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Foreword

Since the discovery of the aflatoxins in the 1960s, regulations have been established in many countries to protect consumers from the harmful effects of mycotoxins that may contaminate foodstuffs, as well as to ensure fair practices in food trade. Various factors play a role in decision-making processes focused on setting limits for mycotoxins. These include scientific factors to assess risk (such as the availability of toxicological data), food consumption data, knowledge about the level and distribution of mycotoxins in commodities, and analytical methodology. Economic factors, such as commercial and trade interests and food security issues, also have an impact. Weighing the various factors that play a role in the decision-making process to establish mycotoxin tolerances is therefore of crucial importance.

Despite the difficulties, mycotoxin regulations have been established in many countries during the past decades, and newer regulations are still being issued. National regulations have been established for a number of mycotoxins such as the naturally occurring aflatoxins and aflatoxin M_1; the trichothecenes deoxynivalenol, diacetoxyscirpenol, T-2 toxin and HT-2 toxin, the fumonisins B_1, B_2 and B_3; agaric acid; the ergot alkaloids; ochratoxin A; patulin, phomopsins; sterigmatocystin and zearalenone.

International inquiries on existing legislation on mycotoxins in foodstuffs and animal feedstuffs have been carried out several times, and details about tolerance levels, legal bases, responsible authorities, and official protocols for sampling and analysis have been published. The Food and Agriculture Organization of the United Nations (FAO) has played a major role in providing information on worldwide regulations for mycotoxins in foods and feeds.

The last comprehensive overview on worldwide regulations was published as the FAO Food and Nutrition Paper 64 in 1997. At that time, 77 countries had specific regulations for mycotoxins in different foods and feeds and 13 countries had general provisions, while about 50 countries did not have data available. The number of countries with specific regulations for mycotoxins has increased over the years. This reflects the general concern that governments have about the potential effects of mycotoxins on humans and animal health and their implications for trade.

The present publication updates the information in the FAO Food and Nutrition Paper 64 and describes the situation of worldwide mycotoxin regulations as of December 2003, based on an international inquiry that was carried out in 2002 and 2003.

Abbreviations

AFB_1	Aflatoxin B_1
AFB_I/G_1	Aflatoxins B_1+G_1
AFG_1	Aflatoxin G_1
AFM_1	Aflatoxin M_1
AFT	Total aflatoxins
AGA	Agaric acid
ALARA	As low as reasonably achievable
AOAC	Association of Official Analytical Chemists
AOCS	American Oil Chemists' Society
AQA	Analytical quality assurance
ASEAN	Association of Southeast Asian Nations
BCR	Bureau Communautaire de Référence
CAC	Codex Alimentarius Commission
CCFAC	Codex Committee on Food Additives and Contaminants
CEN	Comité Européen de Normalisation / European Standardization Committee
CGC	Canadian Grain Commission
DAS	Diacetoxyscirpenol
DON	Deoxynivalenol
EC	European Commission
EFSA	European Food Safety Authority
EFTA	European Free Trade Association
ERG	Ergot alkaloids
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FAPAS	Food analysis performance assessment scheme
FDA	Food and Drug Administration, United States of America
FLEP	Food law enforcement practitioners
$FUMB_1$	Fumonisin B_1
$FUMB_{1/2}$	Fumonisins B_1+B_2
$FUMB_{1/2/3}$	Fumonisins B_1+B_2+B_3
HT-2	HT-2 toxin

JECFA	Joint Expert Committee on Food Additives
JRC/IRMM	Joint Research Centre/Institute for Reference Materials and Measurements
MERCOSUR	Mercado Comun del Sur
NOAEL	No-observed-adverse-effect-level
OCP	Origin Certification Programme
OTA	Ochratoxin A
PAT	Patulin
PHO	Phomopsins
PMTDI	Provisional maximum tolerable daily intake
PTDI	Provisional tolerable daily intake
PTWI	Provisional tolerable weekly intake
SCOOP	Scientific cooperation on questions relating to food
SMT	Standards, measurements and testing
STE	Sterigmatocystin
T-2	T-2 toxin
USDA	United States Department of Agriculture
WHO	World Health Organization
ZEN	Zearalenone

Explanatory note

The greatest care has been exercised in the preparation of the data presented in this publication. Nevertheless FAO recognizes that this compendium may be incomplete or not fully correct in some cases as a result of problems experienced with language, terminology and the interpretation of responses in the inquiry forms. FAO disclaims any liability to users of the limits and regulations and related information for consequential damages of any kind arising out of, or connected with, their use.

1. Introduction

In today's changing world, safety and security have generally remained basic human needs. Ensuring the safety of food has been a major focus of international and national action over the last years. Both microbiological and chemical hazards are of concern. Among chemical hazards, the contamination of food and feed by mycotoxins (toxic metabolites of fungi), fishery products by phycotoxins (toxins produced by algae) and edible plant species by their plant toxins have been recently characterized by the World Health Organization (WHO) as significant sources of food-borne illnesses (WHO, 2002a). Of these three categories of natural toxins, most attention has been directed to mycotoxins until now. In several parts of the world, mycotoxins currently represent a major food safety issue.

The knowledge that mycotoxins can have serious effects on humans and animals has led many countries to establish regulations on mycotoxins in food and feed in the last decades to safeguard the health of humans, as well as the economical interests of producers and traders. Setting mycotoxin regulations is a complex activity, which involves many factors and interested parties. The first limits for mycotoxins were set in the late 1960s for the aflatoxins. By the end of 2003, approximately 100 countries had developed specific limits for mycotoxins in foodstuffs and feedstuffs, and the number continues to grow.

A number of publications focusing on limits and regulations for mycotoxins exist (Krogh, 1977; Schuller *et al.*, 1983; Stoloff *et al.*, 1991; Gilbert, 1991; Resnik *et al.*, 1991; Van Egmond, 1991; Van Egmond and Dekker, 1995; Boutrif and Canet, 1998; Rosner, 1998; Van Egmond, 1999). The most recent comprehensive review on mycotoxins was published by FAO in 1997 based on an international inquiry carried out in 1994 and 1995. Since the publication of this Food and Nutrition Paper, many new limits and regulations for mycotoxins have come into force or are under development, creating a need for an update of this document. A relevant international inquiry was carried out in 2002 and 2003, yielding much detailed information. This information was processed and analysed during 2003 to produce this document, which is based on information and amendments received by 31 December 2003.

2. Factors affecting the constitution of mycotoxin regulations in food and feed

Several factors, both of a scientific and socio-economic nature, may influence the establishment of mycotoxin limits and regulations. These include:

- availability of toxicological data;
- availability of data on the occurrence of mycotoxins in various commodities;
- knowledge of the distribution of mycotoxin concentrations within a lot;
- availability of analytical methods;
- legislation in countries with which trade contacts exist; and
- need for sufficient food supply.

The first two factors provide the necessary information for hazard assessment and exposure assessment respectively, the main ingredients for risk assessment. Risk assessment is the scientific evaluation of the probability of occurrence of known or potential adverse health effects resulting from human exposure to food-borne hazards; it is the primary scientific basis for the establishment of regulations.

2.1 Hazard identification and hazard characterization

Regulations are primarily made on the basis of known toxic effects. For the mycotoxins currently considered most significant – aflatoxins, ochratoxin A, patulin, fumonisins, zearalenone and some trichothecenes including deoxynivalenol – the Joint Expert Committee on Food Additives (JECFA), a scientific advisory body of FAO and WHO, has recently evaluated their hazards. JECFA provides a mechanism for assessing the toxicity of food additives, veterinary drug residues and contaminants. Safety evaluation of contaminants incorporates various steps in a formal health risk assessment approach.

The qualitative indication that a contaminant can cause adverse effects on health (hazard identification) is usually included in the information presented to JECFA for evaluation. Similarly, qualitative and quantitative evaluation of the nature of the adverse effects (hazard characterization) is embodied in the data sets that are presented. The evaluation of toxicological data carried out by JECFA normally results in the estimation of a Provisional Tolerable Weekly Intake (PTWI) or a Provisional Tolerable Daily Intake (PTDI).

The use of the term “provisional” expresses the tentative nature of the evaluation in view of the paucity of reliable data on the consequences of human exposure at levels approaching those with which JECFA is concerned. In principle, the evaluation is based on the determination of a No-Observed-Adverse-Effect-Level (NOAEL) in toxicological studies and the application of an uncertainty factor. The uncertainty factor means that the lowest NOAEL in animal studies is divided by 100, 10 for extrapolation from animals to humans and 10 for variation between individuals, to arrive at a tolerable intake level. In cases where the data are inadequate, JECFA uses a higher safety factor.

This hazard assessment approach does not apply for toxins where carcinogenicity is the basis for concern as is, for example, the case with the aflatoxins. Assuming that a no-effect concentration limit cannot be established for genotoxic compounds, any small dose will have a proportionally small probability of inducing an effect. Imposing the absence of any amount of genotoxic mycotoxins would then be appropriate, if these toxins were not natural contaminants that can never completely be eliminated without outlawing the contaminated

food or feed. In these cases, JECFA does not allocate a PTWI or PTDI. Instead it recommends that the level of the contaminant in food should be reduced so as to be As Low As Reasonably Achievable (ALARA). The ALARA level, which may be viewed as the irreducible level for a contaminant, is defined as the concentration of a substance that cannot be eliminated from a food without involving the discard of that food altogether or without severely compromising the availability of major food supplies. This covers the case of the JECFA evaluations of the aflatoxins made in 1987 and 1997. On some occasions in the 1990s, JECFA also evaluated the risk of other mycotoxins: ochratoxin A, patulin and zearalenone.

In February 2001, a special JECFA session was completely devoted to mycotoxins (FAO, 2001; WHO, 2002b). The mycotoxins evaluated or re-evaluated at this 56th JECFA meeting included fumonisins B_1, B_2 and B_3, ochratoxin A, deoxynivalenol, T-2 and HT-2 toxins, and aflatoxin M_1. The report addressed several concerns about each mycotoxin including explanation of the mycotoxin, absorption through excretion, toxicological studies and final evaluation. Along with the mycotoxin evaluations, the committee put forth general considerations on analytical methods, sampling, associated intake issues and control.

The evaluation of aflatoxin M_1 is the more interesting as JECFA responded to a request by the Codex Committee on Food Additives and Contaminants (CCFAC, see also Section 3.5.5.) at its 32nd session (CAC, 2000) to "examine exposure to aflatoxin M_1 and to conduct a quantitative risk assessment" to compare the application of two standards for contamination of milk (0.05 µg/kg and 0.5 µg/kg), limits that are currently applied in the European Union (EU) and the United States respectively. The calculations showed that, with worst case assumptions, the projected risks for liver cancer attributable to use of the proposed maximum levels of aflatoxin M_1 of 0.05 µg/kg milk and 0.5 µg/kg milk are very small, and that there is no significant health benefit when a 0.5 µg/kg limit would be reduced to 0.05 µg/kg.

In the further development of tolerable daily intake (TDI) levels for mycotoxins in food for national or international (Codex Alimentarius) purposes, factors other than hazard assessment play a role. These will be discussed below.

2.2 Exposure assessment

In addition to information about toxicity, exposure assessment is another main ingredient of the risk assessment. Reliable data on the occurrence of mycotoxins in various commodities and data on food intake are needed to prepare exposure assessment. The quantitative evaluation of the likely intake of mycotoxins is quite difficult. At its 56th Meeting, JECFA stressed the importance of the use of validated analytical methods and the application of analytical quality assurance (see also Section 2.4 on methods of analysis) to ensure that the results of surveys provide a reliable assessment of intake (WHO, 2002b).

In most of the JECFA reviews of mycotoxins, the analytical data on the levels of contamination were often inadequate from developed countries and non-existent for developing countries. Because most mycotoxin contamination is heterogeneous, sampling is another important consideration in the development of information on the levels of contamination (Page, 2003) (see also Section 2.3 on sampling procedures).

In the EU, efforts to assess exposure are undertaken within Scientific Cooperation on Questions relating to Food (SCOOP) projects, funded by the European Commission. The SCOOP projects are targeted to make the best estimates of intake of several mycotoxins by

EU inhabitants. In the 1990s, these activities resulted in a report on the exposure assessment of aflatoxins (European Commission, 1997). SCOOP reports were later published for several other mycotoxins including: ochratoxin A (Miraglia and Brera, 2002); patulin (Majerus and Kapp, 2002); and several *Fusarium* toxins, trichothecenes, fumonisins and zearalenone (Gareis *et al.*, 2003). The SCOOP data have been used by the European Food Safety Authority (EFSA) for its evaluation and advisory work on the risks to public health arising from dietary exposure to certain mycotoxins.

2.3 Sampling procedures

The distribution of the concentration of mycotoxins in products is an important factor to be considered in establishing regulatory sampling criteria. The distribution can be very heterogeneous, as is the case with aflatoxins in peanuts. The number of contaminated peanut kernels in a lot is usually very low, but the contamination level within a kernel can be very high. If insufficient care is taken for representative sampling, the mycotoxin concentration in an inspected lot may therefore easily be wrongly estimated. Also, consumption of peanuts could lead to an accidental high single dose of aflatoxins, rather than a chronic intake at a relatively low level.

A similar situation could occur with pistachio nuts and figs. The risk to both consumer and producer must be considered when establishing sampling criteria for products in which mycotoxins are heterogeneously distributed. The design of sampling procedures has been an international concern for several years (FAO, 1993; CAC, 2000). Working groups and discussions are being organized by FAO and the Codex Alimentarius Commission in an attempt to find a harmonized international approach.

Examples of official sampling plans for mycotoxins are those for aflatoxins in peanuts and corn carried out in the United States (Food and Drug Administration, 2002) and for peanuts in the EU (European Commission, 2002b). In the United States, the USDA requires three 22 kg laboratory samples to average less than 15 μg total aflatoxins/kg for acceptance. In the EU, one 30 kg laboratory sample is required to test less than 15 μg total aflatoxins/kg for raw peanuts destined for further processing, and three 10 kg laboratory samples to all test less than 4 μg total aflatoxins/kg (and 2 μg aflatoxin B_1/kg) for finished peanuts sold for direct human consumption.

Although the approaches are different, the United States peanut industry, in cooperation with USDA, has recently developed an Origin Certification Program (OCP) with several key EU countries that import United States peanuts into Europe. These key markets, in a memorandum of understanding, have agreed to recognize the sampling and testing of United States peanuts for aflatoxin before being exported to these markets (Trucksess *et al.*, 2003). Documents showing positive lot identification and aflatoxin test results can be used to certify that the peanuts meet EU aflatoxin regulations.

In the OCP, the United States exporter uses a first 22 kg sample test result for screening lots. A second USDA 22 kg sample is tested according to EU protocol for lot certification. The OCP will reduce lots rejected at the port of entry, reduce the disruption in supply for the importer, reduce economic losses for the exporter and the importer, and maintain EU standards for consumer safety. The OCP is an example of an agreement between two countries that is mutually beneficial to both while maintaining high standards for consumer safety (Adams and Whitaker, 2004).

2.4 Methods of analysis

Food legislation calls for methods of control. Reliable analytical methods will have to be available to make enforcement of the regulations possible. Tolerance levels that do not have a reasonable expectation of being met are both wasteful in the resources that they utilize, and may well condemn products that are perfectly fit for consumption (Smith *et al.*, 1994). In addition to reliability, simplicity is desired, as it will influence the amount of data that will be generated and the practicality of the ultimate measures taken. The reliability of analysis data can be improved through use of methods that fulfil certain performance criteria (as can be demonstrated in interlaboratory studies).

The Association of Official Analytical Chemists (AOAC International) and the European Standardization Committee (CEN), the European equivalent of ISO, have a number of standardized methods of analysis for mycotoxins that have been validated in formal interlaboratory method validation studies, and this number is gradually growing. The latest edition of Official Methods of Analysis of AOAC International (Horwitz, 2000) contains approximately 40 validated methods for mycotoxin determination, and a recent review has been published about the validation of methods of analysis for mycotoxins (Gilbert and Anklam, 2002).

CEN has produced a document that provides specific criteria for various mycotoxin methods that can be used for official purposes (Comité Européen de Normalisation, 1999). This document presents information concerning method performance, which can be expected from experienced analytical laboratories. The CEN criteria are currently reflected as method performance requirements in official EU legislation on aflatoxins, ochratoxin A and patulin (European Commission, 1998; 2002a; 2003a). They are expected to appear as well in future EU legislation for other mycotoxins in food and feed.

In addition to the use of analytical methods of demonstrated reliability, the application of analytical quality assurance (AQA) procedures is recommended including the use of (certified) reference materials, especially when a high degree of comparison and accuracy is required. Further developments in AQA and the use of reference materials are likely to emerge in the future for the control of mycotoxins in foods. Several (certified) reference materials for mycotoxins have been developed in projects funded by the European Commission's Standards, Measurements and Testing (SMT) Programme (previously known as the Bureau Communautaire de Référence [BCR]), or are currently being redeveloped (Josephs *et al.*, 2004). In Table 1 (in Annex) an overview is given of the BCR (certified) mycotoxin reference materials that have been developed since the 1980s. The mycotoxin reference materials are now worldwide available through the European Commission's Joint Research Centre/Institute for Reference Materials and Measurements (JRC/IRMM)[1].

Certified reference materials are relatively expensive because of the enormous amount of time and money invested in their development, and current supplies are limited. Therefore, laboratories are advised to develop their own reference materials for routine use, the toxin content of which should be established on the basis of the certified materials.
Besides the application of (certified) reference materials, regular participation in interlaboratory comparisons such as proficiency testing schemes is becoming increasingly

[1] See http://www.irmm.jrc.be

important as part of AQA measures that a laboratory must undertake to demonstrate acceptable performance. A number of proficiency testing schemes for mycotoxins exist at the international level including: i) those organized by the Food Analysis Performance Assessment Scheme (FAPAS®) operated by the Central Science Laboratory in the United Kingdom of Great Britain and Northern Ireland (Richard *et al.*, 2003); and ii) those organized by the American Oil Chemists' Society (AOCS) based in the United States (AOCS, 2003).

Good analytical methodology and AQA are prerequisites for adequate food law enforcement. Also important, especially in free trade areas, is the way in which enforcement bodies handle an issue as measurement uncertainty. Within the EU and the European Free Trade Area, approaches are not yet harmonized between countries, which may lead to different action levels, e.g. for aflatoxins. Therefore, the Food Law Enforcement Practitioners (FLEP) Working Party on "Mycotoxins" has recommended a uniform approach (Jeuring, 2004). It is of interest to note that the new EU Commission Directive on patulin in foodstuffs, which came into force in November 2003, gives some guidance about how to deal with measurement uncertainty (European Commission, 2003a). So far this is rather unique but the issue of measurement uncertainty is expected to become part of more regulatory documents in the near future.

2.5 Trade contacts

Preferably, regulations should be brought into harmony with those in force in other countries with which trade contacts exist. In fact, this approach has been applied in the regions of Australia and New Zealand, the EU and MERCOSUR (Mercado Comun del Sur), where harmonized regulations for some mycotoxins now exist. Strict regulative actions may lead importing countries to ban or limit the importing of commodities such as certain food grains, which can cause difficulties for exporting countries in finding or maintaining markets for their products. For example, the stringent regulations for aflatoxin B_1 in animal feedstuffs in the EU (Commission of the European Communities, 1991) led European animal feed manufacturers to switch from groundnut meal to other protein sources to include in feeds; this had an impact on the export of groundnut meal of some developing countries (Bhat, 1999).

The distortion of the market caused by regulations in importing countries may lead to export of the less contaminated foods and feeds leaving those inferior foods and feeds for the local market. Some countries apply different limits for aflatoxins in certain products depending on the destination.

The World Bank has published a study on impact of the adoption of international food safety standards, and the harmonization of standards, on global food trade patterns (Wilson and Otsuki, 2001). Several scenarios led to estimates of the effects of aflatoxin regulatory standards in 15 importing countries (including four developing countries) on exports from 31 countries (including 21 developing countries). In one of the scenarios, the authors examined trade flows when all countries would adopt an international standard for aflatoxin B_1 in food at 9 µg/kg (equivalent to the Codex guidelines of 15 µg/kg for total aflatoxins) in contrast to all importing countries remaining at the (generally lower) limits of 1998. This would lead to an increase of the cereal and nut trade among these countries by US$6.1 billion (or 51 percent).

2.6 Food supply

The regulatory philosophy should not jeopardize the availability of some basic commodities at reasonable prices. Especially in the developing countries, where food supplies are already limited, drastic legal measures may lead to lack of food and to excessive prices. At the time of writing, for instance, the dramatic food security situation in parts of Africa leads to measures that prioritize food sufficiency above food safety. Mycotoxins are an important problem as evidenced by occasional outbreaks of human mycotoxicoses and the role of aflatoxins in liver cancer in West Africa and fumonisins in oesophageal cancer in South Africa (Shephard, 2004).

2.7 Synopsis

Weighing the various factors at the interface of science, food security and regulations is not a trivial activity, and common sense is a major factor for reaching a decision. Public health officials are confronted with a complex problem: mycotoxins, and particularly the carcinogenic mycotoxins, should be excluded from food as much as possible. Since the substances are present in foods as natural contaminants, however, human exposure cannot be completely prevented, and exposure of the population to some level of mycotoxins has to be tolerated. Despite the dilemmas, mycotoxin regulations have been established during the past decades in many countries, and newer regulations are still being drafted.

3. Mycotoxin regulations in 2003 and current developments

3.1 The international inquiry from 2002 to 2003

In 2002, an international inquiry on mycotoxins was initiated by the National Institute for Public Health and the Environment. As part of this inquiry, the Agricultural Services in Dutch Embassies around the world were requested to gather up-to-date information on the situation regarding mycotoxin regulations from local authorities[2] in as many countries as possible. Where this procedure did not lead to the desired information, personal contacts were used.

The questions in the inquiry concerned in particular:

- existence of mycotoxin regulations;
- types of mycotoxins and products for which regulations are in force or proposed, together with maximum permissible levels;
- authorities responsible for control of mycotoxins; and
- use of official and published methods of sampling and analysis.

By the end of 2003, data were received from 89 countries. Together with information gathered in previous inquiries, detailed information became available about the existence or absence of specific mycotoxin limits and regulations in food and feed in 119 countries. All the information received was thoroughly examined and interpreted. Whenever it was necessary and feasible, questions for clarification were submitted to information providers. Corrections received by 31 December 2003 were taken into account in this document. Table 2 (in Annex 2) gives an overview of how up-to-date the information is per country, together with the country codes and population sizes. All data received were sorted by country and by economic community (Australia/New Zealand, EU, MERCOSUR). In addition, information was included about standards set by Codex Alimentarius. For each separate entry, the available data were classified into the categories food, dairy and feed and then tabulated in alphabetic order of the countries (see Table 3 in Annex 2).

3.2 General observations

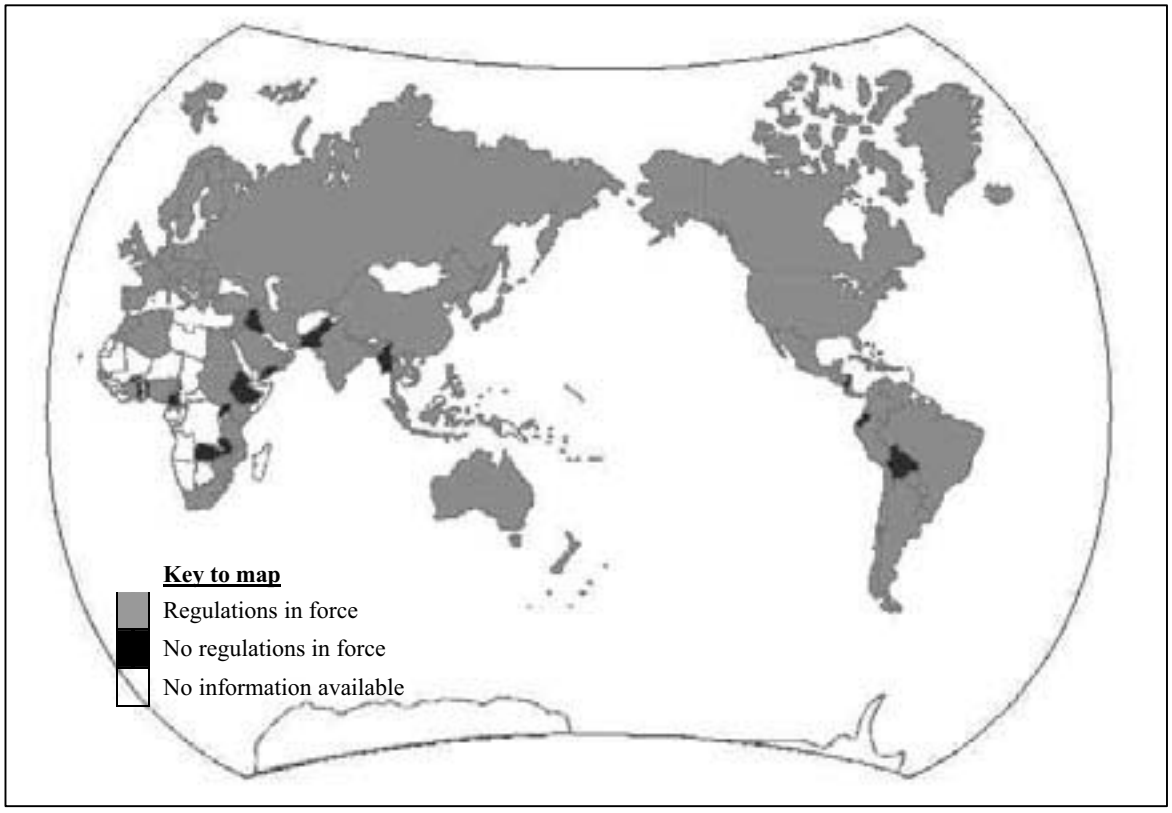
On a worldwide basis, at least 99 countries had mycotoxin regulations[1] for food and/or feed in 2003 (see Figure 1), an increase of approximately 30 percent compared to 1995. The total population in these countries represents approximately 87 percent of the world's inhabitants. Figure 2 shows the share of the global population living in particular regions, where mycotoxin regulations were in force, in 1995 and in 2003. In 1995, 23 percent of the world's inhabitants were living in a region where no known mycotoxin regulations were in force. This percentage had decreased to 13 percent in 2003, due to a slight increase in coverage in Latin America and Europe, and more significant increases in Africa and Asia/Oceania.

In fact, all countries with mycotoxin regulations in 2003 have at least regulatory limits for aflatoxin B_1 or the sum of aflatoxins B_1, B_2, G_1 and G_2 in foods and/or feeds, a situation that was also observed in 1995. For several other mycotoxins, specific regulations exist as well (i.e. aflatoxin M_1; the trichothecenes deoxynivalenol, diacetoxyscirpenol, T-2 toxin and HT-2 toxin; the fumonisins B_1, B_2, and B_3; agaric acid; the ergot alkaloids; ochratoxin A; patulin; the phomopsins; sterigmatocystin and zearalenone). The number of countries regulating mycotoxins has significantly increased over the years. Comparing the situation in 1995 and

[2] The word "regulations" used in the text and the tables also includes other arrangements such as "guidelines"

2003, it appears that in 2003 more mycotoxins are regulated in more commodities and products, whereas tolerance limits generally remain the same or tend to decrease. Regulations have become more diverse and detailed with newer requirements regarding official procedures for sampling and analytical methodology. At the same time, several regulations have been harmonized between countries belonging to economic communities (Australia/New Zealand, EU, MERCOSUR), or are in some stage of harmonization (see Section 3.5).

Figure 1: Countries with and without regulations for mycotoxins[3]



3.3 Specific observations per region

3.3.1 Africa

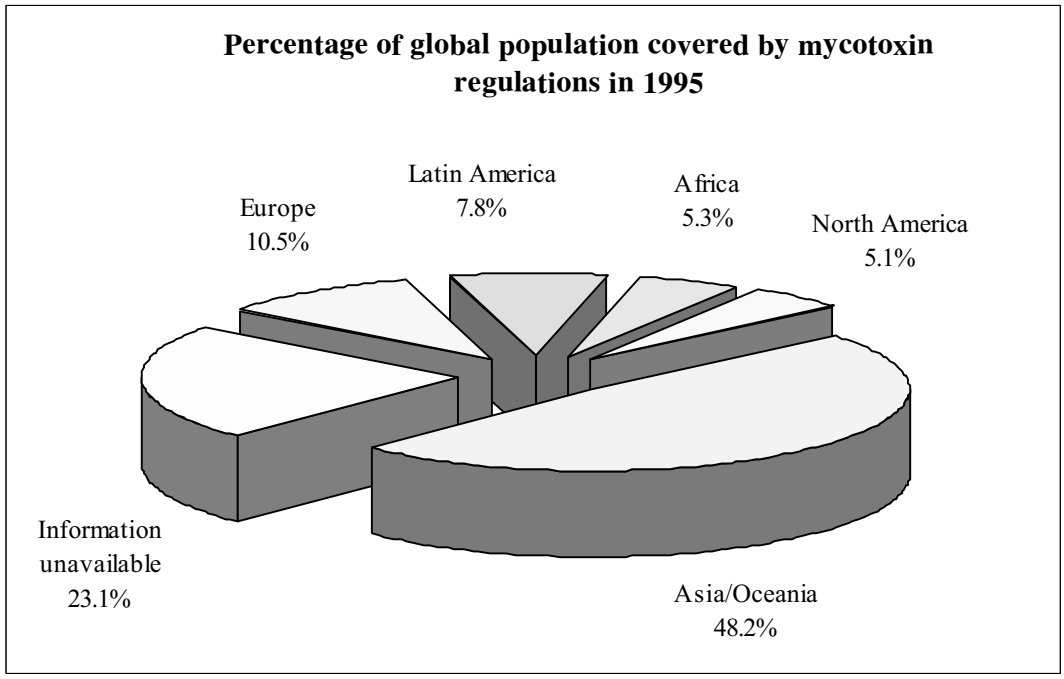
Figures 3 and 4 illustrate the occurrences of the regulatory limits for various mycotoxins in Africa in food and feed respectively. Fifteen countries were known to have specific mycotoxin regulations. These countries cover approximately 59 percent of the inhabitants of the continent. For the majority of the African countries, specific mycotoxin regulations (probably) do not exist. The fact that countries have no specific regulatory limit for mycotoxins does not mean that the problem is ignored. Several of these countries recognize that they have problems due to mycotoxins and that regulations should be developed, and they indicated this in their responses to the inquiry.

The mycotoxin issue in Africa needs to be viewed, however, in the overall context of local food safety, health and agricultural issues (Shephard, 2004). The establishment of mycotoxin regulations will have limited effects in terms of health protection in those countries where

[3] The figures in this document have been prepared using Corel® clipart (Corel Corporation Limited, Dublin, Ireland).

many farmers grow agricultural produce for their own consumption (subsistence farming), which is the case in many African countries. Most of the existing mycotoxin regulations in Africa concern the aflatoxins. Morocco had the most detailed mycotoxin regulations.

