JRC Technical Notes

Mycotoxins Factsheet
2nd Edition

Donata Lerda

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JRC
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Institute for Reference Materials and Measurements

CRL
Mycotoxins

The mission of the IRMM is to promote a common and reliable European measurement system in support of EU policies.

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Contact information
Address: Retieseweg 111, 2440 Geel, Belgium
E-mail: jrc-irmm-crl-mycotox@ec.europa.eu
Tel.: +32 14 571 826
Fax: +32 14 571 783

http://irmm.jrc.ec.europa.eu/
http://www.jrc.ec.europa.eu/

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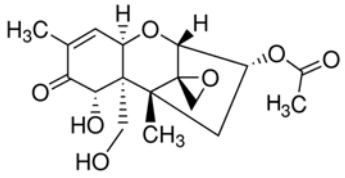
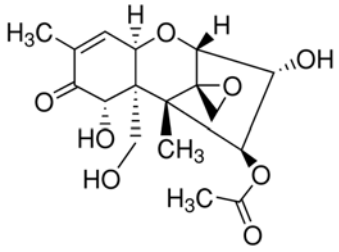
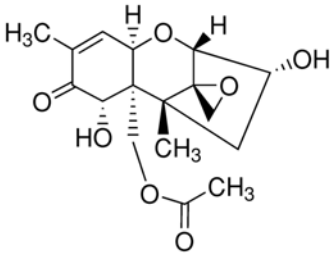
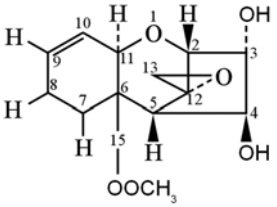
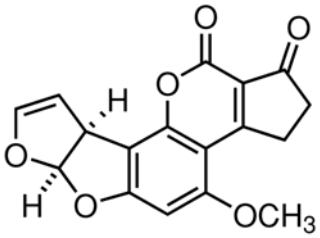
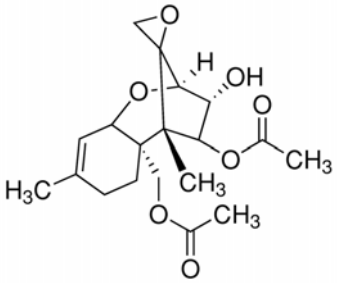
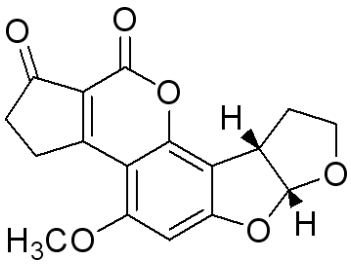
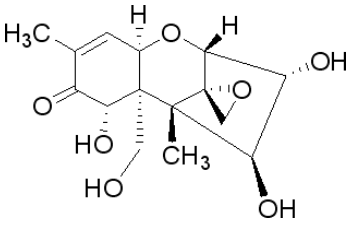
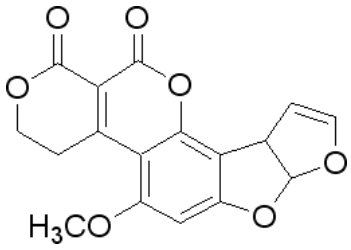
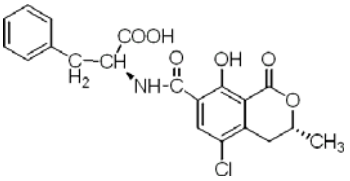
Chemical structure of frequently monitored mycotoxins

Table 1: Names and structures of widely occurring mycotoxins

Name	Structure	Name	Structure
3-acetyl deoxynivalenol (3-AcDON)		Fusarenon-X (FUS-X)	
15-acetyl Deoxynivalenol (15-AcDON)		Monoacetoxyscirpenol	
Aflatoxin B1		Neosolaniol	
Aflatoxin B2		Nivalenol (NIV)	
Aflatoxin G1		Ochratoxin A (OTA)	

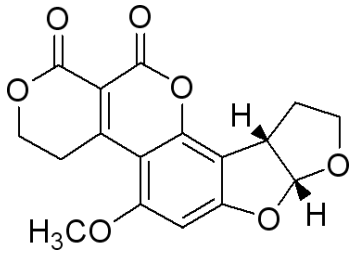
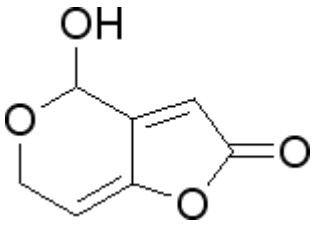
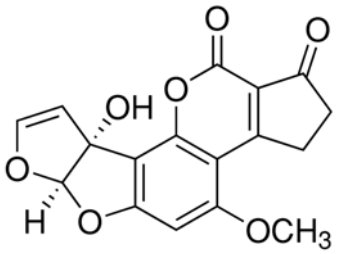
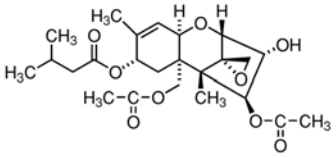
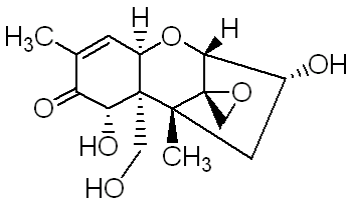
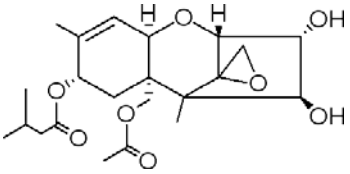
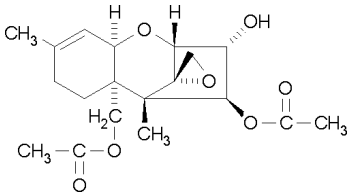
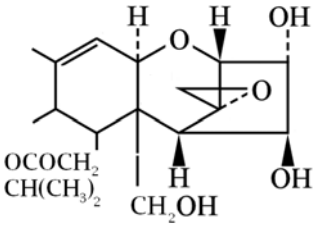
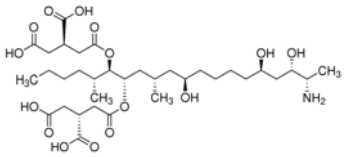
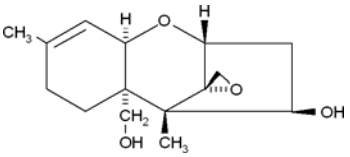
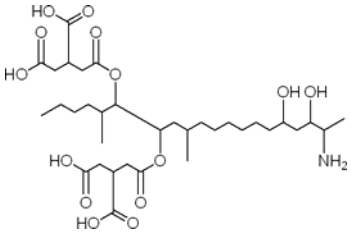
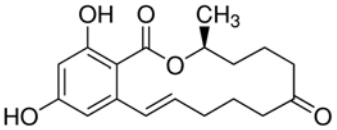
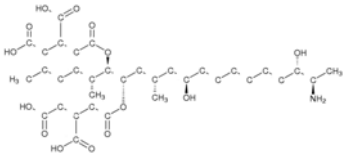
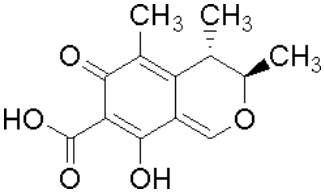
Name	Structure	Name	Structure
Aflatoxin G2		Patulin	
Aflatoxin M1		T-2 Toxin	
Deoxynivalenol (DON)		HT-2 Toxin	
Diacetoxyscirpenol		T2-triol	
Fumonisin B1		Verrucol	
Fumonisin B2		Zearalenone (ZON)	
Fumonisin B3		Citrinine (not mentioned in EU legislation but recently found in food additives in USA)	

