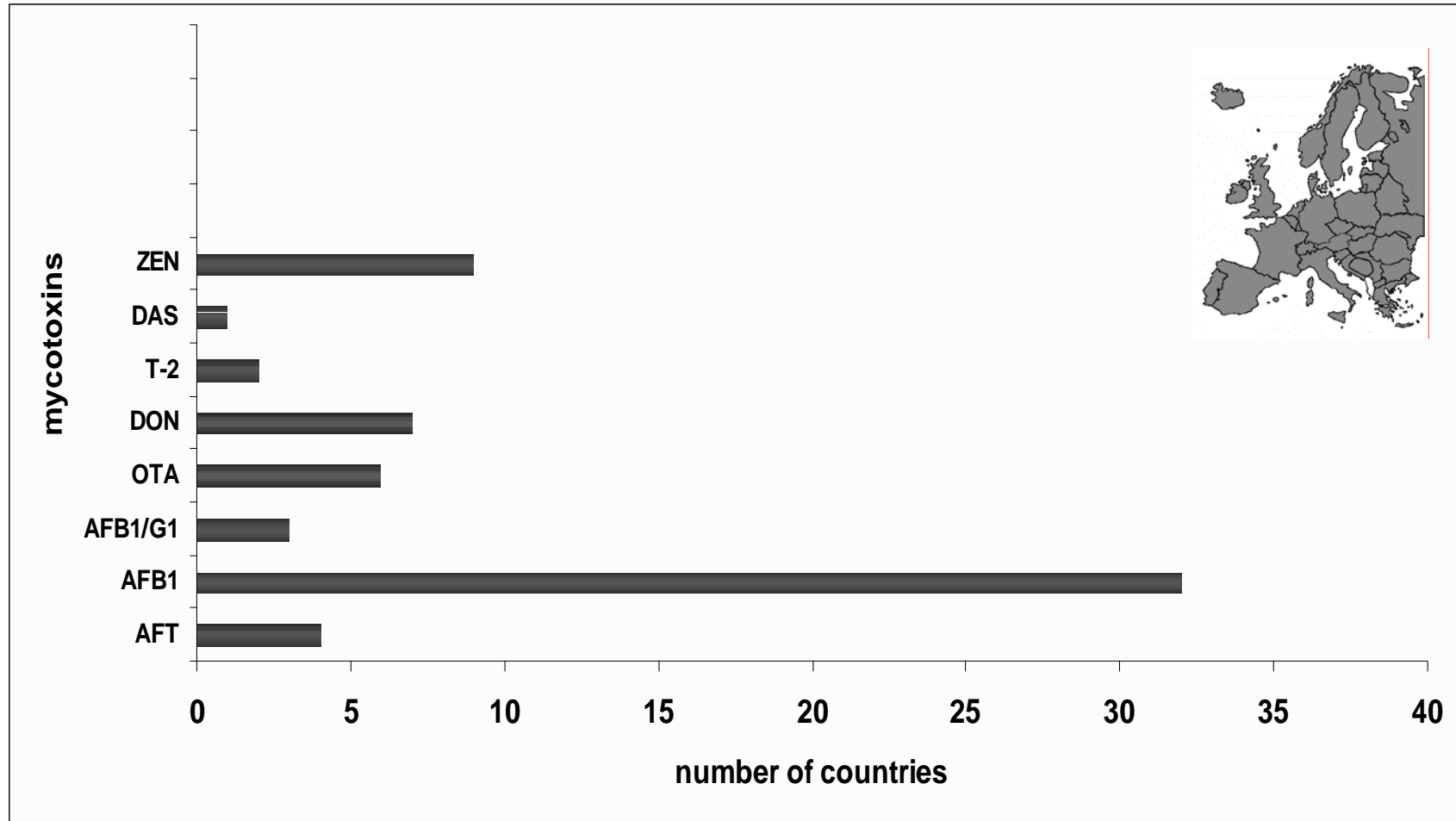
- EU guidelines limits for DON will be “upgraded” to regulated max. levels
- Expected: EU limits for ochratoxin A in coffee, wine and grape juice
- Expected: EU regulations for several *Fusarium* toxins in food and baby food
- Expected: EU regulations for various mycotoxins in feeds (apart from AFB₁)
 - DON, zearalenone, fumonisins
 - ochratoxin A
 - ergot alkaloids

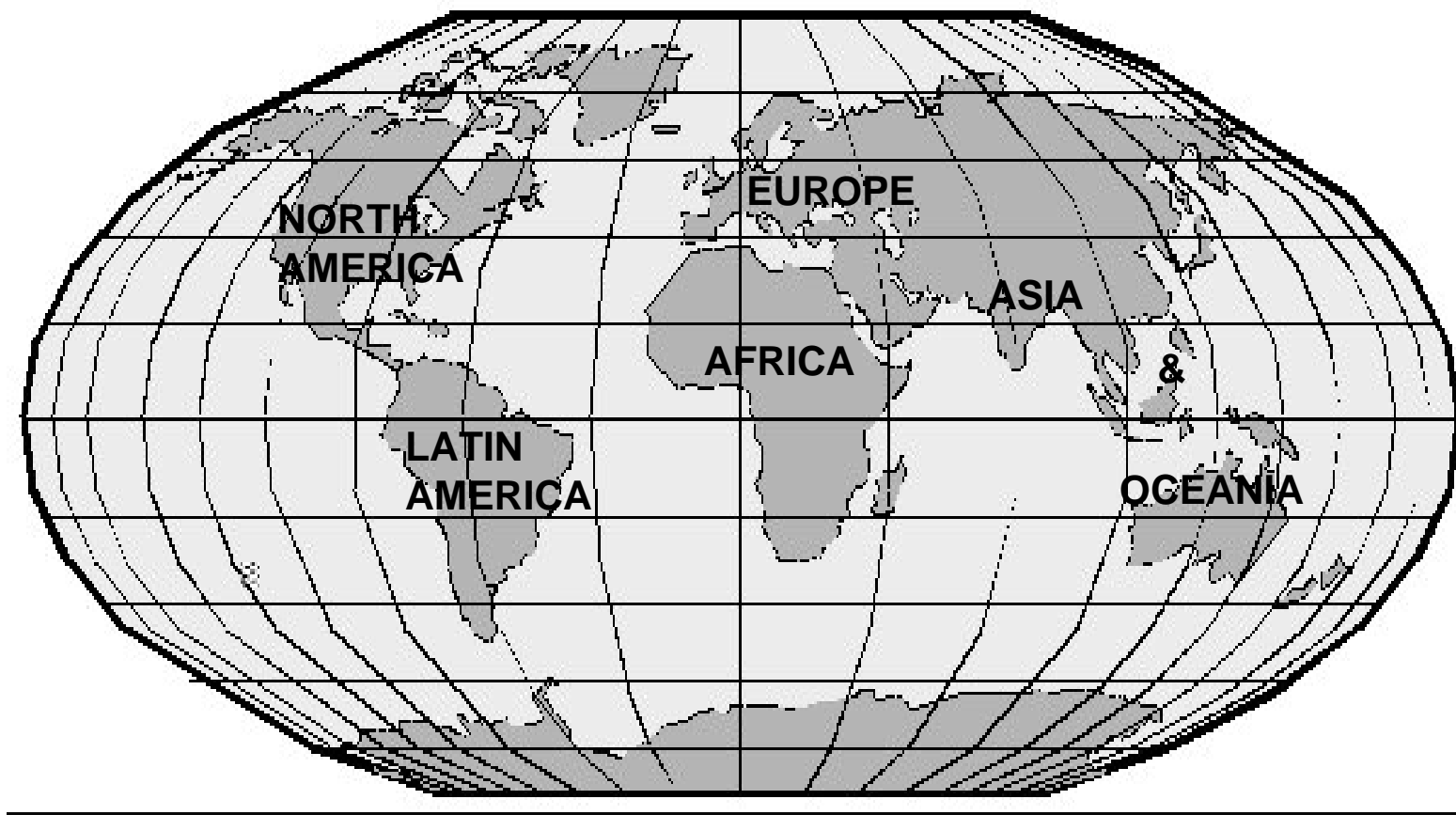


Europe: mycotoxins regulated in food (2003)

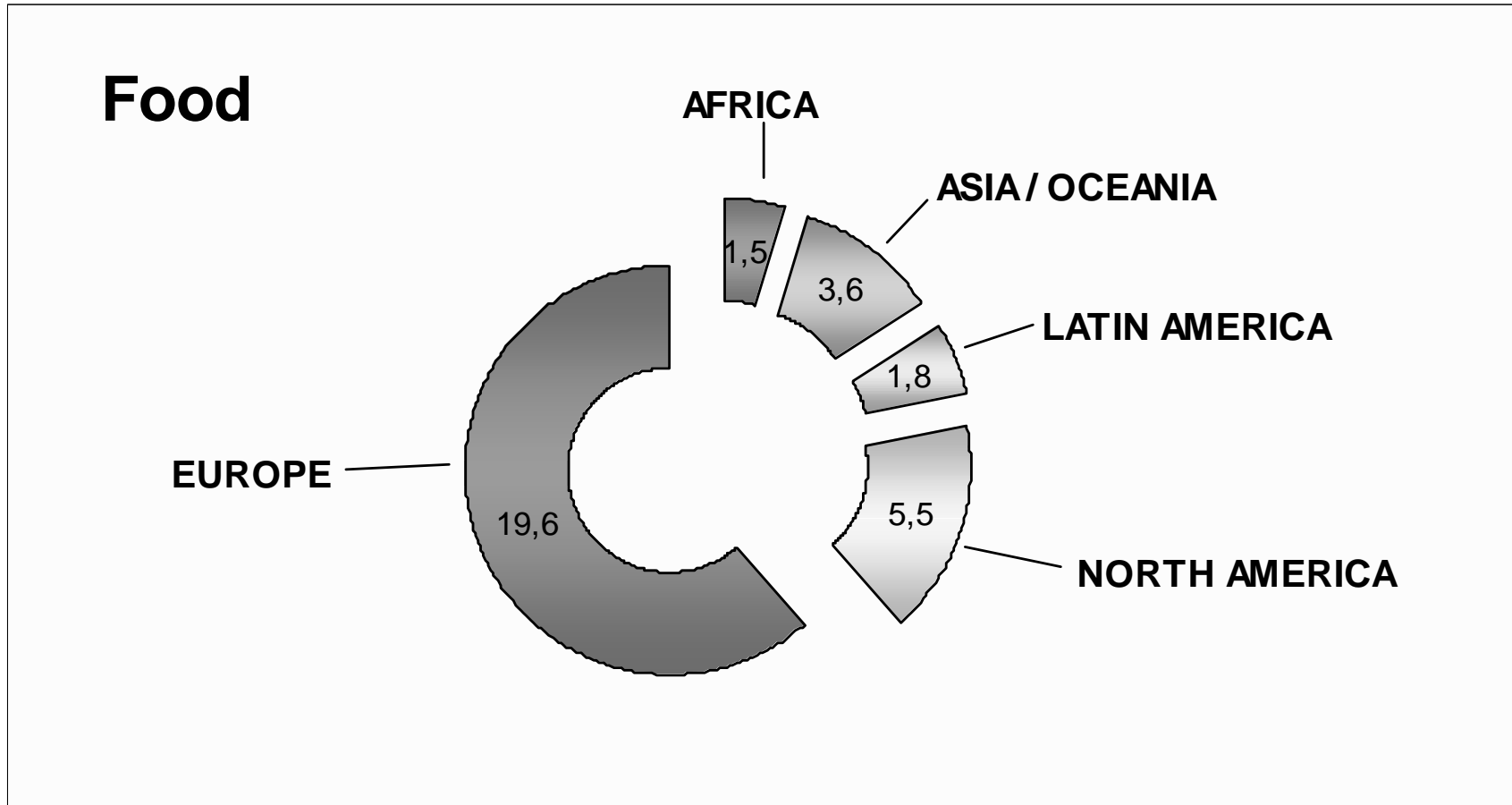


Europe: mycotoxins regulated in feed (2003)