Figure 2: Percentages of world's inhabitants covered by mycotoxin regulations



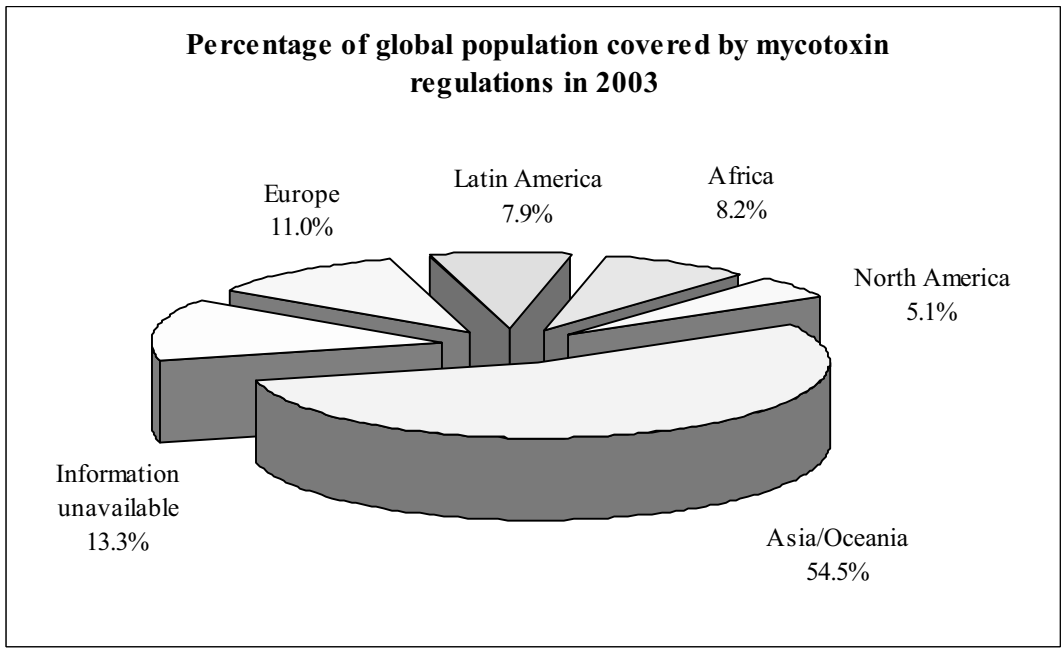


Figure 3: Mycotoxins regulated in food in Africa

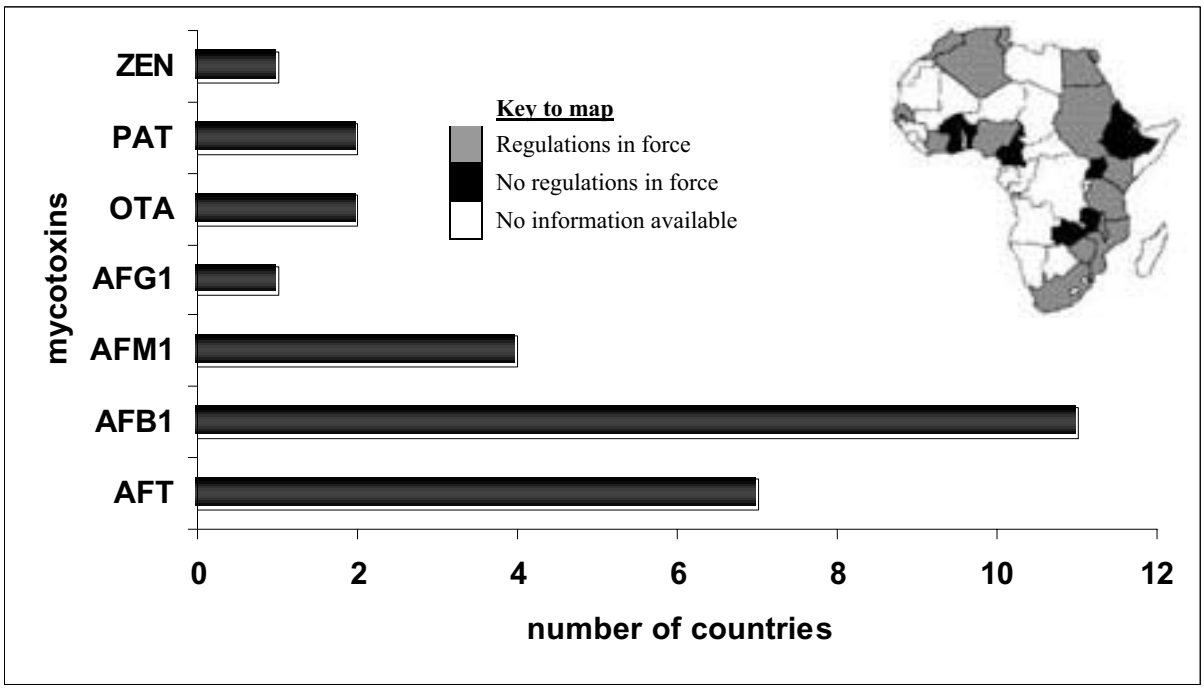
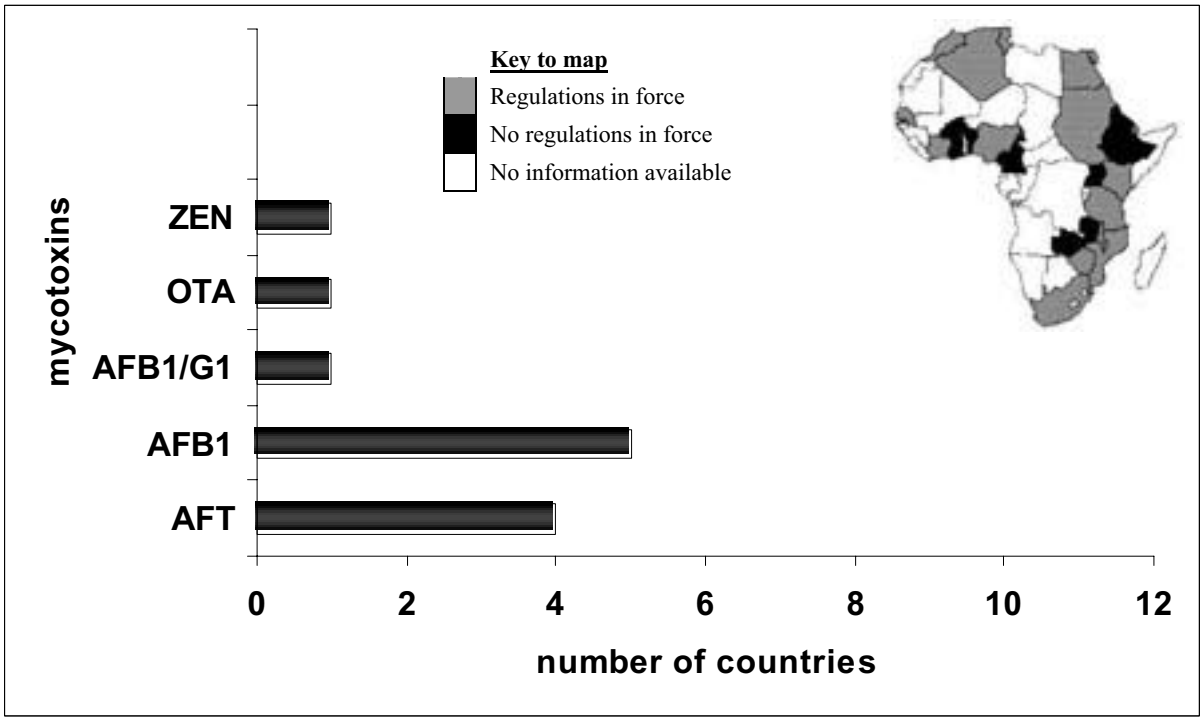


Figure 4: Mycotoxins regulated in feed in Africa



3.3.2 Asia/Oceania

Asia and Oceania cover a very large part of the globe, with most countries in the tropics and subtropics, so it is expected that most mycotoxin problems be caused by fungi, which grow at higher temperatures (Pitt and Hocking, 2003). An exception is New Zealand, which has a temperate to cool climate and separate mycotoxin issues from Asia and northern Australia.

Figures 5 and 6 show the occurrences of the regulatory limits in Asia/Oceania in food and feed respectively. Twenty-six countries in Asia/Oceania were known to have specific mycotoxin regulations (88 percent of the inhabitants of the region). Regulations for total aflatoxins dominate in food, whereas regulations for aflatoxin B_1 dominate in feed. Australia and New Zealand have harmonized their mycotoxin regulations, which include limits for the "exotic" mycotoxins agaric acid and phomopsins (see also Section 3.5.1.) By far the most extensive and detailed regulations can be found in China and the Islamic Republic of Iran.

Figure 5: Mycotoxins regulated in food in Asia/Oceania

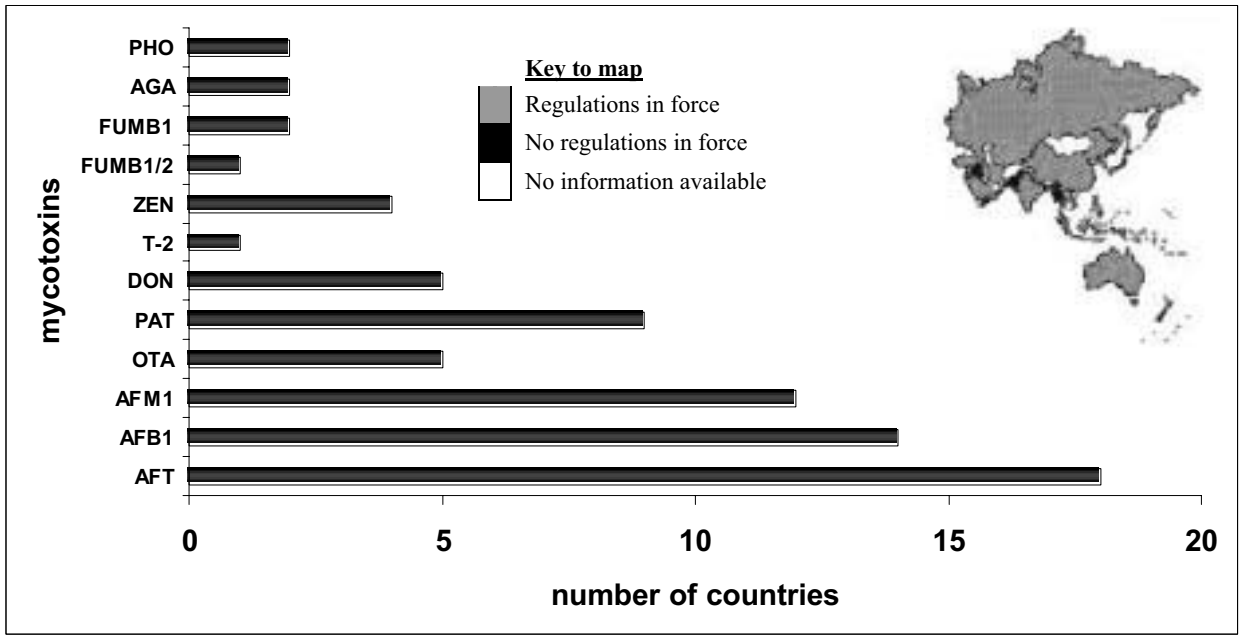
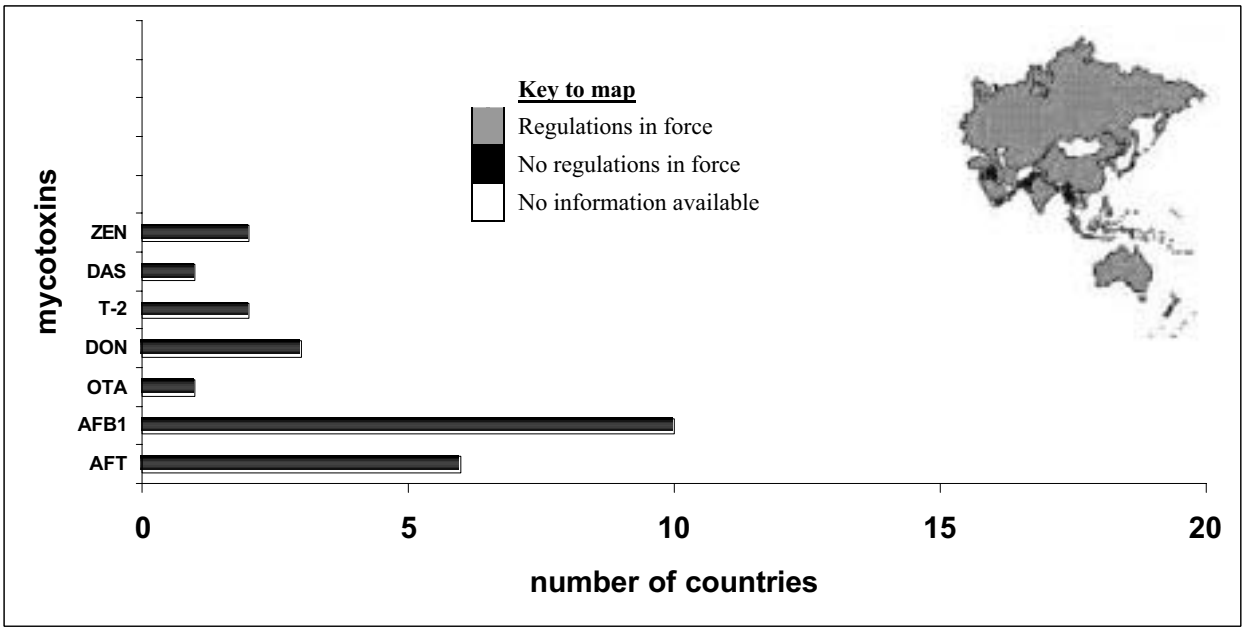


Figure 6: Mycotoxins regulated in feed in Asia/Oceania



3.3.3 Europe

In Europe, 39 countries, accounting for approximately 99 percent of the continent's population, were known to have specific mycotoxin regulations in 2003. Figures 7 and 8 show the occurrences of regulatory limits for various mycotoxins in Europe in food and feed respectively.

Figure 7: Mycotoxins regulated in food in Europe

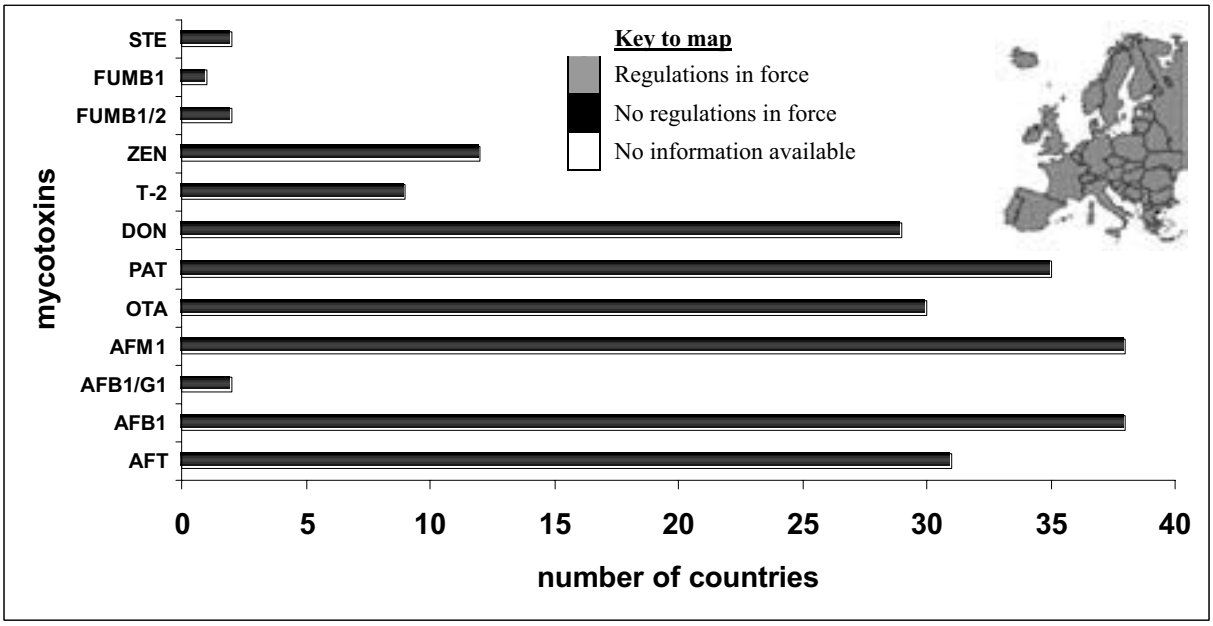
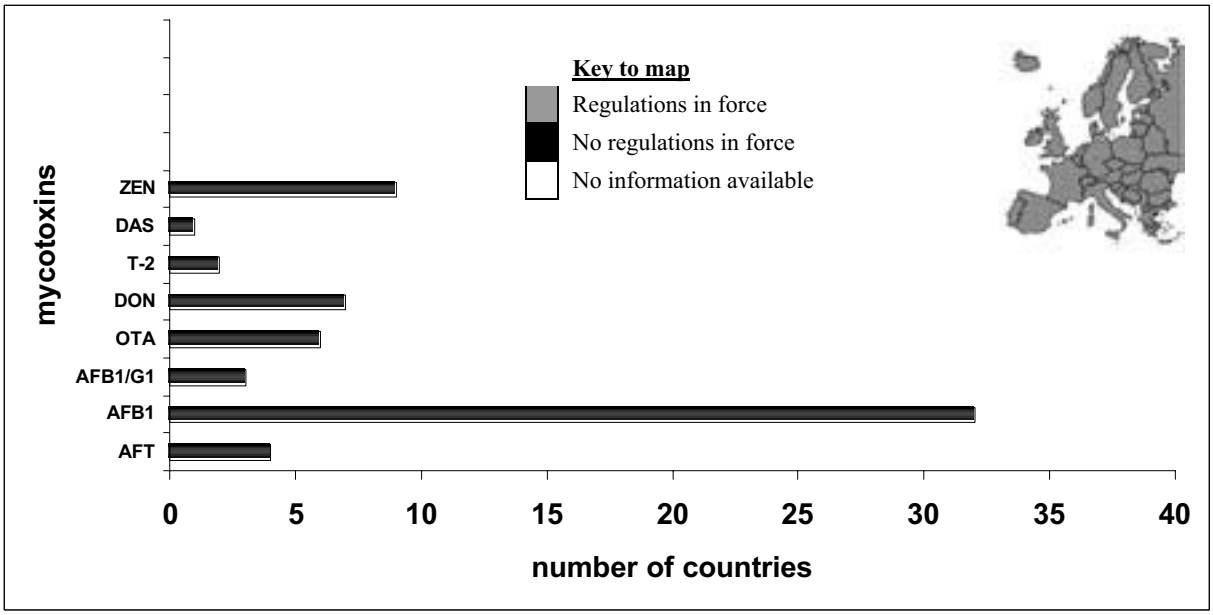


Figure 8: Mycotoxins regulated in feed in Europe



Compared to other regions of the world, Europe has the most extensive and detailed regulations for mycotoxins in food. In the EU, harmonized regulations exist for aflatoxins in various foodstuffs, aflatoxin M1 in milk, ochratoxin A in cereals and dried vine fruits, patulin

in apple juice and apple products, and for aflatoxin B1 in various feedstuffs. Guideline limits have been established for deoxynivalenol in cereals and cereal products. It is of interest to note that many of the EU candidate member countries have mycotoxin regulations, which are often more detailed than those currently in force in the EU.

3.3.4 Latin America

The major Latin American agricultural crops (maize, wheat, coffee, cotton, soybeans, barley, sunflower, groundnuts and tree nuts, cocoa and dairy products) are highly susceptible to fungal contamination and mycotoxin production (Pineiro, 2004). Figures 9 and 10 show the occurrences of regulatory limits for various mycotoxins in Latin America in food and feed respectively. Nineteen countries, accounting for 91 percent of the population of the region, were known to have specific mycotoxin regulations. Harmonized regulations for aflatoxins exist in MERCOSUR, a trading block consisting of Argentina, Brazil, Paraguay and Uruguay (see also Section 3.5.3). Incidentally other countries indicate that they follow MERCOSUR regulations. The aflatoxin regulations in food are often set for the sum of the aflatoxins B_1, B_2, G_1 and G_2. Uruguay has the most detailed regulations, including limits for ergot alkaloids in feeds, which is rather unique in the mycotoxin regulatory world.

Figure 9: Mycotoxins regulated in food in Latin America

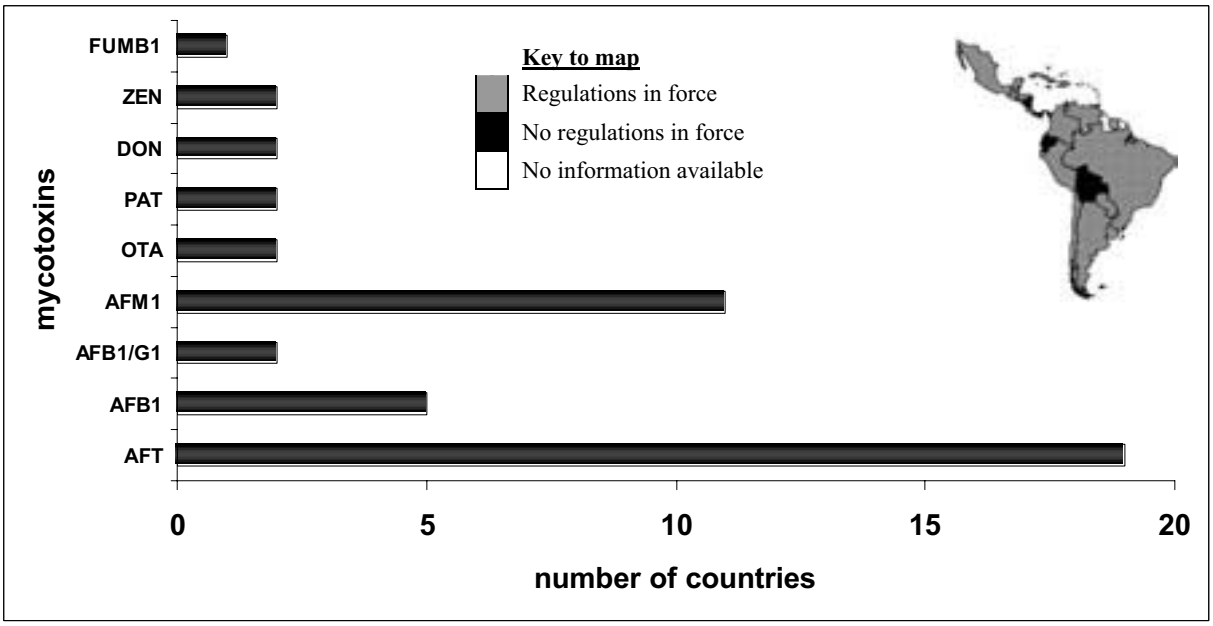
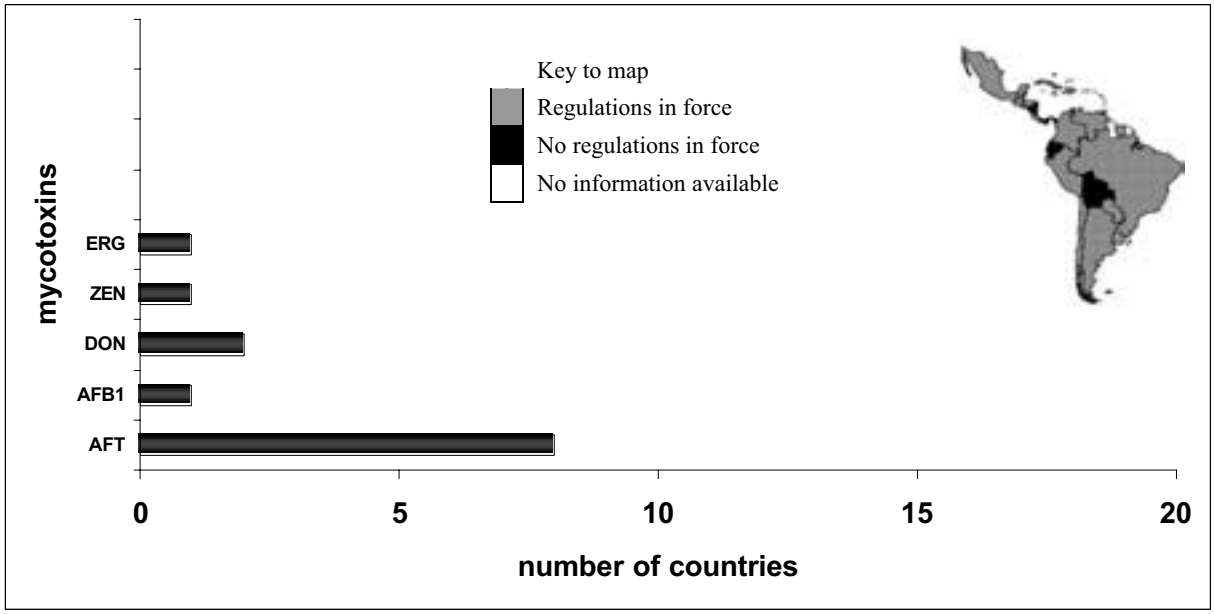


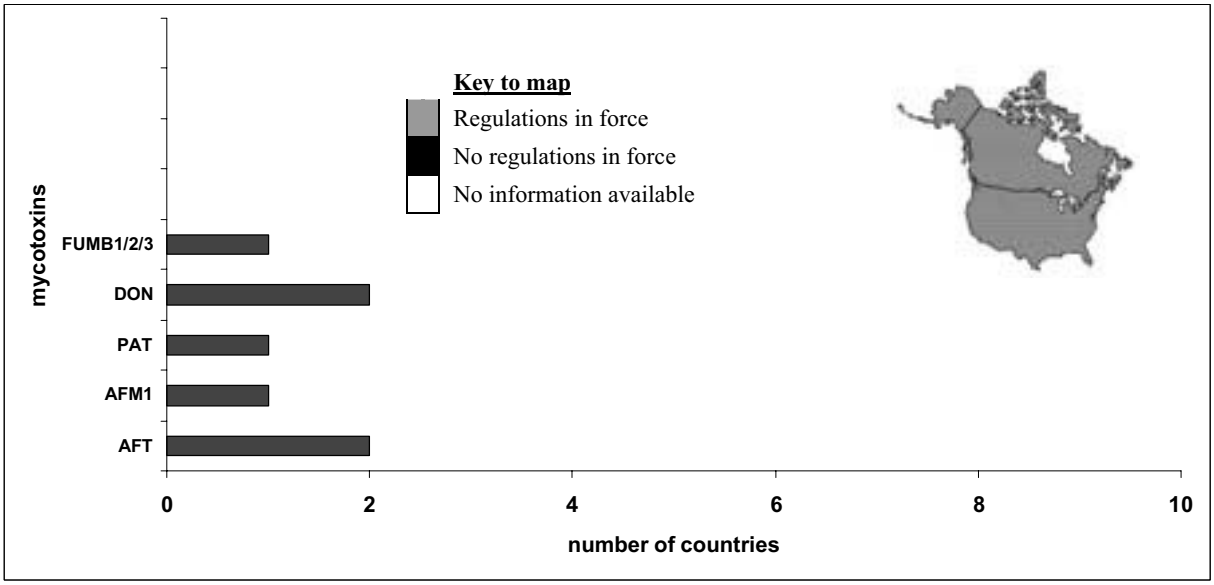
Figure 10: Mycotoxins regulated in feed in Latin America



3.3.5 North America

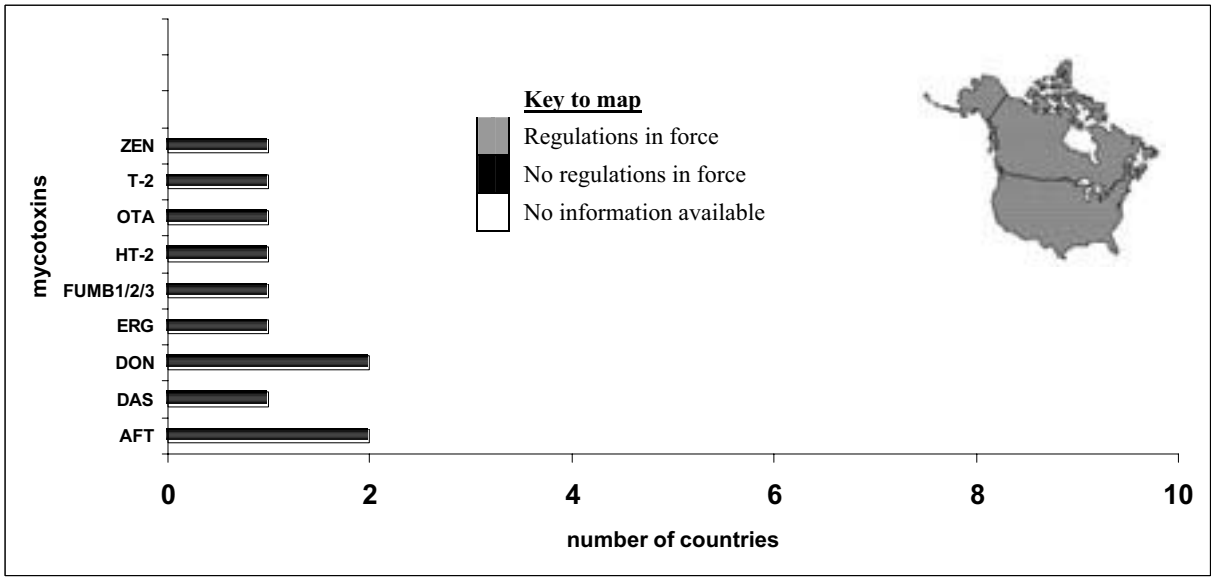
The United States and Canada have had mycotoxin regulations in place for many years, and implement advanced techniques for sampling and analysis. In both countries, limits for aflatoxins are set for the sum of the aflatoxins B_1, B_2, G_1 and G_2. Figures 11 and 12 show the occurrences of regulatory limits or guideline limits for various mycotoxins in North America in food and feed respectively.

Figure 11: Mycotoxins regulated in food in North America



In addition to limits for Fusarium toxins, Canada has also established tolerances for the percentage Fusarium-damaged kernels in wheat (both hard and soft wheat) and other grains. The Canadian Grain Commission (CGC) has issued an Official Grain Grading Guide, which contains Standard Procedures for Grain Inspection[4]. In Canada, limits also exist for the percentage of ergot in various crops. In the United States detailed tolerance levels exist for the sum of the fumonisins B_1, B_2 and B_3 in a wide variety of maize products. This is the only country known to have limits for the sum of these three fumonisins.

Figure 12: Mycotoxins regulated in feed in North America



3.4 Specific observations per mycotoxin or group of mycotoxins

3.4.1 Worldwide limits for aflatoxins

The number of countries regulating aflatoxins has significantly increased over the years. The aflatoxin regulations are often detailed and specific for various foodstuffs, for dairy products and for feedstuffs. Table 4 (in Annex 2) attempts to compare medians, ranges and numbers of countries with legally established limits for aflatoxins in foodstuffs and animal feedstuffs (intended to be used for dairy cattle) in 1995 and 2003 in order to identify trends. Such a comparison is not easy to make, and subject to future adjustments, because not all data used may be fully correct. Another limitation is that some countries have many regulations specifying different tolerated levels for individual foods and feeds, while others have set only one tolerated level for instance for "all foods" or for "all feeds". Therefore simplifications were made.

For food, selections were made of limits established for aflatoxin B_1 and total aflatoxins respectively for the category "all foods" or, if this category was not mentioned in the regulations, for those foodstuffs considered most close to this category. Similarly, for the comparison of limits for aflatoxin M_1, a selection was made of regulatory levels set for milk (whereas many countries also had specific limits for milk products as milk powder, cheese and infant foods). Finally, as for aflatoxins in animal feedstuffs, some countries have many limits often dictated by the destination of the feedstuff. To compare the limits between

[4] See http://www.grainscanada.gc.ca/Pubs/fusarium/backgrounder/don-e.htm

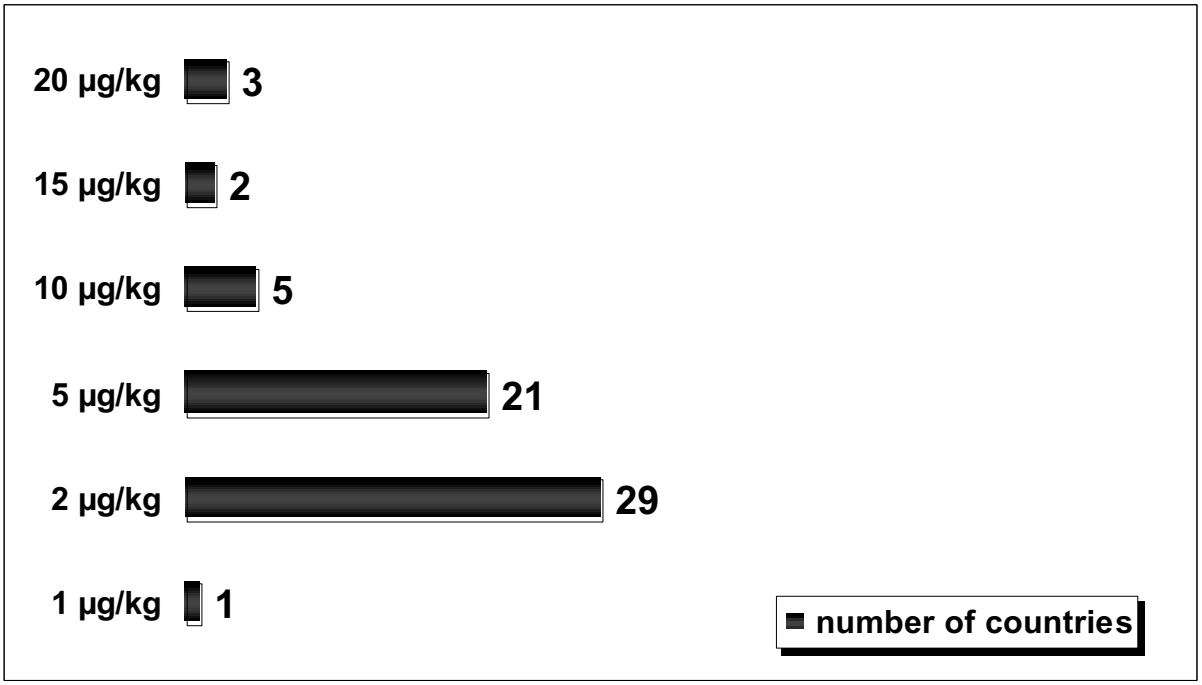
countries for aflatoxin B_1 and total aflatoxins respectively in animal feedstuffs, those were selected that were known or assumed to be relevant for feedstuffs for dairy cattle. These are often the most stringent from the point of view of human health, because of the carry-over of aflatoxin B_1 into aflatoxin M_1 in milk and dairy products.