Table 2: General informative links for mycotoxins

Compound	*IUPAC NAME*	*CAS n.*	*References*
Mycotoxins	NA(1)	NA(1)	mycotoxins.org (European Mycotoxin Awareness Network - **EMAN**)
			List of mycotoxins-producing fungi: Micotoxinas boletim n.46
			List of mycotoxins-producing fungi: Mycotoxins.info
			Mycotoxins
			Wikipedia - Mycotoxins
3-acetyl deoxynivalenol	3α-Acetoxy-7α,15-dihydroxy-12,13-epoxytrichothec-9-en-8-one	876926-22-6	NCBI - Pubchem
15-acetyl deoxynivalenol	15-Acetoxy-3α,7α-dihydroxy-12,13-epoxytrichothec-9-en-8-one	088337-96-6	NCBI - Pubchem
Aflatoxin B1	NA(1)	001162-65-8	EMAN - Aflatoxins (valid for Aflatoxin B2, G1 and G2 as well)
			NCBI - Pubchem
			Aflatoxins
			Wikipedia - Aflatoxin B1
Aflatoxin B2	NA(1)	007220-81-7	NCBI - Pubchem
Aflatoxin G1	NA(1)	001165-39-5	NCBI - Pubchem
Aflatoxin G2	NA(1)	007241-98-7	NCBI - Pubchem
Aflatoxin M1	NA(1)	006795-23-9	EMAN - Aflatoxin M1
			NCBI - Pubchem
			Wikipedia - Aflatoxin M1
Citrinin	(3R,4S)-7-(dihydroxymethylidene)-3,4,5-trimethyl-3,4-dihydroisochromene-6,8-dione	000518-75-2	EMAN - Citrinin
			NCBI - Pubchem
			Wikipedia - Citrinin
Cyclopiazonic acid	NA(1)	018172-33-3	EMAN - Cyclopiazonic acid
			NCBI - Pubchem - Cyclopiazonic acid
			Wikipedia - Cyclopiazonic acid
Deoxynivalenol	3α,7α,15-Trihydroxy-12,13-	051481-10-8	EMAN - Deoxynivalenol

Compound	IUPAC NAME	CAS n.	References
(Vomitoxin)	epoxytrichothec-9-en-8-one		NCBI - Pubchem
			Deoxynivalenol
			Wikipedia - Deoxynivalenol
Diacetoxyscirpenol (Anguidine)	12,13-Epoxytrichothec-9-ene-3,4,15-triol-4,15-diacetate	002270-40-8	NCBI - Pubchem
Fumonisin B1 (Macrofusine)	1,2,3-Propanetricarboxylic acid, 1,1¢-[1-(12-amino-4,9,11-trihydroxy-2-methyltridecyl)-2-(1-methylpentyl)-1,2-ethanediyl] ester	116355-83-0	EMAN - Fumonisins (valid for Fumonisin B2, B3 and B4 as well)
			NCBI - Pubchem
			Fumonisins
			Wikipedia - Fumonisin B1
Fumonisin B2	2-[2-[19-amino-6-(3-carboxy-5-hydroxy-5-oxopentanoyl)oxy-16,18-dihydroxy-5,9-dimethylicosan-7-yl]oxy-2-oxoethyl]butanedioic acid	116355-84-1	NCBI - Pubchem
			Wikipedia - Fumonisin B2
Fumonisin B3	2-[2-[(5R,6R,7S,9S,11R,18R,19S)-19-amino-6-(3-carboxy-5-hydroxy-5-oxopentanoyl)oxy-11,18-dihydroxy-5,9-dimethylicosan-7-yl]oxy-2-oxoethyl]butanedioic acid	NA(1)	NCBI - Pubchem
Fusarenon-X	NA(1)	023255-69-8	NCBI - Pubchem
Monoacetoxyscirpenol	NA(1)	096699-75-1	NCBI - Pubchem
Neosolaniol	4β,15-Diacetoxy-3α,8α-dihydroxy-12,13-epoxytrichothec-9-ene	036519-25-2	NCBI - Pubchem
Nivalenol	3α,4β,7α, 15-Tetrahydroxy-12,13-epoxytrichothec-9-en-8-one	023282-20-4	NCBI - Pubchem
Ochratoxin A	(2S)-2-[[(3R)-5-chloro-8-hydroxy-3-methyl-1-oxoisochroman-7-carbonyl]amino]-3-phenylpropanoic acid	000303-47-9	EMAN - Ochratoxin A
			NCBI - Pubchem
			Ochratoxin A
Patulin	4-hydroxy-4,6-dihydrofuro[4,5-c]pyran-2-one	000149-29-1	EMAN - Patulin
			NCBI - Pubchem
			Patulin

Compound	IUPAC NAME	CAS n.	References
			Wikipedia - Patulin
T-2 Toxin	12,13-Epoxytrichothec-9-ene-3,4,8,15-tetrol-4,15-diacetate-8-isovalerate	021259-20-1	NCBI - Pubchem
			T2-Toxin
HT-2 Toxin	15-Acetoxy-3α,4β-dihydroxy-8α-(3-methylbutyryloxy)-12,13-epoxytrichothec-9-ene	026934-87-2	NCBI - Pubchem
Trichothecenes (T-2, HT-2, DON, NIV, 3_AcDON, 15-AcDON)	NA(1)	NA(1)	EMAN - trichothecenes
T2-triol	NA(1)	NA(1)	
Verrucol	4β,15-Dihydroxy-12,13-epoxytrichothec-9-ene	002198-92-7	
Zearalenone	4S,12E)-16,18-dihydroxy-4-methyl-3-oxabicyclo[12.4.0]octadeca-1(18),12,14,16-tetraene-2,8-dione	017924-92-4	EMAN - Zearalenon
			NCBI - Pubchem
			Zearalenon
Others (Moniliformin, Sterigmatocystin, Ergot alkaloids)	NA(1)	NA(1)	EMAN - Sterigmatocystin
			EMAN - Moniliformin
			EMAN - Ergot alkaloids
			EMAN - Other mycotoxins
			NCBI - Pubchem - Sterigmatocystin
			Moniliformin

(1) Not available/applicable

Regulated mycotoxins

Eur-lex: direct access to European Law (Regulations, Directives, Decisions plus Commission staff working documents, Reports, Proposals for new legislation, Recommendations, etc.)