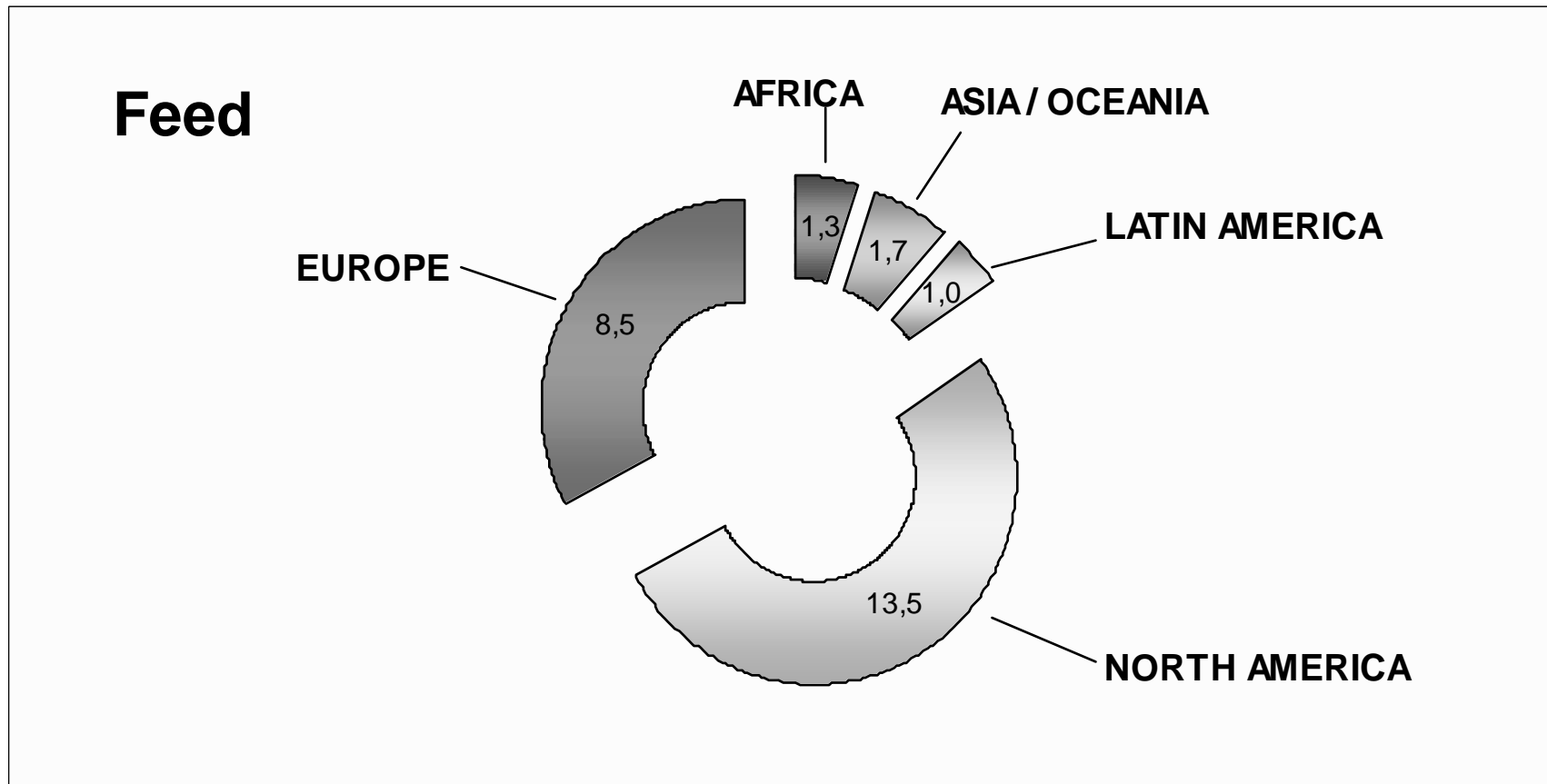




Number of mycotoxin regulations per country



Number of mycotoxin regulations per country

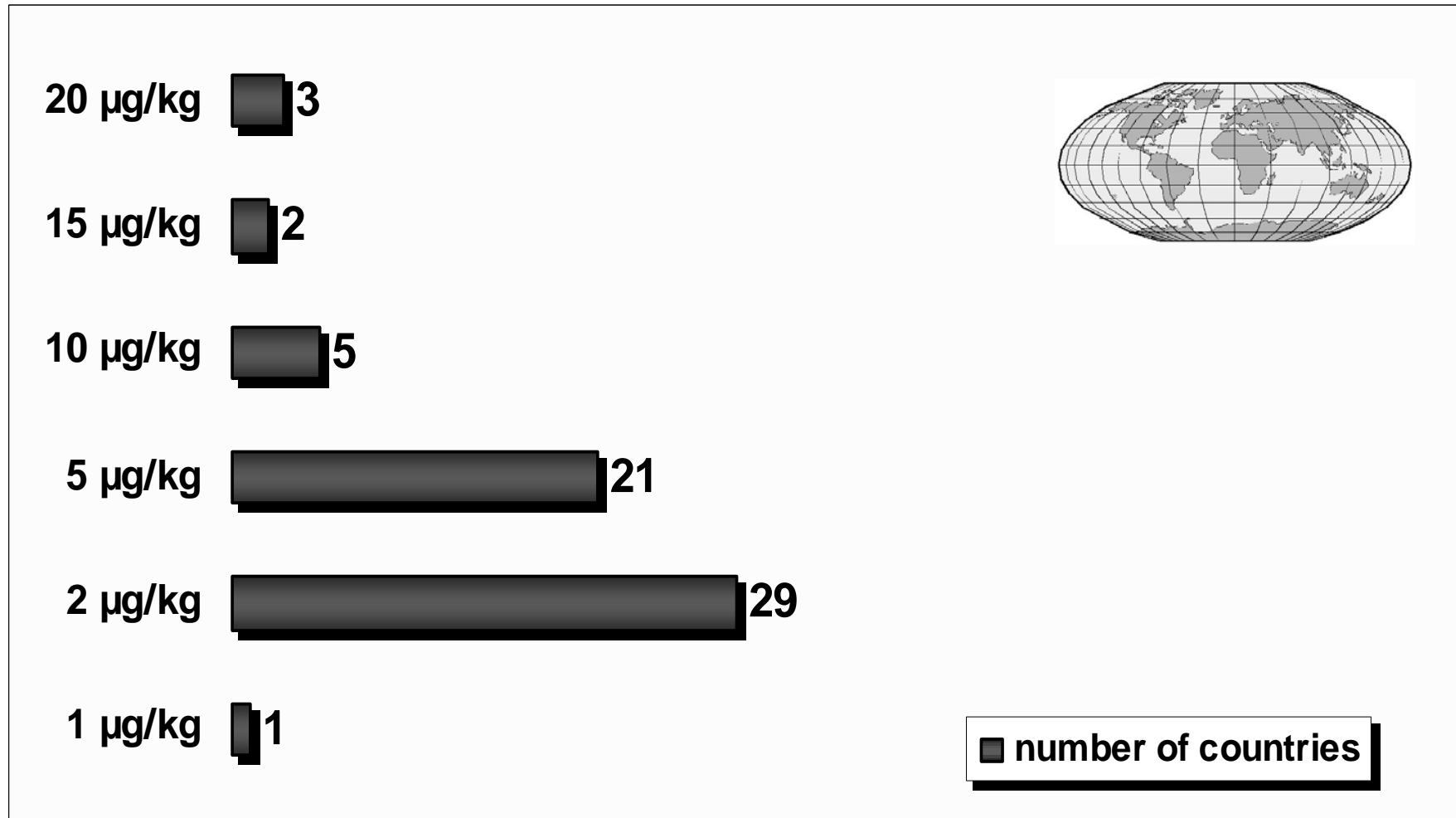


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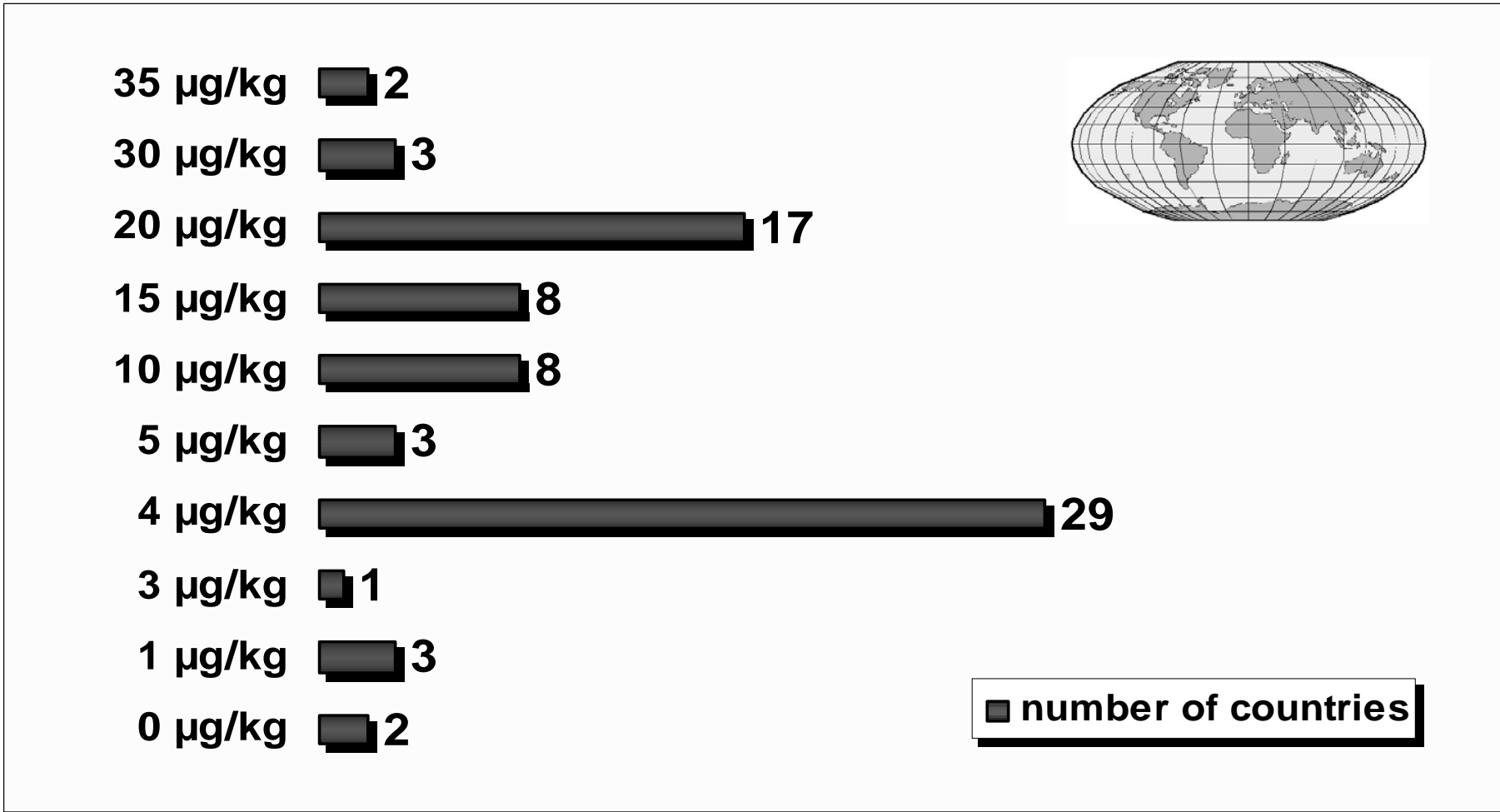
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Aflatoxin B₁ in food

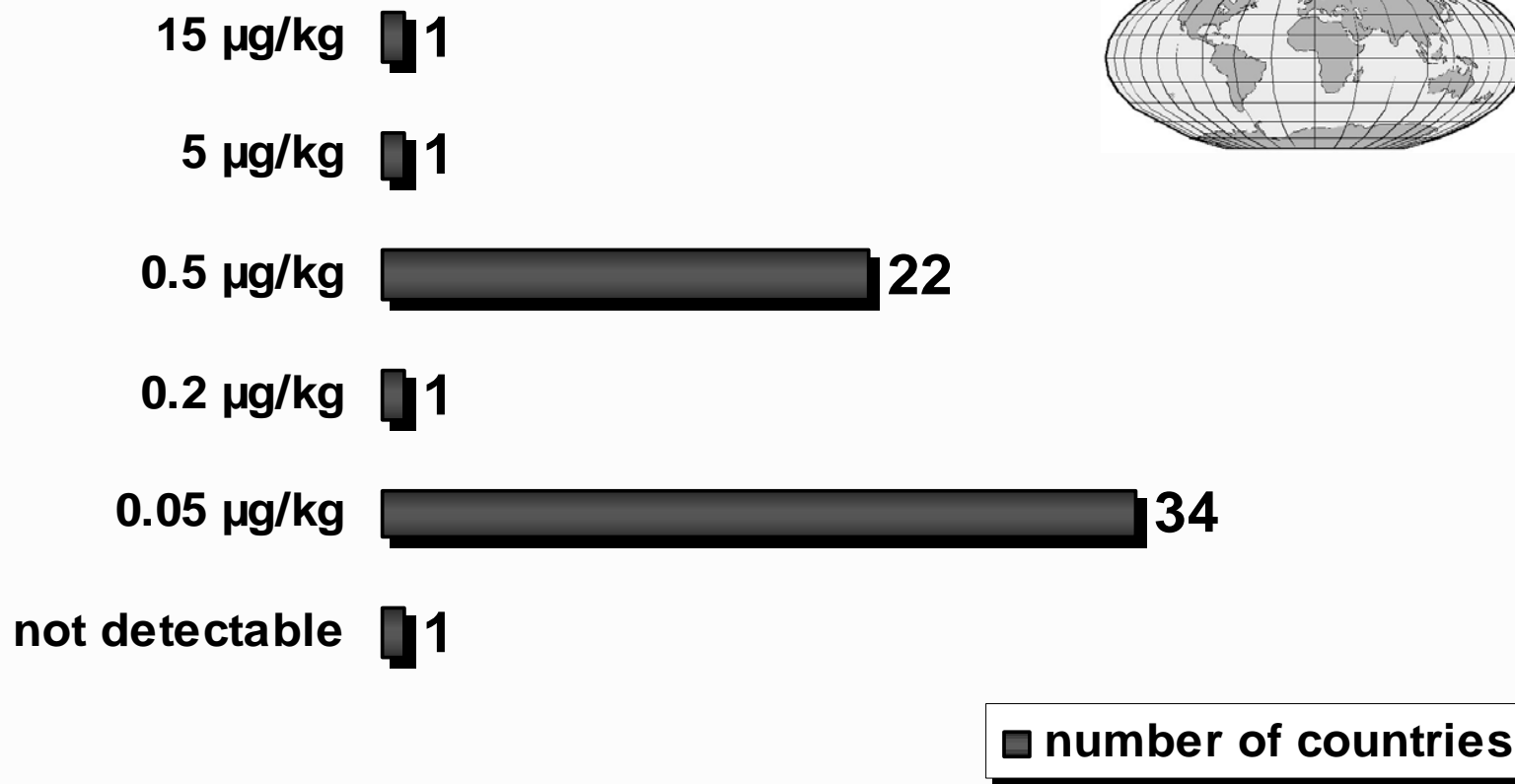
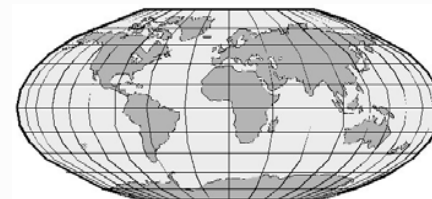