For all five categories, for which some characteristics are summarized in Table 4, frequency distributions of the 2003 situation were prepared as illustrated in Figures 13, 14, 16, 17 and 18. An analysis of Table 4 and these figures leads to the following comments:

3.4.1.1 Aflatoxin B_1 in food

Compared to the situation in 1995, the maximum tolerated levels for aflatoxin B_1 in food have not changed dramatically in 2003, although the range of limits has narrowed a little (1-20 µg/kg), and 2 µg/kg is now a limit in force in at least 29 countries (see Figure 13). Most of these countries belong to the EU (where since 1998 harmonized limits for aflatoxin B_1 and the sum of the aflatoxins B_1, B_2, G_1 and G_2 are in force for various products), the European Free Trade Association (EFTA) and candidate EU countries. By 2003, many of the candidate EU countries had harmonized their national regulations with the EU in anticipation of their membership (on 1 May 2004). Another major limit is visible at 5 µg/kg, followed by 21 countries, spread over Africa, Asia/Oceania, Latin America and Europe. The United States and Canada do not have a single limit for aflatoxin B_1.

Figure 13: Worldwide limits for aflatoxin B_1 in food

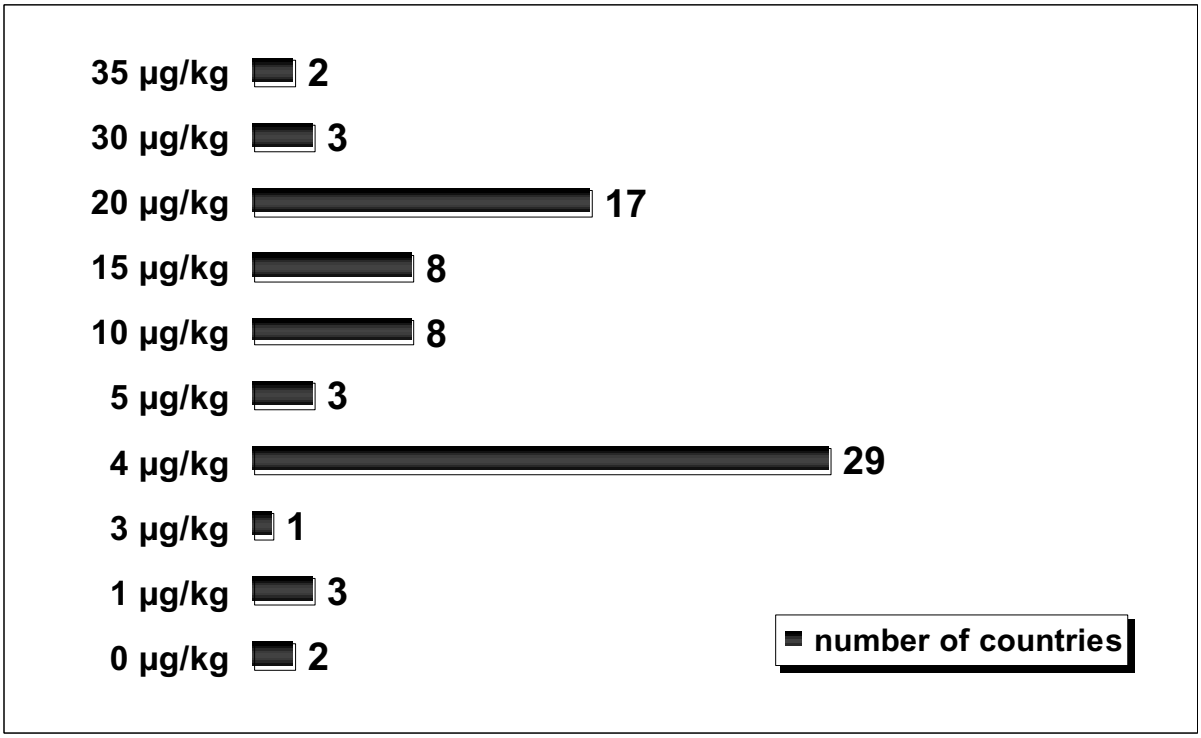


3.4.1.2 Total aflatoxins in food

As in 1995, in 2003 many countries regulated the aflatoxins with limits for the sum of the aflatoxins B_1, B_2, G_1, and G_2, sometimes in combination with a specific limit for aflatoxin B_1. The range of limits (0-35 µg/kg) has narrowed a little compared to 1995, whereas the median limit (10 µg/kg) is slightly higher. The most frequently occurring limit (see Figure 14) is at 4 µg/kg (applied by 29 countries), again a limit found in the harmonized regulations in the EU, EFTA and candidate EU countries where dual limits for both aflatoxin B_1 and total aflatoxins are enforced. Another major peak occurs at 20 µg/kg, applied by 17 countries, with half of them in Latin America (where it is also a MERCOSUR harmonized limit) and several in Africa. Also the United States, one of the first countries that established an aflatoxin action limit, follows the 20 µg/kg limit. Over the years, the "popularity" of a limit for total aflatoxins in foodstuffs has remained, resulting in 76 countries in 2003 applying this regulatory levels (as compared to 61 countries with a specific limit for aflatoxin B_1).

Whether a regulatory level for the sum of the aflatoxins, which requires more analytical work than for aflatoxin B1 alone, contributes significantly to better protection of public health than a regulatory level for aflatoxin B1 alone is debatable. Aflatoxin B1 is the most important of the aflatoxins, considered from both the viewpoints of toxicology and occurrence. It is most unlikely that commodities will contain aflatoxins B2, G1 and G2 and not aflatoxin B1 (Yabe and Nakajima, 2004), and the concentration of the sum of the aflatoxins B2, G1 and G2 is generally less than the concentration of aflatoxin B1 alone.

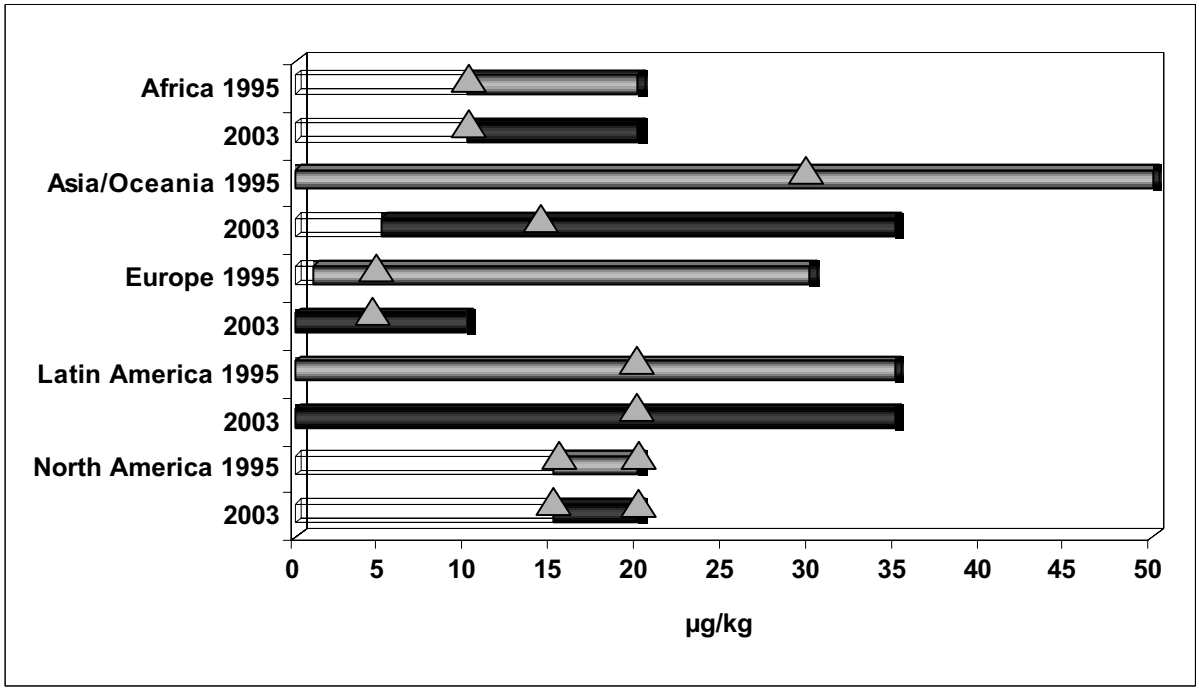
Figure 14: Worldwide limits for total aflatoxins in food



Typical occurrence ratios for aflatoxins B_1 and B_2 (mainly produced by *Aspergillus flavus*) average approximately 4:1. Typical occurrence ratios for aflatoxin B_1 and the sum of the aflatoxins B_2, G_1 and G_2 (the G toxins are mainly produced by *Aspergillus parasiticus*) average approximately 1:0.8, although variations do occur for both ratios (Van Egmond *et al.*, 1978). Regulatory authorities in those countries that apply a regulatory level for the sum of the aflatoxins should critically inspect the analytical data of monitoring agencies to see how frequently the availability of data on the sum of the aflatoxins (above that on aflatoxin B_1) has been indispensable to adequately protect the consumer. Analysis of one target component (aflatoxin B_1) seems to be efficient, sufficient and more practical.

In Figure 15, the ranges and medians of limits for total aflatoxins in food are depicted for the various world regions for 1995 and 2003. It appears that in Africa, Latin America and North America no observable changes have occurred, in contrast to Asia/Oceania and Europe, where a downward trend in the limits for total aflatoxins is visible.

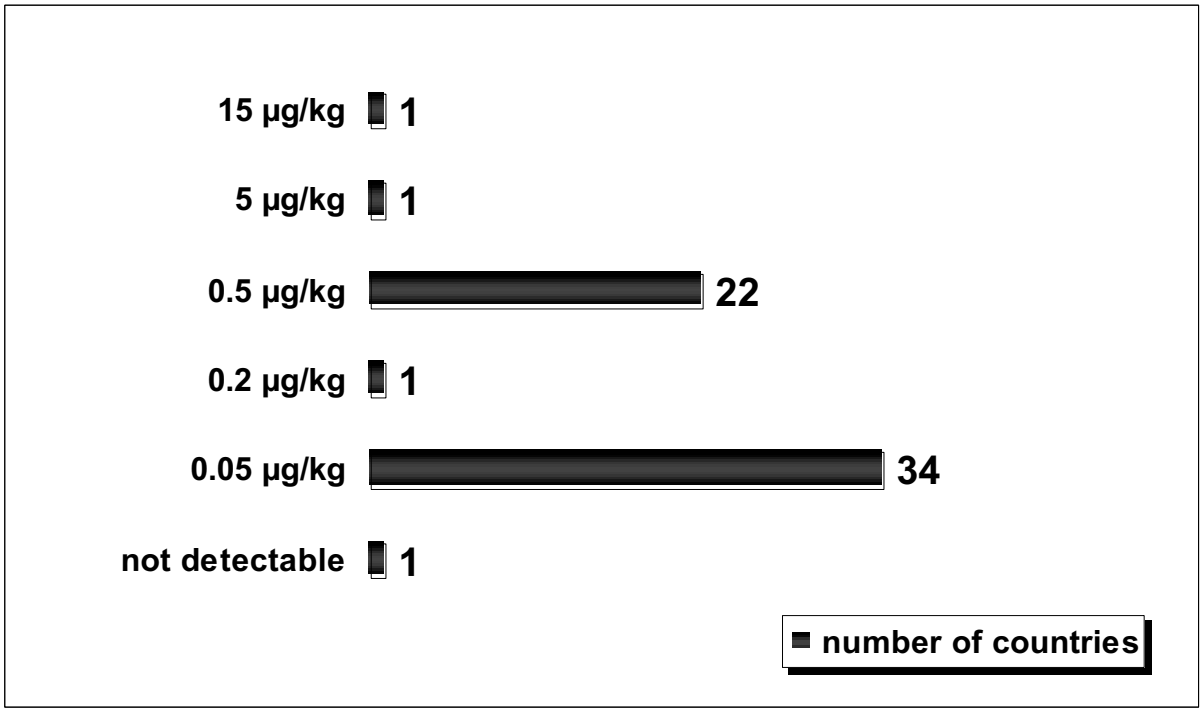
Figure 15: Ranges and medians of limits for total aflatoxins in food per world region



3.4.1.3 Aflatoxin M_1 in dairy products

Regulations for aflatoxin M_1 existed in 60 countries at the end of 2003, a more than three-fold increase as compared to 1995. It is again the EU, EFTA and candidate EU countries that contribute in major part to the largest peak seen in Figure 16 at 0.05 µg/kg, but some other countries in Africa, Asia and Latin America also apply this limit. The other peaking limit is at 0.5 µg/kg. This higher regulatory level is applied in the United States, several Asian and European countries, and it occurs most frequently in Latin America, where it is also established as a harmonized MERCOSUR limit.

Figure 16: Worldwide limits for aflatoxin M_1 in milk

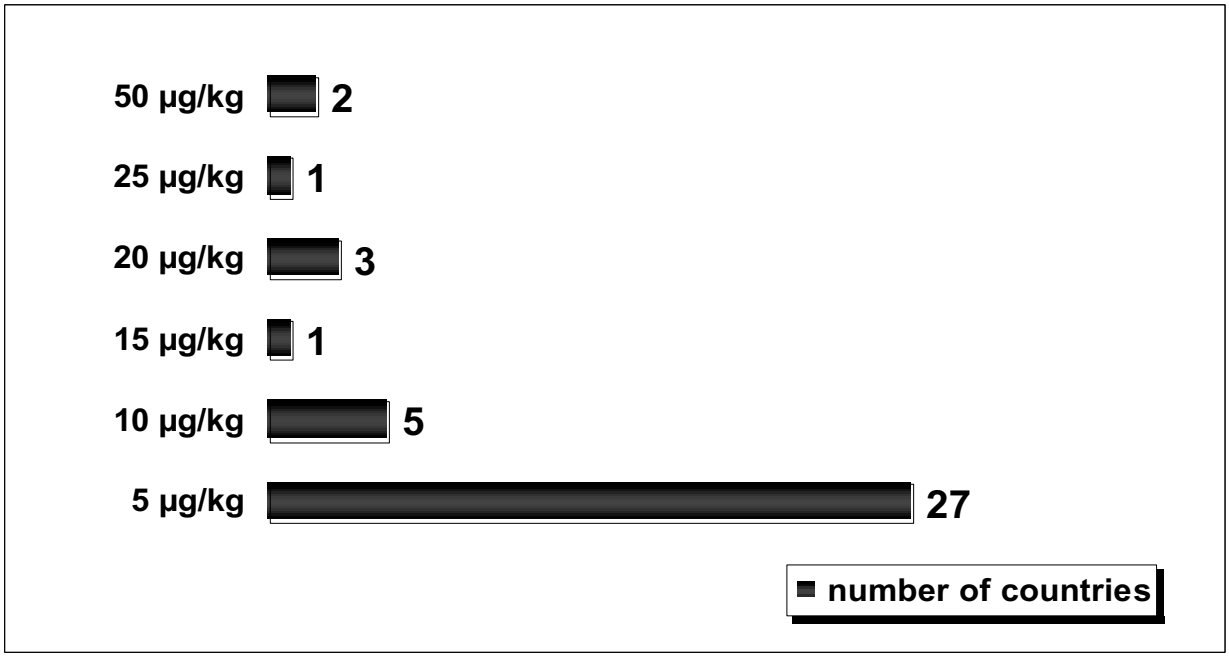


The ten-fold difference between the two most prevailing limits for aflatoxin M_1, which exist already for many years, has given rise to debates within Codex Alimentarius, leading to their request to JECFA to re-evaluate the human health risk of aflatoxin M_1 (see section on hazard assessment). Apart from these sub-µg/kg regulatory limits, a few countries indicated in the 2002/2003 inquiry that they regulate aflatoxin M_1 in milk at levels of 5 and 15 µg/kg. These levels do not seem realistic; however, it was impossible to determine whether mistakes occurred during the completion of the inquiry forms.

3.4.1.4 Aflatoxin B_1 in feed

Many aflatoxin regulations exist for feedstuffs. Those that are applied for feed for dairy cattle are summarized in Figure 17. Whereas many more countries regulate aflatoxin B_1 in feedstuffs for dairy cattle in 2003 than in 1995 (39 in 2003 versus 25 in 1995), the increase is only slightly visible for the countries that regulate the sum of the naturally occurring aflatoxins (21 in 2003 versus 17 in 1995). This is understandable and logical from the point of view that it is aflatoxin M_1, the metabolite of aflatoxin B_1, which causes health concern. Consequently limiting aflatoxin B_1 in animal feeds is the most effective means of controlling aflatoxin M_1 in milk. Figure 17 illustrates that a limit of 5 µg/kg dominates the distribution pattern of aflatoxin B_1 regulations. This limit is applied by countries in the EU and EFTA, and is also followed in many of the candidate EU countries, and is only sporadically seen outside Europe. Strict application will normally be effective to prevent that aflatoxin M_1 levels in milk remain below 0.05 µg/kg for dairy feed (where these countries have set their corresponding limit for aflatoxin M_1 in milk).

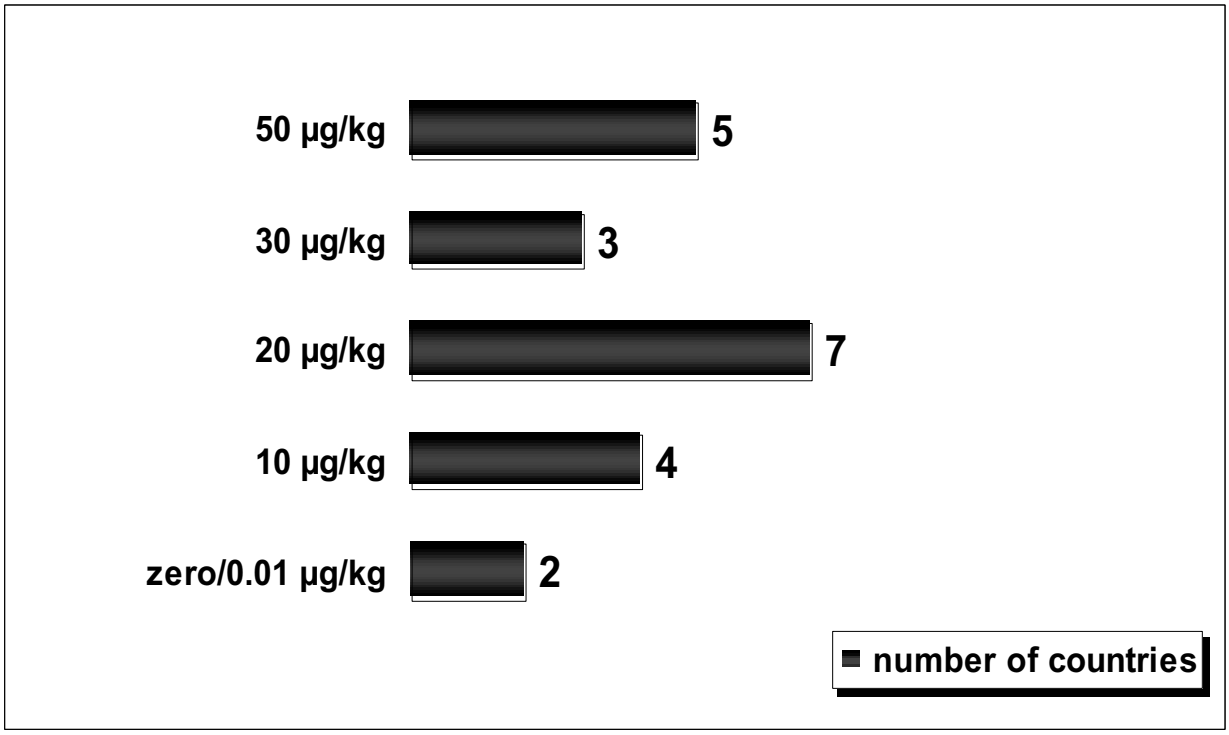
Figure 17: Worldwide limits for aflatoxin B_1 in feed for dairy cattle



3.4.1.5 Total aflatoxins in feed

The number of regulations for the sum of the aflatoxins in feedstuffs is considerably less than those existing for aflatoxin B_1 only. The limits may vary, depending on the destination of the feedstuff. Figure 18 depicts the distribution of the limits for total aflatoxins in animal feeds that are (also) given to dairy cattle.

Figure 18: Worldwide limits for total aflatoxins in feed for dairy cattle



A relatively flat distribution is apparent with the most occurring limits set at 20 µg/kg. Further analysis reveals that regulatory levels for the sum of the aflatoxins B_1, B_2, G_1 and G_2 occur in feed regulations throughout the world but particularly in the Americas.

3.4.2 Worldwide limits for other mycotoxins

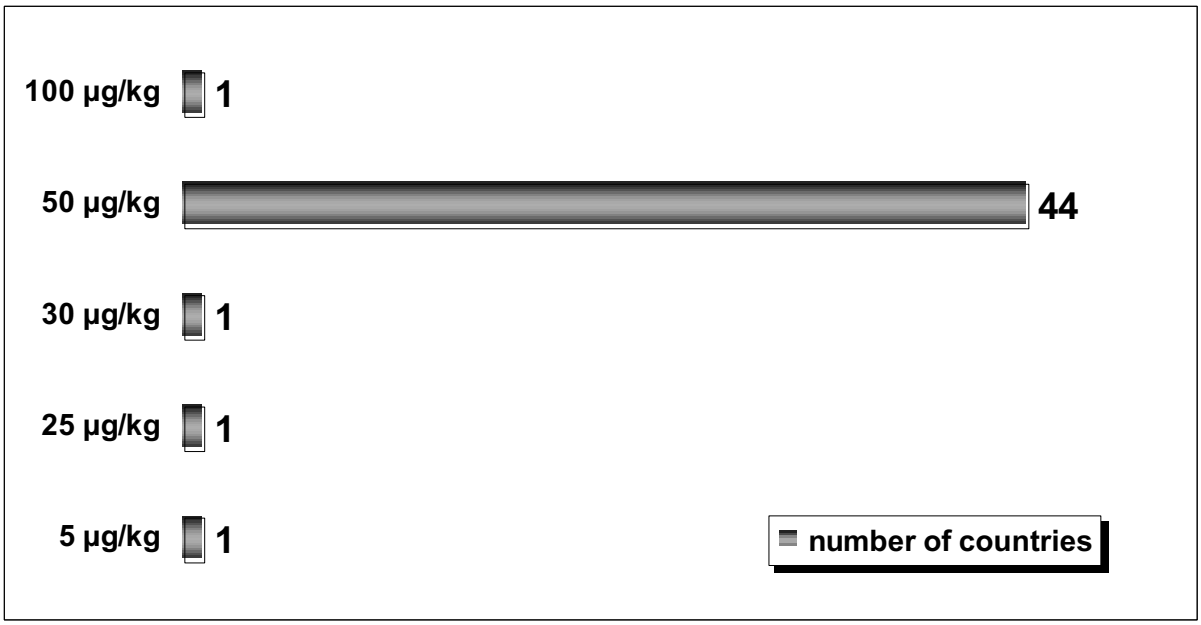
Limits for mycotoxins other than aflatoxins currently exist mostly for food and more incidentally for animal feed. It is to be expected that the number of regulations for mycotoxins other than aflatoxins will significantly increase in the near future, both for food and feed. The following discussions in Sections 3.4.2.1 to 3.4.2.5 are largely restricted to food.

3.4.2.1 Patulin

Since 1995 many more countries have regulated patulin, mostly in fruit products such as apple juice. The vast majority of countries with regulations or guideline levels for patulin in food have set these at the same level (50 µg/kg) as illustrated in Figure 19. Harmonized EU limits for patulin have recently come into force for various products (European Commission, 2003a). This makes patulin one of the most regulated mycotoxins in the world.

Validated analytical methodology (AOAC, CEN) is readily available to determine patulin in fruit juice at a level of 50 µg/kg. However, the new EU limit of 10 µg/kg for baby food and infant formulae was put in *a proviso* that a suitable method of analysis would be timely available. It has caused additional research efforts by the EC Joint Research Centre/Institute for Reference Materials and Measurements in Geel, Belgium, and a collaborative study to prove that the newly developed methodology is fit for purpose has recently been completed successfully.

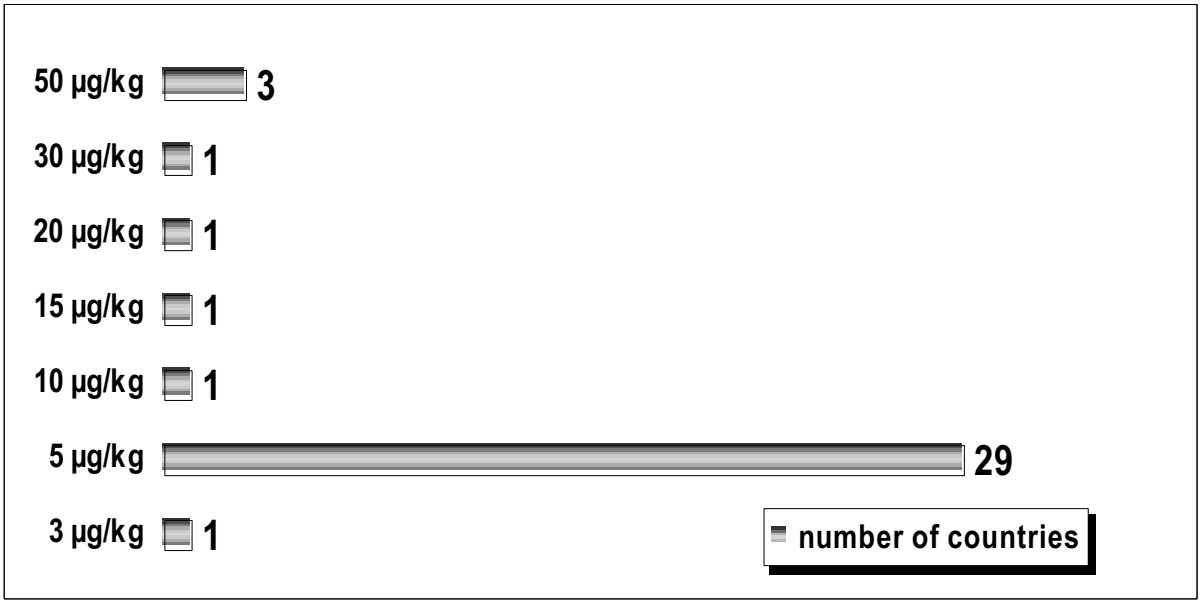
Figure 19: Worldwide limits for patulin in fruits and fruit juices



3.4.2.2 Ochratoxin A

At a first glance the developments in the area of regulations for ochratoxin A show strong similarities with those for patulin. A significant increase in the number of countries that apply limits in foods and good agreement about the desired limit for cereals and cereal products (see Figure 20). Cereals are considered the major source of human exposure to ochratoxin A. There is a restriction with the presentation of the data, however. Many countries have set a limit for ochratoxin A in cereals, many others for cereal products, and various have set separate (different) limits for both. For example, this latter situation occurs in the EU, where a limit of 5 µg/kg (the dominant peak in the figure) is in force for raw cereals and a limit of 3 µg/kg (not presented in Figure 20) for processed cereals. To present this all in one figure was difficult, and therefore the approach was followed to preferentially include a country's limit for (raw) cereals in Figure 20 and, where this did not exist, to include the limit (if any) for cereal products. The current and proposed limits for ochratoxin A may need to be reviewed in the near future pending the outcome of an ongoing EC-supported project on "Mechanisms of ochratoxin A induced carcinogenicity as a basis for an improved risk assessment"[5]. This project is aimed at establishing whether or not the carcinogenicity of ochratoxin A is considered to arise through a threshold or non-threshold approach.

Figure 20: Worldwide limits for ochratoxin A in cereals and cereal products



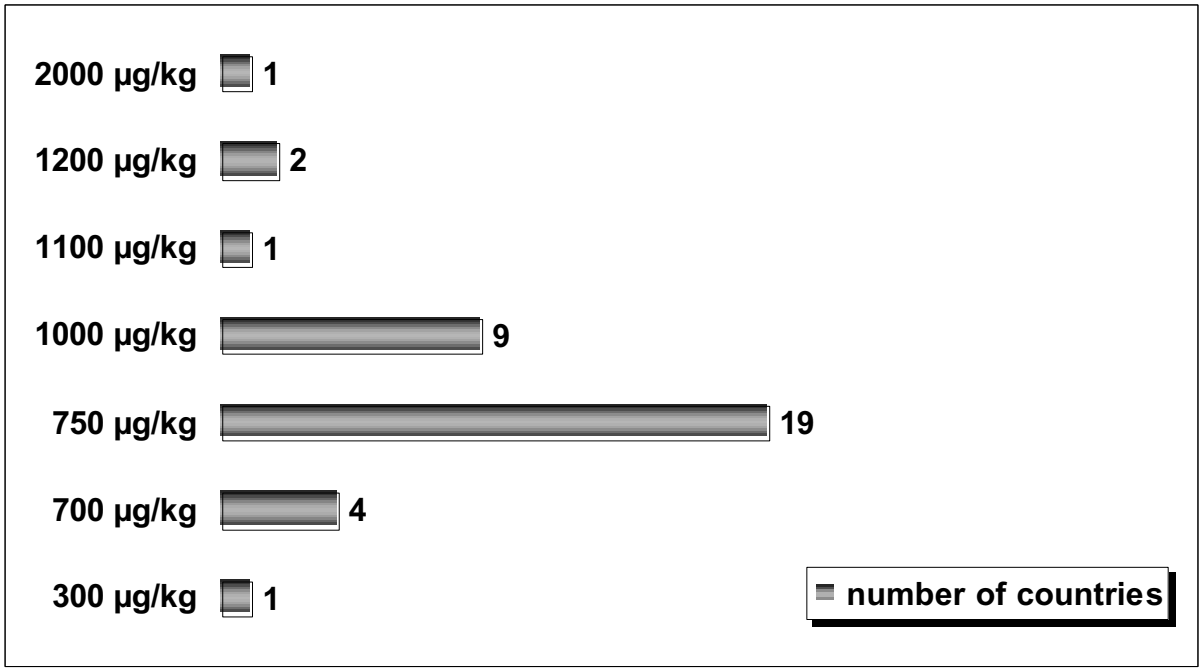
3.4.2.3 Deoxynivalenol

As is the case with patulin and ochratoxin A, a few dozen countries have set regulatory or guideline limits for deoxynivalenol (DON) in food (see Figure 21). Whereas in 1995 this trichothecene was only sporadically regulated in food, it has become a toxin of high concern in monitoring programmes and among regulatory authorities since the late 1990s, when mg/kg concentrations were reported to occur in cereals and cereal products particularly in Europe. Similarly as with ochratoxin A, it was difficult to summarize the most occurring limits for DON in wheat and other cereals in one figure, and those interested in the full details of the many regulations that now exist for DON should consult Table 3. The peak at 750

[5] See http://www.uni-wuerzburg.de/toxikologie/EU-OTA/OchratoxinA.html

µg/kg is dominated by the countries of the EU that currently apply this (unofficial) guideline limit for DON in flour used as raw materials since several years.

Figure 21: Worldwide limits for deoxynivalenol in wheat (flour) and other cereals

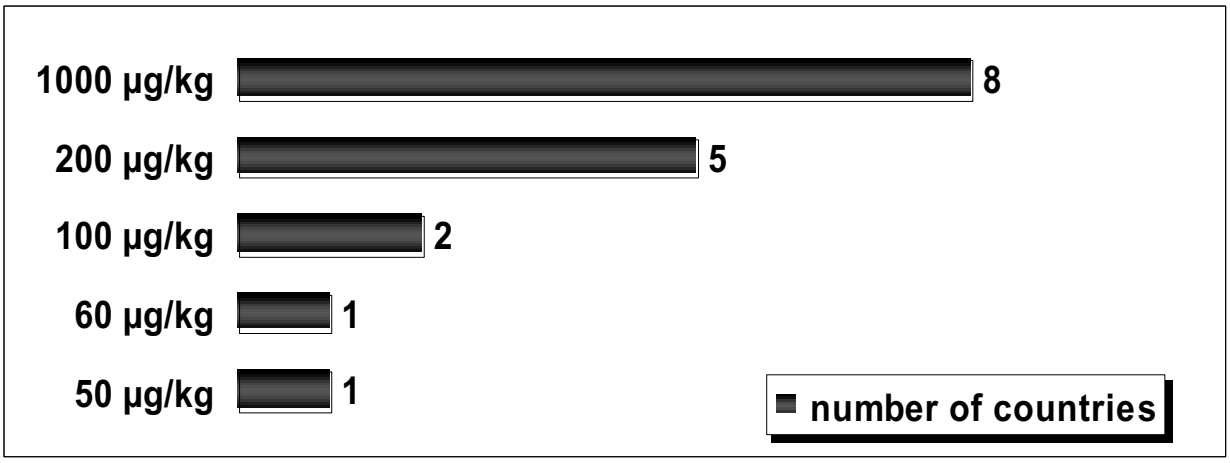


Recent information suggests that fungi that produce nivalenol, a trichothecene related to DON, frequently occurs in some Asian countries, sometimes more often than DON-producing species, for instance in Japan (Tanaka *et al*., 2004) and the Republic of Korea (Lee *et al*., 2004). However nivalenol-producing fungi have also recently been frequently identified in the south and west of England (Jennings *et al*., 2004). Regulations for nivalenol have not yet been established but given the relatively higher toxicity of nivalenol, as compared to DON (European Commission, 2002c), nivalenol might need to be given more attention from a regular point of perspective.