Worldwide regulations for mycotoxins in food and feed in 2003 – FAO Food and Nutrition Paper 80 (2003): Link to PDF file

A comprehensive and up-to-date computerized legislative database: FAOLEX

A search engine for food legislation and RASFF FC 24

Action levels in feed for the American Board of Veterinary Toxicology:
FDA compliance levels for feed

Table 3: EU legislation concerning mycotoxins in food and feed

Legislative Reference	*Matrix*	*ML(1) (Y/N)*	*Compound*
Commission Regulation (EC) No 1881/2006	Food	N(4)	3-acetyl deoxynivalenol 15-acetyl deoxynivalenol Diacetoxyscirpenol Fumonisin B3 Fusarenon-X Monoacetoxyscirpenol Neosolaniol T2-triol Verrucol
		N (TDI)(3,4)	Nivalenol
		Y	Aflatoxins (Sum of B1, B2, G1 and G2) Aflatoxin M1 Deoxynivalenol Fumonisins (B1 and B2) Ochratoxin A Patulin T-2 and HT-2 toxins Zearalenone
Commission Regulation (EC) No 1126/2007	Food	Y	Deoxynivalenol Fumonisins (sum of B1 and B2) Zearalenone
		N (TDI)(3)	Trichothecenes (NIV + T-2 &HT-2 + DON)
Commission Directive 2003/100/EC	Feed	Y	Aflatoxin B1

Legislative Reference	Matrix	ML[1] (Y/N)	Compound
Commission Recommendation (2006/576/EC) of 17 August 2006 on the presence of deoxynivalenol, zearalenon, ochratoxin A, T-2 and HT-2 and fumonisins in products intended for animal feeding	Feed	Y (GV)[2]	Deoxynivalenol Fumonisins (sum of B1 and B2) Ochratoxin A Zearalenon
		N	T-2 and HT-2 toxins
Commission Recommendation (2006/583/EC) of 17 August 2006 on the prevention and reduction of Fusarium Toxins in cereals and cereals products	Cereals (preventive measures)	N	Fusarium toxins
Commission Recommendation (2003/598/EC) of 11 August 2003 on the prevention of patulin contamination in apple juice and apple juice ingredients in other beverages	Food (preventive measures)	N	Patulin
Commission regulation (EC) No 401/2006	Food	N	Aflatoxins (Sum of B1, B2, G1 and G2) Aflatoxin M1 Ochratoxin A Patulin Deoxynivalenol Zearalenon Fumonisin B1 and B2 T-2 and HT-2 toxin

(1) Maximum level (Y=yes; N=no)
(2) Guidance value
(3) Tolerable daily intake
(4) No specific measures needed
(5) Method performance

Toxicity

1. *IARC (International Agency for Research on Cancer) classification*
2. *IARC alphabetical list of carcinogenic agents .*
3. *For most of the Mycotoxins of interest the information can be found in the following IARC volumes:*
   a. *IARC Monograph Volume 82*
   b. *IARC Monograph Volume 56*
   c. *IARC Monographs: Supplement 7 - Update of Volumes 1-42*
4. *OECD (Organisation for Economic Co-operation and Development) guidelines for the testing of chemicals*

Table 4: IARC classification for carcinogenicity

Group	***Definition***
1	The agent (mixture) is carcinogenic to humans. The exposure circumstance entails exposures that are carcinogenic to humans
2A	The agent (mixture) is probably carcinogenic to humans. The exposure circumstance entails exposures that are probably carcinogenic to humans.
2B	The agent (mixture) is possibly carcinogenic to humans. The exposure circumstance entails exposures that are possibly carcinogenic to humans.
3	The agent (mixture or exposure circumstance) is not classifiable as to its carcinogenicity to humans.
4	The agent (mixture) is probably not carcinogenic to humans.

Table 5: Toxicology and epidemiology related links

Compound	*Matrix*	*Useful link*
Mycotoxins	NS(1)	Summary of toxicological effects of mould toxins: SIGMA Aldrich Table
		"Mycotoxins, Endemic Nephropathy and Urinary Tract Tumours" IARC Scientific Publication No 115 Castegnaro, M., Plestina, R., Dirheimer, G., Chernozemsky, I.N., Bartsch, H. IARC publication PDF
		Toxicological effects: Mycotoxins.info
	Feed	Mycotoxicoses in Domestic Animals: The Merck Veterinary Manual
	Food	"Evaluation of Certain Mycotoxins in Food" Fifty-sixth Report of the Joint FAO/WHO Committee on Food Additives Technical Report Series, No 906 WHO publication PDF
		JEFCA report on Third Joint FAO/WHO/UNEP International Conference on Mycotoxins: JECFA Report 1999
3-acetyl deoxynivalenol **(not classified in IARC)**	Food	"Subacute Toxicity of Dietary 3-Acetyldeoxynivalenol in Mice" Can J Comp Med **1985**; 49: 319-322 PubMed PDF
15-acetyl deoxynivalenol **(not classified in IARC)**	Feed	"Deoxynivalenol: Toxicity, mechanisms and animal health risks" Animal Feed Science and Technology **2007**; 137: 283–298
Aflatoxins (naturally occurring mixtures of) Aflatoxin B1 Aflatoxin B2 Aflatoxin G1 Aflatoxin G2 **(IARC classification: 1)**	Food	SCF report (1996) including Aflatoxins, Ochratoxin A and Patulin SCF reports series 35
		Opinion of the scientific panel on contaminants in the food chain [CONTAM] related to the potential increase of consumer health risk by a possible increase of the existing maximum levels for aflatoxins in almonds, hazelnuts and pistachios and derived products. Adopted in 2007 The EFSA Journal (2007) 446, 1-127
		Aflatoxicosis U.S. FDA - Aflatoxins
		WHO Technical Report Series, No. 947/2007 "Evaluation of Certain Food Additives and Contaminants" WHO Press link
	NS(1)	Toxicological effects: Aspergillusflavus.org
		Cancer Potency: The carcinogenic potency database (CPDB) - Aflatoxin B1