Total aflatoxins in food



/

Aflatoxin M₁ in milk



Aflatoxin B₁ in feed for dairy cattle

50 µg/kg 2

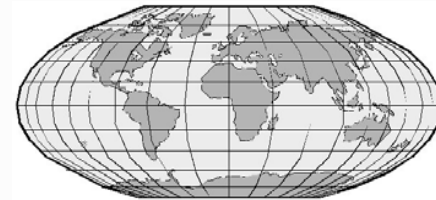
25 µg/kg 1

20 µg/kg 3

15 µg/kg 1

10 µg/kg 5

5 µg/kg 27



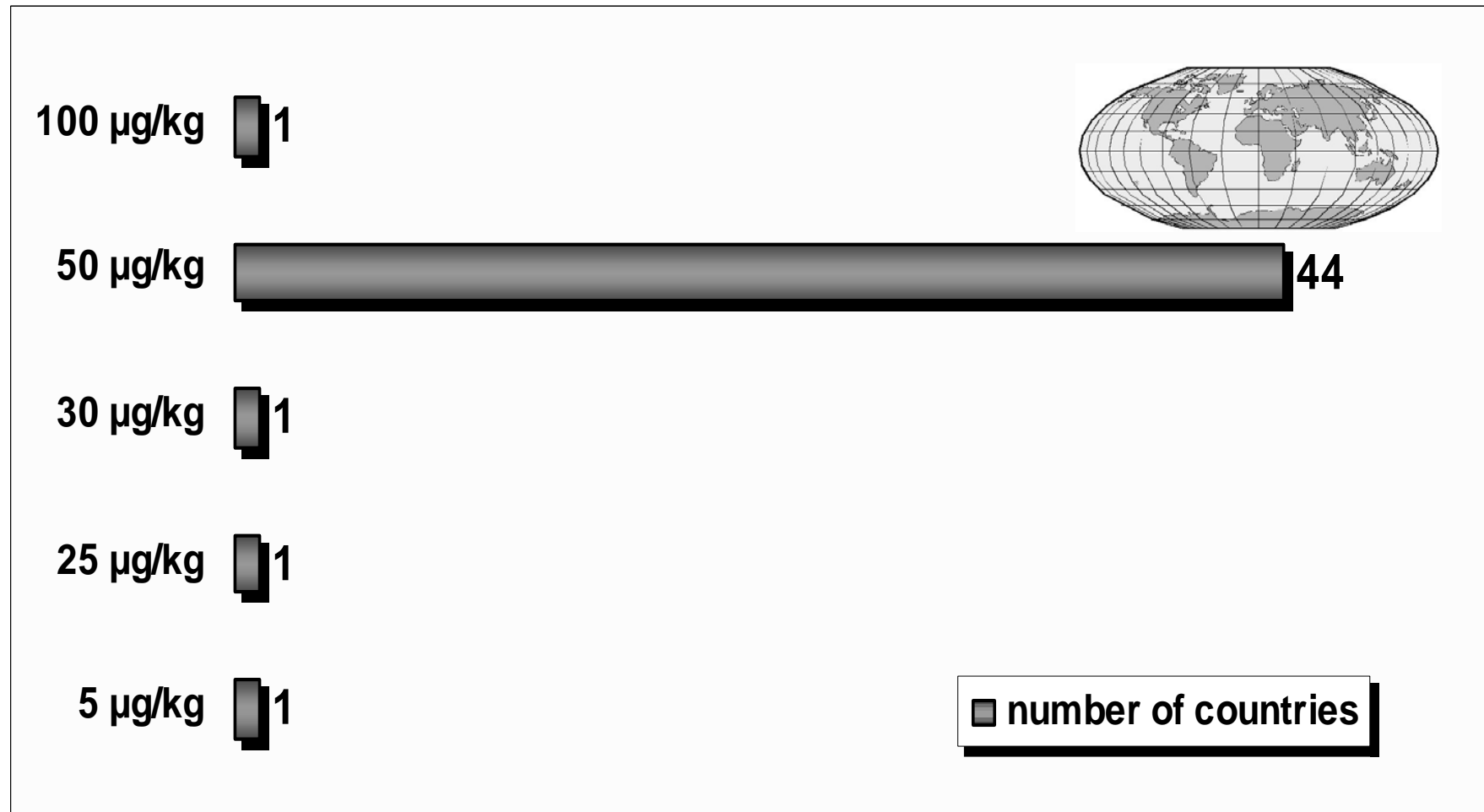
■ number of countries

Outline of presentation

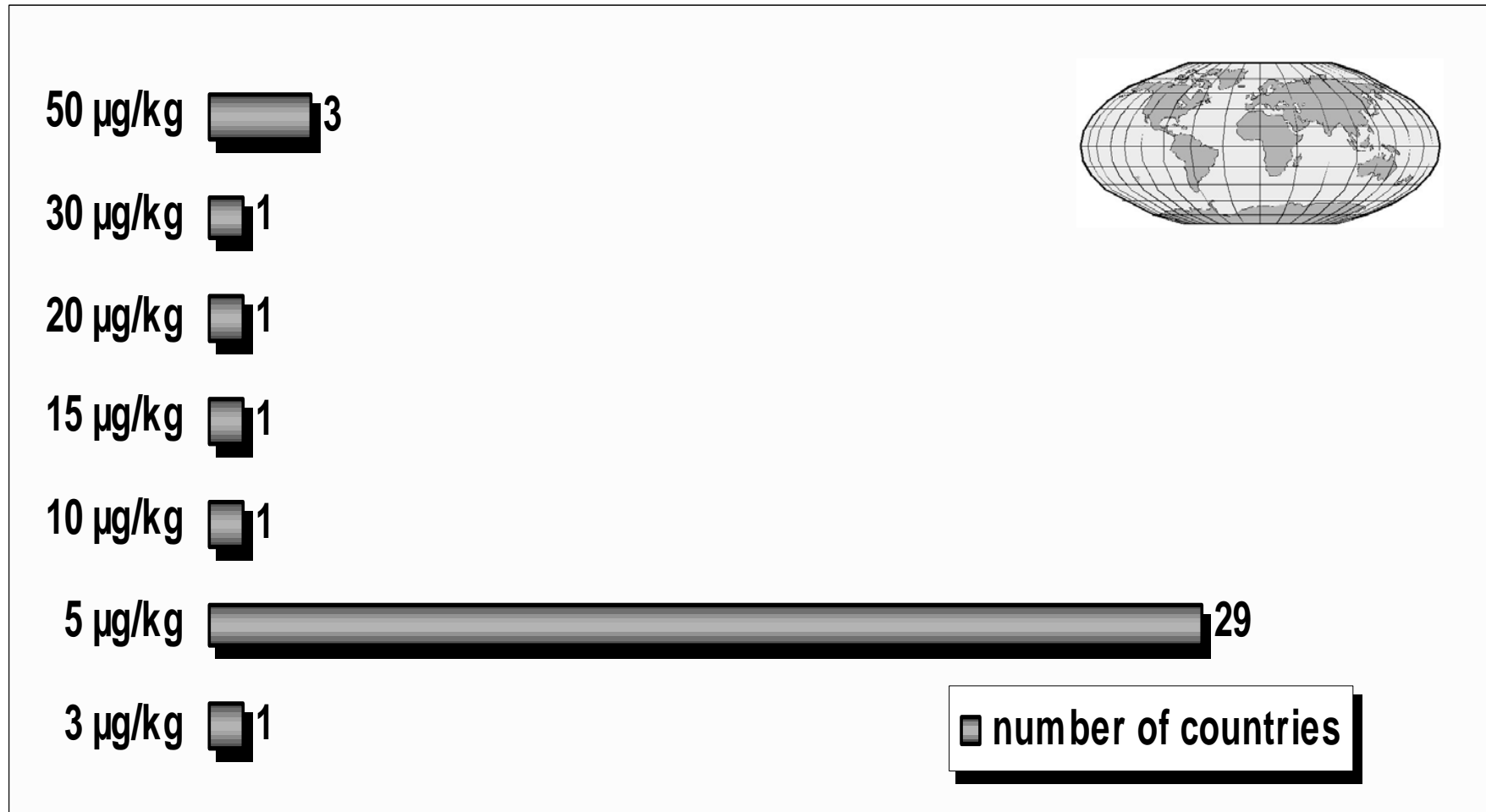
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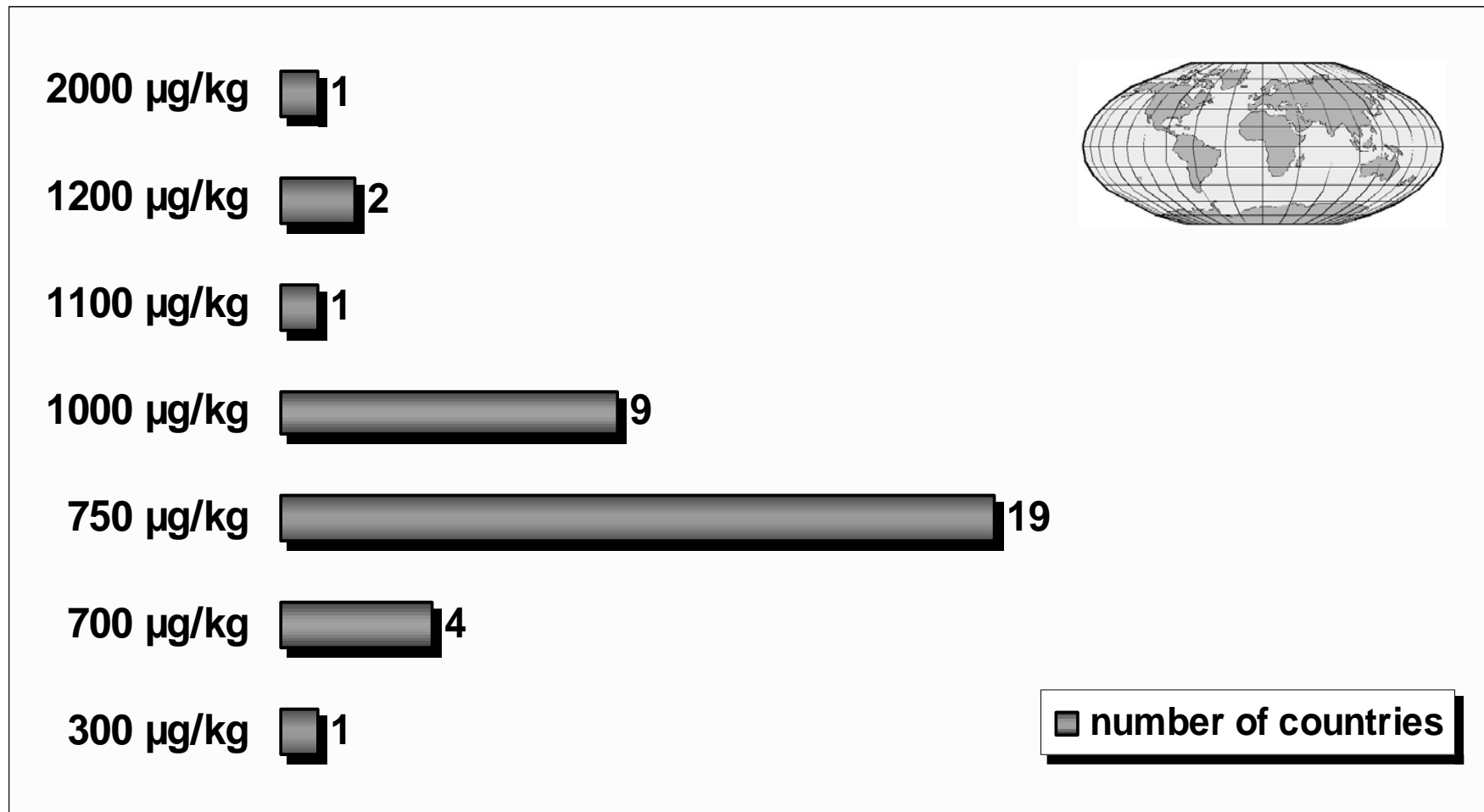
Patulin in fruits and fruit juices



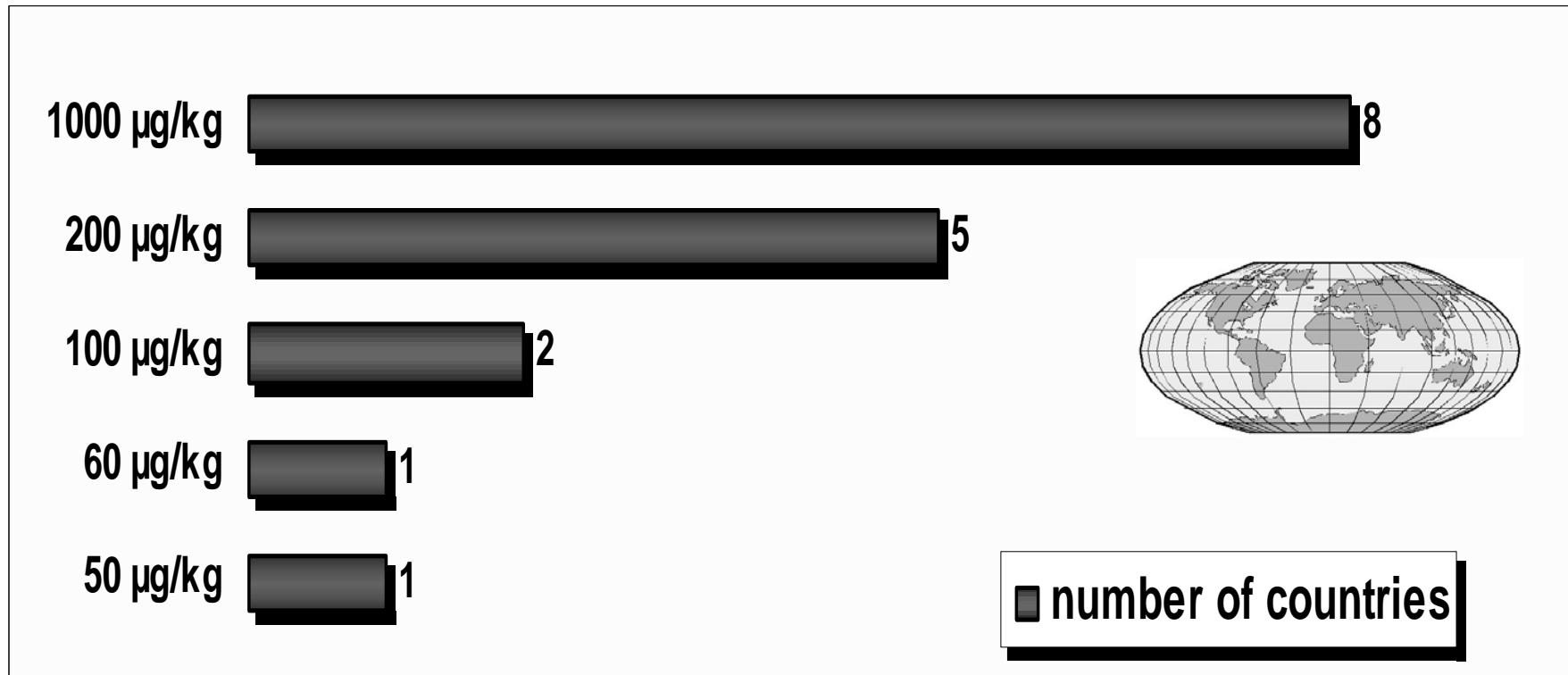
Ochratoxin A in cereals and cereal products