3.4.2.4 Zearalenone

Zearalenone, an estrogenic mycotoxin, is now regulated in food in 16 countries (see Figure 22) compared to six countries in 1995. Zearalenone is structurally related to ⁄ -zearalanol (zeranol), an anabolic growth promoter banned in the EU in 1988. Zearalenone is metabolized in cattle to various compounds including zeranol. By regulating the zearalenone contents of animal feed, the problem of the occurrence of natural zeranol in edible tissues could be controlled. Limits for zearalenone in maize and other cereals currently vary from 50 to 1 000 µg/kg. Figure 22 betrays a tendency of setting limits at higher rather than at lower limits.

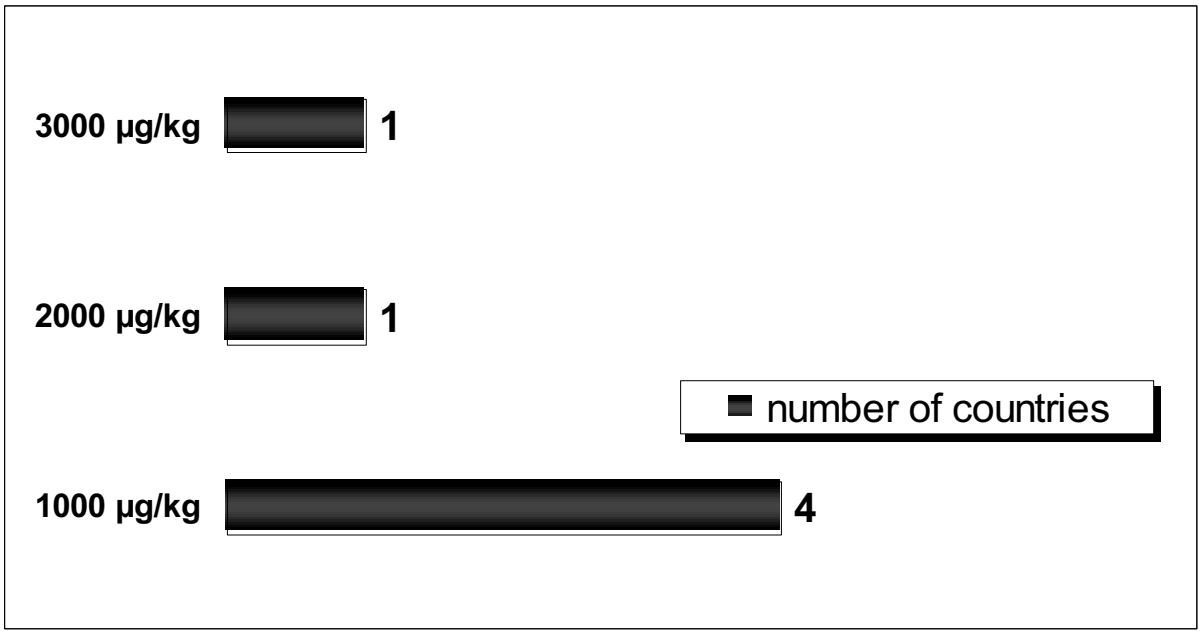
Figure 22: Worldwide limits for zearalenone in maize and other cereals



3.4.2.5 Fumonisins

Fumonisins were discovered in the late 1980s. Whereas in 1995 fumonisins were only subject to regulations in one country, this number has now increased to six with limits for maize ranging from 1 000 to 3 000 µg/kg (see Figure 23). Although proportionally a very significant increase, the number of countries regulating fumonisins is too small to draw meaningful conclusions about generally agreed limits. Regulatory authorities currently considering the constitution of legal limits for fumonisins should carefully consider whether they wish to do so for fumonisin B_1 only or for the sum of the naturally occurring fumonisins. A similar situation occurs here as with the aflatoxins, for which limits also exist for aflatoxin B_1 and for total aflatoxins (see Section 3.4.1).

Figure 23: Worldwide limits for fumonisins in maize



3.4.2.6 Other mycotoxins

In addition to the mycotoxins mentioned in the previous sections, several other mycotoxins are subject to regulatory action. These are diacetoxyscirpenol, T-2 toxin and HT-2 toxin, agaric acid, the ergot alkaloids, phomopsins and sterigmatocystin. Since the number of countries that have established regulations for these mycotoxins is relatively low, they are not further discussed here.

3.5 Harmonized regulations

3.5.1 Australia/New Zealand

Australia and New Zealand have recently harmonized their regulations for mycotoxins. Common limits are now applied for total aflatoxins in peanuts and tree nuts, and ergot (the sclerotium of *Claviceps purpurea*, not actually a mycotoxin but a dormant winter form of the fungus containing mycotoxins: the ergot alkaloids). In addition, the harmonized regulations include unique limits for phomopsins in lupin seeds and products thereof and for agaric acid in food, containing mushrooms and alcoholic beverages. Thus far, limits for these toxins are only known to exist in Australia and New Zealand.

3.5.2 European Union

As previously mentioned, the EU has harmonized EU regulations for aflatoxin B_1 in various feeds since 1976 including official protocols for sampling and analysis. In 1998, the first EU-harmonized regulations for mycotoxins in food came into force (including sampling protocols and criteria for methods of analysis) and have gradually expanded to various mycotoxins in different foodstuffs.

In 2004 and subsequent years, a significant further expansion of EU-harmonized mycotoxin regulations may be expected for foods and feeds. For foods, this concerns patulin, aflatoxin B_1, aflatoxin M_1, ochratoxin A and DON in infant formulae and follow-up formulae; ochratoxin A in coffee, wine, beer, spices, grape juice, cocoa and cocoa products; several *Fusarium*-produced mycotoxins, i.e. trichothecenes (T-2 and HT-2 toxins, in addition to DON), fumonisins and zearalenone in cereal-based foodstuffs. In addition, new limits will probably be established for feeds in the years to come for several mycotoxins including ergot alkaloids, DON, zearalenone and ochratoxin A (European Commission, 2003b), and relevant scientific opinions of the EFSA panel on contaminants in the food chain are currently in preparation.

3.5.3 MERCOSUR

MERCOSUR consists of Argentina, Brazil, Paraguay and Uruguay. These countries apply common limits for total aflatoxins in peanuts, maize and products thereof, and for aflatoxin M_1 in fluid and powdered milk. The MERCOSUR regulations for mycotoxins also include official methods of sampling and analysis. Brazil and Uruguay apply additional limits for certain mycotoxin/matrix combinations.

3.5.4 ASEAN

Current member countries of the Association of Southeast Asian Nations (ASEAN) comprise Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam. Most of these countries have specific regulations for mycotoxins (see Table 3). Whereas harmonized regulations are obviously not (yet) established by ASEAN, an ASEAN Task Force on Codex Alimentarius has taken a common position to support the 0.5 µg/kg level for aflatoxin M_1 in milk.

3.5.5 Codex Alimentarius

The Codex Alimentarius Commission (CAC), supported by FAO and WHO, aims to facilitate world trade and protect the health of consumers through the development of international standards for foods and feeds. Currently 168 countries are members of Codex Alimentarius. Within the CAC, the Codex Committee on Food Additives and Contaminants (CCFAC) derives maximum limits (standards) for additives and contaminants in food, which are decisive in trade conflicts. The CCFAC develops standards based on a procedure that follows the principles of risk analysis as far as possible, according to rules and methods laid down in the Codex Procedural Manual as well as the Codex General Standard for Contaminants and Toxins in Food.

The procedure operates by requesting discussion papers about all relevant aspects of a food contaminant when there is reason to expect health concerns and trade problems, followed by developing proposals for maximum levels when all necessary requirements for standard setting are fulfilled. These requirements are that health concerns can be substantiated, preferably on the basis of a toxicological and exposure assessment by JECFA (see Section 2.1), and that sufficient reliable data about levels in foods are available (preferably worldwide distributed) to develop a maximum level on the basis of the ALARA principle (Kloet, 2002).

In the mycotoxin area, CCFAC established standards for total aflatoxins in unprocessed peanuts, aflatoxin M_1 in milk and patulin in apple juice in 2003. A draft standard has been developed for ochratoxin A in wheat, barley, rice and derived products, and proposed standards for DON in cereals are currently under discussion.

The CCFAC has, apart from its goal to develop standards (Maximum Limits) where necessary, also decided to devote much attention to developing Codes of Practice in which principles and advice about practical measures to control mycotoxins during cultivation, storage and processing are assembled. Examples of these include the codes of practice developed for: i) the reduction of aflatoxin B_1 in raw materials and supplemental feedstuffs for milk producing animals (Codex Alimentarius, 1997); ii) prevention and reduction of patulin contamination in apple juice and apple juice ingredients in other beverages (Codex Alimentarius, 2003a); and iii) the prevention and reduction of mycotoxin contamination in cereals including annexes on ochratoxin A, zearalenone, fumonisins and trichothecenes (Codex Alimentarius, 2003b).

4. Concluding remarks

Comparing the situations in 1995 and 2003, in 2003 more countries are known to have regulations for more mycotoxins in more commodities and products. This trend has actually been visible for a much longer period. It was probably around 1970 that the first mycotoxin limit was established, and gradually the number of countries with mycotoxin limits has grown from at least 31 in 1981 to 56 in 1987, 77 in 1995, and 99 in 2003. If this (apparently linear) trend is extrapolated, one would expect that some 120 countries to have known mycotoxin regulations by the year 2010, after which this upward trend will probably level off.

In 2003, the number of countries that had specific regulations for mycotoxins in foodstuffs was significantly more than those that had specific regulations for feedstuffs. However, the number of countries that is preparing feedstuff regulations for mycotoxins, other than aflatoxins, is expected to grow significantly in the coming years. This development may be observed in particular in the EU, where important initiatives have taken in this respect.

Regulations have become more diverse and detailed with newer requirements regarding official procedures for sampling and analytical methodology, and the issue of measurement uncertainty has entered the regulatory discussions. These developments reflect the general concerns that governments have regarding the potential effects of mycotoxins on the health of humans and animals. At the same time, harmonization of tolerance levels is taking place in some free trade zones (EU, EFTA, MERCOSUR, Australia/New Zealand), and harmonization efforts are being undertaken for goods moving in international commerce (Codex Alimentarius). This harmonization is a slow process because of the different views and interests of those involved in the process.

Whereas harmonized tolerance limits would be beneficial from the point of view of trade, one might argue this would not necessarily be the case from the point of view of (equal) human health protection around the world. Risks associated with mycotoxins depend on both hazard and exposure. The hazard of mycotoxins to individuals is probably more or less the same all over the world (although other factors sometimes play a role as well such as hepatitis B virus infection in relation to the hazard of aflatoxins).

Exposure is not the same because of differences in levels of contamination and dietary habits in various parts of the world. Shephard (2004) exemplified this with the help of some calculations for fumonisins. JECFA established a group Provisional Maximum Tolerable Daily Intake (PMTDI) for fumonisins B_1, B_2 and B_3 of 2 μg/kg body weight per day. This PMTDI is readily exceeded by individuals on a maize-based diet in which maize consumption is of the order of 400 g/person/day. Shephard calculated that, at a contamination level for fumonisins in maize of 2 000 μg/kg (a level within the range of common limits, see Figure 9), dietary exposure for a 60 kg adult would be 13 μg/kg body weight/day or 650 percent of the PMTDI. In the developed world, maize intakes are less than 10 g/person/day (Shephard *et al*., 2002) and contamination levels as high as 12 000 μg/kg can be consumed before dietary exposure exceeds the PMTDI set by JECFA.

National governments or regional communities should encourage and fund activities that contribute to reliable exposure assessment of mycotoxins in their regions. Examples of such activities are the SCOOP tasks, undertaken in the EU in support of safety evaluations on some mycotoxins (see Section 2.2: Exposure assessment). The availability of inexpensive, validated and easily performed analytical methodology and the application of Analytical Quality

Assurance are basic ingredients to come to meaningful data on occurrence, and their development must therefore be stimulated.

Future efforts to improve hazard assessment should preferably be coordinated and funded at the international level. Chronic toxicity studies carried out under good laboratory practice conditions are time consuming, very expensive and not necessarily bound to certain regions. These studies should be carried out in internationally recognized centres of excellence and their results evaluated by international groups of experts such as JECFA. An example of such an internationally concerted effort is the ongoing project "Mechanisms of ochratoxin A induced carcinogenicity as a basis for an improved risk assessment" of the European Commission's Quality of Life and Management of Living Resources Programme[6].

The regulations enacted for mycotoxins in food and feed, and those under development, should be the result of sound cooperation between interested parties, drawn from science, consumers, industry and policy makers. Only then can realistic protection be achieved.

[6] See http://www.uni-wuerzburg.de/toxikologie/EU-OTA/OchratoxinA.html

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- Chuan-Cheng Lin and H.N. Chou, National Taiwan University, Taiwan Province of China
- E. Urio, Food and Nutrition Centre, United Republic of Tanzania
- J. Bröker, Royal Netherlands Embassy, Bangkok, Thailand
- Pornpimol Kattinanon, Food and Drug Administration, Ministry of Public Health, Thailand
- A. Chibani, Institut National de la Normalisation et de la Propriété Industrielle, Tunisia
- G.J.M. Terberg, Royal Netherlands Embassy, Ankara, Turkey
- Sennur Ozkaya, Turkey
- A. Kaaya, Department of Food Science and Technology, Makerere University, Uganda
- E. Van de Vrugt, Royal Netherlands Embassy, Ukraine
- Royal Netherlands Embassy, London, United Kingdom
- B.D. Jones, Food Standards Agency, United Kingdom
- I. Hamid-Hardenberg, Royal Netherlands Embassy, Washington DC, United States
- L. Posnick, Center for Food Safety and Applied Nutrition, Food and Drug Administration, United States
- Royal Netherlands Embassy Montevideo, Uruguay
- J.M. Cea, Technological Laboratory of Uruguay, Uruguay
- M. Van Genne, Royal Netherlands Embassy, Venezuela
- B. Bastardo, National Institute of Hygiene, Ciudad University, Venezuela
- Phan Thi Kim, Viet Nam Food Administration, Viet Nam
- Sultanate of Oman, Ministry of Regional Municipalities, Environment & Water Resources, Directorate General of Health Control, Yemen
- D. Sukovic, Centre for Ecotoxicological Research, Serbia and Montenegro
- K. Choongo, Department of Biomedical Science, Samora School of Veterinary Medicine, Zambia

Annex 2: Tables

Table 1: Overview of currently available mycotoxins reference materials

reference material	available	(re-)development
aflatoxin M_1 in milk powder	x	
aflatoxin M_1 calibrant	x	
total aflatoxins in peanut butter	x	(x)
aflatoxin B_1 in peanut meal	x	
aflatoxin B_1 in feedstuff	x	
ochratoxin A in wheat	x	
DON in maize and wheat	x	
zearalenone in maize	x	
zearalenone calibrant	x	
trichothecene calibrants		x

Note: Materials developed by the Bureau Communautaire de Referénce (BCR) as of December 2003

Table 2: Overview of countries involved in the survey
Mycotoxin regulations for food and feedingstuffs for countries surveyed (as of December 2003)

Myc Reg INFO	Country	αC	POP	Myc Reg INFO	Country	αC	POP	Myc Reg INFO	Country	αC	POP	Myc Reg INFO	Country	αC	POP	TOTALs Population in millions	TOTALs Population %
+ - +	Algeria	DZ	33,578	+ - -	Dominican Republic 1991	DO	9,220	+ + +	Luxembourg [EU]	LU	0,452	+ + +	Serbia and Montenegro	YU	10,494		
- - -	Antigua and Barbuda 1991	AG	0,070	- - -	Ecuador 1991	EC	12,472	+ - -	Macedonia, FYR of 1981	MK	2,115	+ + -	Singapore	SG	4,225		
+ + -	Argentina	AR	36,993	+ - +	Egypt	EG	69,296	+ - -	Malawi 1987	MW	11,266	+ + -	Slovakia [EU cms]	SK	5,381		
+ + -	Armenia	AM	3,913	+ + +	Estonia [EU cms]	EE	1,268	+ - -	Malaysia	MY	24,014	+ + +	Slovenia [EU cms]	SI	1,952		
+ - -	Australia	AU	19,978	- - -	Ethiopia	ET	69,982	+ + -	Malta [EU cms]	MT	0,383	+ + -	South Africa	ZA	45,919		
+ + +	Austria [EU]	AT	8,037	+ + +	EUROPEAN UNION	EU		+ - -	Mauritius 1987	MU	1,243	+ + +	Spain [EU]	ES	41,547		
- - -	Bahamas	BS	0,320	+ + +	Finland [EU]	FI	5,215	+ + -	MERCOSUR			+ - -	Sri Lanka	LK	19,615		
- - -	Bahrain 1995	BH	0,731	+ + +	France [EU]	FR	59,304	+ - +	Mexico	MX	101,457	+ - -	Sudan	SD	37,986		
- - +	Bangladesh	BD	138,901	+ + +	Germany [EU]	DE	81,904	+ + -	Moldova, Republic of	MD	4,230	+ - +	Suriname	SR	0,457		
+ + +	Barbados 1991	BB	0,264	- - -	Ghana	GH	19,851	+ + +	Morocco	MA	30,457	+ + +	Sweden [EU]	SE	8,873		
+ + +	Belgium [EU]	BE	10,339	+ + +	Greece [EU]	GR	11,100	+ + +	Mozambique	MZ	18,151	+ + +	Switzerland	CH	7,376		
+ - -	Belize 1991	BZ	0,257	+ - +	Guatemala 1991	GT	14,223	- - -	Myanmar	MM	51,853	+ + +	Syrian Arab Rep.	SY	18,444		
+ + -	Belarus	BY	10,045	+ + -	Honduras 1991	HN	6,606	+ - +	Nepal	NP	25,836	+ + +	Taiwan Province of China	TW	23,614		
- - -	Benin	BJ	6,739	+ - -	Hong Kong SAR (China)	HK	6,827	+ + +	Netherlands, The [EU]	NL	16,258	+ - +	Tanzania, United Rep. of	TZ	34,828		
- - -	Bolivia 1991	BO	8,676	+ + -	Hungary [EU cms]	HU	10,164	+ - -	New Zealand	NZ	3,786	+ - -	Thailand	TH	63,394		
+ - -	Bosnia & Herzegovina 1981	BA	4,207	+ + +	Iceland	IS	0,294	- - -	Nicaragua 1991	NI	5,778	- - -	Trinidad and Tobago 1991	TT	1,362		
+ + +	Brazil	BR	179,713	+ - +	India	IN	1067,421	+ - -	Nigeria	NG	150,540	+ + -	Tunisia	TN	9,880		
+ + -	Bulgaria [EU cms]	BG	7,918	+ + -	Indonesia	ID	217,825	+ + +	Norway	NO	4,551	+ + +	Turkey [EU cms]	TR	73,197		
- - -	Burkina Faso	BF	11,863	+ + +	Iran, Islamic Rep. of	IR	66,469	+ - +	Oman 1995	OM	3,100	- - -	Uganda	UG	25,475		

Table 2: Overview of countries involved in the survey
Mycotoxin regulations for food and feedingstuffs for countries surveyed (as of December 2003)

Myc Reg INFO	Country	αC	POP	Myc Reg INFO	Country	αC	POP	Myc Reg INFO	Country	αC	POP	Myc Reg INFO	Country	αC	POP	TOTALs Population in millions	TOTALs Population %
- - -	Cameroon	CM	16,341	- - -	Iraq 1995	IQ	26,299	- - -	Pakistan	PK	153,125	+ + +	Ukraine	UA	47,637		
+ - +	Canada	CA	31,720	+ + +	Ireland [EU]	IE	3,968	- - -	Panama 1991	PA	2,991	- - -	United Arab Emirates 1995	AE	3,219		
+ + +	Chile	CL	15,266	+ + +	Israel	IL	6,556	+ + -	Paraguay	PY	6,029	+ + +	United Kingdom [EU]	GB	59,040		
+ + -	China	CN	1311,864	+ + +	Italy [EU]	IT	56,210	+ + -	Peru	PE	27,083	+ + +	United States of America	US	291,640		
info	*CODEX*			+ - -	Jamaica 1991	JM	2,773	+ - +	Philippines, The	PH	81,636	+ + +	Uruguay	UY	3,453		
+ - +	Colombia	CO	44,533	+ - +	Japan	JP	127,708	+ + +	Poland [EU cms]	PL	38,577	+ + -	Venezuela	VZ	23,866		
+ - +	Costa Rica 1991	CR	4,149	+ - +	Jordan 1981	JO	5,612	+ + +	Portugal [EU]	PT	10,367	+ + -	Viet Nam	VN	81,660		
- - +	Côte d'Ivoire 1987	CI	18,301	+ - -	Kenya 1981	KE	32,499	- - -	Qatar 1995	QA	0,630	+ + -	Yemen	YE	22,605		
+ + -	Croatia	HR	4,3974	+ + +	Korea, Rep. of	KR	46,852	+ + +	Romania [EU cms]	RO	21,590	- - -	Zambia	ZM	11,194		
+ - +	Cuba	CU	11,823	+ + -	Kuwait 1995	KW	1,984	+ + -	Russian Federation	RU	141,364	+ - +	Zimbabwe 1995	ZW	14,301		
+ + +	Cyprus [EU cms]	CY	0,935	+ + +	Latvia [EU cms]	LV	2,290	+ - +	Salvador, El 1991	SV	6,179						
+ + +	Czech Republic [EU cms]	CZ	10,290	+ + +	Liechtenstein	LI	0,035	+ + -	Saudi Arabia [1995]	SA	22,736						
+ + +	Denmark [EU]	DK	5,387	+ + +	Lithuania [EU cms]	LT	3,492	- - +	Senegal 1987	SN	11,327						
Population of countries surveyed about mycotoxin regulations																5975,002	94,0
Population of remaining countries without information about mycotoxin regulations																380,541	6,0
World population for all countries and regions																6355,544	100,0
Explanation of symbols under Myc(otoxin) Reg(ulation) INFO: +++ mycotoxin regulation(s) for food(s), dairy and feed(s); ++ - mycotoxin regulation(s) for food(s) and dairy; + - + mycotoxin regulation(s) for food(s) [except dairy] and feed(s); + - - mycotoxin regulation(s) for food(s) [except dairy] ; - - + mycotoxin regulation(s) for feed(s); - - - no mycotoxin regulation(s)																	
Data on population estimates for 2003 was obtained from Internet-World-Stats (available at www.internetworldstats.com/stats.htm)																	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	

Mycotoxins	Abbreviations used here	CAS Registry Number
aflatoxin B_1	afla B_1	1162-65-8
aflatoxin B_2		7220-81-7
aflatoxin G_1		1165-39-5
aflatoxin G_2		7241-98-7
aflatoxins $B_1B_2G_1G_2$	afla $B_1B_2G_1G_2$	
aflatoxin M_1	afla M_1	6795-23-9
aflatoxin M_2	afla M_2	6885-57-0
agaric acid		666-99-9
deoxynivalenol	DON	51481-10-8
diacetoxyscirpenol	DAS	2270-40-8
fumonisin B_1		116355-83-0
fumonisin B_2		116355-84-1
fumonisin B_3		136379-59-4
HT-2 toxin		26934-87-2
ochratoxin A		303-47-9
patulin		149-29-1
phomopsin A		64925-80-0
sterigmatocystin		10048-13-2
T-2 toxin		21259-20-1
zearalenone		17924-92-4

Note: Specific references have been entered in Table 3 as letter/number combinations in square brackets, where the letters conform to the relevant country code (see also Table 2) and the numbers with the chronological order of referencing the regulatory details of the specific countries. Abbreviations used in the column “Responsible authority” are further clarified, together with the references, in the List of Abbreviations and References for Table 3.

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
ALGERIA [DZ] 2003										
	Food									
	peanuts, nuts, cereals	afla B_1	10		MT	non-official		official	DZ1	
		afla $B_1B_2G_1G_2$	20							
	Feed									
	cattle feed	afla B_1	20		MT	non-official		official	DZ2	
ANTIGUA and BARBUDA [BH] 2003: situation 1991: no regulations [FAO 1997]										
ARGENTINA [AR] 2003 [MERCOSUR member state]										
	Food									
	See MERCOSUR [harmonized regulations] except									
	additional regulations of Argentina:									
	peanuts exported to EU: see EU			AR1						
	Dairy									
	See MERCOSUR [harmonized regulations]									
ARMENIA [AM] 2003										
	Food									
	all foods	afla B_1	5	AM1	SSHAHS	official		non-official	AM2 AM3	
		zearalenone	1000						AM4 AM5	
		T-2 toxin	100						AM6 AM5	
	wheat	DON	700						AM7 AM8	
	barley		1000							
	tomato paste, apple	patulin	5						AM9 AM10 AM5	
	Dairy									
	milk	afla M_1	0.5	AM1	SSHAHS	official		non-official	AM11	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
AUSTRALIA [AU] 2003										
	all regulations harmonized with New Zealand									
	Food									
	peanuts, tree nuts	afla $B_1B_2G_1G_2$	15	AU1	AQIS, STANZHD					
	cereal grains	ergot *)	500000							*) see footnote
	lupin seeds and products thereof	phomopsins	5							
	food containing mushrooms; alcoholic beverages	agaric acid	100000							
AUSTRIA [AT] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	additional regulations of Austria:									
	other products [outside EU regulations]	afla B_1	1		MSSG	official		official	AT1	since 1986
		afla $B_1B_2G_1G_2$	5							
	wheat, rye/durum wheat	zearalenone	60					non-official		guideline value since 1993
	Dairy									
	see European Union [harmonized regulations]				MSSG					
	Feed									
	see European Union [harmonized regulations]									
	additional regulations of Austria:									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	pig feed	DON	500		MA	official		non-official	AT2	measures for feed in force since 1999
	feed for fatting-poultry		1500							
	feed for breeding-poultry and laying hens		1000							
	feed for fatting-bovine animals		1000							
	feed for breeding-pigs	zearalenone	50						AT3	
BAHAMAS [BS] 2003: no regulations										
BAHRAIN [BH] 2003: situation 1996 no regulations [FAO 1997]										
BANGLADESH [BD] 2003										
	Feed									
	maize, rice polish and mixed feed for poultry	afla $B_1B_2G_1G_2$			MFL/MHF	non-official		non-official	BD1	in preparation, a limit of 100 µg/kg is used in practice [BD2]
	maize and mixed feed for poultry	ochratoxin A								in preparation [BD3]
BARBADOS [BB] 2003: situation 1991 [FAO 1997]										
	Food									
	all foods	afla $B_1B_2G_1G_2$	20							
	Dairy									
	milk	afla M_1	0.5							
	Feed									
	all feedstuffs	afla $B_1B_2G_1G_2$	50							
BELGIUM [BE] 2003 [EU member state]										
	Food									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	see European Union [harmonized regulations]									
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
BELIZE [BZ] 2003: situation 1991 [FAO 1997]										
	Food									
	maize, groundnut	afla $B_1B_2G_1G_2$	20							
BELARUS [BY] 2003										
	Food									
	grain, leguminous plants	afla B_1	5	BY1	MPH	official		official	BY1	
	infant food		not allowed						BY2	
	mushrooms, fruits, vegetables	patulin	50							
	barley	DON	1000						BY3	
	wheat		700							
	infant food		not allowed							
	barley, wheat, maize	zearalenone	1000							
	infant food		not allowed							
	grain, flour, groats	T-2 toxin	unknown						BY4	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	infant food	T-2 toxin	not allowed	BY1	MPH	official		official	BY4	
	Dairy									
	butter, milkprotein concentrate	afla M_1	0,5	BY1	MPH	official		official	BY1	
	infant food		not allowed							
BENIN [BJ] 2003: no regulations										
BOLIVIA [BO] 2003: situation 1991: no regulations [FAO 1997]										
BOSNIA & HERZEGOVINA [BA] 2003: situation 1981 [FAO 1997]										
	Food									
	wheat, maize, rice, cereals	afla B_1G_1	1	BA1	FCLHSW	official	BA2	official		
	beans		5							
BRAZIL [BR] 2003 [MERCOSUR member state]										
	Food									
	See MERCOSUR [harmonized regulations]									
	additional regulations of Brazil:									
	all foodstuffs	afla B_1G_1	30	BR1	MH			official + non-official	BR2 BR3	
	Dairy									
	See MERCOSUR [harmonized regulations]									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Feed									
	animal feed and ingredients: hay cotton, peanut, rice, oats, residues of bird bowels, babassu, cocoa, sugar cane (residue-pulp), linhaça, dendê, manioc, sunflower, crisálidas, malt, wheat, soya, yeast (sugar cane subproduct)	afla $B_1B_2G_1G_2$	50	BR4	MA				BR2 BR3	
BULGARIA [BG] 2003 [EU candidate member state]										
	Food									
	all foods			BG1		official	BG1			
	groundnuts, nuts and dried fruit and processed products thereof, intended for direct human consumption or as an ingredient in foodstuffs	afla B_1	2*		MH	official	BG1	official	BG2	* max limits apply to the edible part
		afla $B_1B_2G_1G_2$	4*						BG3	
	groundnuts to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs	afla B_1	8*		MAF				BG2	
		afla $B_1B_2G_1G_2$	15*						BG3	
	nuts and dried fruit to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs	afla B_1	5*						BG2	
		afla $B_1B_2G_1G_2$	10*						BG3	
	cereals and processed products thereof intended for direct human consumption or as an ingredient in foodstuffs	afla B_1	2		MH				BG2	
		afla $B_1B_2G_1G_2$	4						BG3	
	spices	afla B_1	2						BG2	
		afla $B_1B_2G_1G_2$	5						BG3	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	cocoa beans and processed products thereof	afla B_1	2		MH	official	BG1	official	BG2	
		afla $B_1B_2G_1G_2$	5						BG3	
	dried vine fruit	ochratoxin A	5						BG4	
	cereals and processed products thereof intended for direct human consumption or as an ingredient in foodstuffs		3							
	cereals to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs		5		MAF					
	spices		10		MH					
	green coffee beans		8							
	roasted coffee		4							
	beer		0.2							
	grape juice		3							
	fruit juices and nectars	patulin	50						BG5	
	fruit concentrates		50**							** max. limit applies to the product for direct consumption
	cereals and processed products thereof intended for direct human consumption or as an ingredient in foodstuffs	DON	1000						BG6	
	cereals to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs		2000		MAF					

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	maize and processed products thereof	DON	1000		MH & MAF	official	BG1	official	BG6	
	maize and processed products thereof	fumonisins B_1B_2	1000		MH			non-official	BG7	
	cereals and processed products thereof intended for direct human consumption or as an ingredient in foodstuffs	zearalenone	200					official	BG8	
	maize and processed products thereof		200		MH & MAF					
	cereals and processed products thereof intended for direct human consumption or as an ingredient in foodstuffs	T2-toxin	100							
	Dairy									
	raw milk	afla M_1	0.05		MAF	official	BG1	non-official	BG2	
	milk powder, condensed milk		0.4							
	butter		0.02							
	cheese		0.02							
BURKINA FASO [BF] 2003: no regulations										
CAMEROON [CM] 2003: no regulations										