Compound	Matrix	Useful link
		CPDB - Aflatoxin crude
		Toxicosis in animals: Merck veterinary manual - Aflatoxicosis
	Feed	Opinion of the Scientific Panel on Contaminants in the Food Chain on a request from the Commission related to Aflatoxin B1 as undesirable substance in animal feed. Adopted in 2004 The EFSA Journal (2004) 39, 1-27
	NS(1)	Not Significant Risk Level (NSRL) as defined by Office of Environmental Health Hazard Assessment of California (US): OEHHA NSRL
Aflatoxin M1 **(IARC classification: 2B)**	Feed	Opinion of the Scientific Panel on Contaminants in the Food Chain on a request from the Commission related to Aflatoxin B1 as undesirable substance in animal feed Adopted on 3 February 2004 The EFSA Journal (2004) 39, 1-27
	NS(1)	JECFA Toxicological Monograph FAS 47/FNP 74-JECFA 56/1
Citrinin **(IARC classification: 3)**	NS(1)	Cancer Potency: CPDB - Citrinin
Cyclopiazonic acid **(not classified in IARC)**		Cyclopiazonic acid factsheet
Deoxynivalenol **(IARC classification: 3)**	Food	Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 1: Deoxynivalenol (DON), (expressed on 2 December 1999) SCF/CS/CNTM/MYC/19 Final SCF opinion (SCF/CS/CNTM/MYC/19 Final)
		Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 6: Group evaluation of T-2 toxin, HT-2toxin, nivalenol and deoxynivalenol. (adopted on 26 February 2002) SCF opinion (SCF/CS/CNTM/MYC/27 Final)
	Feed	Opinion of the Scientific Panel on contaminants in the food chain [CONTAM] related to Deoxynivalenol (DON) as undesirable substance in animal feed. Adopted in 2004 The EFSA Journal (2004) 73, 1-72
	NS(1)	JECFA Toxicological Monograph FAS 47/FNP 74-JEFCA 56/419
		Cancer Potency: CPDB - Deoxynivalenol
Diacetoxyscirpenol (Anguidine) **(not classified in IARC)**	NS(1)	"Short-term effects of two fusarium toxins, diacetoxyscirpenol and neosolaniol monoacetate, in male wistar rats" Food-Chem-Toxicol. 1987; 25: 767-71 Sciencedirect publication link

Compound	*Matrix*	*Useful link*
Fumonisins **(IARC classification for Fumonisins B1, B2 and Fusarin C: 2B)**	Food	Updated opinion of the Scientific Committee on Food on Fumonisin B1, B2 and B3. SCF opinion (SCF/CS/CNTM/MYC 28 Final)
	Feed	Opinion of the Scientific Panel on contaminants in the food chain [CONTAM] related to fumonisins as undesirable substances in animal feed. Adopted in 2005 The EFSA Journal (2005) 235, 1-32
	NS(1)	Toxicosis in animals: Merck veterinary manual - Fumonisin toxicosis
Fumonisin B1 **(IARC classification: 2B)**	Food	Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 3: Fumonisin B1 (FB1) (expressed on 17 October 2000) SCF opinion (SCF/CS/CNTM/MYC/24 Final)
	NS(1)	Cancer Potency: CPDB - Fumonisin B1
		Carcinogenicity and other toxicological effects: EHC - Fumonisin B1
Fusarenon-X **(IARC classification: 3)**	NS(1)	Cancer Potency: CPDB - Fusarenon X
Monoacetoxyscirpenol **(not classified in IARC)**	Food and Feed	"Fusarium toxins of the scirpentriol subgroup: a review" Mycopathologia **2007**; 164:101-118 SpringerLink purchase page
Neosolaniol **(not classified in IARC)**	NS(1)	"Short-term effects of two fusarium toxins, diacetoxyscirpenol and neosolaniol monoacetate, in male wistar rats" Food and Chemical Toxicology **1987**; 25: 767-71 Sciencedirect publication link
Nivalenol **(IARC classification: 3)**	Food	Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 4: Nivalenol (expressed on 19 October 2000) SCF opinion (SCF/CS/CNTM/MYC/26 Final)
		Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 6: Group evaluation of T-2 toxin, HT-2toxin, nivalenol and deoxynivalenol. (adopted on 26 February 2002) SCF opinion (SCF/CS/CNTM/MYC/27 Final)
	NS(1)	Cancer Potency: CPDB - Nivalenol
Ochratoxin A **(IARC classification: 2B)**	Food	Opinion of the Scientific Panel on contaminants in the food chain [CONTAM] related to Ochratoxin A in food. Adopted in 2006 The EFSA Journal (2006) 365, 1-56
		SCF report (1996) including Aflatoxins, Ochratoxin A and Patulin SCF reports series 35
		Opinion of the Scientific Committee on Food on Ochratoxin A

Compound	Matrix	Useful link
		(expressed on 17 September 1998) SCF reports series 14
		WHO Technical Report Series, No. 947/2007 "Evaluation of Certain Food Additives and Contaminants" WHO Press link
	Feed	Opinion of the Scientific Panel on Contaminants in Food Chain on a request from the Commission related to ochratoxin A (OTA) as undesirable substance in animal feed. Adopted in 2004 The EFSA Journal (2004) 101, 1-36
	NS(1)	Cancer Potency: CPDB - Ochratoxin A
		Not Significant Risk Level (NSRL) as defined by Office of Environmental Health Hazard Assessment of California (US): OEHHA NSRL
Patulin **(IARC classification: 3)**	Food	SCF report (1996) including Aflatoxins, Ochratoxin A and Patulin SCF reports series 35
		Opinion expressed by the Scientific Committee on Food during the plenary meeting on 8 March 2000. SCF minute statement
	NS(1)	Cancer Potency: CPDB - Patulin
Sterigmatocystin **(IARC classification: 2B)**	NS(1)	OEHHA - NSRL
		Cancer Potency: CPDB - Sterigmatocystin
T-2 + HT-2 **(IARC classification for T-2 toxin: 3)**	Food	Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 5: T-2 toxin and HT-2 toxin (adopted on 30 May 2001) SCF Opinion (SCF/CS/CNTM/MYC/25 Rev 6 Final
		Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 6: Group evaluation of T-2 toxin, HT-2toxin, nivalenol and deoxynivalenol. (adopted on 26 February 2002) SCF opinion (SCF/CS/CNTM/MYC/27 Final)
	NS(1)	Cancer Potency: CPDB - T2 toxin
Trichothecenes	NS(1)	Maxwell-Gunter AFB Trichothecenes mycotoxins
		Toxicosis in animals: Merck veterinary manual - Trichothecenes toxicosis
		Toxicology and occurrence of nivalenol, fusarenon X, diacetoxyscirpenol, neosolaniol and 3- and 15-acetyldeoxynivalenol: a review of six