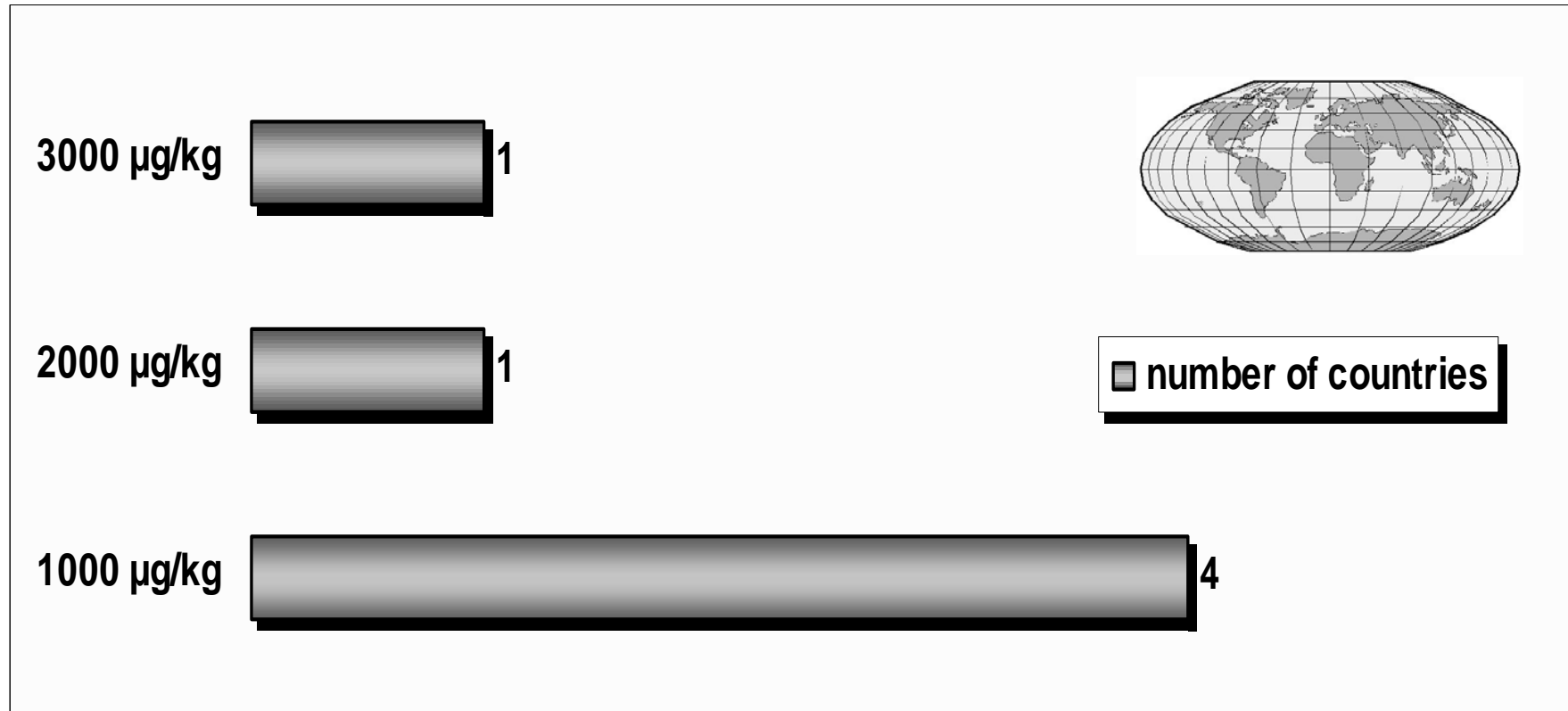
DON in wheat(flour) and other cereals



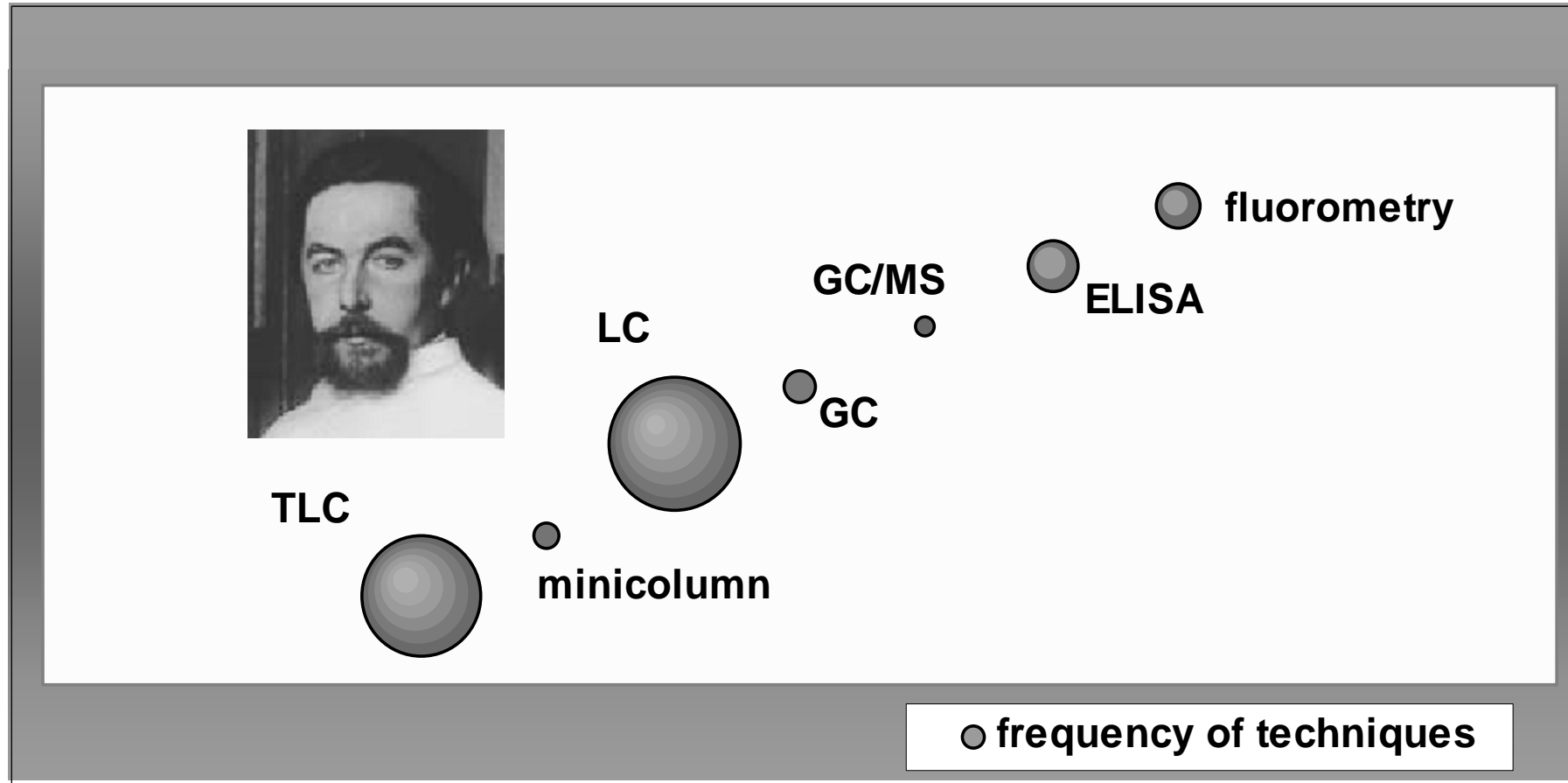
Zearalenone in maize and other cereals



Fumonisin in maize



Techniques used in mycotoxin regulatory analysis



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An Integrated Project proposal submitted to the EC
on the subject of chemical contaminant monitoring

Broad Spectrum Contaminant Analysis

In their wise & far sighted approach to the subject the European Commission published in the FP6 Food Quality Work Programme:



“New methods to prevent & monitor occurrence of multiple contaminants such as pesticides, toxins, drugs and endocrine disrupters in foods.

This should be achieved through use of advanced sample preparation techniques & emerging biotechnological screening approaches based on development of novel biomarkers.”

Question.....

How can such a radical set of requirements be met?

The birth of the  consortium (32 partners)

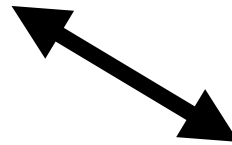
The BioCop principles:

The fundamental scientific objective is to utilise emerging life science technologies to create a powerful new approach to detect & control chemical contaminants in foods.



BioCop: the science.....

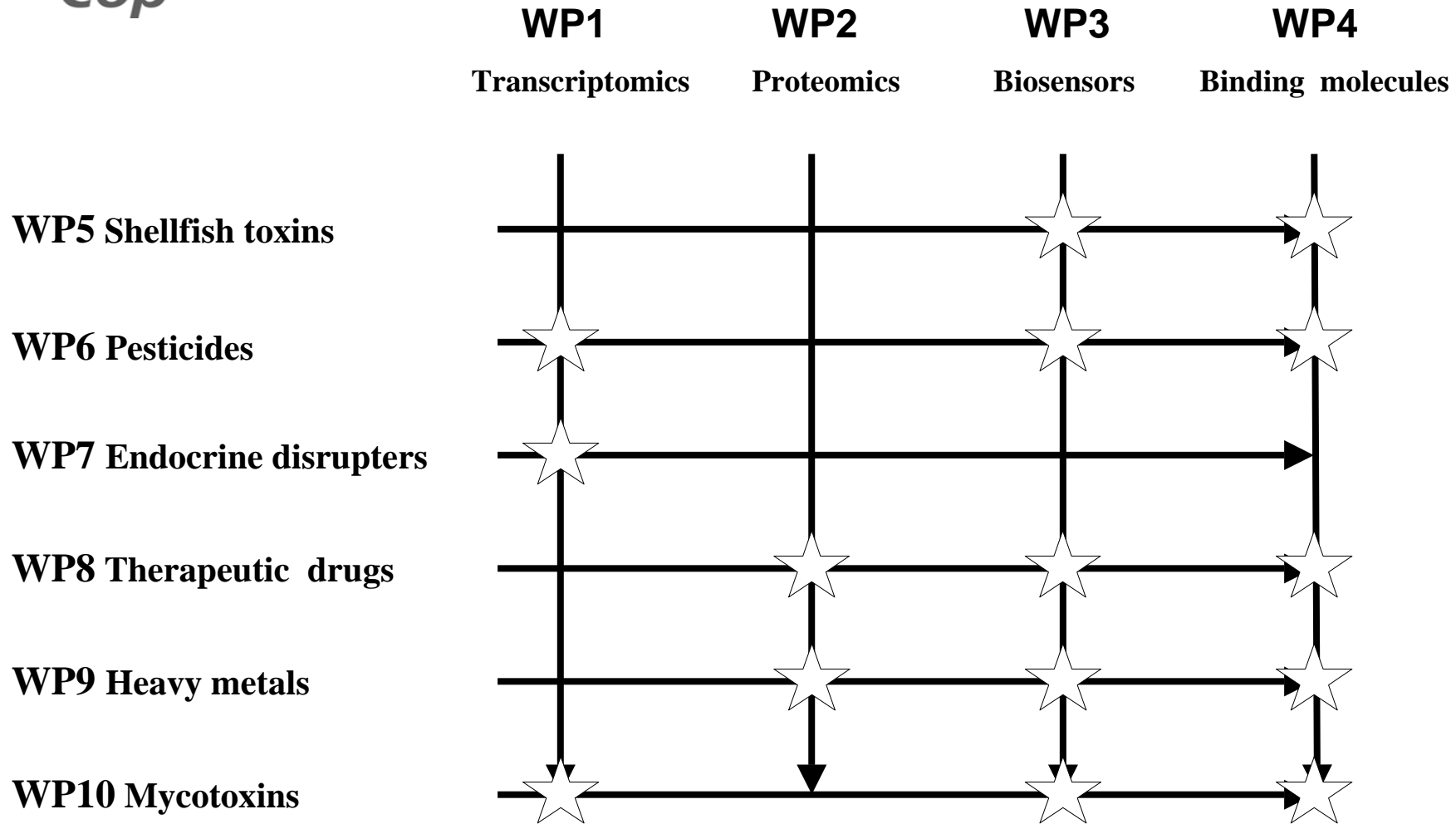
Veterinary drugs, heavy metals,
mycotoxins, endocrine disrupters,
shellfish toxins, pesticides



Transcriptomics,
proteomics, biosensors,
molecular engineering



The BioCop matrix



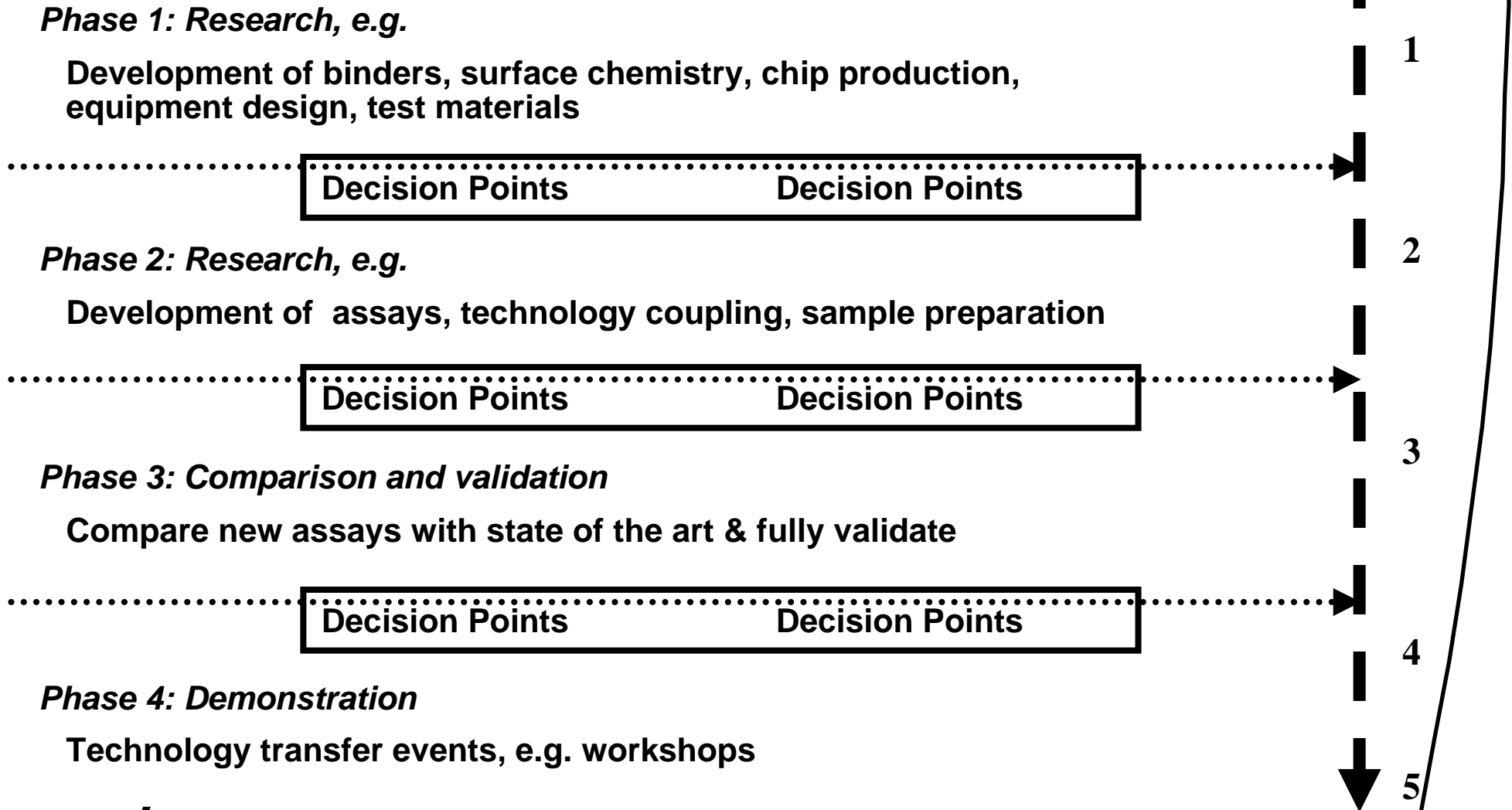


Work package mycotoxins

- 8 partners involved
- Links with CEN and AOAC International
- Focus on trichothecenes (DON, NIV, T-2, HT-2)
- Techniques explored:
 - new analyte isolation techniques (e.g. pressurized liquid extraction, slurrying techniques, microwave hydrolysis)
 - transcriptomics (identification of chemical residues through genomic fingerprints)
 - electrochemical biosensors (low cost portable devices)