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
										currently mycotoxin issues have the interest of the national authorities [the National Bureau of Standards and the National Institute of Agricultural Research for Development]
CANADA [CA] 2003										
	Food									
	nuts and nut products	afla $B_1B_2G_1G_2$	15	CA1	HC/CFIA	official	CA3	non-official	CA6 CA7 CA8 CA9	calculated on the nut meat portion; in force since 1969
	domestic uncleaned soft wheat	DON	2000	CA2	HC/CFIA	official and non-official	CA4 CA5	non-official	CA8 CA9 CA10 CA11	regulations exist for the grading of wheat both for domestic and export use, based on the percentage of Fusarium-damaged kernels (% FDK)
	soft wheat flour (adult food)		1200							
	soft wheat flour (infant food)		600							
	wheat, oats, barley, rye, solin, flaxseed, canola, buckwheat, soybeans, mustard seed, peas, canada pea beans, canada triticale, canada lentils	ergot *)	not applicable		HC/CGC					various tolerances exist, expressed as % by weight; *) see footnote
	Feed									
	all feeds	afla $B_1B_2G_1G_2$	20	CA12	CFIA	official	CA14	official	CA15	since 1983
	feed for swine and poultry	ochratoxin A	2000	CA13				non official	CA16	guideline limits only, since 1996
		T-2 toxin	1000						CA17	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	feed for cattle and poultry	DON	5000	CA13	CFIA	official	CA14	non official	CA17	guideline limits only, since 1996
		HT-2 toxin	100							
	feed for swine, calves, dairy cattle	DON	1000							
	feed for gilts and sows	zearalenone	3000						CA18	
	feed for swine	diacetoxyscirpenol	2000						CA17	
		ergot alkaloids	6000							
	feed for poultry	diacetoxyscirpenol	1000						CA17	
	feed for cattle, sheep, horses	ergot alkaloids	3000							
	feed for chicks	ergot alkaloids	9000							
CHILE [CL] 2003										
	Food									
	all foods	afla $B_1B_2G_1G_2$	5	CL1	MPH	official	CL2			
		zearalenone	200							
	Dairy									
	milk	afla M_1	0.05	CL1	MPH					
	Feed									
	complete feedingstuffs for poultry, goats and cattle	afla $B_1B_2G_1G_2$	30	CL3	MA	official	CL2	official		
	complete feedingstuffs for other animals		10							
	all ingredients for use in animal feed except peanuts and derivatives, cottonseed and derivatives, maize and derivatives		50							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	peanuts and derivatives, cottonseed and derivatives, maize and derivatives	afla B1B2G1G2	200	CL3	MA	official	CL2	official		
CHINA [CN] 2003										
	Food									
	maize and maize products, peanut and peanut products, peanut oil, irradiated peanut	afla B_1	20	CN1 CN2	MH	official		official and non-official		
	rice, irradiated rice, edible vegetable oil		10							
	soya bean sauce, grain paste, vinegar, other grains, beans, fermented foods, fermented bean products, starch products, fermented wine, red rice, butter cake, pastry biscuit and bread, food additive alpha-amylase, food additive gluco-amylase preparation, salad oil		5							
	infant formula-soybean based, infant formula '5410', formulated weaning foods (rice, soybean based), weaning supplementary foods (rice, soybean, wheat flour, milk powder)		non-detectable							infant formula '5410' not specified
	semi-finished products (juice or paste)	patulin	100		MH	official		official and non-official		
	fruit juice or jam, fruit wine, canned products, hawthorn strip (cake)		50							
	wheat and wheat flour, maize and maize flour	DON	1000		MH	official		official and non-official		

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Dairy									
	milk and milk products	afla M_1	0.5	CN1 CN2	MH	official		official		
	food for infants and young children, infant formula milk powder		non-detectable							
CODEX ALIMENTARIUS 2003 (the Codex Alimentarius Commission - created in 1963 by FAO and WHO - is the body responsible for compiling the standards, codes of practice, guidelines and recommendations that constitute the Codex Alimentarius. In 2003, the Codex Alimentarius Commission had 168 member countries).										
	Food									
	peanuts, raw	afla $B_1B_2G_1G_2$	15	CC1	CCFAC	official	CC1	official	CC1	
	apple juice and apple ingredients in other beverages	patulin	50	CC2						
	Dairy									
	milk	afla M_1	0.5	CC3	CCFAC					
COLOMBIA [CO] 2003										
	Food									
	all foods	afla $B_1B_2G_1G_2$	10	CO1	MH	non-official	CO3	non-official	CO4	
		afla M_1								
		afla M_2								
	maize	afla $B_1B_2G_1G_2$	20	CO2						
	Feed									
	maize and maize products	afla $B_1B_2G_1G_2$	20	CO5 CO6	MA	official	CO3	non-official	CO9	
	sorghum		40	CO7						
	rabbit / trout feeds		10	CO8						
	poultry / dog / cat / fish feeds		20							
	bovine / pig feeds		50							
	sorghum	zearalenone	1000	CO7					CO10	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
COSTA RICA [CR] 2003: situation 1991 [FAO 1997]										
	Food									
	maize	afla $B_1B_2G_1G_2$	35							
	Feed									
	maize	afla $B_1B_2G_1G_3$	50							
CÔTE d'IVOIRE [CI] 2003: situation 1987 [FAO 1997]										
	Feed									
	straight feedstuffs	afla $B_1B_2G_1G_2$	100		MPH & MAP & MC	official				
	complete feedstuffs		10							
	complete feedstuffs for pigs/poultry except young animals/ducks		38							
	complete feedstuffs for cattle/sheep/goats		75							
	complete feedstuffs for dairy cattle		50							
CROATIA [HR] 2003										
	Food									
	cereals, beans, peanuts, coffee, tea	afla B_1	5		MPH	official + non-official		non-official	HR1 HR2	
	spices		30							
	cocoa beans, almonds, flours, hazelnuts, walnuts	afla $B_1B_2G_1G_2$	3							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	juice and concentrates, apples	patulin	50		MPH	official + non-official		official	HR3	
	Dairy									
	milk, milk products	afla M_1	0.5		MPH	official + non-official		non-official	HR4	
CUBA [CU] 2003										
	Food									
	cereals, peanuts, cocoa mass	afla B_1	5	CU1	MPH/INHA	official		official	CU2	
	all foods	afla $B_1B_2G_1G_2$	5							
	coffee, cereals	ochratoxin A	5							
	fruits	patulin	50					non-official	CU3 CU4 CU5	
	maize, rice	fumonisin B_1	1000						CU6	
	imported cereals	DON	300						CU7	
	Feed									
	all feeds and feed ingredients	afla $B_1B_2G_1G_2$	5		MA	official		official	CU2	
	all feeds	DON	300					non-official	CU7	
CYPRUS [CY] 2003 [EU candidate member state]: aflatoxin regulations harmonized with EU legislation as per 1 January 2003										
	Food									
	following EU regulations	afla B_1	see EU	CY1	MH	official	CY2	official	CY3	
		afla $B_1B_2G_1G_2$								
	Dairy									
	following EU regulations	afla M_1	see EU	CY1	MH	official	CY4	non-official	CY5	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Feed									
	following EU regulations	afla B_1	see EU		MANRE	official	CY4	official	CY8	
	feed materials	zearalenone	2000	CY6			CY7		CY9	
	complete feedingstuffs for piglets		1000							
	complete feedingstuffs for swine other than piglets		1500							
	feed materials except cereal grains	DON	7000							
	cereal grains		1200							
	complete feedingstuffs for pigs		1000							
	complete feedingstuffs for poultry and fattening calves		5000							
	complete feedingstuffs for other animals		3000							
CZECH REPUBLIC [CZ] 2003 [EU candidate member state]										
	Food									
	child and baby nourishment	afla B_1	0.5	CZ1	MA & MH	official	CZ2	official & non-official	CZ3 CZ4	
	peanuts for direct consumption		2							
	peanuts as raw material		8							
	cocoa		10							
	nuts and dried fruits as raw material		5							
	nuts and dried fruits for direct consumption		2							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	spices	afla B1	20	CZ1	MA & MH	official	CZ2	official & non-official	CZ3 CZ4	
	cereals and their products		2							
	foodstuffs type A		5							foodstuffs types A and B not specified
	foodstuffs type B		20							
	nuts including peanuts and dried fruits for direct consumption	afla $B_1B_2G_1G_2$	4							
	peanuts as raw material		15							
	nuts and dried fruits as raw material		10							
	cereals		4							
	child nourishment (>12 months)		2							
	baby nourishment (<12 months)		1							
	foodstuffs type A		8							foodstuffs types A and B not specified
	foodstuffs type B		40							
	child and baby nourishment	ochratoxin A	1						CZ5	
	flours and cereal products		3						CZ6 CZ7	
	foodstuffs type A		5							foodstuffs types A and B not specified
	foodstuffs type B		10							
	child nourishment	patulin	30						CZ3 CZ4	
	baby nourishment		20							
	foodstuffs type A		50							foodstuffs types A and B not specified
	foodstuffs type B		100							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	corn, rice, maize	DON	2000	CZ1	MA & MH	official	CZ2	non-official	CZ8	
	flour		1000							
	foodstuffs type A	sterigmatocystin	5						CZ4	foodstuffs types A and B not specified
	foodstuffs type B		20							
	Dairy									
	raw milk, milk, babyfood based on milk	afla M_1	0.05	CZ1	MA & MH	official	CZ2	non-official	CZ9	
	Feed									
	complete feeds: following EU regulations	afla B_1	see EU	CZ10	MA					
	complementary feeds: following EU regulations									
DENMARK [DK] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	additional regulations of Denmark:									
	pig kidney	ochratoxin A	10	DK1	DVFA					viscera condemned; visibly damaged kidneys are analysed chemically
			25							whole carcass condemned; visibly damaged kidneys are analysed chemically

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
DOMINICAN REPUBLIC [DO] 2003: situation 1991 [FAO 1997]										
	Food									
	maize(products), groundnut, soya, tomato(products)	afla B_1G_1	0							
	imported maize	afla $B_1B_2G_1G_2$	20							
ECUADOR [EC] 2003: situation 1991: no regulations [FAO 1997]										
EGYPT [EG] 2003										
	Food									
	peanuts & cereals	afla B_1	5	EG1	MPH	official				
		afla $B_1B_2G_1G_2$	10							
	corn	afla B_1	10							
		afla $B_1B_2G_1G_2$	20							
	Feed									
	animal and chicken feed	afla B_1	10							
		afla $B_1B_2G_1G_2$	20							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
ESTONIA [EE] 2003 [EU candidate member state]										
	Food									
	meat and meat preparations, offals, eggs and egg products, cocoa and cocoa products, chocolate and chocolate products, dried fruits required additional treatment before use, fruit juices, drinks, concentrates and nectars, edible part of nuts required additional treatment before use, tea and coffee, fats, oil seeds, unrefined vegetable oils, food supplements based on unrefined vegetable oils	**afla B_1**	**5**	**EE1**	**VFB**	**official**	**EE2**	**official**	**EE2**	
	edible part of groundnuts required additional treatment before use		**8**							
	cereals, cereal flours, cereal groats and flakes, confectionery products, pasta products, ordinary baker's wares, fine baker's wares, legume vegetables, dried fruits and vegetables, tinned fruits and vegetables including berries, edible part of nuts; isolates, concentrates and hydrolysates of vegetable protein		**2**							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	cereals, cereal flours, cereal groats and flakes, pasta products, ordinary baker's wares, fine baker's wares, confectionery products, legume vegetables, dried fruits, edible part of nuts; isolates, concentrates and hydrolysates of vegetable protein	afla $B_1B_2G_1G_2$	4	EE1	VFB	official	EE2	official	EE2	
	dried fruits, edible part of nuts required additional treatment before use		10							
	edible part of groundnuts required additional treatment before use		15							
	pig liver	ochratoxin A	10							
	cereals, cereal flours, cereal groats and flakes, pasta products, ordinary baker's wares, fine baker's wares; isolates, concentrates and hydrolysates of cereals protein		5							
	fresh or frozen fruits and vegetables including berries and mushrooms, tinned apples, tomatoes and seabuck thorns, apple and seabuck thorn jam, juices, drinks, concentrates and nectars; salted, pickled, leavened or otherwise processed fruits, vegetables and mushrooms	patulin	50							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	wheat: flour, flakes; isolates, concentrates and hydrolysates of wheat protein	DON	700	EE1	VFB	official		official		
	barley: flour, flakes; isolates, concentrates and hydrolysates of barley protein		1000							
	wheat, barley, maize, cereal flours (wheat, barley, maize), cereal groats and flakes (wheat, barley, maize), pasta products, ordinary baker's wares, fine baker's wares, confectionery products, legume vegetables, fats, oils; isolates, concentrates and hydrolysates of cereals protein	zearalenone	1000							
	cereals, cereal flours, cereal groats and flakes, pasta products, ordinary baker's wares, fine baker's wares	T-2 toxin	100							
	Dairy									
	milk and milk products	afla M_1	0.05	EE1	VFB	official	EE2	official	EE2	
	crude fat, tallow, butter, hydrolysates of milk protein, casein and caseinates, whey concentrates, food supplements based on milk and milk products		0.5							
	Feed									
	following EU regulations	afla B_1	see EU	EE3	PPI & VFB	official	EE4	official		
	feedingstuffs of vegetable origin	afla $B_1B_2G_1G_2$	100							
	complete feedingstuffs for cattle, pigs and other farm animals		100							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	complete feedingstuffs for young cattle, young pigs and other young farm animals	afla B1B2G1G2	50	EE3	PPI & VFB	official	EE4	official		
	complete feedingstuffs for milk producing animals		20							
	complementary feedingstuffs for cattle, pigs and other farm animals		50							
	complementary feedingstuffs for young cattle, young pigs and other young farm animals		10							
	feedingstuffs of vegetable origin	DON	1000							
	complete feedingstuffs for cattle, pigs and other farm animals		1000							
	complete feedingstuffs for young cattle, young pigs and other young farm animals		500							
	complementary feedingstuffs for cattle, pigs and other farm animals		2500							
	complementary feedingstuffs for cattle, pigs and other farm animals		500							
	feedingstuffs of vegetable origin	ochratoxin A	100							
	complete feedingstuffs for cattle, pigs and other farm animals		100							
	complete feedingstuffs for young cattle, young pigs and other young farm animals		50							
	complementary feedingstuffs for cattle, pigs and other farm animals		200							
	complementary feedingstuffs for young cattle, young pigs and other young farm animals		50							
	feedingstuffs of vegetable origin	zearalenone	100							
	complete feedingstuffs for cattle, pigs and other farm animals		100							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	complete feedingstuffs for young cattle, young pigs and other young farm animals	zearalenone	50	EE3	PPI & VFB	official	EE4	official		
	complementary feedingstuffs for cattle, pigs and other farm animals		200							
	complementary feedingstuffs for young cattle, young pigs and other young farm animals		50							
ETHIOPIA [ET] 2003: no regulations										
EUROPEAN UNION [EU] 2003 EU member states: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, United Kingdom EU candidate member states: Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia will join the European Union per 1 May 2004; the other EU candidate member states - Bulgaria, Romania and Turkey - may join the EU later.										
	Food									
	groundnuts, nuts and dried fruit and processed products thereof, intended for direct human consumption or as an ingredient in foodstuffs	afla B_1	2	EU2	various	official	EU7	official	EU7	Performance criteria for methods of analysis are given. A specific limit has been proposed for afla B_1 in baby foods and processed cereal-based foods for infants and young children, and in dietary foods for special medical purposes intended specifically for infants; these limits are expected to come into force in May 2004.
		afla $B_1B_2G_1G_2$	4							
	groundnuts to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs	afla B_1	8							
		afla $B_1B_2G_1G_2$	15							
	nuts and dried fruit to be subjected to sorting, or other physical treatment, before human (continued)	afla B_1	5							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	consumption or use as an ingredient in foodstuffs	afla $B_1B_2G_1G_2$	10	EU2	various	official	EU7	official	EU7	as above
	cereals (including buckwheat, *Fagopyrum sp.*) and processed products thereof intended for direct human consumption or use as an ingredient in foodstuffs	afla B_1	2							
		afla $B_1B_2G_1G_2$	4							
	cereals (including buckwheat, *Fagopyrum sp.*) , with the exception of maize, to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs	afla B_1	2							
		afla $B_1B_2G_1G_2$	4							
	maize to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs	afla B_1	5	EU3						
		afla $B_1B_2G_1G_2$	10							
	spices: *Capsicum spp.* (dried fruits thereof, whole or ground, including chillies, chilli powder, cayenne and paprika); *Piper spp.* (fruits thereof, including white and black pepper); *Myristica fragrans* (nutmeg); *Zingiber officinale* (ginger); *Curcuma longa*	afla B_1	5	EU4			EU8		EU8	
		afla $B_1B_2G_1G_2$	10							
	raw cereal grains (including raw rice and buckwheat)	ochratoxin A	5		various		EU9		EU9	Performance criteria for methods of analysis are given.A specific limit has been proposed for ochratoxin A in baby foods and (continued)
	all products derived from cereals (including processed cereal products and cereal grains intended for direct human consumption)		3							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	dried vine fruit (currants, raisins and sultanas)	ochratoxin A	10	EU4	various		EU9		EU9	processed cereal-based foods for infants and young children, and in dietary foods for special medical purposes intended specifically for infants; these limits are expected to come into force in May 2004.
	fruit juices and fruit nectar, in particular apple juice, and fruit juice ingredients in other beverages	patulin	50	EU5		official	EU10	official	EU10	since 1 november 2003; prevention and reduction of patulin contamination [see EU 11]; performance criteria for methods of analysis are given
	concentrated fruit juice after reconstitution as instructed by the manufacturer		50							
	spirit drinks, cider and other fermented drinks derived from apples or containing apple juice		50							
	solid apple products, including apple compote, apple puree intended for direct consumption		25							
	apple juice and solid apple products, including apple compote and apple puree, for infants and young children and labelled and sold as intended for infants and young children		10							
	other baby food (as defined in Article 1 of [EU1])		10							
	cereal products as consumed and other cereal products at retail stage	DON	500	EU6						draft Commission Recommendation

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	flour used as raw material in food products	DON	750	EU6	various					see above
	Dairy									
	milk (raw milk, milk for the manufacture of milk-based products and heat-treated milk as defined by Council Directive 92/46/EEC, as last amended by Council Directive 94/71/EC)	afla M_1	0.05	EU2	various	official	EU7	official	EU7	Performance criteria for methods of analysis are given. A specific limit has been proposed for afla M_1 in infant formulae and follow-on formulae, including infant milk and follow-on milk; these limits are expected to come into force in May 2004.
	Feed									
	all feed materials	afla B_1	20	EU12	various	official	EU14	official	EU15 EU16	Maximum content relative to a feedingstuff with a moisture content of 12 %
	complete feedingstuffs for cattle, sheep and goats with the exception of: - complete feedingstuffs for dairy animals - complete feedingstuffs for calves and lambs		20							
	complete feedingstuffs for dairy animals		5							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	complete feedingstuffs for calves and lambs	afla B1	10	EU12	various	official	EU14	official	EU15 EU16	Maximum content relative to a feedingstuff with a moisture content of 12 %
	complete feedingstuffs for pigs and poultry (except young animals)		20							
	other complete feedingstuffs		10							
	complementary feedingstuffs for cattle, sheep and goats (except complementary feedingstuffs for dairy animals, calves and lambs)		20							
	Complementary feedingstuffs for pigs and poultry (except young animals)		20							
	other complementary feedingstuffs		5							
	All feedingstuffs containing unground cereals	Rye ergot *) (*Claviceps purpurea*)	1000000	EU13						Maximum content relative to a feedingstuff with a moisture content of 12 %;*) see footnote
FINLAND [FI] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]				MAF [EELA] & MF [FC]					
	additional regulations of Finland:									
	all spices	afla $B_1B_2G_1G_2$	10	FI1	MF [FC]	official	FI2	official	FI3	
	other food products		5							
	Dairy									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	see European Union [harmonized regulations]				MAF [EELA]					
	Feed									
	see European Union [harmonized regulations]				MAF [KTTK]					
FRANCE [FR] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]				DGCCRF					
	additional regulations of France:									
	cereals & cereal products	fumonisin B_1	1000	FR1	DGCCRF	non-official		non-official	FR2 FR3	1000 µg/kg target value
			3000							3000 µg/kg max. limit
		zearalenone	50							
	vegetable oils	zearalenone	200							
	Dairy									
	see European Union [harmonized regulations]				DGCCRF & DGAL					
	Feed									
	see European Union [harmonized regulations]				DGCCRF & DGAL					
GERMANY [DE] 2003 [EU member state]										
	Food									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	see European Union [harmonized regulations]				BMVEL & LMBG					EU regulations for afla B_1 and afla $B_1B_2G_1G_2$ are applied to other commodities than regulated in the EU
	additional regulations of Germany:									Specific limits have been proposed for ochratoxin A, DON, Fumonisins B_1 and B_2, and zearalenone in a variety of foods. In addition specific limits have been proposed for fumonisins B_1 and B_2, zearalenone and DON in raw materials intended for the production of food for infants and young children. These limits are expected to come into force in February 2004.
	enzymes and enzyme formulations used for food preparation	afla $B_1B_2G_1G_2$	0.05	DE1	BMVEL & LMBG	official	DE3	official	EU6	
	food for infants and young children	afla $B_1B_2G_1G_3$	0.05	DE2					DE4	
	Dairy									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	see European Union [harmonized regulations]				BMVEL & LMBG					EU regulations for afla M_1 are applied to other commodities than regulated in the EU
	additional regulations of Germany:									
	food for infants and young children	afla M_1	0.01	DE2	BMVEL & LMBG	official	DE3	official	DE4	
	Feed									
	see European Union [harmonized regulations]									
GHANA [GH] 2003: no regulations										
GREECE [GR] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]				MA & GCSL & EFET					
	additional regulations of Greece:									
	coffee (raw and processed)	ochratoxin A	20	GR1	MA & GCSL & EFET	non-official		non-official		
	Dairy									
	see European Union [harmonized regulations]				MA & GCSL & EFET					
	Feed									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	see European Union [harmonized regulations]				MA & GCSL & EFET					
GUATEMALA [GT] 2003: situation 1991 [FAO 1997]										
	Food									
	maize, kidney beans, rice, sorghum, groundnuts, groundnut butter	$B_1B_2G_1G_2$	20							guide value until regulation will be approved
	Feed									
	concentrate	$B_1B_2G_1G_2$	20							guide value until regulation will be approved
HONDURAS [HN] 2003: situation 1991 [FAO 1997 ref.1]										
	Food									
	all foods	afla $B_2G_1G_2$	1							
	maize (ground or whole grain)	afla B_1	1							
	baby food	afla $B_1B_2G_1G_2$	0.01							
		afla M_1	0.02							
	Dairy									
	milk(products)	afla M_1	0.05							
	cheese		0.25							
HONG KONG SPECIAL ADMINISTRATIVE REGION (SAR), CHINA [HK] 2003										
	Food									
	foods	afla B_1	15	HK1	FEHD	official		official	HK2	
		afla $B_1B_2G_1G_2$	15							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	foods	afla M_1	15		FEHD	official		official	HK3	
	peanuts, peanut products	afla B_1	20						HK2	
		afla $B_1B_2G_1G_2$	20							
		afla M_1	20						HK3	
HUNGARY [HU] 2003 [EU candidate member state]										
	Food									
	walnut, hazelnut, sweet-chestnut and dried fruits and their processed products (directly for human consumption and for processing as food constituents)	afla B_1	2	HU1	MPH & MA					the tolerance limit(s) are related to the edible part(s) of the shelled fruits
		afla $B_1B_2G_1G_2$	4							
	peanut (to be cleaned up by selection or other physical manipulations before using as food constituent or directly applied for human consumption)	afla B_1	8							
		afla $B_1B_2G_1G_2$	15							
	walnut, hazelnut, sweet-chestnut, dried fruits and vegetables (if cleaned up via selection or other physical means for human consumption or to be applied as food constituent)	afla B_1	5							
		afla $B_1B_2G_1G_2$	10							
	confectionary / sweet products	afla B_1	1							
		afla $B_1B_2G_1G_2$	1							
	cereals (including *Fagopyrum sp.*) milled products for direct human consumption or using as food constituent(s)	afla B_1	2							
		afla $B_1B_2G_1G_2$	4							
	cereals (including *Fagopyrum sp.*) except maize (directly for human consumption and for processing as food constituent)	afla B_1	2							
		afla $B_1B_2G_1G_2$	4							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	spices: paprika (*Capsicum sp.) whole, milled (including* chilli and its milled product); pepper (*Piper sp.)* white and black; nutmeg (*Myristica fragrans)*; ginger (*Zingiber officinale)*; curcuma (*Curcuma longa)*	afla B_1	5	HU1	MPH & MA					
		afla $B_1B_2G_1G_2$	10							
	cereals (including the rice and *Fagopyrum sp.*)	ochratoxin A	5							
	every cereal product including milled products and those cereal products used for direct human consumption		3							
	raisin (currant, sultana); roasted coffee and coffee products; other plant originated foods		10							
	green / unroasted coffee		15							
	products of fruits and vegetables	patulin	50							
	milled products, cereal-constituent of muesli	DON	1000							
	edible bran		1200							
	milled products, cereal-constituent of muesli	zearalenone	100							
	milled products, cereal-constituent of muesli	T-2 toxin	300							
	Dairy									
	milk and milk products (according to the rate of milk in the product(s)	afla M_1	0.05	HU1	MPH & MA	official		official		

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
ICELAND [IS] 2003										
	Food									
	following European Union [harmonized regulations]									
	Dairy									
	following European Union [harmonized regulations]									
	Feed									
	following European Union [harmonized regulations]									
INDIA [IN] 2003										
	Food									
	all food products	afla $B_1B_2G_1G_2$ & afla M_1	30	IN1	MHFW	official	IN2	official	IN3	
	Feed									
	peanut meal (export)	afla B_1	120	IN4	MFCS [DCS]	official	IN5			
INDONESIA [ID] 2003										
	Food									
	peanuts, coco nuts, spices, traditional drugs/medicines/herbs	afla $B_1B_2G_1G_2$	20	ID1	NADFC	official		official & non-official	ID2 ID3	
	coffee	ochratoxin A	not detectable							
	maize	zearalenone	not detectable							
	Dairy									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	milk, cheese	afla M_1	5	ID1	NADFC			official & non-official		
IRAN, ISLAMIC REPUBLIC OF [IR] 2003										
	Food									
	pistachio nuts, peanuts, walnuts, other nuts and edible seeds	afla B_1	5	IR1	ISIRI & MOH	official	IR2	official	IR4 IR5	The Ministry of Health and Medical Education is responsible for the control of aflatoxins in pistachios, exported to the EU, as well as foodstuffs for the Iranian market. Official sampling plans and methods of analysis exist for aflatoxins in pistachio.
		afla $B_1B_2G_1G_2$	15							
	dates, dried grapes (raisins and sultanas), figs and all dried fruits	afla B_1	5					official	IR5	
		afla $B_1B_2G_1G_2$	15							
		ochratoxin A	10					non-official		
	fruit juices, nectarine and fruit drinks	patulin	50					non-official		
	baby food based on cereals with milk	afla B_1	0.5							
		afla M_1	0.02							
	baby food based on cereals without milk	afla B_1	1							
		ochratoxin A	1							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	baby instant food (ready to use)	ochratoxin A	1	IR1	ISIRI & MOH			non-official		
	barley	afla B_1	10			official	IR3	non-official	IR4 IR5	
		afla $B_1B_2G_1G_2$	50							
		ochratoxin A	50							
		DON	1000							
		zearalenone	400							
	maize	afla B_1	5			official	IR3		IR4 IR5	
		afla $B_1B_2G_1G_2$	30							
		ochratoxin A	50							
		DON	1000							
		zearalenone	200							
		fumonisins B_1 B_2	1000							for fumonisins there are no official sampling methods yet
	rice	afla B_1	5			official	IR3		IR4 IR5	
		afla $B_1B_2G_1G_2$	30							
		ochratoxin A	5							
		DON	1000							
		zearalenone	200							
	wheat	afla B_1	5			official	IR3		IR4 IR5	
		afla $B_1B_2G_1G_2$	15							
		ochratoxin A	5							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	wheat	DON	1000	IR1	ISIRI & MOH			non-official		
		zearalenone	200							
	legumes	afla B_1	5					non-official	IR4 IR5	
		afla $B_1B_2G_1G_2$	10							
		ochratoxin A	20							
	Dairy									
	milk [raw, pasteurised, sterilised]	afla M_1	0.05	IR1	ISIRI & MOH	non-official	IR6	non-official	IR7	
	milk powder		0.5							
	milk powder for babies (after reconstitution)		0.01							
	cheese		0.2							
	butter, gee		0.02							
	other dairy products		0.05							
	Feed									
	cotton seed meal	afla B_1	15	IR1	ISIRI	official	IR3	non-official		
		afla $B_1B_2G_1G_2$	50							
	fish meal, meat meal, bone meal, blood meal, single cell protein, rice and wheat bran:									
	intended for sheep, goats and beef cattle	afla B_1	10	IR1	ISIRI	official	IR3	non-official		
	intended for poultry, calf, lamb, kid, dairy sheep, goats and cattle	afla B_1	5							
		afla $B_1B_2G_1G_2$	20							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	soya bean meal, sunflower meal, sesame seed meal, olive meal and other meals from oil producing seeds:									
	intended for sheep, goats and beef cattle	afla B_1	10	IR1	ISIRI	official	IR3	non-official		
		afla $B_1B_2G_1G_2$	20							
	intended for poultry, calf, lamb, kid, dairy sheep, dairy goats and dairy cattle	afla B_1	5							
		afla $B_1B_2G_1G_2$	20							
	maize:									
	intended for sheep, goats and beef cattle, poultry, calf, lamb, kid, dairy sheep, dairy goats and dairy cattle	afla B_1	5	IR1	ISIRI	official	IR3	non-official		
		afla $B_1B_2G_1G_2$	20							
	premixes including vitamins and mineral premixes:									
	intended for sheep, goats and beef cattle	afla $B_1B_2G_1G_2$	10	IR1	ISIRI	official	IR3	non-official		
	intended for calf, lamb, kid, dairy sheep, goats and cattle		5							
	intended for poultry		10							
	complete feed:									
	intended for sheep, goats and beef cattle	afla B_1	50	IR1	ISIRI	official	IR3	non-official		
		DON	5000			non-official				
		T-2 toxin	100							as of 2004
	intended for calf, lamb, kid, dairy sheep, goats and cattle	afla B_1	5			official	IR3	non-official		

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	intended for calf, lamb, kid, dairy sheep, goats and cattle	DON	1000	IR1	ISIRI	non-official		non-official		
		T-2 toxin	25							as of 2004
	intended for layers and breeders (broilers and layers)	afla B_1	10			official	IR3	non-official		
		afla $B_1B_2G_1G_2$	20							
	intended for broilers and pullet	afla B_1	10							
	intended for parent and grandparent stocks	afla B_1	5							
		afla $B_1B_2G_1G_2$	20							
IRAQ [IQ] 2003:situation 1996 no regulations [FAO 1997]										
IRELAND [IE] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
ISRAEL [IL] 2003										
	Food									
	nuts, peanuts, maize flour, figs and their products and other foods	afla B_1	5		MH	official		official	IL1	
		afla $B_1B_2G_1G_2$	15							
	cereals, cereal products and other foods	ochratoxin A	50					non-official	IL2	
	apple juice	patulin	50							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Dairy									
	milk and milk products	afla M_1	0.05		MH	official		official	IL3	
	Feed									
	all grains	afla $B_1B_2G_1G_2$	20		MH	official		non-official	IL4	
		ochratoxin A	300							
		DON	1000							
		zearalenone	not given						IL5	
		T-2 toxin	100							
		diacetoxyscirpenol	200							
ITALY [IT] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	additional regulations of Italy:									
	infusion plants	afla B_1	5	IT1	MH, RA & AP	official	IT2		IT2	
		afla $B_1B_2G_1G_2$	10							
	coffee	ochratoxin A	8							
	roasted coffee		4							
	cocoa and derived products		0.5							
	beer		0.2							
	pig meat and derived products		1							
	fruit juice		50							
	baby food	afla M_1	0.01							
		ochratoxin A	0.5							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	baby food	zearalenone	20	IT1	MH, RA & AP					
	cereals and derived products	zearalenone	100							
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
JAMAICA [JM] 2003: situation 1991 [FAO 1997]										
	Food									
	food, grains	afla $B_1B_2G_1G_2$	20							
JAPAN [JP] 2003										
	Food									
	all foods	afla B1	10		MHL&W	official		official	JP1	
	apple juice	patulin	50							
	wheat and wheat products	DON	1100			official				provisional limit
	Feed									
	compound feeds for cattle (except calves, dairy cows), pigs (except piglets), chicken (except young chicken, broilers) and quails	afla B_1	20		MAF&F	official		official		
	compound feeds for calves, dairy cows, piglets, young chicken and broilers		10							
	compound feeds	zearalenone	1000							provisional limit
		DON	1000							provisional limit
	compound feeds for cows with an age over 3 months	DON	4000							provisional limit