Compound	*Matrix*	*Useful link*
		Trichothecenes RIVM report
T2-triol **(not classified in IARC)**	NS(1)	NS(1)
Verrucol **(not classified in IARC)**	NS(1)	NS(1)
Zearalenon **(IARC classification: 3)**	Food	Opinion of the Scientific Committee on Food on Fusarium-toxins. Part 2: Zearalenone (ZEA), (expressed on 22 June 2000) SCF/CS/CNTM/MYC/22 Rev 3 Final SCF opinion (SCF/CS/CNTM/MYC/22 Rev 3 Final)
	Feed	Opinion of the Scientific Panel on contaminants in the food chain [CONTAM] related to Zearalenone as undesirable substance in animal feed. Adopted in 2004 The EFSA Journal (2004) 89, 1-35
	NS(1)	Cancer Potency: CPDB - Zearalenon

(1) Not specified

Occurrence

On the web site of the Directorate-General for Health and Consumers (DG SANCO), under the Rapid Alert System for Food and Feed, a list of alert notifications, information notifications and border rejections for various contaminations and/or non-compliances for food and feed can be found: RASFF, RASFF weekly overview, RASFF Report 2007, International Portal on Food Safety, Animal & Plant Health

Table 6: Some links concerning Mycotoxin occurrence in various matrices

Compound	*Matrix*	*Useful link*
Mycotoxins	Unprocessed cereals and Feed	Conditions of fungi growth: Mycotoxins.info
		Geographical distribution of occurrence: Mycotoxins.info
		Feed storage conditions: Mycotoxins.info
		"Grain storage techniques - Evolution and trends in developing countries" - Edited by D.L. Proctor, FAO Consultant FAO Agricultural Services Bulletin n. 109
	Feed	Mouldy grains, mycotoxins and feeding problems OHIO State University - Mycotoxins
	Food	"Mycotoxins: The Cost of Achieving Food Security and Food Quality" APS Net
		"Manual on the application of the HACCP system in Mycotoxin prevention and control" FAO Food and Nutrition Paper 73
		"Food, Nutrition and Agriculture" FAO Food and Nutrition Paper 23
		"Effect of Food Processing on Mycotoxin Levels" EMAN - Expert factsheet
		Decontamination of mycotoxin contaminated raw materials EMAN - Training course
		"Evaluation of certain mycotoxins in food" Fifty-sixth report of the JECFA – WHO Technical Report Series n. 906 WHO Publication PDF
		"Climate change: implications for food safety" FAO PDF file
	Environment	Mould-help webpage: a list of mycotoxins

Compound	Matrix	Useful link
		Mould-help web page: description of possible indoor fungi and effects of the produced toxins
Aflatoxins	Food	"Prevention of aflatoxin in pistachios" E. Boutrif FAO Food and Nutrition Paper 21
		"Aflatoxin Contamination of Commercial Maize Products during an Outbreak of Acute Aflatoxicosis in Eastern and Central Kenya" Environmental Health Perspectives - 2005
	Air	Chemical Sampling Information – Aflatoxin (B2) OSHA.gov
Fumonisins	Food and Feed	Fumonisin Levels in Human Foods and Animal Feeds CFSAN - FDA - Guidance for Industry
	Food	SCOOP report: "Collection of occurrence data of Fusarium toxins in food and assessment of dietary intake by the population of EU Member States" Task 3.2.10 (April 2003)
		"Mycotoxin prevention and decontamination – a case study on maize" FAO Food and Nutrition Paper 22
Ochratoxin A	Food	SCOOP report: "Assessment of dietary intake of Ochratoxin A by the population of EU Member States" Task 3.2.7 (January 2002)
		"Surveillance and Occurrence Studies on Ochratoxin A" EMAN - Expert factsheet
		Naturally Occurring Ochratoxins EMAN - Basic factsheet
Patulin	Food	SCOOP report: "Assessment of dietary intake of Patulin by the population of EU Member States" Task 3.2.8 (March 2002)
		Sec. 510.150 Apple Juice, Apple Juice Concentrates, and Apple Juice Products - Adulteration with Patulin FDA - Compliance guidance document
Trichothecenes	Air	Maxwell-Gunter AFB Trichothecenes mycotoxins
	Various	"Toxicology and occurrence of nivalenol, fusarenon X, diacetoxyscirpenol, neosolaniol and 3- and 15-acetyldeoxynivalenol: a review of six Trichothecenes" RIVM report
	Food	SCOOP report: "Collection of occurrence data of Fusarium toxins in food and assessment of dietary intake by the population of EU Member States" Task 3.2.10 (April 2003)
		Research Project: "Control of Fusarium Graminearum mycotoxins in wheat, barley and corn"

Compound	*Matrix*	*Useful link*
		USDA - Agricultural Research Service
Zearalenon	Food	SCOOP report: "Collection of occurrence data of Fusarium toxins in food and assessment of dietary intake by the population of EU Member States" Task 3.2.10 (April 2003)
		"Safety evaluation of certain food additives and contaminants" WHO - Food Additives Series 44 (2000)

Useful links

European Commission

DG Health and Consumers – Food and feed safety – Contaminants: Patulin ; Ochratoxin A ; Fusarium toxins ; Aflatoxins (Directorate General Health and Consumers of the European Commission – DG SANCO)

EFSA (European Food Safety Authority)

International organisations of general interest for analytical chemistry and food safety

AACC (AACC International – formerly denominated American Association of Cereal Chemists)

ACS-AGFD & ACS-AC (American Chemical Society – Agricultural and Food Chemistry Division & Analytical Chemistry Division)

AOAC (AOAC International – The Association of Official Analytical Chemists)

CEN (European Committee for Standardization)

CIAA (Confederation of the Food and Drink Industries in the EU. The webpage includes general information about food production and agricultural subjects)

CITAC (Cooperation on International Traceability in Analytical Chemistry)

Codex Alimentarius (Joint FAO/WHO Food Standards)

EA (European co-operation for Accreditation: association for accreditation bodies)

Eurachem (A network of organisations working for the improvement of traceability of chemical measurements)

Euramet (European Association of National Metrology Institutes)