BioCop phases





Current status of the BioCop proposal

Submitted February 2004



First phase of evaluation: Passed



Second phase evaluation: Passed



Contract negotiations ongoing since June 2004



Completion of contracts: November 2004



Five year project from January 2005, 32 partners from 16 countries, EC contribution approx. 10M €

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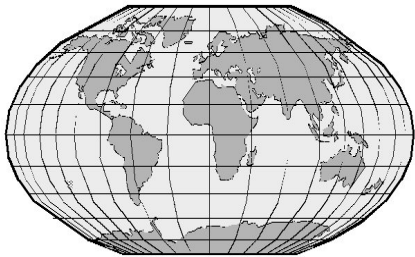


Summary



- Various factors involved in establishing mycotoxin regulations
- Mycotoxin regulations exist in 100 countries and for 13 toxins
- Regulations in 2003: more diverse and detailed than in 1995
- Harmonisation takes place, yet regulatory limits remain substantially different across countries
- Details of 2002/2003 inquiry: FAO FNP in 2004
- BioCop: new technologies (transcriptomics, biosensors) explored for determination of trichothecenes

Thank you for your attention!



**Worldwide and European regulations
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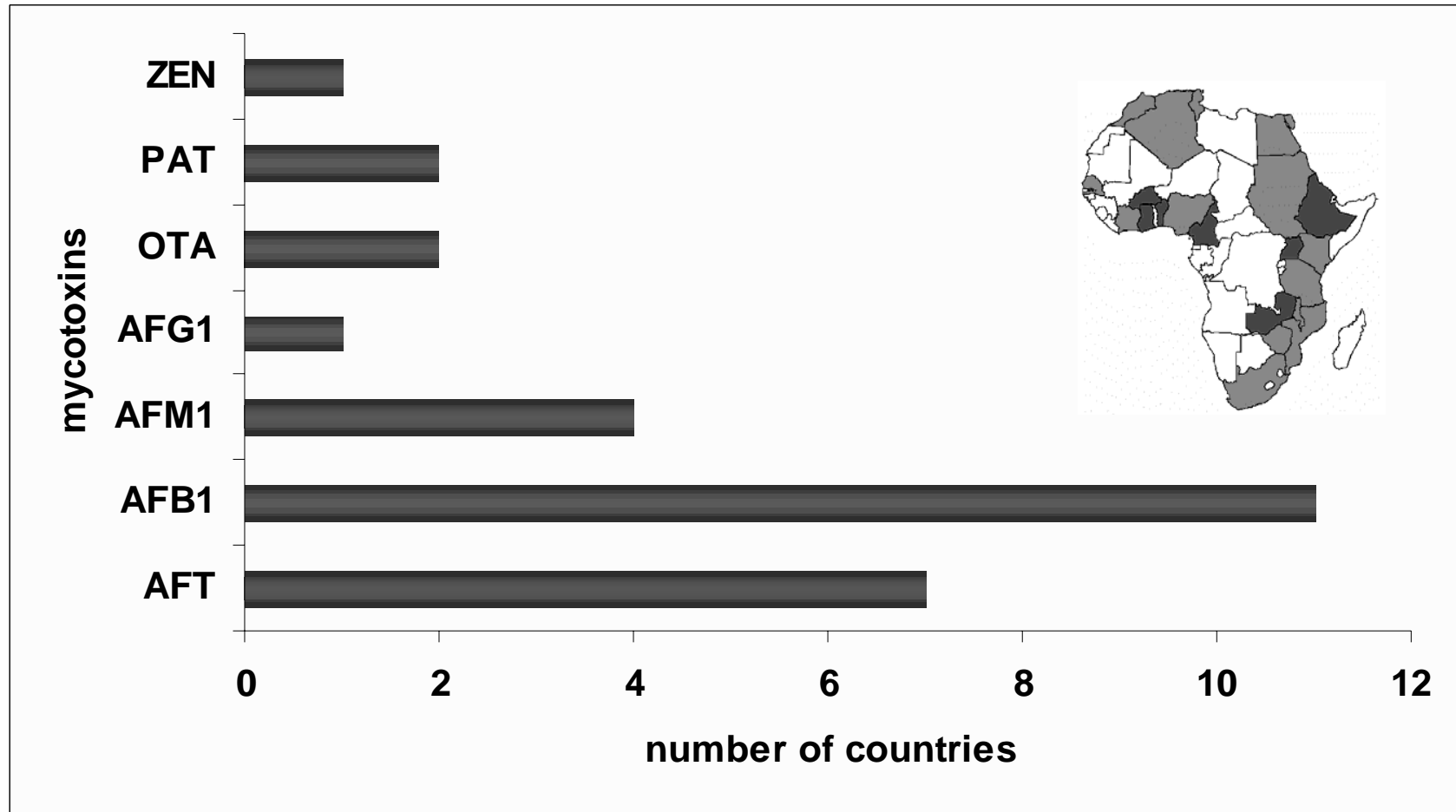


Hans van Egmond & Marco Jonker, Brussels, 22 October 2004

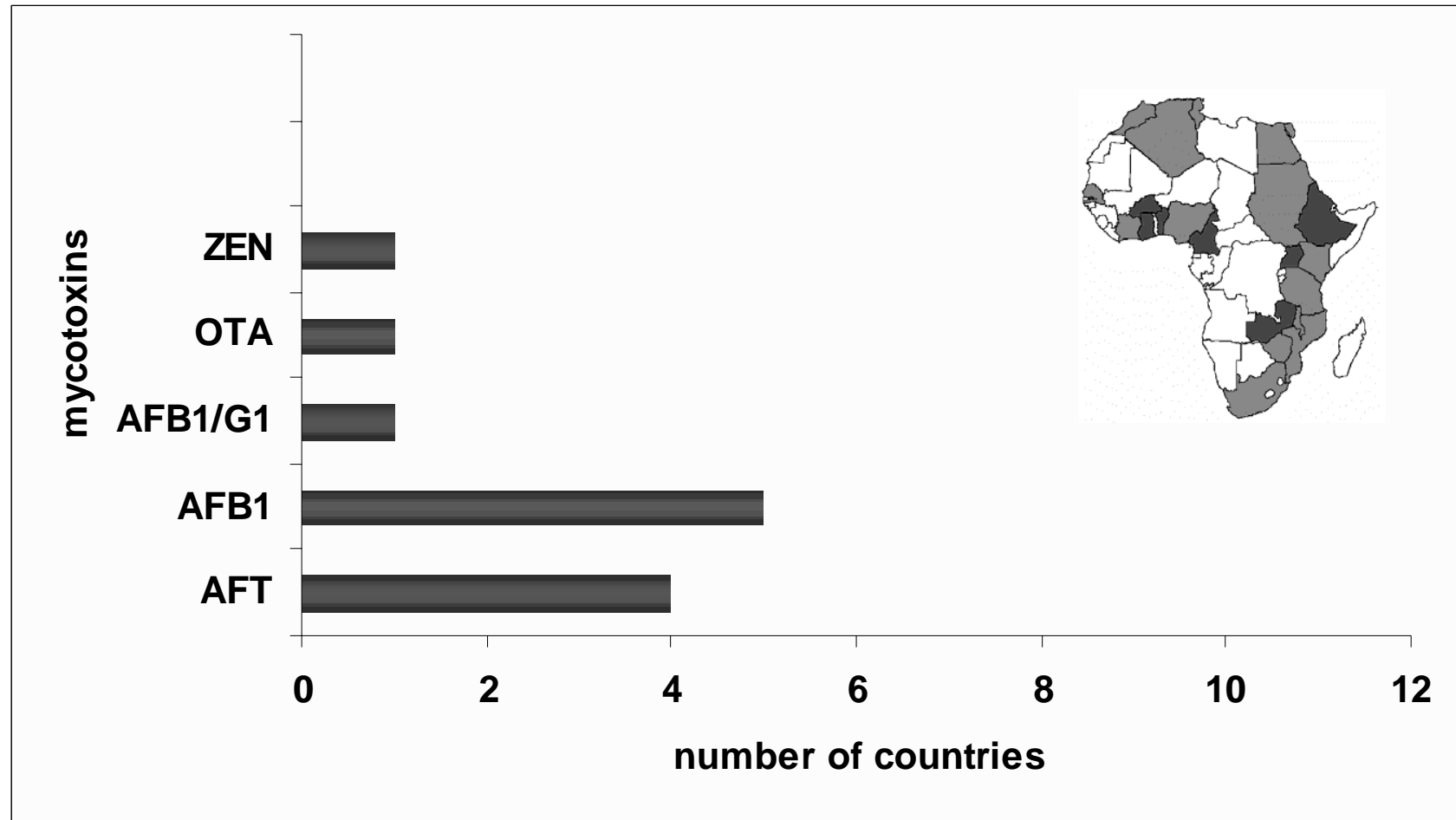
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Africa: mycotoxins regulated in food