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
JORDAN [JO] 2003: situation 1981 [FAO 1997]										
	Food									
	almonds, cereals, maize, peanuts, pistachio nuts, pine nuts, rice	afla B_1	15	JO1	MH			official		
		afla $B_1B_2G_1G_2$	30							
	Feed									
	all feedstuffs	afla B_1	15		MH					
		afla $B_1B_2G_1G_2$	30							
KENYA [KE] 2003: situation 1981 [FAO 1997]										
	Food									
	peanut(product)s, vegetable oils	afla $B_1B_2G_1G_2$	20	KE1	MH	official	KE1	not official	KE2	
KOREA, REPUBLIC OF [KR] 2003										
	Food									
	grains, soy-bean, peanuts, nuts, wheat and the products made from these by simple processing such as grinding and cutting	afla B_1	10	KR1	KFDA	official		official	KR1	
	apple juice, apple juice concentrate	patulin	50							
	Dairy									
	milk and milk products	afla M1	0.5	KR1	KFDA			official	KR1	
	Feed									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	compound feeds for calfs, chicken, piglets, broilers (early stage) and dairy cattle	afla B_1	10	KR2	MAF	official		official	KR3	
	other compound feeds (except premixes)		20							
	feed ingredients: vegetable proteins, grains, by-products of grains and food		50							
KUWAIT [KW] 2003										
	Food									
	infant and children food	afla $B_1B_2G_1G_2$	0.05	KW1						
	Dairy									
	liquid milk and milk products [except dried milk]	afla $B_1B_2G_1G_2$	0.2	KW1						
LATVIA [LV] 2003 [EU candidate member state]										
	Food									
	food products of plant and animal origin	afla B_1	5	LV1	MA	official		official	LV2	
	cereals	ochratoxin A	5			non-official		non-official	LV3	
		DON	1000							
		zearalenone	1000							
		T-2 toxin	100							
	bread	zearalenone	1000					non-official		
	apple, tomato juice	patulin	50					official	LV4	
	Dairy									
	milk and milk products	afla M_1	0.5	LV1	MA	official		non-official	LV3	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Feed									
	animal feed	afla B_1	5		MA	official		official	LV2	
LIECHTENSTEIN [LI] 2003										
	Food									
	following European Union [harmonized regulations]									
	Dairy									
	following European Union [harmonized regulations]									
	Feed									
	following European Union [harmonized regulations]									
LITHUANIA [LT] 2003 [EU candidate member state]										
	Food									
	following European Union [harmonized regulations]	afla B_1	see EU	LT1	SFVS	official and non-official	LT2 LT3 LT4	official	LT5 LT6 LT7	
		afla $B_1B_2G_1G_2$							LT8 LT9	
		ochratoxin A				non-official			LT10	
	juice	patulin	25			official and non-official	LT2			
	Dairy									
	following European Union [harmonized regulations]	afla M_1	see EU	LT1	SFVS	official and non-official	LT2	official	LT11	
	Feed									
	following European Union [harmonized regulations]	afla B_1	see EU	LT1	MA	official and non-official	LT2	official	LT5 LT6 LT7	
	for pigs and poultry	ochratoxin A	50			non-official			LT10	
	for young pigs and young poultry		20							
	pigs	DON	1000						LT12	
	gilts		600							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	piglet	DON	200	LT1	MA	non-official		official	LT12	
	pigs	zearalenone	300						LT13	
	piglet		100							
LUXEMBOURG [LU] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
MACEDONIA, FORMER YUGOSLAV REPUBLIC OF [MK] 2003: situation 1981 [FAO 1997]										
	Food									
	wheat, maize, rice, cereals	afla B_1G_1	1	MK1	FCLHSW	official	MK2	official		
	beans	afla B_1G_1	5							
MALAWI [MW] 2003: situation 1987 [FAO 1997]										
	Food									
	peanuts (export)	afla B_1	5				MW1			
MALAYSIA [MY] 2003: situation 1987 [FAO 1997]										
	Food									
	all foods	afla $B_1B_2G_1G_2$	35	MY1						
MALTA [MT] 2003 [EU candidate member state]										
	Food									
	nuts, dried fruit, cereals	afla B_1	2	MT1	DPH	official	MT2	non-official	MT2	in force since 1-5-2002
		afla $B_1B_2G_1G_2$	4							
	Dairy									
	milk	afla M_1	0.05	MT1	DPH	official	MT2	non-official	MT2	in force since 1-5-2002

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
MAURITIUS [MU] 2003: situation 1987 [FAO 1997]										
	Food									
	all foods	afla B_1	5	MU1	MHQL					
		afla $B_1B_2G_1G_2M_1M_2$	10							
	groundnuts	afla B_1	5							
		afla $B_1B_2G_1G_2M_1M_2$	15							
MERCOSUR [ME] 2003 **MERCOSUR member states: Argentina, Brazil, Paraguay and Uruguay**										
	Food									
	peanuts, maize and products thereof	afla $B_1B_2G_1G_2$	20	ME1		official	ME2 ME3 ME4 ME5	official	ME7 ME8 ME9	
	Dairy									
	fluid milk	afla M_1	0.5	ME1		official	ME6	official	ME8 ME10	
	powdered milk		5							
MEXICO [MX] 2003										
	Food									
	cereals and products	afla $B_1B_2G_1G_2$	20	MX1	MPH	non-official	MX2	official	MX4	since 1996
	corn flour for tortillas		12				MX3			
	Feed									
	cereals for bovine and porcine fattening feedstuffs	afla $B_1B_2G_1G_2$	200							situation 1991
	feedstuffs for dairy cattle/poultry		0							
MOLDOVA, REPUBLIC OF [MD] 2003										

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Food									
	cereals, legumes, flour, cocoa, nuts, coffee, sunflower, tea	afla B_1	5	MD1	MOH	official		official		
	wheat and wheat flour	DON	700							
	barley and barley flour		1000							
	wheat and wheat flour, barley and barley flour, maize and maize flour	zearalenone	1000							
	cereals and cereal flour	T-2 toxin	100							
	juices, canned vegetables, fruits	patulin	50							
	Dairy									
	milk, cottage cheese, butter	afla M_1	0.5	MD1	MOH	official		official		
MOROCCO [MA] 2003										
	Food									
	all foods	afla B_1	10							MA1 proposed legislation
	peanuts, pistache nuts, almonds, vegetable oils in pasta, children foods		1							
	wheat meal		3							
	wheat bran		10							
	vegetable oils, cereals, wheat meal (complete)		5							
	apple juice (products)	patulin	50							
	cereals, vegetable oils	zearalenone	200							
	cereals	ochratoxin A	30							
	Dairy									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	milk (product)	afla M_1	0.05							MA1 proposed legislation
	milk (product) for infants under 3 years		0.03							
	milk powder		0.5							
	milk powder for infants under 3 years		0.3							
	Feed									
	simple feedstuffs (except peanuts, copra, cottonseed, babassu, maize and their products)	afla B_1	50							MA1 proposed legislation
	peanuts, copra, cottonseed, babassu, maize and their products		20							
	complete feedstuffs for cattle, sheep and goats (except for dairy animals, calves and lambs)		50							
	complete feedstuffs for dairy animals		5							
	complete feedstuffs for calves and lambs		10							
	complete feedstuffs for pigs and poultry (except young animals)		20							
	other complete feedstuffs		10							
	complementary feedstuffs for cattle, sheep and goats (except for dairy animals, calves and lambs)		50							
	complementary feedstuffs for pigs and poultry (except young animals)		30							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	other complementary feedstuffs, especially dairy animals	afla B1	10							MA1 proposed legislation
MOZAMBIQUE [MZ] 2003										
	Food									
	peanut, peanut milk	afla $B_1B_2G_1G_2$	10	MZ1	MH	official		official		
	Dairy									
	milk	afla M_1	unknown	MZ1	MH	official		official		
	Feed									
	peanut, maize, peanut butter	afla $B_1B_2G_1G_2$	10	MZ1	MH					
	cereals and feedstuffs					official		offcial		
	feedstuff	afla B_1	unknown							
	corn	ochratoxin A	unknown	MZ1	MH	official		official		
		zearalenone	unknown							
MYANMAR [MM] 2003: no regulations										
NEPAL [NP] 2003										
	Food									
	cereals	afla B_1	20	NP1	MA / DFTCC	official		official	NP2 NP3	updated in 1984
	Feed									
	feedstuffs	afla B_1	50	NP4	MA / DFTCC	official		official	NP2 NP3	updated in 1990
NETHERLANDS, THE [NL] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	Dairy									
	see European Union [harmonized regulations]									
	Feed									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	see European Union [harmonized regulations]									
	additional regulations of the Netherlands:									
	grain and grain products to be incorporated in:									
	feed for pigs	DON	5000	NL1	CBAF					Decision Commodity Board Animal Feedstuffs in force since 2000
	feed for beef cattle and poultry		10000							
	feed for calves until 4 months and dairy cattle		5000							
	feed for laying hens		5000							
	complete mixed feed for pigs		1000							
	complete mixed feed for beef cattle and poultry		5000							
	complete feed for calves until 4 months and dairy cattle		2000							
	complete feed for laying hens		3000							
NEW ZEALAND [NZ] 2003										
	Food									
	all regulations harmonized with Australia									
NICARAGUA [NI] 2003: situation 1991: no regulations [FAO 1997]										

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
NIGERIA [NG] 2003										
	Food									
	foodstuffs	**afla B_1**	**20**	**NG1**	**NAFDAC**	**official**		**official**	**NG2**	**new limits are yet to be established when surveys and stakeholders meetings are held with the assistance of data acquired from a new laboratory that is currently being built in NAFDAC**
NORWAY [NO] 2003										
	Food									
	following European Union [harmonized regulations]									
	Dairy									
	following European Union [harmonized regulations]									
	Feed									
	following European Union [harmonized regulations]									
OMAN [OM] 2003: situation 1987 [FAO 1997]										
	Food									
	complete foodstuffs	**afla B_1**	**10**	**OM1**	**MCI**	**official**	**OM2**			**Maximum content referred to a moisture content of 12%**
	Feed									
	complete feedstuffs for poultry	**afla B_1**	**20**	**OM1**	**MCI**	**official**	**OM2**			**Maximum content referred to a moisture content of 12 %**

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
PAKISTAN [PK] 2003: no regulations										
PANAMA [PA] 2003: situation 1991: no regulations [FAO 1997]										
PARAGUAY [PY] 2003 [MERCOSUR member state]										
	Food									
	See MERCOSUR [harmonized regulations]									
	Dairy									
	See MERCOSUR [harmonized regulations]									
PERU [PE] 2003										
	Food									
	raw and processed peanuts	afla $B_1B_2G_1G_2$	15		MPH & MA					following Codex guideline limits
	Dairy									
	milk	afla M_1	0.5		MPH					following Codex guideline limits
PHILIPPINES, THE [PH] 2003										
	Food									
	nut (products)	afla $B_1B_2G_1G_2$	20	PH1						
	Feed									
	mixed feed	afla B_1	20		DA-BAI	official	PH2		PH3	
	copra and copra products	afla B_1	20		PHILCOA				PH4	guideline limit

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
POLAND [PL] 2003 [EU candidate member state]										
	Food									
	following European Union [harmonized regulations]	afla B_1	see EU	PL1	MH & MARD	non-official		official and non-official	PL3 PL4	
		afla $B_1B_2G_1G_2$								
		ochratoxin A						official	PL5 PL6	
	apple juice, apple products	patulin	30		MARD	official	PL2		PL7 PL8	
	Dairy									
	following European Union [harmonized regulations]	afla M_1	0.05	PL1	MARD	official	PL2	official	PL9 PL10	
	Feed									
	following European Union [harmonized regulations]	afla B_1	see EU	PL11	MH & MARD	non-official		official	PL12 PL13 PL14	
PORTUGAL [PT] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
QATAR [QA] 2003: situation 1996 no regulations [FAO 1997]										
ROMANIA [RO] 2003 [EU candidate member state]										
	Food									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	alimentary products	afla B_1	5	RO1 RO2	MAFF	official	RO3 RO4	official	RO5 RO6	
		afla $B_1B_2G_1G_2$	absent							
		ochratoxin A	20							
	alimentary products for babies 3 years old	ochratoxin A	5							
	fruit juice	patulin	50					non-official	RO7	
	Dairy									
	milk and milk products	afla M_1	0.5	RO1 RO2	MAFF	official	RO3 RO4	official	RO8	
	Feed									
	feeds	afla $B_1B_2G_1G_2$	absent	RO1 RO2	MAFF	official	RO3 RO4	official	RO9	
		zearalenone	20							
RUSSIAN FEDERATION, THE [RU] 2003										
	Food									
	bread grain including wheat, rye, triticale, oats, barley, millet, buckwheat, rice, maize, sorghum	afla B_1	5	RU1	MH					
	grain legumes, including pea, bean, lentil, soya									
	cereals, oat flour, flakes									
	wheat flour including for pasta, rye flour, triticale flour, corn, barley, millet, rice, buckwheat, pulse flour, sorghum, soya flour									
	pasta, bread, bakery products									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	sugary confectionary products	alfa B1	5	RU1	MH					
	cocoa beans & cocoa products									
	bio-active additives (for food products)									
	flour confectionary products									
	nuts									
	tea (black, green, tablet)									
	coffee (bean, ground, instant)									
	oil seeds (sunflower, soya, cotton, corn, flax, mustard, rape, peanut)	afla B1	5	RU1	MH					
	vegetable oils (all kinds)									
	derivatives of vegetable oils (margarine, culinary fat, confectionary fat, mayonnaise, phosphatide concentrates)									
	isolates, concentrates & hydrolysates of vegetable proteins; flour and coarse meal of pulses, oil seeds and non-traditional food products									
	wheat germ flakes & coarse meal made of them									
	food bran made of pulses & cereals									
	cow butter	afla B_1	0.5							
	wheat	DON	700							
	barley	DON	1000							
		T-2 toxin	100							
	wheat, barley, maize, corn	zearalenone	1000							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	bottled, canned or potted vegetables, fruit, berries; juices, beverages or concentrates of vegetables, berries (canned); jams, confitures, syrups, fruit & berries mashed with sugar, fruit or berry concentrates with sugar	patulin	50	RU1	MH					
	Dairy									
	milk & dairy products	afla M_1	0.5	RU1	MH					
	casein, caseinates, concentrates of milk proteins, hydrolysates of milk proteins	afla M1	0,5	RU1	MH					
	bio-active additives (for food products)									
SALVADOR, EL [SV] 2003: situation 1991 [FAO 1997]										
	Food									
	foods	afla $B_1B_2G_1G_2$	20							
	Feed									
	all feedstuffs	afla B_1	10							
	supplementary feeds for porcine/poultry/dairy cattle; single composite feedstuffs; bovine/caprine/ovine feedstuffs		20							
SAUDI ARABIA [SA] 2003										
	Food									
	infant and children food	all afla	0.05		SASO					SA1
	Dairy									
	liquid milk and milk products [except dried milk]	all afla	0.2		SASO					SA1

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
SENEGAL [SN] 2003: situation 1987 [FAO 1997]										
	Feed									
	peanut products (straight feedstuffs)	afla B_1	50	SE1	MC	official		official	SE2	
	peanut products (feedstuff ingredients)		300		MC & MPH					
SERBIA and MONTENEGRO [YU] 2003										
	Food									
	wheat, corn, rice, barley, bean, peas, roasted coffee, roasted peanut, tea	afla B_1	5	YU1	MPH	official	YU2	official	YU3	in force since 1992
	meat and meat products		0,5							
	spices		30							
	milk and milk products		0,5							
	all foodstuffs	ochratoxin A	10							in force since 1990
	apple juice	patulin	50							in force since 1992
	corn	zearalenone	1000							
	Dairy									
	milk and milk products	afla M_1	0,5	YU1	MPH	official	YU2	official	YU3	in force since 1992
	Feed									
	feed for chicken, pigs (until 50kg), calf, young turkey, duckling, cow	afla $B_1B_2G_1G_2$	10	YU4	MA	official	YU5	official	YU3	in force since 1990
	feed for ox, sheep, goat		50							
	feed for swine and poultry		20							
	feed for pigs (until 50kg)	ochratoxin A	100							
	feed for swine		200							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	feed for poultry		1000	YU4	MA	official	YU5	official		in force since 1990
	feed for egg laying hen		250							
	feed for chicken, pigs (until 50kg) and calf	sum of trichothecenes	300							
	feed for swine, ox and poultry		600							
	feed for pigs (until 50kg)	zearalenone	500							
	feed for other type of swine		1000							
	feed for cow, sheep and goat		3000							
	feed for ox		5000							
	feed for egg laying hen		100000							
SINGAPORE [SG] 2003										
	Food									
	corn, nuts, and cereal products	afla B_1	not given	SG1	AVA	non-official		official	SG2	
	corn, nuts, and cereal products	afla $B_1B_2G_1G_2$	5							
	cereal, raw coffee beans	ochratoxin A	2.5						SG3	
	roasted coffee beans		2.5						SG4	
	apple & apple juice	patulin	50					non-official	SG5	
	cereal & grain products	DON	not given						SG6	
	corn & corn products	fumonisin B_1	not given						SG7	
	cereal & grain products	zearalenone	not given					non-official but SOP	SG8	
	Dairy									
	milk & cheese products	afla M_1	0.5	SG1	AVA	non-official		non-official	SG9	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
SLOVAKIA [SK] 2003 [EU candidate member state]										
	Food									
	milk, meat, poultry, flour and its products, rice, vegetables, potatoes	afla B_1	5	SK1	MH / MA	official		official		
	milk, meat, poultry, flour and its products, rice, vegetables, potatoes	ochratoxin A	5	SK1	MH / MA	official		official		
		patulin	50							
		sterigmatocystin	5							not analysed
	infant formulae	afla B_1	1			official		official		
		afla $B_1B_2G_1G_2$	1							
		ochratoxin A	1							
		patulin	20							
	food for children	afla B_1	1							
		afla $B_1B_2G_1G_2$	2							
	food for children	ochratoxin A	1	SK1	MH / MA	official		official		
		patulin	30							
	other foodstuffs	afla B_1	20							
		afla $B_1B_2G_1G_2$	80							
		ochratoxin A	10							
		patulin	100							
		sterigmatocystin	20							not analysed
	ground nuts, cocoa, nuts	afla B_1	10			official		official		
	wheat, rice for production of children food	T-2 toxin	0.5					non-official	SK2	
	maize for production of children food		1							
	wheat, rice, maize		20							
	Dairy									
	milk and milk products	afla M_1	0.5	SK1	MH / MA					

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	infant formulae and milk-based food for children	afla M_1	0.1	SK1	MH / MA					
SLOVENIA [SI] 2003 [EU candidate member state]										
	Food									
	following European Union [harmonized regulations]	afla B_1	see EU	SI-1	MHHI	official		non-official	SI-2	in force since 1983
		afla $B_1B_2G_1G_2$								
		ochratoxin A								
		patulin								
		DON								
	Dairy									
	following European Union [harmonized regulations]	afla M_1	see EU	SI-1	VARS MAFF MHHI	official		non-official	SI-3	in force since 1983
	Feed									
	following European Union [harmonized regulations]	afla B_1	see EU	SI-4	VARS MAFF	official	SI-5	official	SI-6	in force since 1976
	feedstuffs for pigs	ochratoxin A	200					non-official	SI-7	
		zearalenone	1000						SI-8	
		T-2 toxin	1000						SI-9	in force since 1988
		DAS and derivatives	1000							
	complete feedstuffs for pigs	DON	400						SI-10	in force since 1985
	feedstuffs for poultry	ochratoxin A	1000						SI-7	in force since 1976
		T-2 toxin	1000						SI-9	in force since 1988
		DAS and derivatives	1000							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
SOUTH AFRICA [ZA] 2003										
	Food									
	all foodstuffs	afla B_1	5	ZA1	DH	official		non-official		in force since 1990
		afla $B_1B_2G_1G_2$	10							in force since 1990; a draft is currently in process to increase the limit for aflatoxins in peanuts intended for further processing to 15 µg/kg, to bring it in line with the CODEX level
		patulin	50							in force since 1995
	Dairy									
	milk	afla M_1	0.05	ZA1	DH					in force since 1995
SPAIN [ES] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
SRI LANKA [LK] 2003										
Food	**Food**									
	all foods	all afla	30	LK1	MH & MA	non-official		non-official		random sampling
	food for children up to 3 years		1							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
SUDAN [SD] 2003										
	Food									
	oil seeds	afla $B_1B_2G_1G_2$	see CODEX		SSMO	official		official		
	wheat	ochratoxin A	15							
SURINAME [SR] 2003: situation 1991 [FAO 1997 ref.1]										
	Food									
	maize	afla $B_1B_2G_1G_2$	30							
	groundnut(products), legumes	afla B_1	5							
	Feed									
	feedstuffs	afla $B_1B_2G_1G_2$	30							
SWEDEN [SE] 2003 [EU member state]										
	Food									
	see European Union [harmonized regulations]									
	additional regulations of Sweden:									
	all foods , not specifically regulated at EU level	afla $B_1B_2G_1G_2$	5	SE1 SE2	NFA	official	SE3	official	SE3	updated in 2002
	Dairy									
	see European Union [harmonized regulations]									
	Feed									
	see European Union [harmonized regulations]									
	additional regulations of Sweden:									
	cereal grains and forages as feedstuff ingredients for dairy cattle	afla B1	1	SE4	SBA					

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	feedstuff ingredients for dairy cattle	afla B1	10	SE4	SBA					
	feedstuff ingredients	afla B1	50							
	complete feedstuff (including forage) for dairy cattle		1.5							
	mixed feedstuffs (excluding forages) for dairy cattle		3							
	complete feedstuff for pigs	ochratoxin A	100							
	complete feedstuff for poultry		200							
SWITZERLAND [CH] 2003										
	Food									
	nutmeg	afla B_1	10	CH1	OFCACS	official & non-official	CH2 CH3	official & non-official	CH3 CH4	
		afla $B_1B_2G_1G_2$	20							
	spices	afla B_1	5							excluding nutmeg
		afla $B_1B_2G_1G_2$	10							
		ochratoxin A	20							referred to dry matter
	dried fruit	ochratoxin A	20							referred to dry matter
	infant formulae and follow-on formulae	afla $B_1B_2G_1G_2$	0.01							based on ready-to-eat preparation
		afla M_1	0.02							
		ochratoxin A	0.5							referred to dry matter

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	processed cereal-based foods and baby foods for infants and young children	afla $B_1B_2G_1G_2$	0.01	CH1	OFCACS	official & non-official	CH2 CH3	official & non-official	CH3 CH4	based on ready-to-eat preparation
	processed cereal-based foods and baby foods for infants and young children	afla M_1	0.02							as above
		ochratoxin A	0.5							referred to dry matter
	all foodstuffs	afla B_1	2							except those with special regulations
		afla $B_1B_2G_1G_2$	4							
		ochratoxin A	5							
	fruit juices	patulin	50							
	cereal grains	DON	1000							tolerance value (less strict than limit)
	maize	fumonisins B_1B_2	1000							tolerance value (less strict than limit)
	Dairy									
	milk and milk products	afla M_1	0.05	CH1	OFCACS	official & non-official	CH2 CH3	official & non-official	CH3 CH4	
	cheese		0.25							
	Feed									
	babassu seed, cotton seed, peanut, coconut, maize kernel, palm kernel and their products as raw materials	afla B_1	200	CH5	EVD					in force 1 July 1999
	babassu seed, cotton seed, peanut, coconut, maize kernel, palm kernel and their products as single feed materials		20							
	other single feeds / raw materials		50							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	complete and complementary feeds for bovine animals, sheep and goats, except milk cows, calves and lambs	afla B_1	50	CH5	EVD					in force 1 July 1999
	complementary feeds for pigs and poultry except young animals		30							
	complete feeds for pigs and poultry except young animals		20							
	complementary feed for lactating bovine animals, lactating sheep and lactating goats		5							
	other complete and complementary feeds		10							
SYRIAN ARAB REPUBLIC [SY] 2003										
	Food									
	peanuts and pistachios	afla B_1	5		MS MH	official		official		
	baby food	afla $B_1B_2G_1G_2$	0.05							
	pulses, mixed nuts, oil seeds and products thereof		20							
	Dairy									
	liquid milk	afla M_1	0.2		MS MH	official		official		
	dried milk [not used in baby food]		0.05							
	Feed									
	domestic feed	afla $B_1B_2G_1G_2$	20		MS MA	official		official		
	livestock cattle feed		10							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
TAIWAN PROVINCE OF CHINA [TW] 2003										
	Food									
	peanut, corn, maize	afla $B_1B_2G_1G_2$	15	TW1	DH	non-official	TW3	official	TW4 TW5 TW6	since 1997
	rice, sorghum, legumes, nuts, wheat and barley, oats	afla B1B2G1G2	10	TW1	DH	non-official	TV3	official	TW4 TW5 TW6	since 1997
	edible oils and fats		10							
	other foods		10							
	infant food		not detectable	TW2						
	cereals	ochratoxin A						non-official	TW7	The maximum permissible content is not available for ochratoxin A, patulin and fumonisin B_1. The product safety is decided according to the result of risk assessment
	apple juice	patulin						official	TW8 TW9	
	maize products	fumonisin B_1						non-official	TW10 TW11	
	Dairy									
	milk	afla M_1	0.5	TW1	DH	non-official	TW12	non-official	TW13 TW14 TW15	since 1983
	milk powder		5							
	Feed									
	maize (raw material)	afla $B_1B_2G_1G_2$	50		CA					
	all feedstuffs	afla B_1	25-100			official		official	TW4	since 1997. The value of maximum permissible content depends on the animal species

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
TANZANIA, UNITED REPUBLIC OF [TZ] 2003										
	Food									
	cereals, oil seeds	afla B_1	5	TZ1	NFCC	official	TZ2	official	TZ3	since 1989
		afla $B_1B_2G_1G_2$	10							
	Feed									
	feeds	afla B_1	5	TZ1	NFCC	official	TZ2	official	TZ3	since 1989
		afla $B_1B_2G_1G_2$	10							
THAILAND [TH] 2003										
	Food									
	all food products	afla $B_1B_2G_1G_2$	20	TH1	MPH-FDA					In addition, an amendment of the national regulations of mycotoxins is made, by using CODEX maximum levels
TRINIDAD and TOBAGO [TT] 2003: situation 1991: no regulations [FAO 1997 ref.1]										
TUNISIA [TN] 2003										
	Food									
	all products	afla B_1	2	TN1	MH-DHMPE	non-official		non-official	TN2	
		afla $B_1B_2G_1G_2$	unknown							
	Dairy									
	milk	afla M_1	unknown		ANCSEP			non-official	TN2	
TURKEY [TR] 2003 [EU candidate member state]										
	Food									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	hazelnut, peanut and other nuts; oily seed; dried fruits (fig, raisin, etc.) and foodstuffs produced of these	afla B_1	5	TR1	MARA	official	see EU6	official	TR2	in force since 2002, but existing since 1990 for all foods
		afla $B_1B_2G_1G_2$	10							in force since 2002, but existing since 1997 for all foods
	cereals and cereal flour	afla B_1	2				see EU6			in force since 1990
	cereals and cereal flour	afla $B_1B_2G_1G_2$	4	TR1	MARA	official		official		in force since 1990
	spices	afla B_1	5				see EU7			in force since 2002, but existing since 1990 for all foods
		afla $B_1B_2G_1G_2$	10							in force since 2002, but existing since 1997 for all foods
	other foods (foods with an aflatoxin risk)	afla B_1	5							in force since 1990 for all foods
		afla $B_1B_2G_1G_2$	10							in force since 1997 for all foods
	baby food	afla B_1	1						TR3	in force since 2002
		afla $B_1B_2G_1G_2$	2							
	baby food	afla M_1	0.05						TR4	
	raw grain	ochratoxin A	5						TR5	
	foodstuffs produced from grain		3							
	dried raisins		10					non-official	TR6	
	fruit juice	patulin	50					official	TR7	in force since 1997

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Dairy									
	milk	afla M_1	0.05	TR1	MARA	official	see EU6	official	TR4	in force since 1997
	milk powder		0.5							in force since 2002
	cheese		0.25						TR8	in force since 1997
	Feed									
	feed ingredients	afla B_1	50	TR9	MARA			official	TR10	in force since 1991
	mixed feed for ruminants except young animals		50							
	mixed feed for poultry except young animals		20							
	other mixed feeds		10							
UGANDA [UG] 2003: no regulations										
UKRAINE [UA] 2003										
	Food									
	milk and dairy products, condensed milk, milk powder, cheese, animal butter, animal fats, casein, dairy products for babyfood; grain-based babyfood; vegetable and fruit-berry preserves and mixes for babyfood; meat and fish preserves for babyfood; products for children allergic to food/lactose; diet meat preserves for diet children´s food; babyfood for early born babies	afla B_1	1	UA1 UA2 UA3	MHP & SDVM	official		official	UA4	in force since 1980

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	meats [fresh, chilled and frozen], meat products, sausages, poultry; vegetable preserves in cans and glass jars, subproducts; kidneys and processed kidneys; eggs, eggpowder; grains, beans, wheat middlings, all seeds to be used for immediate human consumption and for processing into products for human consumption; soya press, sunflower press; flour, bread; all nuts; confectionery; cocoa, chocolate, coffee, tea; fruit juices, fruit puree; vegetable oil	afla B_1	5	UA1 UA2 UA3	MHP & SDVM	official		official	UA4	in force since 1980
	grain-based babyfood products; fruit-vegetable-dairy mixes for babyfood; products for children allergic to food/lactose; babyfood for early born babies	afla M_1	0.5							
	vegetable and fruit-berry preserves and mixes for babyfood, fish preserves for babyfood	patulin	20						UA5	in force since 1982. Tests are done if there is vegetable additive in the recipe.
	vegetables, including potatoes, fruit and grapes, berries; vegetable, fruit, berry preserves in cans and jars		50							in force since 1982
	grain-based babyfood products; fruit-vegetable-dairy mixes for babyfood	DON	200						UA6	in force since 1984
	wheat of other than hard strong varieties, flour, bread		500							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	wheat of hard strong varieties; all seeds to be used for immediate human consumption and for processing into the products for human consumption; wheat middlings	DON	1000	UA1 UA2 UA3	MHP & SDVM	official		official	UA6	in force since 1984
	grains, flour, wheat middlings, bread products; all seeds to be used for immediate human consumption and for processing into products for human consumption	T-2 toxin	100						UA7	
	grain-based babyfood products	zearalenone	40							
	grains, beans; sunflower press; flour, bread; all nuts; all seeds to be used for immediate human consumption and for processing into the products for human consumption; vegetable oil; wheat middlings		1000						UA8	
	Dairy									
	milk and dairy products, condensed milk, milk powder, cheese, butter; animal fats; casein; dairy products for babyfood	afla M_1	0.5	UA1 UA2 UA3	MHP & SDVM	official		official	UA9	in force since 1980
	Feed									
	combined feed for non-productive animals	afla B_1	10	UA1 UA2 UA3	MHP & SDVM	official		official	UA4	in force since 1980
	combined feed for poultry		25							
	combined feed for cows in the period of lactation, for piglets no older than 2 months		50							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	combined feed for calves and sheep older than 4 months, animals for meat, breeding bulls	afla B1	100	UA1 UA2 UA3	MHP & SDVM	official		official	UA4	in force since 1980
	combined feed for sows (pregnant, feeding), breeding boars, piglets younger than 2 months	zearalenone	40						UA8	in force since 1984
	soya press for feed		1000							
	combined feed for pigs fed for pork lighter than 50 kg		2000							
	combined feed for pigs fed for pork over 50 kg of weight		3000							
	combined feed for all animals	DON	1000						UA6	
	combined feed for egg-layers and broilers	T-2 toxin	200						UA7	
	combined feed for calves and older cattle fed for beef		250							
UNITED ARAB EMIRATES [AE] 2003: no regulations										
										no specific legislation relating to maximum residue limits; the government body advises for food imports in the UAE to follow the latest CODEX standards [AE1]
UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND [UK] 2003 [EU member state]										
	Food									

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	see European Union [harmonized regulations]				FSA via PHA and LAEHTSO					
	Dairy									
	see European Union [harmonized regulations]				FSA via PHA and LAEHTSO					
	Feed									
	see European Union [harmonized regulations]				FSA via PHA and LAEHTSO					
UNITED STATES OF AMERICA [US] 2003										
	Food									
	all foods except milk	afla $B_1B_2G_1G_2$	20	US1	FDA, USDA	official	US6	official	US8	in force since 1969
	apple juice, apple juice concentrate, and apple juice component of a food that contains apple juice as an ingredient	patulin	50	US2	FDA		US7			in force since 2001
	finished wheat products for consumption by humans	DON	1000	US3				non official	US9	updated since 1993
	degermed dry milled corn products (e.g. flaking grits, corn grits, corn meal, corn flour with fat content of <2.25%, dry weight basis)	fumonisins $B_1B_2B_3$	2000	US4 US5				official	US8	in force since 2001; guidance level for industry