Eurolab (the European Federation of National Associations of Measurement, Testing and Analytical Laboratories)

FDA (US Food and Drug Administration - National Food Safety Programs)

IAF (International Accreditation Forum)

IAFP (International Association for Food Protection portal)

ILAC (International Laboratory Accreditation Cooperation)
mycotoxins in feed)

IPFSAPH (International Portal on Food Safety, Animal and Plant Health - IPFSAPH)

ISO (International Organization for Standardization)

IUPAC (International Union of Pure and Applied Chemistry)

NMI (National Measurement Institute – Australia)

NMKL (Nordic committee on food analysis – Methods, Guidelines - e.g. Validation Protocol, Measurement Uncertainty - Training, list of Expert Laboratories are only a few examples of the very useful information that are available in the web-page, some information only accessible upon subscription)

OECD (Organisation for economic co-operation and development)

USDA (United States Department of Agriculture – Food Safety Research Information Office)

VAM (National Measurement System - Chemical and Biological Metrology Website: Guides and other useful publications)

WTO (World Trade Organisation)

Organisations of specific interest and some e-publications

AAFCO (Association of American Feed Control Officials)

aspergillus.org (List of mycotoxin metabolites, including their chemical and toxicological properties)

Aspergillusflavus.org (Webpage mostly for botanical and medical applications)

BIOCOP, BIOCOP - Workpackage 10: Mycotoxins (the FP6 Biocop project, focussing on new measurement strategies applied to detection of food contamination. The webpage includes a description of the project and a regularly updated "Events" page).

Cereal Disease Laboratory (webpage of the Cereal Disease Laboratory of the Agriculture Research Service – United States Department of Agriculture)

CRLs-Pesticides (common portal for all Community Reference Laboratories for Residues of Pesticides: well organised and containing a lot of useful information)

CRL for dioxins and PCBs in feed and food

CRL for Marine Biotoxins

fera (The food and Environment Research Agency web site)

FAO - mycotoxins section (Joint FAO/WHO Expert Committee on Food Additives (JECFA) - activities on mycotoxins)

Food magazine.eu

ICRISAT-Aflatoxins (International Crops Research Institute for the Semi-Arid Tropics - Patancheru, India. The webpage presents a general overview on aflatoxins)

Micotoxinas - boletim (Newsletter of the Brazilian website dedicated to scientific news on mycotoxins)

Molnar Institute (Software for chromatography, collection of literature on HPLC methods development and application, training)

MoniQA project (FP6 MoniQA - "Monitoring and Quality Assurance in the Food Supply Chain" - project webpage: quality assurance and quality control for bio toxins and mycotoxins is one of the priority topics of the project)

Mycobank (a complete database of all fungi)

Myco-globe (FP6 project for an integrated system for mycotoxins)

Mycology (Webpage for medical ad botanical applications)

Mycotoxins: biosecurity and food safety (US Purdue University Project "Mycotoxins: Biosecurity and Food Safety")

Mycotoxin Newsletter (IUPAC Mycotoxin Newsletter edited by Carlo Brera of the ISS-Italy)

Mycotoxins.org (European Mycotoxin Awareness Network – EMAN. A very important site for all people working in fields of research on which mycotoxins have impact: chemistry, agriculture, health. It contains information on: analytical methods, test kits, prevention and HACCP, quality assurance issue, etc.)

OHIO State University (Project on mycotoxins: a large amount of useful information and links reported)

Purdue University (Indiana - United States, Purdue University, Biosecurity and Food Safety, list of useful links)

The SAFE Consortium (European Association for Food Safety web page: among the items of the consortium database, several are related for mycotoxin prevention and control, rapid detection methods in food and feed, isolation and characterization of masked mycotoxins in cereals and derived products, methods for simultaneous determination of mycotoxins in cereals and derived products)

Publications

Some of the most popular search engines that can be used to find scientific literature sources (books, journals and others) and to search for specific items are listed below:

SCIRUS (over 450 million scientific items indexed)
Food navigator (Foodnavigator.com Europe)
Agris (FAO Search application for Agricultural Sciences and Technologies)
SCOPUS
ScienceDirect
SwetsWise
PubMed
EBSCO

The following journals are relevant for the mycotoxin field:

World Mycotoxin Journal
Mycotoxin Research
International Journal of Food Microbiology
Food additives & contaminants
Toxin reviews
Journal of Agriculture and Food Chemistry
Food and Chemical Toxicology
Mycotoxins - Japanese Society of Mycology

Books

The following books are some of the works that could be considered as a helpful support in the field of Mycotoxins.

The mycotoxin factbook - Food & feed topics, D. Barug, D. Bhatnagar, H.P. van Egmond, J.W. van der Kamp, W.A. van Osenbruggen and A. Visconti Editors. **2006**: Wageningen Academic Publishers.
Wageningen Academic Publishers link for book description

Manual on the application of the HACCP system in Mycotoxin prevention and control, Food and Agriculture Organization of the United Nations Editor. **2001**: FAO.
FAO - PDF file of the book

Natural Toxicants in Food (Chapters 7, 9 and following), D.H. Watson Editor. **1998**: Sheffield Academic Press – CRC Press.
FAO - AGRIS link for book description

Mycotoxins in fruit and vegetables, R. Barkai-Golan Editor. **2008**: Academic Press, Elsevier.
Elsevier link for book description

Food Contaminants and Residue Analysis, 51, Y. Picó, Editor. **2008**: Elsevier.
Elsevier link for book description

The Mycotoxin Blue Book, Duarte Diaz Editor. **2005**: Nottingham University Press.
Springerlink - Book review

Mycotoxin prevention and control in foodgrains, R.L. Semple, A.S. Frio, P.A. Hicks and J.V. Lozare Editors. **1989**: RAP Publication.
FAO link for book download

Guidelines

Description of Standardisation bodies activities

CEN (European Committee for Standardization) TC 275 is the Technical Committee for Food Analysis – Horizontal methods. Via the following links the current activities of the committee including released standards and on-going activities for the preparation of new standards can be consulted. Working group (WG) 5 (Biotoxins) and WG 0 (General considerations) are the two WGs dealing with items of interest for laboratories performing mycotoxin determinations in food matrices. For laboratories dealing with feed samples, information about activities of CEN/TC 327/WG 1 (Animal Feeding Stuffs – Methods of sampling and analysis – Organic contaminants) is important.
CEN/TC 275, CEN/TC 327

ISO (International Organization for Standardization) is composed of many different Technical Committees. TC 34 (Food products), TC 69 (Applications of statistical methods), TC 176 (Quality management and quality assurance) and TC 243 (Project Committee: Consumer product safety) are the relevant ones for Food Control Laboratories. In the ISOTC Portal all information about current activities of the TCs can be found, within the Public information folder:
ISO TC 34 (Food Products) Newsletter
ISO TC 69 webpage
ISO TC 176 webpage
ISO TC 243 webpage

List of useful links to documents

DG Health and Consumers Report on compliancy to legislative limits
DG SANCO Report on the relationship between analytical results, measurement uncertainty, recovery factors and the provisions of EU Food and Feed legislation, with particular reference to Community legislation concerning contaminants in food and undesirable substances in feed

DG Health and Consumers Document on correct interpretation of EU legislation on mycotoxins
Directorate General for Health and Consumers "Guidance document for competent authorities for the control of compliance with EU legislation on aflatoxins"

AOAC Document on method validation
Validation: An invisible Component of Measurement. An explicative paper concerning the meaning of validation, written by Horwitz.