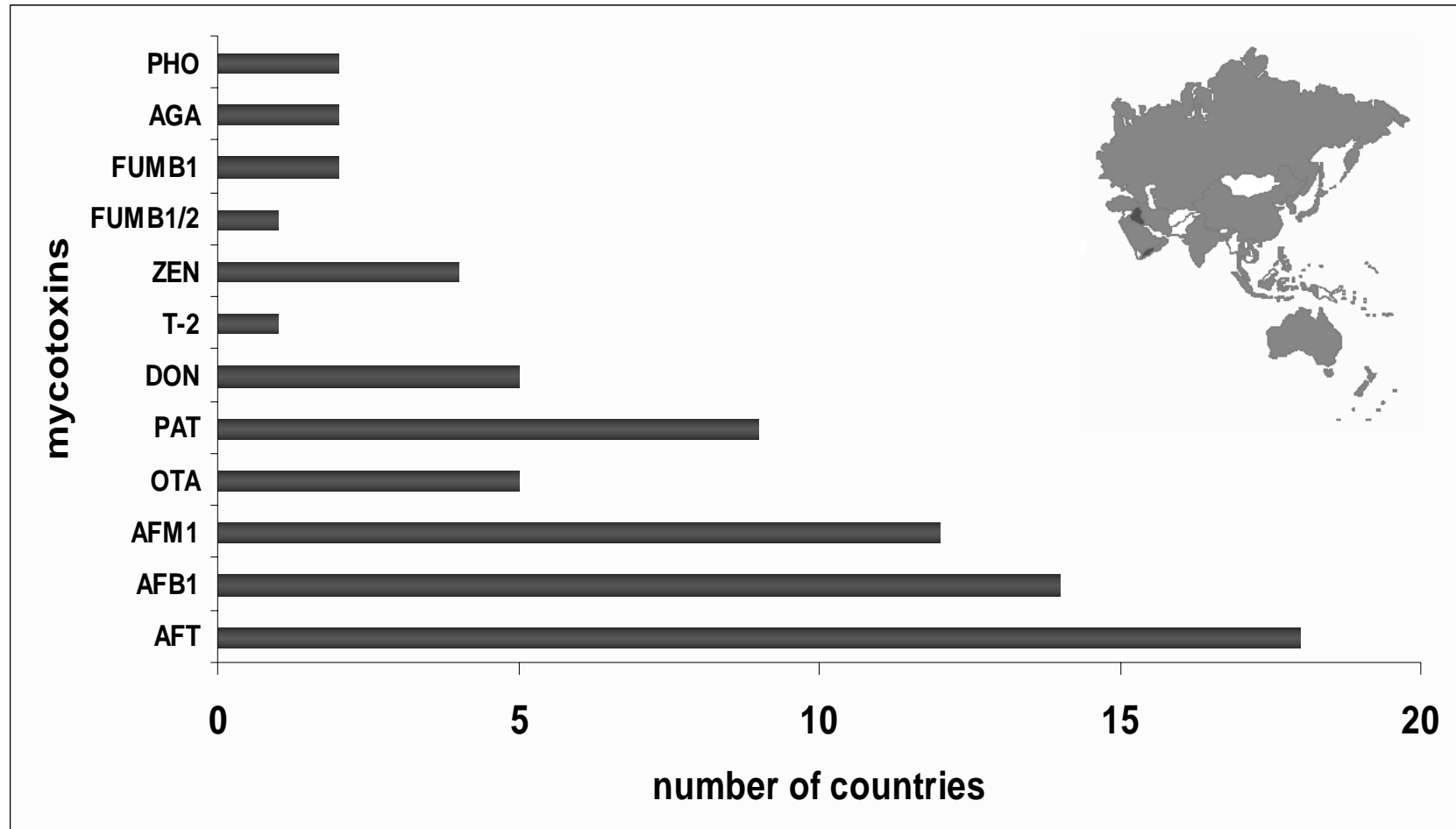


Africa: mycotoxins regulated in feed

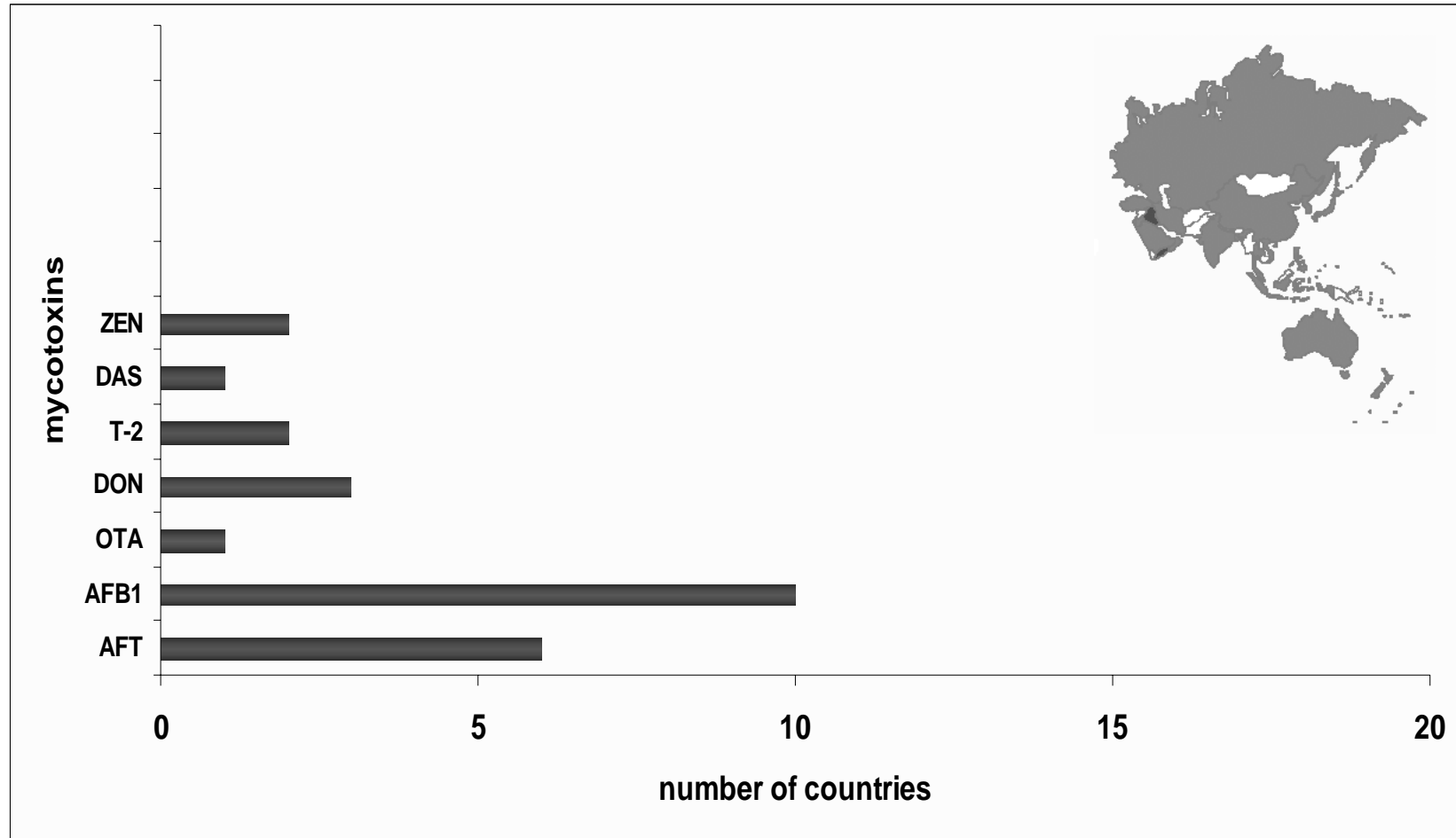


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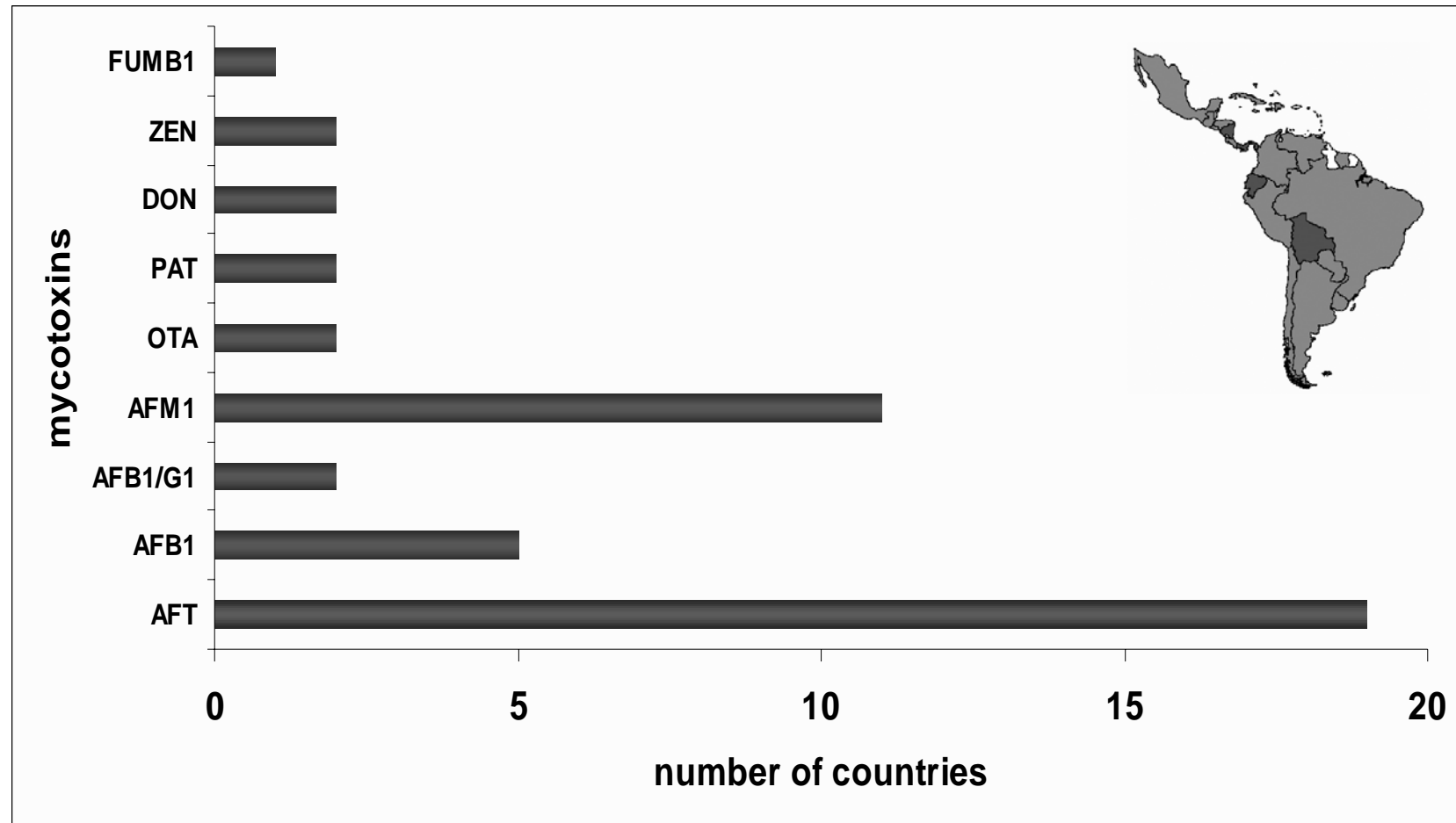
Asia/Oceania: mycotoxins regulated in food



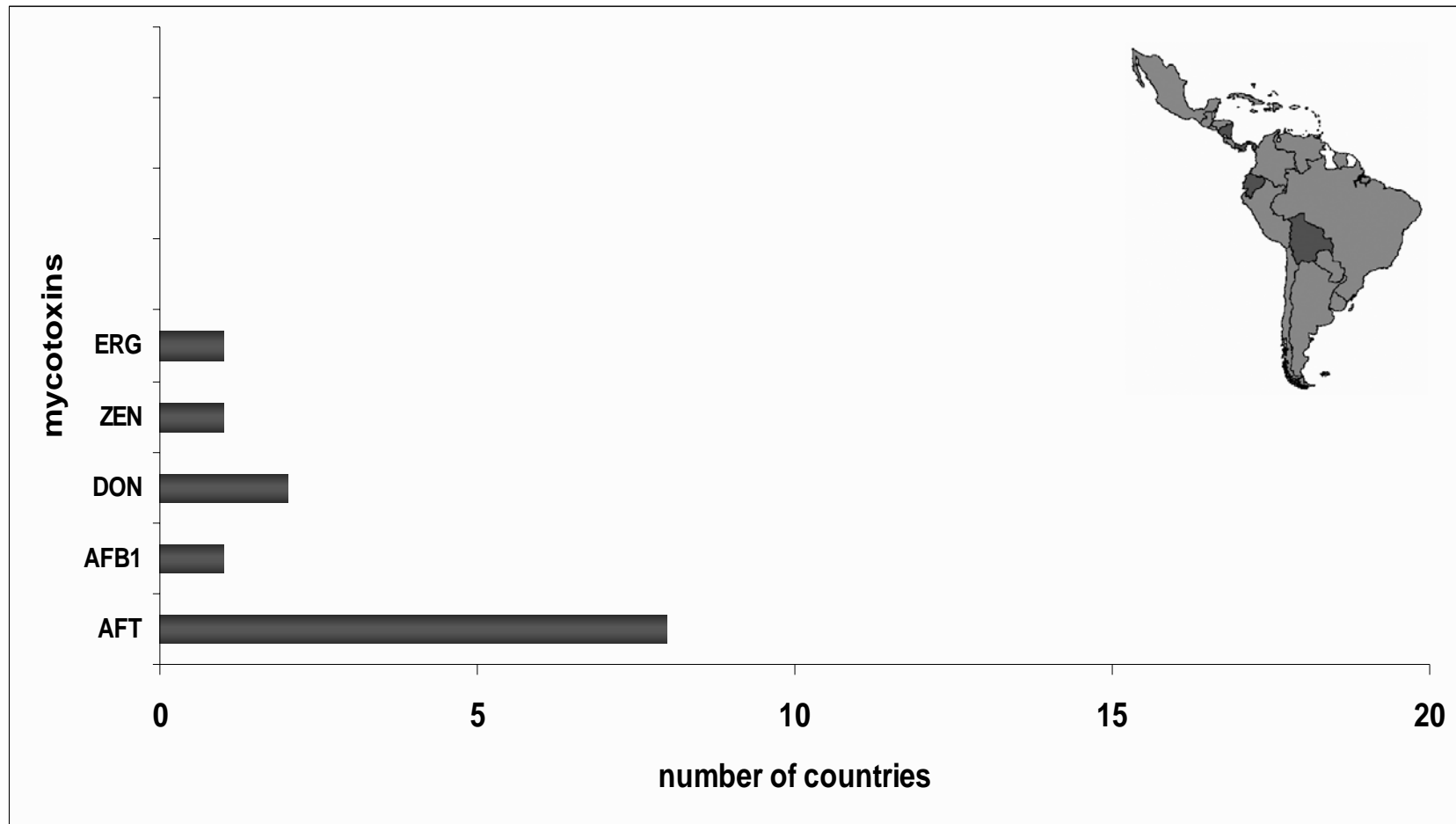
Asia/Oceania: mycotoxins regulated in feed



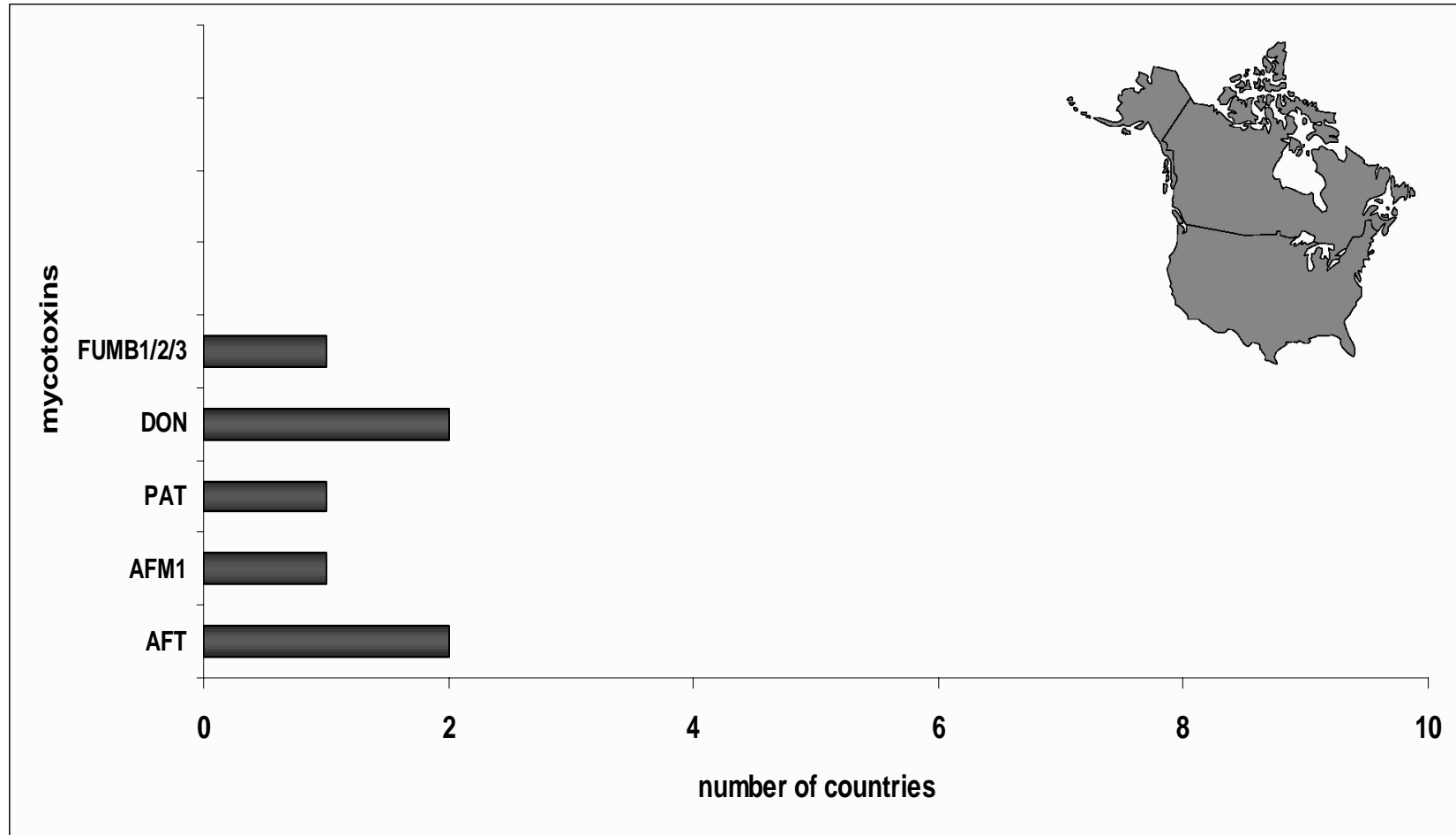
Latin America: mycotoxins regulated in food