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	cleaned corn intended for popcorn	fumonisins B1B2B3	3000	US4 US5	FDA	official	US7	official	US8	in force since 2001; guidance level for industry
	whole of partially degermed dry milled corn products (e.g. flaking grits, corn grits, corn meal, corn flour with fat content of ≥2.25%, dry weight basis); dry milled corn bran; cleaned corn intended for masa production		4000							
	Dairy									
	milk	afla M_1	0.5	US10	FDA	official	US6	official	US8	in force since 1977
	Feed									
	corn and peanut products intended for finishing (i.e., feedlot) beef cattle	afla $B_1B_2G_1G_2$	300	US11	FDA, USDA	official	US12	official	US8	in force since 1969
	cottonseed meal intended for beef cattle, swine, or poultry		300							
	corn or peanut products intended for finishing swine of 100 pounds or greater		200							
	corn and peanut products intended for breeding beef cattle, breeding swine, or mature poultry		100			official	US12			
	corn, peanut products, and other animal feeds and feed ingredients, excluding cottonseed meal, intended for immature animals		20							

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	corn, corn products, cottonseed meal, and other animal feeds and feed ingredients intended for dairy animals, for animal species or uses not specified above, or when the intended use is not known	afla B1B2G1G2	20	US11	FDA, USDA	official	US12	official	US8	as above
	grains and grain byproducts destined for ruminating beef and feedlot cattle older than 4 months and for chickens	DON	10000	US3	FDA			not-official	US9	updated in 1993; not to exceed 50% of the diet
	grain and grain byproducts destined for swine		5000							updated in 1993; not to exceed 20% of the diet
	grain and grain byproducts for all other animals		5000							updated in 1993; not to exceed 40% of the diet
	corn and corn byproducts intended for equids and rabbits	fumonisins $B_1B_2B_3$	5000	US4 US5	FDA			official	US8+A588	in force since 2001; guidance level for industry [no more than 20% of diet on dry weight basis]
	corn and corn byproducts intended for swine and catfish		20000							in force since 2001; guidance level for industry [no more than 50% of diet on dry weight basis]
	corn and corn byproducts intended for breeding ruminants, breeding poultry and breeding mink (includes lactating dairy cattle and hens laying eggs for human consumption)		30000			official	US12	official	US8	in force since 2001; guidance level for industry [no more than 50% of diet on dry weight basis]

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	ruminants >3 months old being raised for slaughter and mink being raised for pelt production	fumonisins $B_1B_2B_3$	60000	US4 US5	FDA	official	US12	official	US8	as above
	poultry being raised for slaughter		100000							
	all other species or classes of livestock and pet animals		10000							
URUGUAY [UY] 2003 [MERCOSUR member state]										
	Food									
	See MERCOSUR [harmonized regulations]									
	additional regulations of Uruguay:									
	all food and spices	afla B_1	5	UY1	TLU			official	UY4 UY5 UY6	in force since 1994
		afla $B_1B_2G_1G_2$	20							
	infant food [an exception of all food and spices]		3						UY4 UY5 UY6	
	cocoa [an exception of all food and spices]		10							
	dried fruits [an exception of all food and spices]		30							
	soya protein [an exception of all food and spices]		30							
	rice, barley, beans, coffee, corn	ochratoxin A	50						UY4	
	fruit juice	patulin	50	UY2					UY7	
	wheat flour and by-products	DON	1000	UY3	MSP, TLU, MGAP				UY8	in force since 2001
	corn, barley	zearalenone	200	UY2	TLU				UY9	

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	Dairy									
	See MERCOSUR [harmonized regulations]									
	Feed									
	feed for meat cattle, sheep and birds	DON	5000	UY10	TLU, MSP, MGAP			official		in force since 2001
	feed for milk cattle		2000							
	feed for pigs and horses		1000							
	feed for other animals		2000							
	animal feed	ergot alkaloids	450	UY11	TLU			non-official	UY12	in force since 1986
	animal feed for pigs and female rabbits		not detectable							
VENEZUELA [VZ] 2003										
	Food									
	corn, corn flour, peanuts, peanut butter	afla $B_1B_2G_1G_2$	20			non-official		official	VZ1	updated in 2000
	Dairy									
	fluid milk	afla M_1	0.5			non-official		official	VZ2	updated in 2000
	milk powder		5.0							
VIET NAM [VN] 2003										
	Food									
	foodstuffs	afla $B_1B_2G_1G_2$	10	VN1	MH, MARD	official & non-official	VN2 VN3	official & non-official	VN2 VN3	in force since 1998

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
	foodstuffs	total of other mycotoxins	35	VN2	MH, MARD	non-official	VN3 VN4	non-official	VN3 VN4	in force since 1999
	Dairy									
	milk and milk products	afla M_1	0.5	VN1	MH	official & non-official	VN2 VN3	official & non-official	VN2 VN3	in force since 1998
YEMEN [YE] 2003: no official regulations, but some control takes place										
	Food									
	foodstuffs	afla $B_1B_2G_1G_2$			MCI-DGSS	official	YE1	official	YE1	
	Dairy									
	milk	afla M_1			MCI-DGSS	official	YE1	official	YE1	
ZAMBIA [ZM] 2003: no official regulations										
										There are no measures in Zambia which cover the control of mycotoxins in consumable products, but for export measures existing in destination countries may be applied and the exporter sends samples where ever analysis can be done, even outside the country.

Table 3: Maximum tolerated levels of mycotoxins in foodstuffs, dairy products and animal feedstuffs (2002/2003 survey)

Country	Commodity	(Sum of) Mycotoxin(s)	Limit (µg/kg)	Legal basis	Responsible authority	Sampling method		Analytical method		Remarks
						status	ref.	status	ref.	
ZIMBABWE [ZW] 2003: situation 1996 no regulations [FAO 1997]										
	Food									
	foods	afla B_1	5	ZW1	MA	official		official		
	groundnuts, maize, sorghum	afla B_1	5							
		afla G_1	4							
	Feed									
	feedstuffs	afla $B_1B_2G_1G_2$	unknown		MA	official		official		levels vary with type of animal
	poultry feed	afla B_1G_1	10							

*) ergot means the sclerotium or dormant winter form of the fungus *Claviceps purpurea.* The limit refers to the weight of ergot kernels per total commodity weight, and not toxin concentration.

Abbreviations and References for Table 3

ALGERIA [DZ]

Abbreviation:

MT: Ministry of Trade

References:

DZ1 AOAC (1990). 986.22. Aflatoxins in peanuts and peanuts products – CB method Food and Drug Laboratories – Canada – Best food method.

DZ2 NF-VF (1980). Animal feed – aflatoxins measurement B_1, June 1980: 18-200.

ARGENTINA [AR]

Reference:

AR1 Mercosur Resolution 56/94

ARMENIA [AM]

Abbreviation:

SSHAHS: Supervision Service of Haypetstandard and Authorities of Health Sphere

References:

AM1 Moscow (1997). Foodstuffs and their raw materials. Hygienic requirements for quality and safety of foodstuffs and their raw materials. Sanitary regulations and norms Sanitary Supervision 2.3.2 560-96.

AM2 Ministry of Health of the USSR (1980). Methodical recommendations for revealing, identification and determination of Aflatoxins in foodstuffs, December 10,1980 Moscow. No. 2273-80.

AM3 Ministry of Health of the USSR (1980). Methodical recommendations for revealing, identification and determination of the content of Aflatoxins in foodstuffs and their raw materials, using the high effective liquid chromatography, March 20,1986 Moscow. No. 4082-86.

AM4 Ministry of Health of the USSR (1984). Methodical instructions for revealing, identification and determination of Zearalenone in foodstuffs, January 23, 1984, Moscow. No. 2964-84.

AM5 GOST 28001-88. Corn, the products of its processing, combicorm. Method of determination of mycotoxins, namely: T-2 toxin, Zearalenone (F-2) and ochratoxin A. Products of fruit and vegetable processing. Method of determination of Patulin.

AM6 Ministry of Health of the USSR (1984). Methodical instructions for revealing, identification and determination of the content of T-2 toxin in foodstuffs, December 29, 1984, Moscow. No. 3184-84.

AM7 Ministry of Health of the USSR (1985). Methodical instructions for revealing, identification and determination of Deoxynivalenol (Vomitoxin) in corn and grain products, October 10, 1985, Moscow. No. 3940-85.

AM8 Ministry of Health of the USSR (1990). Methodical instructions for revealing, identification and determination of Deoxynivalenol (Vomitoxin) and Zearalenone in corn and grain products, July 27,1990, Moscow. No. 5177-90.

AM9 Ministry of Health of the USSR (1982). Methodical recommendations for revealing, identification and determination of the content of Patulin in both fruit and vegetable juices and those paste, December 30,1982 Moscow. No. 2655-82.

AM10 Products of fruit and vegetable processing. Method of determination of Patulin. GOST 28038-89.

AM11 Ministry of Health of the USSR (1985). Methodical recommendations for quality control of Aflatoxins in food coming from animals, October 11,1985 Moscow. No. 3942-85.

AUSTRALIA [AU]

Abbreviations:

AQIS : Australian Quarantine Inspection Service
STANZHD: State and Territories of Australia New Zealand Health Departments

Reference:

AU1 Maximum limits of these toxins are listed in Australia New Zealand. Food Standard Code: Standard 1.4.1 – Contaminants and Natural Toxicants.

AUSTRIA [AT]

Abbreviation:

MA: Ministry of Agriculture

References:

AT1 CEN-Method prEN 14123.

AT2 Lew, et al. (2001). Clean-up by Romer-column, silylation, GC-ECD. Die Bodenkultur 52 (3): 199-207.

AT3 Schuhmacher, et al. (1998). Clean-up by immunoaffinity column, HPLC. Fresenius J. Anal. Chem. 360: 241-245.

BANGLADESH [BD]

Abbreviations:

MFL: Ministry of Fisheries and Live Stock
MHF: Ministry of Health and Planning
EIA: Enzyme Immuno Assay

References:

BD1 Ridascreen Fast Aflatoxin kit, R-Biopharm GmbH, D-Darmstadt, Germany. Enzyme immunoassay for quantitative determination of aflatoxin.

BD2 Giasuddin, et al. (2002). Prevalence of poultry disease in Bangladesh. Journal of Bio. Sci. 2002: 212-213.

BD3 Motalib Khan, Khamar (2001). Ochratoxin, the silent killer of poultry. Monthly magazine on poultry livestock & fisheries, March 2001: 17-18.

BELARUS [BY]

Abbreviation:

MPH: Ministry of Public Health

References:

BY1 Hygienical requirements for food product safety and quality.
Sanitarian Code RB 98: 70, 72-74, 76, 79, 80, 81, 98-101, 112, 116, 133, 160.

BY2 Hygienical requirements for food product safety and quality.
Sanitarian Code RB 98: 85, 90, 92.

BY3 Hygienical requirements for food product safety and quality.
Sanitarian Code RB 98: 70, 81, 112, 160, 72-75.

BY4 Hygienical requirements for food product safety and quality.
Sanitarian Code RB 98: 70, 72-75, 160.

BOSNIA & HERZEGOVINA [BA]

References:

BA1 Article 57, Federal Register no.2, 1980, Sluzbeni list Socijalisticka Federation Republika Jugoslavija 2/1980.

BA2 Instruction for sampling methods of foodstuffs/ Federal Register no. 60/1978 Sluzbeni list SFRJ br. 60/1978.

Abbreviation:

FCLHSW: Federal Commission Labour Health Social Welfare

BRAZIL [BR] (see also MERCOSUR)

Abbreviations:

MPH: Ministry of Public Health
MA: Ministry of Agriculture

References:

BR1 Ministry Health (1977). Resolução Nº 34/76, CNNPA/MS – Diário Official da União, 19/01/1977 – Seção I: 710.

BR2 Journal AOAC (1989) 72: 22-26 (TLC).

BR3 AOAC (1990). Official Methods of Analysis, 15th ed. (TLC or HPLC).

BR4 Ministry Agriculture (1988). Portaria Nº 07/88, MAA - Diário Official da União, 14/11/1988, Seção I: 21968-21974.

MERCOSUR

ME1 Mercosul/GMC/Res No 56/94.

ME2 FAO (1993). Food and Nutrition Paper 55.

ME3 (1979). International Standard ISO 950.

ME4 Cereals – Sampling (as grain).

ME5 Walting AE (1980). JAOAC 63: 103-106.

ME6 FIL-IDF (1985). International IDF Standard 50B. Milk and Milk Products (and/or current).

ME7 AOAC (1990). Official Methods of Analysis, 15th ed. 968.22 and/or current.

ME8 AOAC (1990). Official Methods of Analysis, 15th ed. 970.44 and 971.22 (standards).

ME9 AOAC (1990). Official Methods of Analysis, 15th ed. 970.45 and/or current.

ME10 AOAC (1990). Official Methods of Analysis, 15th ed. 980.21 and/or current.

BULGARIA [BG]

Abbreviations:

MH: Ministry of Health
MAF: Ministry of Agriculture and Forestry

References:

BG1 Ministry of Health in coordination with the Ministry of Agriculture and Forestry, the Ministry of Industry and the State Standardization Agency (2000). Regulation No. 11/2000 of 11 July 2000 laying down the maximum levels of mycotoxins in foodstuffs. Official Newspaper of the Republic of Bulgaria No. 58: 18-24.

BG2 Bulgarian State Standard Method BDS 16254-85.

BG3 Bulgarian State Standard Method BDS 16254-85. C-IAC with fluorometric determination.

BG4 AOAC (1995). Official Methods of Analysis of the AOAC, 16th Edition, Chapter 49, Method 973.37. Ochratoxins in Barley, C-IAC with fluorometric determination.

BG5 (1993). ISO 8128:2

BG6 Russian State Standard Method GOST 3940-85
AOAC (1995). Official Methods of Analysis of the AOAC, 16th Edition, Chapter 49, Method 986.17. Deoxynivalenol in wheat.

BG7 IAC with fluorometric determination.

BG8 (2001). BDS ISO 6870.

CANADA [CA]

Abbreviations:

HC: Health Canada
CFIA: Canadian Food Inspection Agency

References:

CA1 Tolerance under Canadian Food and Drugs Act and Regulations B.01.046 (1) and (n) and B.01.046 (2).

CA2 Guideline under Canadian Food and Drugs Act and Regulations, part 4a.

CA3 Codex Standard 209, Rev. 1, 2001.

CA4 Canadian Grain Commission; Official Grain Grading Guide. Standard Procedures for Grain Inspection as specified by the CGC.

CA5 Unofficial sampling plan of Health Canada [HC].

CA6 Health Protection Branch manual of Official Methods of Analysis – HPB-FC-14, June, 1993.

CA7 Canadian Grain Commission; analytical method for aflatoxins, ochratoxins and zearalenone in grains by HPLC with fluorescence detection.

CA8 Health Protection Branch Methods of Analysis, LPFC-155 (DON in wheat and soybeans) and LPFC-144 (DON in cereals).

CA9 Mass Spectral Investigations on Trichothecene Mycotoxins. 1. Application of Negative Ion Chemical Ionization Techniques for the Simultaneous and Accurate Analysis of Simple Trichothecenes in Picogram Levels, J. of Biomedical and Environmental Mass Spectrometry 13: 503 (1986).

CA10 Methods for the determination of Deoxynivalenol and other Trichothecenes in Foods, G.A. Lombaert in Mycotoxins and Food Safety, Advances in Experimental Medicine and Biology, Vol. 504, Kluwer Academic / Plenum Publishers, NY, 2002.

CA11 Canadian Grain Commission analytical method for determination of Fusarium trichothecenes in grain by GC-MS.

CA12 Canadian Feeds Act and Regulations (1983), Section 19 (1) (I).

CA13 Mycotoxin Factsheet 2000.

CA14 Feed Inspection Manual, May 1994.

CA15 AOAC Official Method 991.31.

CA16 JAOAC Int., 83, 1377 (2000).

CA17 CFIA SOP, extraction with acetonitrile/water (84/16), cleanup with Romer MycoSep 227, trifluoroacyl derivatives, GC/MS (ion-trap using acetonitrile CI).

CA18 CFIA SOP, extraction with acetonitrile/water (90/10), cleanup with IAC, LC/fluorescence detection.

CHILE [CL]

Abbreviations:

MPH: Ministry of Public Health
MA: Ministry of Agriculture

References:

CL1 For food established in the Sanitary Regulations of Foods.

CL2 Procedure NCh 1479 (1979) for food and feed.

CL3 For feed established in the Resolution 736. Ministry of Agriculture: Servicio Agricola y Ganadero.

CHINA [CN]

Abbreviation:

MH: Ministry of Health

References:

CN1 The compilation of food hygiene standards (1991). Chinese Standards Publishing House.
Hygienic standards of food additive-red rice, 360.
Hygienic standards of food additive-a-amylase preparation, 401.
Hygienic standards of food additive-glucoamylase preparation, 402.
Hygienic standards of irradiated peanut, 503-504.
Hygienic standards of irradiated rice, 509-510.
Hygienic standards of food for infants and young children-infant formula-soybean, 650-654.
Hygienic standards of food for infants and young children-infant formula-"5410", 655-659.
Hygienic standards of food for infants and young children- formulated weaning foods, 660-665.

CN2 Handbook of food hygiene standards [section of food hygiene standards] (1996). Chinese Standards Publishing House.
Hygienic standards of fermented bean products, 157.
Hygienic standards of starch products, 158.
Hygienic standards of edible vegetable oil, 163-164.
Hygienic standards of soybean sauce, 165.
Hygienic standards of grain paste, 166.
Hygienic standards of vinegar, 167.
Hygienic standards of fermented wine, 220-221.
Tolerance limits of Aflatoxin B_1 in foods, 269.
Hygienic standards of batter cake, 316-317.
Hygienic standards of pastry, biscuit and bread, 318-319.

Tolerance limits of Aflatoxin M_1 in milk and milk products, 377.
Hygienic standards of salad oil. Chinese Standards Publishing House: 473-474.
Hygienic standard for tolerance limits of patulin in apple and hawthorn products, 561-563.
Tolerance limits of Aflatoxin M_1 in foods for infant and young children-infant formula milk powder, 776-784.
Tolerance limits of Aflatoxin M_1 in foods for infant and young children-infant formula milk powder, 785-794.

CODEX ALIMENTARIUS

Abbreviation:

CCFAC: Codex Committee on Food Additives and Contaminants

References:

CC1 Maximum level and sampling plan for total aflatoxins in peanuts intended for further processing. CODEX STAN 209-1999, Rev.1-2001: 5 pp.

CC2 Maximum level for patulin, CODEX STAN -2003, pre-publication.

CC3 Maximum level for aflatoxin M_1 in milk, CODEX STAN 232-2003.

COLOMBIA [CO]

Abbreviations:

MH: Ministry of Health
MA: Ministry of Agriculture

References:

CO1 Instituto Colombiano de Normas Técnicas, ICONTEC. Document NTC 3581.

CO2 NTC366.

CO3 Instituto Colombiano de Normas Técnicas, ICONTEC. Document NTC 740: Livestock Industry – Animal Food - Sampling.

CO4 Diaz GJ, Perilla NS and Royas Y (2001). Occurrence of aflatoxins in selected Colombian foods. Mycotoxin Research, 17: 15-20.

CO5 NTC 535-1.

CO6 NTC 535-2.

CO7 Instituto Colombiano de Normas Técnicas, ICONTEC. Document NTC 602.

CO8 Agropecuario, ICA. Document No. DIP-3-100-002.
CO9 Céspedes AE and Diaz GJ (1997). Analysis of aflatoxins in poultry and pig feeds and feedstuffs used in Colombia. J. of AOAC Int., 80:1215-1219.

CO10 Diaz GJ and Céspedes AE (1997). Natural occurrence of zearalenone in feeds and feedstuffs used in poultry and pig nutrition in Colombia. Mycotoxin Research, 12: 81-87.

COTE d'ÍVOIRE [CI]

Abbreviations:

MPH: Ministry of Public Health
MAP: Ministry of Animal Production
MC: Ministry of Commerce

CROATIA [HR]

Abbreviation:

MPH: Ministry of Public Health

References:

HR1 Rhône Diagnostics Technologies and TLC, HPLC.

HR2 Rhône Diagnostics Technologies and TLC, HPLC.

HR3 AOAC (1990). Official Methods of Analysis, 974.18.

HR4 Rhône Diagnostics Technologies and HPLC.

CUBA [CU]

Abbreviations:

MPH/ INHA: Ministry of Public Health/Instituto de Nutricion e Higiene de los Alimentos
MA: Ministry of Agriculture

References:

CU1 Ministerio de Salud Pública (1999). Manual de indicadores empleados en la evaluación sanitaria de alimentos. Instituto de Nutrición e Hygiene de los Alimentos (INHA), Diciembre de 1999.

CU2 NC76-06: 85.

CU3 (1991). Determinación de patulina en frutas frescas y conservas. Rev. Cub Alim.Nutr. No. 2.

CU4 Otero E, Arias JA, Sersa R (2001). Presencia de patulina en purés y jugos de frutas. Rev. Alimentaria No. 321: 133.5.

CU5 Otero E, Arias JA, Sersa R. España Validación de un método para la determinación de patulina en purés y jugos de frutas por HPLC. Rev. Cub. Alim. y Nutr. (En prensa).

CU6 Arauce Calderius, Lic. JJ (2002). Determinación de fumonisina B_1 en harina de maíz. Tésis de Maestría en Nutrición. INHA, abril 2002.

CU7 Methodo Modif. Trucksess.

CYPRUS [CY]

Abbreviations:

MH: Ministry of Health
MANRE: Ministry of Agriculture Natural Resources & Environment

References:

CY1 Acquis Communautaire. EC Regulation No. 1528/98.

CY2 EU Directive 98/53/EC.

CY3 AOAC (2000). Official Method 991.31.

CY4 Acquis Communautaire.

CY5 Kakouri E, et al. (1995). Food & Agriculture Immunology 7: 131-137.

CY6 (1993, 2001).Feedingstuffs and Feed Additives (Control of Quality, Supply and Use). Law 13 (I) of 1993 & 34 (I) of 2001, harmonized to the relevant Acquis Communautaire.

CY7 AOAC methods 2000.

CY8 EU method.

CY9 AOAC methods 2000.

CZECH REPUBLIC [CZ]

Abbreviations:

MAH: Ministry of Agriculture and Health

MA: Ministry of Agriculture

References:

CZ1 Czech Republic Law Collection (2002). Chemical requirements on health unexceptionality of food and food raw materials. Decree No. 53/2002 Coll.

CZ2 Czech Republic Law Collection (2001). Decree No. 339/2001 Coll.

CZ3 Adensam L, Lebedová M, Turek B (1986). Determination of very low concentrations of aflatoxins. Cs. Hyg. 31, 5.

CZ4 AOAC Official Methods of Analysis.

CZ5 Adensam L, Lebedová M, Turek B (1989). Determination of ochratoxin A in children and infant children food. Cs. Hyg. 3, 1.

CZ6 Atelier du Travail International sur l'Ochratoxine A (UNESCO, FAO, IUPAC, ICSU) [1995] de protocoles pour l'analyse de l'ochratoxine A. Tunisie, Sousse, Faculté de Médecine, 14-17.11: 1-28.

CZ7 Manual of the OCHRAPREP® immunoaffinity columns, Rhone-diagnostics technologies Ltd.

CZ8 Manual of the ROMER MycoSep^{TM} DON-Column, Coring System Diagnostics GmbH.

CZ9 Adensam L, Lebedová M, Turek B (1987). Determination of very low concentrations of aflatoxins – Monitoring of aflatoxins in milk for infant children. Cs. Hyg. 32, 6.

CZ10 Ministry of Agriculture (2000). Decree No. 451/2000 Coll.

DENMARK [DK]

Abbreviation:

DVFA: Danish Veterinary and Food Administration

Reference:

DK1 Legal basis for OA legislation: Circular letter of 20 November 1980.

EGYPT [EG]

Abbreviation:

MA: Ministry of Agriculture

Reference:

EG1 Egyptian Standard UDC 615.91. Maximum Limits for Mycotoxin. In Foods Part I: Aflatoxin.

ESTONIA [EE]

Abbreviations:

VFB: Veterinary and Food Board
PPI: Plant Production Inspectorate

References:

EE1 Regulation of the Government of the Republic (2000). Establishment of the list and permitted limits of permitted contaminants by food group No. 14 of 12 January 2000. Official Journal of Estonia Riigi Teataja (RT I, 2000, 6, 38).

EE2 Regulation of the Government (2000). The methods of sampling and analysis for determination of aflatoxins in foodstuffs No. 334 of 18 October 2000.

EE3 The list of undesirable substances and the maximum allowed quantities for the content thereof in feedingstuffs, containing undesirable substances of feed materials, which exceed the maximum allowed quantities for the manufacture of feedingstuffs. No. 54 of 17 June 2002.

EE4 The procedure for taking of control samples from feedingstuffs. No. 43 of 13 June 2002.

EUROPEAN UNION [EU]

References:

EU1 Commission Directive 2003/13/EC of 10 February 2003 amending Directive 96/5/EC on processed cereal-based foods and baby foods for infants and young children. Official J. European Union L 41 (2003) 33-36.

EU2 Commission Regulation (EC) No 466/2001 of 8 March 2001 setting maximum levels for certain contaminants in foodstuffs. Official J. European Commun. L 77 (2001) 1-13.

EU3 Commission Regulation (EC) No 2174/2003 of 12 December 2003 amending Regulation (EC) No 466/2001 as regards aflatoxins. Official J. European Union L 326 (2003) 12-15.

EU4 Commission Regulation (EC) No 472/2002 of 12 March 2002 amending Regulation (EC) No 466/2001 setting maximum levels for certain contaminants in foodstuffs. Official J. European Commun. L 75 (2002) 18-20.

EU5 Commission Regulation (EC) No 1425/2003 of 11 August 2003 amending Regulation (EC) No 466/2001 as regards patulin. Official J. European Union L 203 (2003) 1-3.

EU6 Draft Commission Recommendation on the reduction of the presence of deoxynivalenol in cereals and cereal products. SANCO /1925/00-rev-1 pp. 5 .

EU7 Commission Directive 98/53/EC of 16 July 1998 laying down the sampling methods and the methods for analysis for the official control of the levels for certain contaminants in foodstuffs. Official J. European Commun. L 201 (1998) 93-101.

EU8 Commission Directive 2002/27/EC of 13 March 2002 amending Directive 98/53/EC laying down the sampling methods and the methods of analysis for the official control of the levels for certain contaminants in foodstuffs. Official J. European Commun. L 75 (2002) 44-45.

EU9 Commission Directive 2002/26/EC of 13 March 2002 laying down the sampling methods and the methods of analysis for the official control of the levels of ochratoxin A in foodstuffs. Official J. European Commun. L 75 (2002) 38-43.

EU10 Commission Directive 2003/78/EC of 11 August 2003 laying down the sampling methods and the methods of analysis for the official control of the levels of patulin in foodstuffs. Official J. European Union L 203 (2003) 40-44.

EU11 Commission Recommendation of 11 August 2003 on the prevention and reduction of patulin contamination in apple juice and apple juice ingredients in other beverages. Official J. European Union L 203 (2003) 54-59.

EU12 Commission Directive 2003/100/EC of 31 October 2003 amending Annex I to Directive 2002/32/EC of the European Parliament and of the Council on undesirable substances in animal feed. Official Journal of the European Union L 285 (2003) 33-37.

EU13 Council Directive 1999/29/EC of 22 April 1999 on the undesirable substances and products in animal nutrition. Official J. European Commun. L 115 (1999) 32- 46.

EU14 EC-directive 76/371/01.03.1976. Official J. European Commun. L 102 (1976) 8.

EU15 Seventh Commission Directive of 1 March 1976 establishing Community methods of analysis for the official control of feedingstuffs. EC-Directive 76/372/EEC. Official J. European Commun. L 102 (1976) 9-18.

EU16 Commission Directive 92/95 EEC of November 9, 1992 amending the Annex of the Seventh Directive (76/372/EEC) establishing Community methods of analysis for the official control of feeding stuffs. Official J. European Commun. L 327 (1992) 54-62.

FINLAND [FI]

Abbreviations:

MAF [EELA]: Ministry of Agriculture and Forestry [National Veterinary and Food Research Institute]
MAF [KTTK]: Ministry of Agriculture and Forestry [Plant Production Inspection Centre]

MF [FC]: Ministry of Finance [Finnish Customs]
References:

FI1 Regulation by Ministry of Trade and Industry for food products not included in EU food legislation.

FI2 Official import control in Finland by customs.

FI3 Proposal prEN 14123.

FRANCE [FR]

Abbreviations:

DGCCRF: Direction Générale de la Concurrence, de la Consommation et de la Répression des Fraudes, Ministère de l'Economie, des Finances et de l'Industrie
DGAL: Direction Général de l'Alimention, Ministère de l'Agriculture et de la Pêche

References:

FR1 Avis du Conseil Supérieur d'Hygiène Publique de France du 8/12/1998.

FR2 CEN-NF EN 13585.

FR3 CEN-PrEN 14352.

GERMANY [DE]

Abbreviations:

BMVEL: Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft (Federal Ministry of Consumer Protection, Food and Agriculture) Ministry of Public Health
LMBG: Lebensmittel- und Bedarfsgegenständegesetz (Act on Food and Commodities)

References:

DE1 Mykotoxin – Höchstmengenverordnung. (Ordinance laying down maximum levels for mycotoxins in foodstuffs). Das Deutsche Bundesrecht 834. Lieferung Oktober 1999.

DE2 Diätverordnung (Ordinance on dietetic foodstuffs). Das Deutsche Bundesrecht 832. Lieferung September 1999.

DE3 Sampling based on § 42 LMBG considering Commission Directive 98/53/EC of 16 July 1998 [see EU6].

DE4 Sampling based on § 35 LMBG considering Commission Directive 98/53/EC of 16 July 1998 [see EU6].

GREECE [GR]

Abbreviations:

MA: Ministry of Agriculture
GCSL: General State Laboratory
EFET: Hellenic Food Authority

Reference:

GR1 Ministerial decision 91587/3.11.1992.

HONG KONG SPECIAL ADMINISTRATIVE REGION, CHINA [HK]

Abbreviation:

FEHD: Food and Environmental Hygiene Department of the Hong Kong SAR

References:

HK1 Harmful substances in Food Regulations, Cap. 132 of the laws of Hong Kong SAR.

HK2 Aflatoxin $B_1B_2G_1G_2$: In house method referenced to AOAC official method 991.31

HK3 Aflatoxin M_1: In house method referenced to AOAC official method 200.08

HUNGARY [HU]

Abbreviations:

MPH: Ministry of Public Health
MA: Ministry of Agriculture

Reference:

HU1 17/1999. (VI.16.) EüM Order and its amendment : 9/20003. (III.13.) ESZCSM Order's 3rd Annex.

INDIA [IN]

Abbreviations:

MHFW: Ministry of Health & Family Welfare
MFCS [DCS]: Ministry of Food and Civil Supplies [Department of Civil Supplies]

References:

IN1 Ministry of Health & Family Welfare, Government of India. Prevention of Food Adulteration Act (PFA) 1954 & Rules 1955.

IN2 Official method of sampling ISI 1548 (1981). Published by Bureau of Indian Standards.

IN3 Method for aflatoxin analysis – ISI 9071 Part I (1979). Published by Bureau of Indian Standards.

IN4 Licence under the solvent extraction oil, deoiled meal and edible flour (control) order 1967.

IN5 Indian Standards Institution IS: 1714 (1960) and IS: 4115 (1967).

INDONESIA [ID]

Abbreviation:

NADFC: National Agency of Drug and Food Control [BADAN POM]

References:

ID1 Hishashi Kamimura. Report in Indonesia.

ID2 (1985). Modification. Journal AOAC, Vol. 68, No. 3.

ID3 AOAC 1995 (by HPLC).

IRAN, ISLAMIC REPUBLIC OF [IR]

Abbreviations:

ISIRI: Institute of Standard and Industrial Research of the Islamic Republic of Iran
MOH: Ministry of Health and Medical Education
References:

IR1 National standard of Institute of Standard and Industrial Research of the Islamic Republic of Iran (ISIRI) [2002]. Maximum tolerated levels of mycotoxins in food and feeds. No. 5925.

IR2 National standard of Institute of Standard and Industrial Research of the Islamic Republic of Iran (ISIRI) [2002]. Code of practice for sampling of pistachio and pistachio kernel for aflatoxin analysis. No. 5197.

IR3 National standard of Institute of Standard and Industrial Research of the Islamic Republic of Iran (ISIRI) [2002]. Code for practice for sampling of agricultural products for aflatoxin analysis. No. 2581.

IR4 National standard of Institute of Standard and Industrial Research of the Islamic Republic of Iran (ISIRI) [2003]. Determination of aflatoxins (B_1, B_2, G_1 and G_2) in foodstuffs – Immunoaffinity column clean-up with thin-layer chromatography method. No. 6696.

IR5 National standard of Institute of Standard and Industrial Research of the Islamic Republic of Iran (ISIRI) [2003]. Determination of aflatoxins (B_1, B_2, G_1 and G_2) in foodstuffs – Immunoaffinity column clean-up with high performance liquid chromatography. In Press.