AOAC Book on accreditation
AOAC Book "Guidelines for Laboratories Performing Microbiological and Chemical Analyses of Food and Pharmaceuticals"

AOAC ALACC Guide 2007
AOAC Guide "How to Meet ISO 17025 - Requirements for Method Verification"

CEN Guidance document
Guidance - Uncertainty of measurement concept in European Standards

List of EA publications

EA 04/16
European Co-operation for Accreditation "EA guidelines on the expression of uncertainty in quantitative testing"

EA 04/14
EA Guideline "The Selection and Use of Reference Materials"

Eurachem Guide on uncertainty
Measurement uncertainty arising from sampling: A guide to methods and approaches Produced jointly by Eurachem, EUROLAB, CITAC, Nordtest and the RSC Analytical Methods Committee

Eurachem Guide on compliance of results
Eurachem/CITAC guide: "Use of uncertainty information in compliance assessment"

Eurachem Guide on methods fitness for purpose
Eurachem Guide "The Fitness for Purpose of Analytical Methods. A Laboratory Guide to Method Validation and Related Topics"

Eurachem/CITAC CG2

Eurachem/CITAC Guide "Quality Assurance for Research and Development and Non-routine Analysis"

IUPAC/ISO/AOAC International/Eurachem Report on Recovery
"Harmonised guidelines for the use of recovery information in analytical measurement"

Eurachem/CITAC CG4
EURACHEM / CITAC Guide "Quantifying Uncertainty in Analytical Measurement" Second Edition

Eurachem Guide for proficiency testing
Eurachem Guide "Selection, use and interpretation of proficiency testing (PT) schemes by laboratories – 2000 Edition 1.0"

Eurachem/CITAC Guide on accreditation
Eurachem/CITAC "Guide to Quality in Analytical Chemistry - An Aid to Accreditation"

Eurachem Guide EEE-RM-062rev3
Eurachem Guide "The selection and use of Reference Materials – A basic guide for laboratories and accreditation bodies"

Eurachem/CITAC Guide on Traceability
EURACHEM / CITAC Guide "Traceability in Chemical Measurement - A guide to achieving comparable results in chemical measurement"

Eurolab Report on MU
Eurolab Technical Report n. 1/2007 "Measurement uncertainty revisited: Alternative approaches to uncertainty evaluation"

Eurolab Report on Flexible Scope Accreditation
Eurolab Technical Report n. 2/2008 " EUROLAB Inquiry: Use of the Accreditation Symbol and Accreditation with Flexible Scope – Results"

ILAC Guidelines (a list of the issued documents related to Quality Assurance and Control in Laboratories)

ILAC Document on MU
ILAC Guide G17:2002 "Introducing the Concept of Uncertainty of Measurement in Testing in Association with the Application of the Standard ISO/IEC 17025"

ILAC Document on RM
ILAC Guide G9:2005 "Guidelines for the Selection and Use of Reference Materials"

ILAC Document on Calibration
ILAC Guide G24:2007 "Guidelines for the determination of calibration intervals of measuring instruments"

ISO Standard
ISO Guide 33:2000 "Uses of certified reference materials"

ISO Technical Specification

ISO/TS 21748:2004 "Guidance for the use of repeatability, reproducibility and trueness estimates in measurement uncertainty estimation"

ISO Standard
ISO 13528:2005 "Statistical methods for use in proficiency testing by interlaboratory comparisons"

ISO Standard
ISO Guide 32:1997 "Calibration in analytical chemistry and use of certified reference materials"

ISO Standard
ISO 11843-1:1997 "Capability of detection -- Part 1: Terms and definitions"

ISO Standard
ISO 11843-2:2000 "Capability of detection -- Part 2: Methodology in the linear calibration case"

ISO Standard
ISO 11843-3:2003 "Capability of detection -- Part 3: Methodology for determination of the critical value for the response variable when no calibration data are used"

ISO Standard
ISO 11843-4:2003 "Capability of detection -- Part 4: Methodology for comparing the minimum detectable value with a given value"

ISO Standard
ISO 11843-5:2008 "Capability of detection -- Part 5: Methodology in the linear and non-linear calibration cases"

ISO Standard
ISO 11095:1996 "Linear calibration using reference materials"

ISO Standard
ISO 7966:1993 "Acceptance control charts"

ISO Standard
ISO 7870-1:2007 "Control charts -- Part 1: General guidelines"

ISO Standard
ISO 8258:1991 "Shewhart control charts"

ISO Standard
ISO/TR 7871:1997 "Cumulative sum charts -- Guidance on quality control and data analysis using CUSUM techniques"

ISO Standard
ISO 7873:1993 "Control charts for arithmetic average with warning limits"

ISO Standard
ISO 3534-1:2006 "Statistics -- Vocabulary and symbols -- Part 1: General statistical terms and terms used in probability"

ISO Standard
ISO 3534-2:2006 "Statistics -- Vocabulary and symbols -- Part 2: Applied statistics"

ISO Standard
ISO 3534-3:1999 "Statistics -- Vocabulary and symbols -- Part 3: Design of experiments"

IUPAC Document on PTs
IUPAC Technical report – "The International Harmonized Protocol for the proficiency testing of analytical chemistry laboratories" M. Thompson et al.

IUPAC Document on IQC
IUPAC Technical report - "Harmonized guidelines for internal quality control in analytical chemistry laboratories" M. Thompson and R. Wood

IUPAC Document on MV
IUPAC Technical report – "Harmonized guidelines for single-laboratory validation of methods of analysis" M. Thompson et al.

IUPAC Document on recovery
IUPAC Recommendations "Use of the terms “recovery” and “apparent recovery” in analytical procedures" D.T. Burns et al.