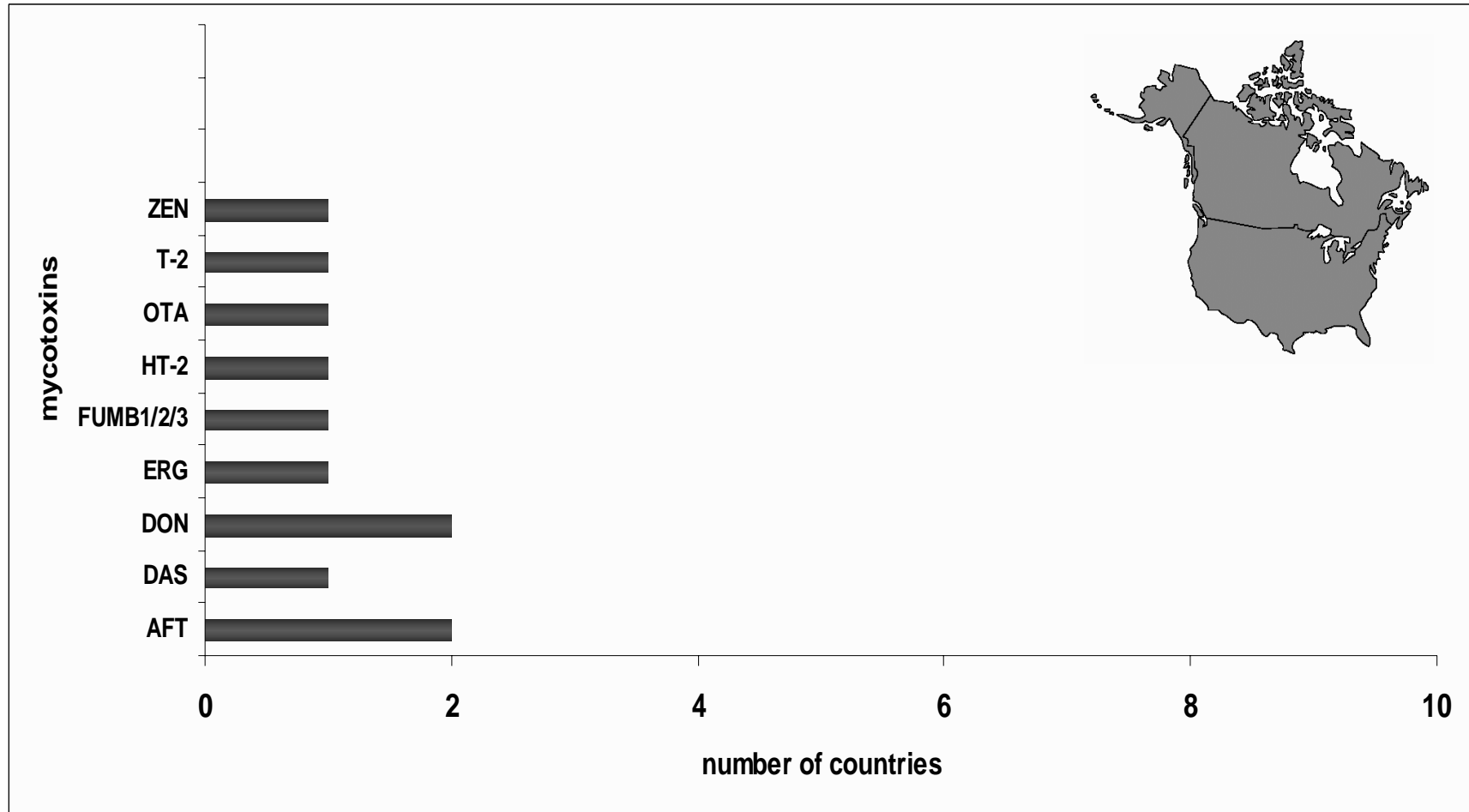
Latin America: mycotoxins regulated in feed



North America: mycotoxins regulated in food

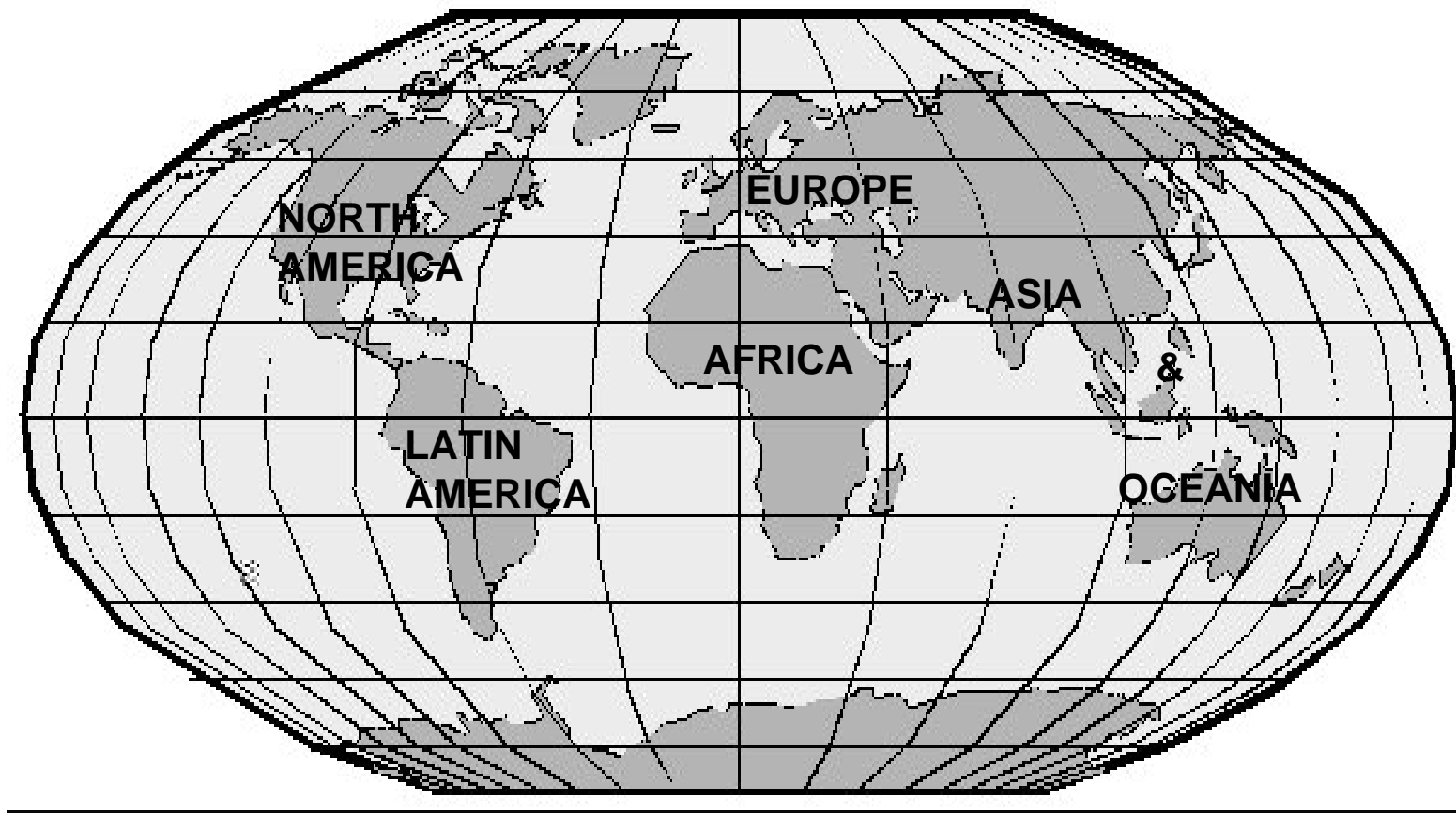


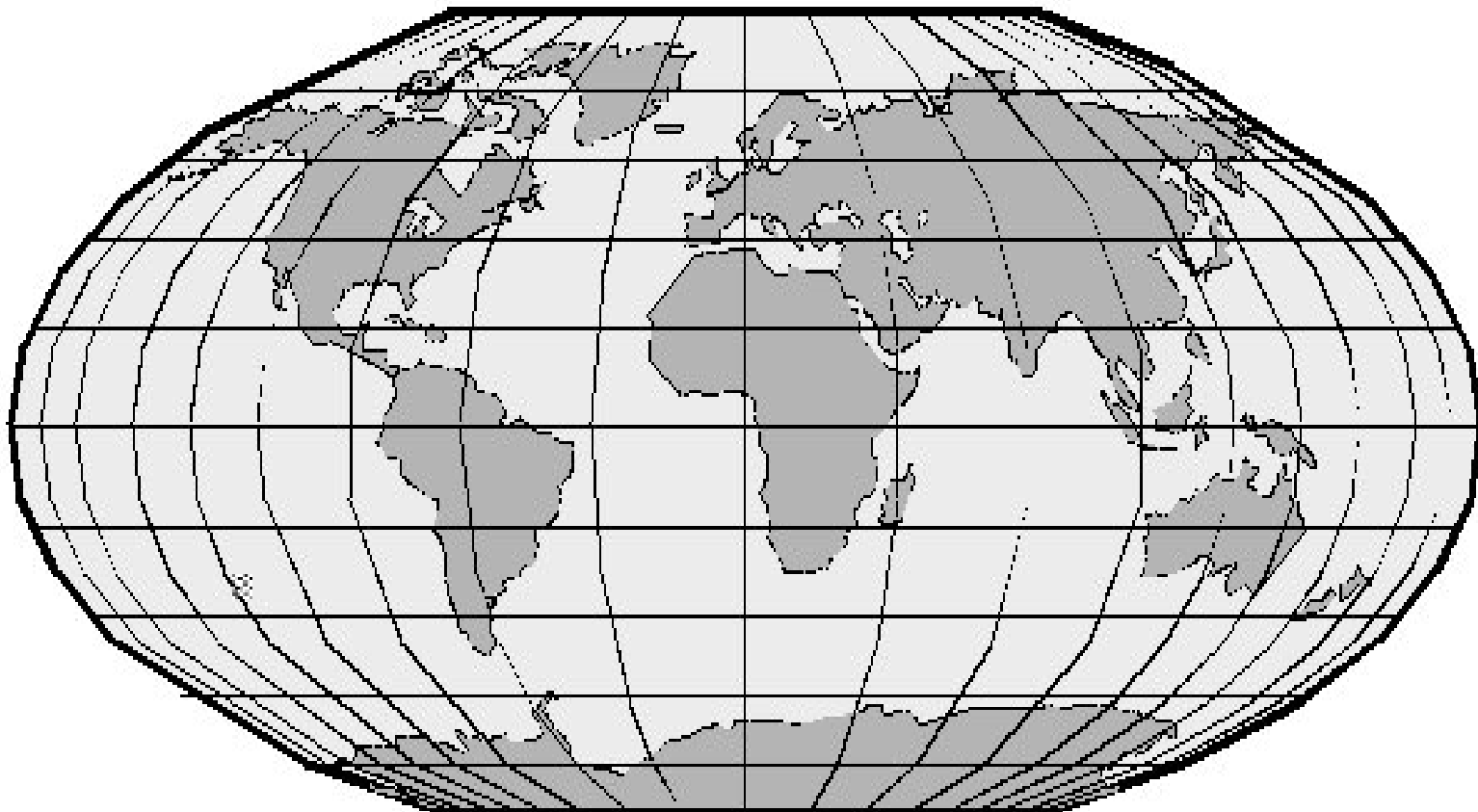
North America: mycotoxins regulated in feed