IR6 ISO [1997]. Sampling of milk and milk powder for aflatoxin analysis. No. 707.

IR7 ISO [1998]. Milk and milk powder – Determination of aflatoxin M_1 content – clean-up by immunoaffinity column and determination by high performance liquid chromatography. No. 14501.

IRELAND [IE]

Abbreviation:

FSAI: Food Safety Authority of Ireland

ISRAEL [IL]

Abbreviation:

MH: Ministry of Health

References:

IL1 AOAC Official Method Chapter 49 994.08, pages 24 – 24A.

IL2 VICAM Instruction Manual [publication foreseen].

IL3 ISO/CD 14501: 1995.

IL4 Journal of Chromatography (1993). A 654: 247-254.

IL5 VICAM. Zeara latest Instruction Manual.

ITALY [IT]

Abbreviations:

MH: Ministry of Health
RA&AP: Regional Authorities & Autonomous Provinces

References:

IT1 Ministry of Health (1999). Circular of the Ministry of Health no. 10, 9 June 1999, indicating limits for food matrix not included in Regulation, according to indication of the National Health Institute (ISS).

IT2 Ministry of Health (2000). The Decree of the Ministry of Health 23.12.2000, transposing Directive 98/53/EC, indicates methods of analysis for food products.

JAPAN [JP]

Abbreviations:

MHL&W: Ministry of Health, Labour and Welfare
MAF&F: Ministry of Agriculture, Forestry and Fisheries

Reference:

JP1 An analytical method for aflatoxins B_1, B_2, G_1 and G_2 in spices using a multifunctional column clean-up; Hiroshi Akiyama, Yukihiro Goda, Toshitsugu Tanaka and Masatake Toyoda, Journal of chromatography A 932 (2001) 153 – 157.

JORDAN [JO]

Abbreviation:

MH: Ministry of Health

Reference:

JO1 Minister of Finance and Customs Instructions (5/35/8251) 11.03.1981; letter of Minister of Health (48/37/2049)-03.03.1981.

KENYA [KE]

Abbreviation:

MH: Ministry of Health

References:

KE1 Foods, Drugs and Chemical Substances Regulations, Kenya Gazette, 01.07.1978.

KE2 Official Methods of Analysis, AOAC.

KOREA, REPUBLIC OF [KR]

Abbreviations:

KFDA: Korean Food and Drug Administration
MAF: Ministry of Agriculture & Forestry

References:

KR1 Korean Food and Drug Administration (2002). The food Index of Korea: pp 127.

KR2 Ministry of Agriculture and Forestry (2001). Specification on maximum allowance levels of harmful materials and chemical residues in animal feed: pp 4.

KR3 Ministry of Agriculture and Forestry [MAF]. Feed Manual.

KUWAIT [KW]

Abbreviation:

MH: Ministry of Health

Reference:

KW1 Aflatoxin M_1 concentration in commercial samples of milk and dairy products in Kuwait; Srivastava, Bu-Abbas, Alaa-Basuny, Al-Johar, Al-Mufti and Siddiqui, Food Additives and Contaminants 18 (2001) 993 – 997.

LATVIA [LV]

Abbreviation:

MA: Ministry of Agriculture

References:

LV1 Regulations of Cabinet of Ministers of Latvia. “About contamination of food”. No. 292.

LV2 AOAC 994.08.

LV3 Analytical instruction. R-biopharm ELISA test kit.
LV4 AOAC 995.10.

LITHUANIA [LT]

Abbreviation:

SFVS: State Food and Veterinary Service [Ministry of Health]
MA: Ministry of Agriculture

References:

LT1 Hygiene norm HN 54-2001.

LT2 The Director of the State Food and Veterinary Services and the Minister of Health (2002). Order No. 286/300, 24 June 2002.

LT3 The Minister of Health Order No.679, 24 December, 2002, laying down sampling and methods of analysis. Prepared according Commission Directives 98/53/EC of 16 July 1998 and 2001/22/EC laying down the sampling methods and the methods of analysis for the official control of the levels for certain contaminants in foodstuffs.

LT4 The order of the State Food and Veterinary Service No. B1-356, April 7, 2003. Sampling for monitoring of substances and residues in food of animal origin. Prepared according Commission Directives 96/23/EC.

LT5 RIDASCREEN. Aflatoxin B_1. Art. No. R 1201.

LT6 EUR 19027 EN (1999). Standard operation procedure for the determination of aflatoxins in various food matrixes by immunoaffinity clean-up and thin layer chromatography.

LT7 Determination of Aflatoxin B_1 by HPLC.
SOP 5.4.Ch.16: prepared according to J.Stroka, E.Anklam Project SMT-CT96-2045. Validation of Analytical Method to Determine the Content of Aflatoxins, 1997.

LT8 Determination of Aflatoxins B_1, B_2, G_1, G_2 by HPLC.
SOP 5.4.Ch.27: prepared according to J.Stroka, E.Anklam Project SMT-CT96-2045. Validation of Analytical Method to Determine the Content of Aflatoxins, 1997.

LT9 Immuno sorbent assay of total Aflatoxins B_1, B_2, G_1, G_2 in grain and feedingstuffs. SOP 5.4.Ch.20: prepared according to R 4701 RIDASCREEN Aflatoxin total.

LT10 Immuno sorbent assay of Ochratoxin A in grain and feeding stuff.
SOP 5.4.Ch.22: prepared according to R 1301 RIDASCREEN Ochratoxin A.

LT11 Immuno sorbent assay of Aflatoxin M_1 in milk and cheese.
SOP 5.4.Ch.21: prepared according to R 1101 RIDASCREEN Aflatoxin M_1.

LT 12 Immuno sorbent assay of DON (deoxynivalenol) in grains and feedingstuff.
SDP 5.4.Ch.24: prepared according to R 5906 RIDASCREEN DON.

LT13 Immuno sorbent assay of Zearalenone in grain and feedingstuff.
SOP 5.4.Ch.23: prepared according to R 1401 RIDASCREEN Zearalenone.

MACEDONIA, FORMER YUGOSLAV REPUBLIC OF [MK]

Abbreviation:

FCLHSW: Federal Committee for Labour, Health and Social Welfare

References:

MK1 Article 57, Federal Register no. 2, 1980, Slusbeni list Socijalisticka Federation Republika Jugoslavija 2/1980.

MK2 Instruction for sampling methods of foodstuffs/ Federal register no. 60/1978 Slusbeni.

MALAWI [MW]

References:

MW1 Letter of Malawi Bureau of Standards BS/1/1 of 24.06.1976.

MALAYSIA [MY]

References:

MY1 Food Regulations, 1985.

MALTA [MT]

Abbreviation:

DPH: Department of Public Health

References:

MT1 Draft legislation available on Malta Standards Authority website. http://www.msa.org.mt

MT2 European Community Directive 98/53/EC.

MAURITIUS [MU]

Abbreviation:

MHQL: Ministry of Health & Quality of Life

References:

MU1 Food regulations made under the Food Act 1998; Ninth schedule, regulation 62 (2) (c): maximum permissible quantity of mycological contaminants in food.

MEXICO [MX]

Abbreviation:

MPH: Ministry of Public Health

References:

MX1 Official Norm of cereals. Flour, seeds for human consumption. National control and imports. Norm NOM-147-SSA 1996. Official diary of Mexican Government, December 10th (1999).

MX2 Eppley method for peanuts and oilseeds.

MX3 Modified CB method for aflatoxin in corn and tortilla.

MX4 Aflatest. Official method.

MOLDOVA, REPUBLIC OF [MD]

Abbreviation:

MH: Ministry of Health

Reference:

MD1 Medico-biological regulations and sanitary norms of quality for food raw materials and food, approved by USSR Ministry of Health, ur. 5061-89 from 01.08.1989, revised by Russian Federation in 1996 and approved on 06.08.2000 by the Ministry of Health of the Republic of Moldova.

MOROCCO [MA]

References:

MA1 Ministère de l'Agriculture, du Dévéloppement Rural et des Eaux et Forêts. Project de circulaire sur les contaminants. Direction de la Protection des Végétaux, des Contrôles Techniques et de la Répression des Fraudes. Circulaire de discussion au niveau de la Commission Interministérielle Permanente pour le Contrôle et la Répression des Fraudes. Rabat [received May 2002]

MOZAMBIQUE [MZ]

Abbreviation:

MH: Ministry of Health

Reference:

MZ1 Codex Alimentarius limits.

NEPAL [NP]

Abbreviations:

MA: Ministry of Agriculture
DFTCC: Department of Food Technology and Quality Control

References:

NP1 Food Act 1966.

NP2 Romer mini-column method.

NP3 CB method of AOAC.

NP4 Feed Act 1976.

THE NETHERLANDS [NL]

Abbreviation:

CBAF: Commodity Board Animal Feedstuffs

References:

NL1 Productschap Diervoeder. Maximale normstelling DON. Besluit Productschap Diervoeder, PDV 2098, PDV, Den Haag, The Netherlands.

NEW ZEALAND [NZ]

See Australia

NIGERIA [NG]

Abbreviation:

NAFDAC: National Agency for Food and Drug Administration and Control

References:

NG1 National Agency for Food and Drug Administration and Control (NAFDAC) Decrees: SON (Standards Organisation of Nigeria) Industrial Standard.

NG2 AOAC methods

NORWAY [NO]

Abbreviations:

MHAF: Ministry of Health, Agriculture and Fisheries
SNT: Norwegian Food Control Authority

OMAN [OM]

Abbreviation:

MCI: Ministry of Commerce and Industry

References:

OM1 Omanian Standard 46/1984 "Annex B: Prescribed Limit for harmful substances in compound animal feeds" Official Gazette 7/2/14054 of 01.11.1984.

OM2 Omanian Standard 48 "Methods of Sampling Animal Feeds".

PERU [PE]

Abbreviations:

MPH: Ministry of Public Health (for processed products)
MA: Ministry of Agriculture (for raw products)

THE PHILIPPINES [PH]

Abbreviations:

DA-BAI: Department of Agriculture, Bureau of Animal industry
PHILCOA: Philippine Coconut Authority

References:

PH1 Action Levels for Contaminants in Food; Food, Drug and Devices, and Cosmetics Act (R.A. 3720).

PH2 Inform client-example FAO sampling plan.

PH3 AOAC and Chromatographia.

PH4 Philippine Coconut Authority (PHILCOA), Diliman Quezon City, Phillippines. Implementing guidelines of board resolution No. 034-91, prohibiting exports of copra meal, copra cake and copra pellets containing aflatoxin level of more than twenty parts per billion (20 ppb). Administrative Order No. 03, series of 1991.

POLAND [PL]

Abbreviations:

MA: Ministry of Health
MARD: Ministry of Agriculture Rural Development

References:

PL1 Ministry of Health (2001). Regulation of 27 December 2001, Dz.U. No. 9, 72.

PL2 European Commission (1996). National Veterinary Residue Control Plan according to Council Directive 96/23/EC of 29 April 1996 on measures to monitor certain substances and residues thereof in life animals and animal products (organized by the Ministry of Agriculture and Rural Development).

PL3 Polish Standard (2001). Foodstuffs – Determination of aflatoxin B_1 and the sum of aflatoxins B_1, B_2, G_1 and G_2 in cereals, shell-fruits and derived products – High performance liquid chromatographic method with post column derivatization and immunoaffinity column clean-up. PN-EN-12955.

PL4 Postupolski J, Jankowska B, Urbanek-Karlowska B (1996). Ocena metody oznaczania aflatoksyn w orzechach arachidowych przy uzyciu chromatografii powinowactwa immunologicznego z detekcja. Roczn. PZH, 47, 3: 277-283.

PL5 Polish Standard (2000). Foodstuffs – Determination of ochratoxin A in cereals and cereal products – Part 1: High performance liquid chromatographic method with silica gel clean up. PN-EN-ISO-15141-1.

PL6 Polish Standard (2000). Foodstuffs – Determination of ochratoxin A in cereals and cereal products – Part 2: High performance liquid chromatographic method with bicarbonate clean up. PN-EN-ISO-15141-2.

PL7 Polish Standard (1997). Apple juice - Apple juice concentrates and drinks containing apple juice – Determination of patulin content – Part 1: Method using high-performance liquid chromatography. PN-ISO 8128-1.

PL8 Polish Standard (1997). Apple juice - Apple juice concentrates and drinks containing apple juice – Determination of patulin content – Part 2: Method using thin-layer chromatography. PN-ISO 8128-2.

PL9 Polish Standard (2002). Milk and milk powder – Determination of aflatoxin M_1 content – Clean up by immunoaffinity chromatography and determination by high-performance liquid chromatography. RPr. PN-ISO-14501.

PL10 Czerwiecki L (1998). Oznaczanie wybranych mikotoksyn w zywnosci. Cz. I. Dobór optymalnych warunków oznaczania aflatoksyny M1 w mleku metoda wysokosprawnej chromatografii cieczowej. Roczn. PZH, 49, 1: 1-11.

PL11 Polish Standard (1994). Animal feedingstuffs - Aflatoxins admissible content and determination. PN-R-64757.

PL12 Polish Standard (2001). Animal feedingstuffs – Determination of aflatoxin B_1 content of mixed feedingstuffs – Method using high performance liquid chromatography. PN-ISO-14718.

PL13 Kozak A, Wisniewska-Dmytrow H, Zmudzki J (1995). Oznaczanie zawartosci aflatoksyny B_1 w paszach metoda immunoenzymatyczna – Ocena testu Ridascreen® Aflatoxin B_1. Bromat. Chem. Toksykol. XXVIII, 4: 383-387.

PL14 Polish Standard (1994). Animal feedingstuffs -Aflatoxins admissible content and determination. PN-R-64757.

ROMANIA [RO]

Abbreviation:

MAFF: Ministry of Agriculture, Food and Forests; National Sanitary Veterinary Agency; Hygiene Institute of Public Veterinary Health

References:

RO1 Health Ministry (1998). Order no. 975/1998, article 100. Official Journal 268/11-06-1999: 47 pp.

RO2 Ministry of Agriculture, Food and Forests (1995). Order no. 186/22-9-2000. Official Journal of Romania no. 179/1995, part 1: 28 pp.

RO3 AOAC Official method 970.44. Standard preparation for mycotoxins through TLC.

RO4 AOAC Official method 977.16. Sampling and preparation of samples for determination of mycotoxins through TLC.

RO5 AOAC Official method 978.15. Aflatoxin B_1 in eggs through TLC.

RO6 AOAC Official method 982.96 for aflatoxin M_1 determination from liver.

RO7 ELISA test method provided with the kit test.

RO8 AOAC Official method 980.21. M_1 aflatoxins in milk and cheese by TLC.

RO9 SR ISO 6651-93. Determination of aflatoxin B_1 content from feeds.

THE RUSSIAN FEDERATION [RU]

Abbreviation:

MH: Ministry of Health

Reference:

RU1 Sanitary Rules and Standards, Moscow (1997). Hygienic requirements for quality and safety of food raw materials and food products. SanPiN 2.3.2.560-96. Official publication.

SENEGAL [SE]

Abbreviations:

MC: Ministry of Commerce
MPH: Ministry of Public Health

References:

SE1 Journal Officiel de la République du Sénégal.

SE2 EC-directive 76/372/01.03.1976. Official Journal EC L102/9, 1976.

SAUDI ARABIA [SA]

Abbreviation:

SASO: Saudi Arabian Standard Organisation

Reference:

SA1 Aflatoxin M1 concentration in commercial samples of milk and dairy products in Kuwait; Srivastava, Bu-Abbas, Alaa-Basuny, Al-Johar, Al-Mufti and Siddiqui, Food Additives and Contaminants 18 (2001) 993 – 997.

SERBIA AND MONTENEGRO [YU]

Abbreviations:

MPH: Ministry of Public Health
MA: Ministry of Agriculture

References:

YU1 Regulations on amounts of pesticides, metals and other toxic substances, anabolics and other toxic substances, in foodstuff (1992).

YU2 Guide on sampling method for analysis and superanalysis of samples of food and general use items (60/78 – 1980).

YU3 AOAC methods.

YU4 Regulations of maximum permissible concentrations of toxic and harmful ingredients in feedstuff (1990).

YU5 Regulation on sampling method and physical, chemical and microbiological analysis of feed (15/87 – 1987).

SINGAPORE [SG]

Abbreviation:

AVA: Agri-Food and Veterinary Authority

References:

SG1 Regulation 34 of the Singapore Food Regulations.

SG2 AOAC International, 17th Edition, 990.33.

SG3 JAOAC (1992), Vol. 3: 481.

SG4 Food & Agricultural Immunology (1990). Vol.2: 189-195.

SG5 JAOAC (1978). Vol. 61, 6: 1359-1362.

SG6 J. Chromatography A (1999). 859: 23-28.

SG7 JAOAC International (1997). 80: 825-828.

SG8 VICAM, ZearalaTest HPLC Document.

SG9 J. Chromatography A (1987). Vol. 407: 393-398.

SLOVAKIA [SK]

Abbreviations:

MA: Ministry of Agriculture
MH: Ministry of Health

References:

SK1 Food Codex of Slovak Republik. Registered in Collection of Laws from 29 June 1996.

SK2 ELISA test [Standard Operating Protocol].

SLOVENIA [SI]

Abbreviations:

MHHI: Ministry of Health, Health Inspectorate
VARS: Veterinary Administration of Republic Slovenia
MAFF: Ministry of Agriculture, Forestry and Food

References:

SI-1 Rules on contaminants in foodstuffs (OJ RS 69/2003, 16.07.2003).

SI-2 Immunoaffinity columns, HPLC, Kobra cell (Rhone Diagnostics).

SI-3 AOAC, immunoaffinity columns, HPLC (Rhone Diagnostics).

SI-4 Rules on the Sanitary Suitability of Feedingstuffs (OJ RS 65/2002).

SI-5 Rules on the method of sampling and analysis for the official control of feedingstuffs. (OJ RS 41/2003, 05.05.2003).

SI-6 Rules on the method of analysis for the official control of feedingstuffs (OJ RS 73/2003, 29.07.2003; - in accordance with CD 76/372 EEC and 94/14 EEC).

SI-7 AOAC (1995). 16th Ed. Combination with Romer minicolumns.

SI-8 Easi-Extract Zearalenone, Application of immunoaffinity columns for sample clean-up prior to detection of zearalenone using HPLC analysis, Rhone Diagnostics, EE Zearalenone IFU (RP91v7). Doc 27-10-99.

SI-9 Rood HD et al. (1988). Gas chromatographic screening method for T-2 toxin, DAS, DON and related trichothecenes in feeds. Journal of AOAC 71, 493-498.

SI-10 AOAC (1995). Analysis method for Trichothecenes. DON, 3-Acetyl-DON, 15-Acetyl-DON, FUS X, NIV by TLC, Romer; 3 Toxin Test – Analysis Method for Aflatoxin B_1, Zearalenone and Deoxynivalenol, Romer, AOAC, 16th Ed.

SOUTH AFRICA [ZA]

Abbreviation:

DH: Department of Health

Reference:

ZA1 Regulations R.313 of 16 February 1990, published under the Foodstuffs, Cosmetics and Disinfectants Act (Act 54 of 1972).

SPAIN [ES]

SRI LANKA [LK]

Abbreviations:

MA: Ministry of Agriculture
MH: Ministry of Health

Reference:

LK1 Food (Labelling & Miscellaneous) Regulations 1993.

THE SUDAN [SD]

Abbreviation:

SSMO: not given

SWEDEN [SE]

Abbreviations:

NFA: National Food Administration
SBA: Swedish Board of Agriculture

References:

SE1 SLVFS 1993:36.

SE2 SLVFS 2002:16, annexes 1 & 2.

SE3 SLVFS 2000:43.

SE4 SLVFS 1993 :17, annex 15.

SWITZERLAND [CH]

Abbreviation:

OFCACS: Official Food Control Authorities of the Cantons of Switzerland
EVD: Eidgenössische Volkswirtschaftsdepartement

References:

CH1 Verordnung über Fremd- und Inhaltsstoffe in Lebensmitteln. SR817.021.23, see http://www.admin.ch/ch/d/sr/c817_021_23.html

CH2 Verordnung über Probenerhebung von Lebensmitteln und Gebrauchsgegenständen. SR817.94, see http://www.bk.admin.ch/ch/d/sr/c817_94.html

CH3 Schweizerisches Lebenmittelbuch. Ausgabe 2002, Deutsche Version, Kapitel 54.

CH4 CEN-methods.

CH5 Verordnung des EVD vom 10. Juni 1999 über die Produktion und das Inverkehrbringen von Futternmitteln, Zusatzstoffen für die Tierernährung, Silierungszusätzen und Diätfuttermitteln (Futtermittelbuch-Verordnung, FMBV). SR916.307.1, Artikel 15 und Artikel 17 (Anhang 10, Teil 1, Aflatoxin B_1) (available at www.admin.ch/ch/d/sr/c916_307_1.html).

SYRIAN ARAB REPUBLIC [SY]

Abbreviations:

MS: Ministry of Supply
MH: Ministry of Health
MA: Ministry of Agriculture

TAIWAN PROVINCE OF CHINA [TW]

Abbreviations:

DH: Department of Health
CA: Council of Agriculture

References:

TW1 Standard for the tolerance of aflatoxin in foods. DOH Food No. 8189322 Announced, 1/4/1993.

TW2 Sanitation Standard for Infant Foods. DOH Food No. 8189322. Announced, 1/4/1993.

TW3 Chinese National Standard, General No. 12925, Classified No. N6233, Method of Test for Grains-Sampling.

TW4 AOAC official method 991.31.

TW5 Lin SS, Lin FM, Fu YM, Shih YC (2002). Survey of Aflatoxins of Peanut Products in Taiwan. Ann. Rept. NLFD Taiwan, R.O.C. 20: 257-262.

TW6 Chinese National Standard, General No. 4090, Classified No. N6097, Method of Test for Aflatoxins in Foods.

TW7 Lin SS, Lai CL, Fu YM, Shih YC. Analysis of ochratoxin A of cereals by Reversed Phase HPLC with fluorescence detector (unpublished).

TW8 AOAC official method 995.10.

TW9 Lai CL, Fu YM, Shih YC (2000). Determination of Mycotoxin Patulin in Apple Juice. Journal of Food and Drug Analysis 8 (2): 85-96.

TW10 Journal of AOAC Int. (1995). 78: 705-710.

TW11 Chung YJ, Fu YM. Assay of mycotoxin fumonisins in foods (unpublished).

TW12 Chinese National Standard, General No. 3440, Classified No. 6056, Method of Test for Milk and Milk Products-General Rules.

TW13 Journal of AOAC Int. (2001). 84: 437-443.

TW14 Fu YM (1996). Determination of aflatoxin M_1 in milk and milk powder using immuno-affinity column and fluorescence measurement. Journal of Food and Drug Analysis 4 (2): 178-183.

TW15 Chinese National Standard, General No. 13631, Classified No. N6282, Method of Test for Milk and Milk Products-Test for Aflatoxins M_1 and M_2 in Fluid Milk.

TANZANIA, UNITED REPUBLIC OF [TZ]

Abbreviation:

NFCC: National Food Control Commission of the Ministry of Health

References:

TZ1 The Food (Control of Quality / Importation of Food) Regulations (1982).

TZ2 Sampling of Agricultural Products and their analysis for Aflatoxin Determination Manual (1989) FAO/UNEP/USSR Tanzanian Project FP/7101/86/03, Centre for International Projects, USSR State Committee for Environment Protection, Moscow.

TZ3 AOAC and ROMER Methods.

THAILAND [TH]

Abbreviation:

MPH-FDA: Ministry of Public Health – Food and Drug Administration
References:

TH1 Notification of Ministry of Public Health No. 98 B.E. 2529. Re: Standard of food containing contaminants.

TH2 Notification of Ministry of Public Health No. 193 B.E. 2543 and its amendment Notification No. 239 B.E. 2544. Re: Prescribing the methods of production, tools and utensils, used in the production and storage of food.

TUNISIA [TN]

Abbreviations:

MH: Ministry of Health
ANCSEP: National Agency for the Sanitary Control for Products

References:

TN1 Official Journal of the Republic of Tunisia. Standard NT 117.02 – 1985.

TN2 EEC published methods.

TURKEY [TR]

Abbreviation:

MARA: Ministry of Agriculture and Rural Affairs

References:

TR1 Turkish Food Codex Regulation. 1997. Official Gazette (16 November 1997) No. 23172: 1-198 and the amendments to this Codex Regulation: Official Gazette (23 September 2002) No. 24885: 29-40.

TR2 AOAC Official Method 999.07 (2000). Aflatoxins and total aflatoxins in peanut butter, pistachio paste, fig paste and paprika powder. Immunoaffinity column-liquid chromatography with post-column derivatization. First action 1999. J AOAC Int. 83: 320.

TR3 AOAC Official Method 2000.16. Aflatoxin B_1 in Baby Food. AOAC Official Methods of Analysis; Chapter 49: 37.

TR4 ISO 14501. Milk and milk powder. Determination of aflatoxin M1 content; clean-up by immunoaffinity chromatography and determination by high-performance liquid chromatography. First edition 1998-11-15.

TR5 Entwisle C, et al. (2000). Liquid Chromatographic Method with Immunoaffinity Column Cleanup for Determination of Ochratoxin A in Barley. AOAC Official Method 2000.03. J. AOAC Int. 83: 1377.

TR6 Ochratest. Procedure for Currants and Raisins. Vicam Ochratest. HPLC Procedure.

TR7 ISO 8128-1 (1993). Apple juice, apple juice concentrates and drinks containing apple juice. Determination of patulin content. Part 1: Method using high-performance liquid chromatography.

TR8 MAFF-UK. Survey of Aflatoxin M_1 in Retail Milk and Milk Products. CSL Food Science Laboratory. Norwich Research Park, Colney. Norwich NR4 7UQ. Report No. FD 94/98A.

TR9 Official Gazette (1991). (5 August 1991) No. 20982.

TR10 Stroka J, Von Holst C, Anklam E (2003). Immunoaffinity Column Cleanup with Liquid Chromatography Using Post-Column Bromination for Determination of Aflatoxin B_1 in Cattle Feed: Collaborative Study. AOAC Official Method 2000.02. J. AOAC Int 86: 1179-1186.

UKRAINE [AU]

Abbreviations:

MHP: Ministry of Health Protection
SDVM: State Department of Veterinary Medicine
(Ministry of Agricultural Policy)

References:

UA1 The order of the Ministry of Health of USSR No. 5061-89. Medical and biological requirements and sanitary norms of the quality of food raw materials and ready products.

UA2 The order of the Ministry of Agricultural Complex of Ukraine, State Department of Veterinary Medicine No. 16 from 03.11.1998. On approval of the mandatory minimal list of tests of the materials, products of animal and plant origin, raw materials for

animal combined feed, vitamins etc. to be conducted by the state laboratories of veterinary medicine and as a result of which the veterinary document F2 is issued.

UA3 Ministry of Health – The issuing agency (2001). Temporary hygienic norms for the contents of chemical and biological contaminants in the biologically active additives. No. TH 4.4.8.073-2001.

UA4 Ministry of Health of USSR. Methodology recommendations for detection, identification and determination of contents of aflatoxins in food products. No. 2273-80.

UA5 Ministry of Health of USSR. Methodology recommendations for detection, identification and determination of contents of patulin in fruit and vegetable juices and puree. No. 2655-82.

UA6 Ministry of Health of USSR. Methodology recommendations for detection, identification and determination of contents of deoxynivalenol (vomitoxin) in grain and grain products. No. 3940-84.

UA7 Ministry of Health of USSR. Methodology recommendations for detection, identification and determination of contents of T-2 toxin in food products and food raw materials. No. 3184-84.

UA8 Ministry of Health of USSR. Methodology recommendations for detection, identification and determination of contents of zearalenone in food products. No. 2964-84.

UA9 Ministry of Health of USSR. Methodology recommendations for detection, identification and determination of aflatoxins in food raw materials and food products by means of high performance liquid chromatography. No. 4082-86.

UNITED ARAB EMIRATES [AE]

Reference:

AE1 Information about maximum residue levels established in various countries. Australian Government, Department of Agriculture , Fisheries and Forestry; Commonwealth of Australia 2003. Internet access date: 6 October 2003; http://www.affa.gov.au > Product Integrity / Animal and Plant Health > National Residue Survey (NRS).

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND [UK]

Abbreviation:

FSA via PHA and LAEHTSO:	Food Standards Agency via the Port Health Authorities and the Local Authority Environmental Health and Trading Standards Officers.

URUGUAY [UY]

Abbreviations:

TLU: Technological Laboratory of Uruguay
MSP: Ministerio de Salud Pública
MGAP: Ministerio de Ganaderiá Agricultura y Pesca

References:

UY1 Decreto 315/994. Reglamento Bromatológico Nacional (1994) page 99, 100A, 283, 302A, 336A.

UY2 Decreto 315/994. Reglamento Bromatológico Nacional (1994) page 99, 100A.

UY3 Decreto 533/001. Ministerio de Salud Pública (2001).

UY4 AOAC (2000). 970.45

UY5 AOAC (2000). 993.17.

UY6 Journal of AOAC International (1994). 77:1518.

UY7 AOAC (2000). 974.18.

UY8 AOAC (2000). 986.17.

UY9 AOAC (2000). 985.18.

UY10 Resoluciones 26 dic. 2001, 7 February 2002, 28. Ministerio de Ganadería Agricultura y Pesca (2002).

UY11 Decreto 737/986. Ministerio de Ganadería Agricultura y Pesca (1986).

UY12 Fajardo JE, Dexter JE, Roscoe MM, Nowicki TW (1995). Retention of Ergot Alkaloids in Wheat during Processing. Cereal Chem 72 (3): 291-298.

UNITED STATES OF AMERICA [US]

Abbreviations:

FDA: Food and Drug Administration
USDA: United States Department of Agriculture

References:

US1 Compliance Policy Guides. CPG 555.400, CPG 570.200, CPG 570.375, CPG 570.500.

US2 Compliance Policy Guide. CPG 510.150.

US3 Unpublished letter from FDA to State Agricultural Directors, State Feed Control Officials, and Food, Feed and Grain Trade Organizations, September 16, 1993.

US4 FDA (2001). Guidance for Industry: Fumonisin Levels in Human Foods and Animal Feeds, November 9, 2001.

US5 http://www.cfsan.fda.gov/~dms/fumongu2.html .

US6 FDA Investigative Operations Manual, http://www.fda.gov/ora/inspect_ref/iom/Contents/ch4_TOC.html .

US7 FDA Compliance Program, Mycotoxins in Domestic Foods (7307.001), Mycotoxins in Imported Foods (7307.002).

US8 AOAC International (2000). Official methods of Analysis, 17th Edition, Chapter 49.

US9 Trucksess et al. (1996). Journal of AOAC International 79 (4): 883-887.

US10 Compliance Policy Guide. CPG 527.400.

US11 Compliance Policy Guide. CPG 683.100.

US12 FDA Compliance Program, Feed Contaminants (7371.003). http://www.cfsan.fda.gov/~comm/cp04004.html .

VENEZUELA [VZ]

References:

VZ1 AOAC [Title, source, page]

VZ2 AOAC [Title, source, page]

VIET NAM [VN]

Abbreviations:

MH: Ministry of Health
MARD: Ministry of Agriculture and Rural Development

References:

VN1 Ministry of Health (1998). List of hygiene standard of foodstuffs issued with the Decision No. 867/1998/QDD-BYT dated 4/4/1998: 55.

VN2 Ministry of Health. Viet Nam Standards, Normal Rule.

VN3 AOAC

VN4 Ministry of Agriculture and Rural Development. Normal Rule

YEMEN [YE]

Abbreviations:
MCI: Ministry of Commerce and Industry
DGSS: Directorate General of Standards & Specifications

Reference:

YE1 AOAC Official Methods (2000). Detection of Natural Toxins. Chapter 49.

ZIMBABWE [ZW]

Abbreviation:

MA: Ministry of Agriculture

Reference:

ZW1 Government Gazette no. 4959- 16.01.1976.

Table 4: Medians and ranges of maximum tolerated levels (μg/kg) for some (groups of) aflatoxins in 1995 and 2003 and numbers of countries known to have relevant regulations

	1995			2003		
aflatoxin/matrix combination	**median (μg/kg)**	**range (μg/kg)**	**countries**	**median (μg/kg)**	**range (μg/kg)**	**countries**
afla B_1 in foodstuffs	4	0–30	33	5	1–20	61
afla B_1+B_2+G_1+G_2 in foodstuffs	8	0–50	48	10	0–35	76
afla M_1 in milk	0.05	0–1	17	0.05	0.05–15	60
afla B_1 in feedstuffs	5	5–50	25	5	5–50	39
afla B_1+B_2+G_1+G_2 in feedstuffs	20	0–1 000	17	20	0–50	21