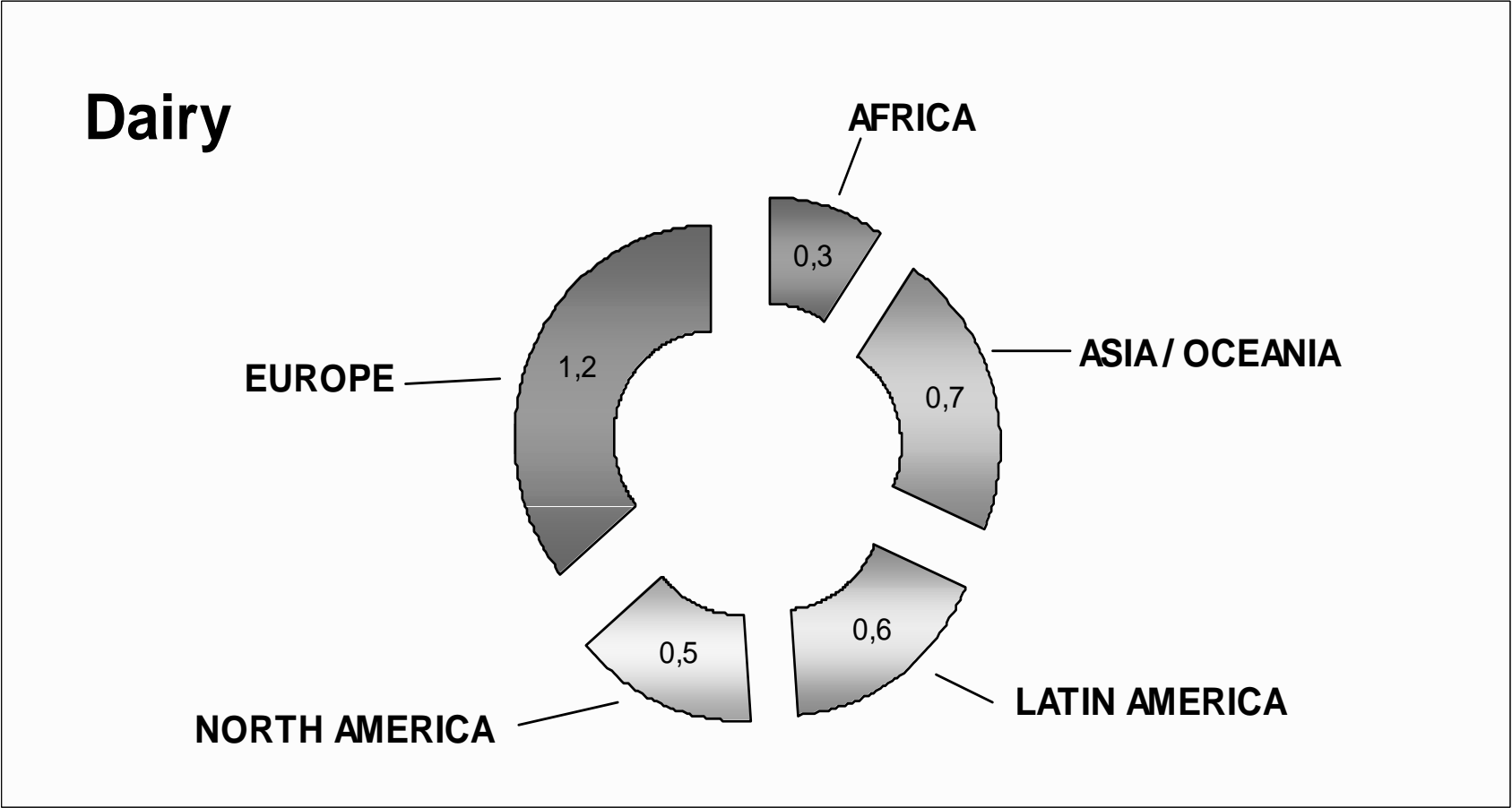
Information in draft table of FAO document

Commodity	Mycotoxin	Limit (ng/g)	Legal basis	Responsible authority	Sampling method		Analytical method	
					status	ref.	status	ref
The Netherlands <NL> 2002:								
FOOD								
Groundnuts, nuts, dried fruit	Aflatoxin B ₁	2	[EU 1]	Min. Health	official	[EU 2]	official	[EU 2]
DAIRY								
Milk	Aflatoxin M ₁	0.05	[EU 1]	Min. Health	official	[EU 2]	official	[EU 2]
FEED								
grain (products) incorporated in feed for pigs	DON	5000	[NL 1]	Commodity Board Animal Feedstuffs				

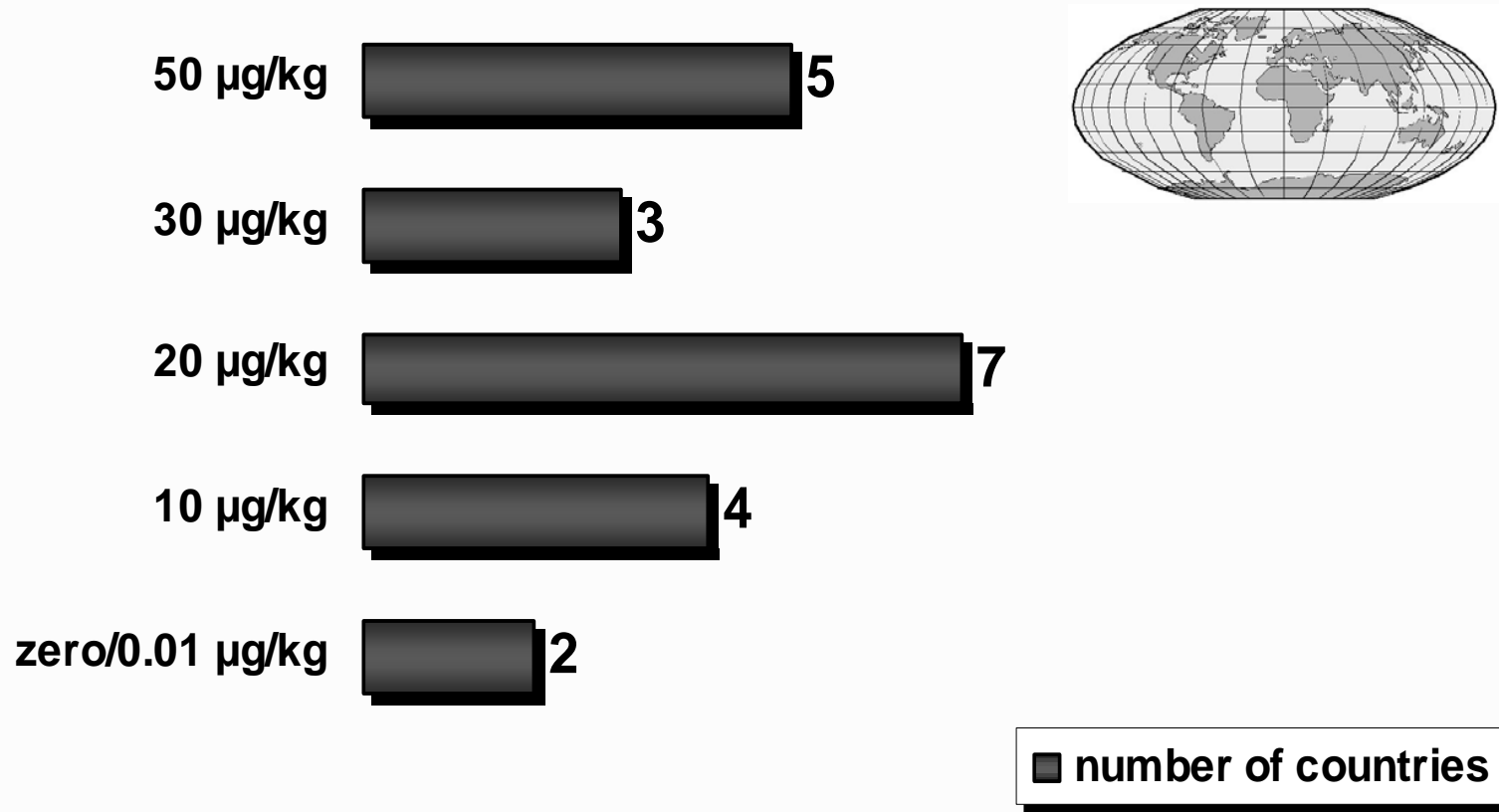




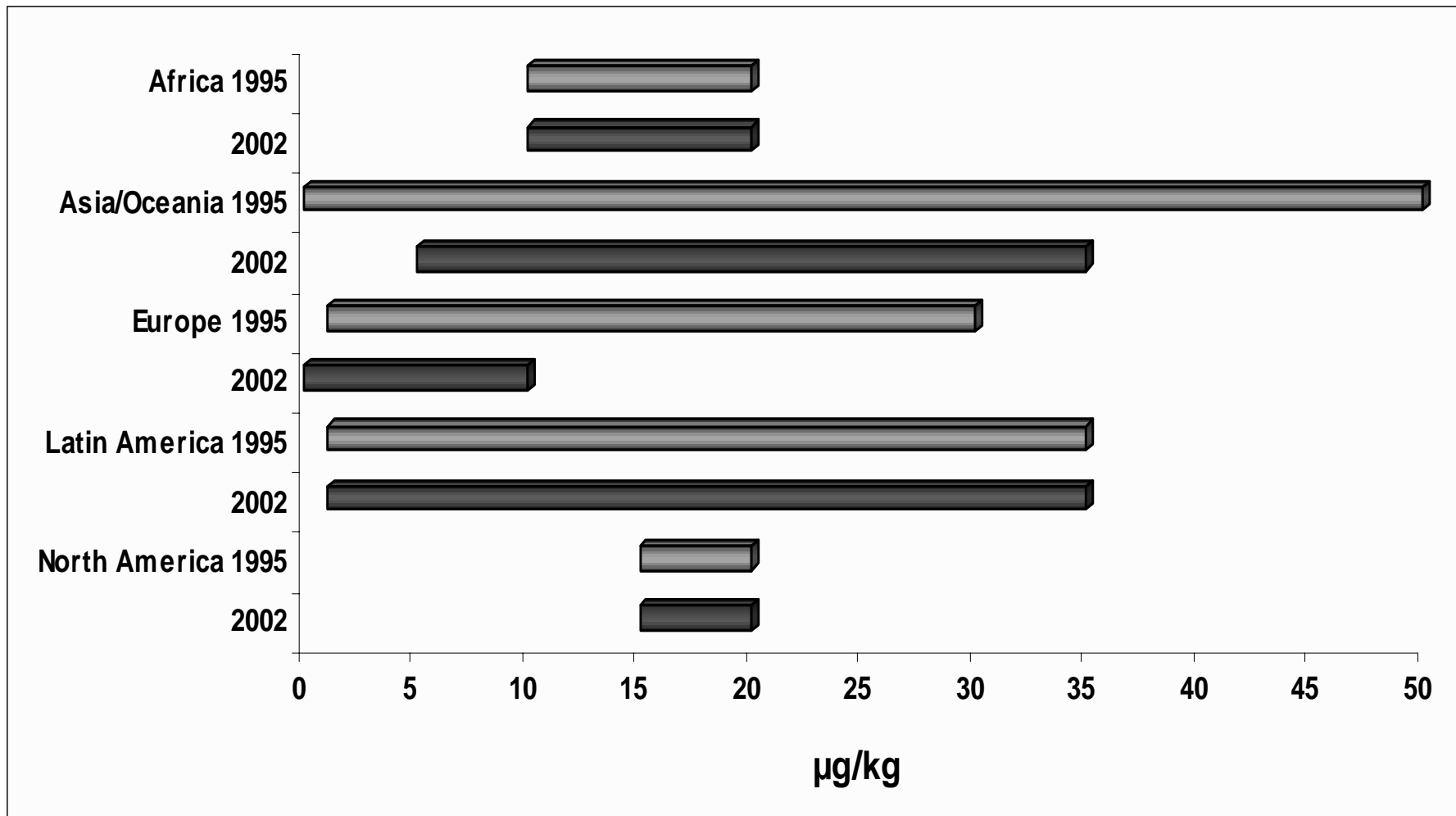
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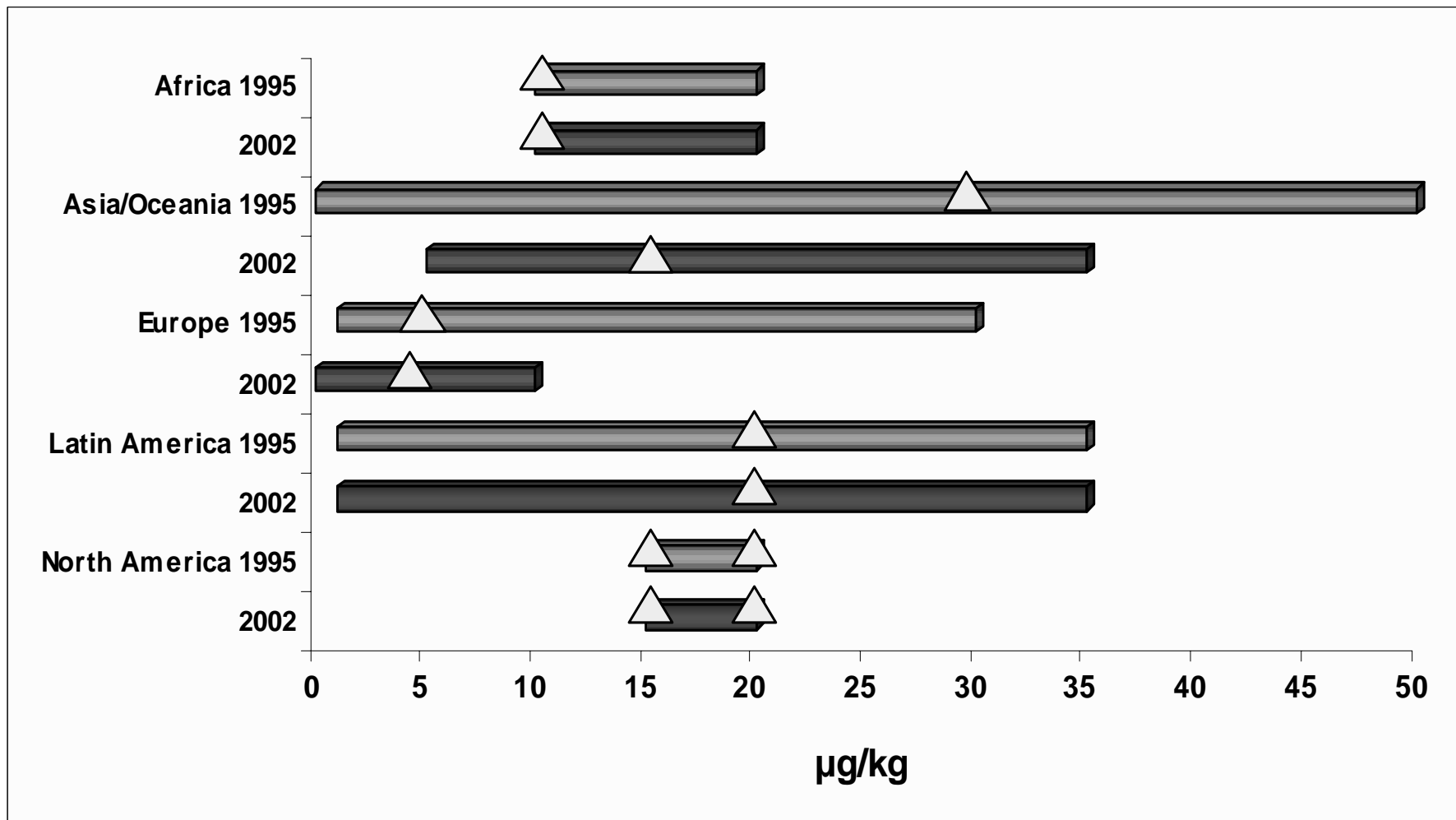
Total aflatoxins in feed for dairy cattle



Ranges of limits for total aflatoxins in food



Typical limits for total aflatoxins in food



/





The BioCop matrix