LGC best practice guide for calibration design
LGC Document "Preparation to calibration curves – a guide to best practice. (2003)

NIST Document on MU
NIST Technical Note 1297 - 1994 Edition "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results"

NORDTEST Document on MU
NORDTEST Technical report 537 (2003) – "Handbook for Calculation of Measurement Uncertainty in Environmental Laboratories"

The Royal Society of Chemistry - AMC
Analytical Methods Committee Technical Briefs: a series of short publications of very high utility for analytical chemists

VIM 2008- Bureau International des Poids et Mesures (BIPM)
International vocabulary of metrology — Basic and general concepts and associated terms

Training

Institute for Reference Materials and Measurements
JRC - IRMM Training page

SARAF (School for Advanced Residue Analysis in Food)
Courses about analytical, QC and QA, reporting aspects for residues in food.
SARAF

Basic Toxicology Courses. Covered topics range from basic principles of toxicology to epidemiology, from legislation to risk assessment.
EUROTOX

Community Reference Laboratory for Single Residue Methods training programme 2008
CRL pesticides training page

LGC: training on method validation, quality management, internal auditing, accreditation
LGC courses list

Molnar Institute intensive courses for HPLC users
MI courses

The United Kingdom Accreditation Service calendar of courses
UKAS training

Proficiency testing providers

Database of Proficiency Tests available in Europe: EPTIS

AACC

AAFCO

AOAC

FAPAS

FEPAS

LGC

National Measurement Institute of Australia

UNICHIM (in Italian)

Suppliers of calibrations standards (pure substances, solutions, isotopically labelled standards)

Mycotoxin detection kits tested and validated by AOAC (Association of Analytical Communities)
AOAC

Single standards (solid and solutions) and mixtures
Tecna LAB

Single standards (solid and solutions) and mixtures, from different suppliers
ChemIndustry: example of search for Ochratoxin A

Single standards (solid and solutions, native or labelled, and conjugates) or calibrant mixtures
SIGMA Aldrich

Single standards (solid and solutions) and mixtures, from different suppliers.
VWR

Single standards (solid and solutions, native and labelled, conjugates and masked) and calibrant mixtures. Datasheets for registered users.
Romer Labs

Single standards (solid and solutions) and mixtures, from different suppliers.
Chemexper

Bioactive substances and standard solutions (producer and distributor).
Fermentek

Single standards (solid and solutions, native and labelled, conjugates) and calibrant mixtures. Datasheets available.
Biopure

Single standards (solid and solutions, native and labelled, conjugates) and calibrant mixtures. Datasheets available.
LGC Standards

Certified reference materials and reference materials

Certified matrix and pure substance reference materials
JRC - IRMM catalogue PDF format or JRC - IRMM catalogue search engine

BCR® - 423 (Aflatoxin M1 in chloroform)
JRC - IRMM link to the product

ERM® - AC057 (Aflatoxin B1 in acetonitrile)
JRC - IRMM link to the product

ERM® - AC058 (Aflatoxin B2 in acetonitrile)
JRC - IRMM link to the product

ERM® - AC059 (Aflatoxin G1 in acetonitrile)
JRC - IRMM link to the product

ERM® - AC060 (Aflatoxin G2 in acetonitrile)
JRC - IRMM link to the product

IRMM - 315 (Deoxynivalenol in acetonitrile)
JRC - IRMM link to the product

ERM® - AC699 (Zearalenone in acetonitrile)
JRC - IRMM link to the product

BCR® - 262R (Defatted peanut meal Aflatoxin B1 blank)
JRC - IRMM link to the product

BCR® - 385R (Peanut butter - Aflatoxin high level)
JRC - IRMM link to the product

BCR® - 263R (Peanut meal containing Aflatoxin B1, B2, G1 and G2)
JRC - IRMM link to the product

BCR® - 264R (Defatted peanut meal containing Aflatoxin B1 at high level)
JRC - IRMM link to the product

BCR® - 375 (Compound feed Aflatoxin B1 blank)
JRC - IRMM link to the product

BCR® - 377 (Maize flour Deoxynivalenol blank)
JRC - IRMM link to the product

BCR® - 396 (Wheat flour Deoxynivalenol blank)
JRC - IRMM link to the product

BCR® - 471 (Wheat flour Ochratoxin A blank)

JRC - IRMM link to the product

ERM® - BC716 (Maize Zearalenone blank)
JRC - IRMM link to the product

ERM® - BC717 (Maize containing Zearalenone)
JRC - IRMM link to the product

ERM® - BD282 (Whole milk powder Aflatoxin M1 blank)
JRC - IRMM link to the product

ERM® - BD283 (Whole milk powder containing Aflatoxin M1 low level)
JRC - IRMM link to the product

ERM® - BD284 (Whole milk powder containing Aflatoxin M1 high level)
JRC - IRMM link to the product

SRM® 2387 (Peanut butter - reference values for Aflatoxins B1, B2, and total aflatoxins)
NIST link to the product

Materials characterised by proficiency testing providers
FAPAS
Romer Labs

Consumables

Elisa test kits and immunoaffinity clean-up columns IAC for various mycotoxins: Tecna LAB, Romer Labs, R-Biopharm, Grace Division, Vicam, Neogen, Coring System Diagnostix GmbH, Abraxis Bioscience

"Monoclonal antibody-based indirect competitive ELISA for the detection of T-2 toxin in wheat, maize, and baby food"
Biocop presentation of ELISA test kit

Analytical methods

Table 7: Standardised methods for Mycotoxin determination in various matrices

Matrix	*Method*	*Comments/links*
Food	CEN/TR 15298:2006	Foodstuffs - Sample comminution for mycotoxins analysis - Comparison between dry milling and slurry mixing CEN standards page
Food	CR 13505:1999	Food analysis - Biotoxins - Criteria of analytical methods of mycotoxins CEN standards page
Food	EN ISO 14675:2003	Milk and milk products - Guidelines for a standardized description of competitive enzyme immunoassays - Determination of aflatoxin M1 content CEN standards page
Food	ISO 14501:2007	Milk and milk powder -- Determination of aflatoxin M1 content -- Clean-up by immunoaffinity chromatography and determination by high-performance liquid chromatography ISO purchase page
Food	ISO 14674:2005	Milk and milk powder -- Determination of aflatoxin M1 content -- Clean-up by immunoaffinity chromatography and determination by thin-layer chromatography ISO purchase page
Food	EN 14123:2007	Foodstuffs - Determination of aflatoxin B1 and the sum of aflatoxin B1, B2, G1 and G2 in hazelnuts, peanuts, pistachios, figs, and paprika powder - High performance liquid chromatographic method with post-column derivatisation and immunoaffinity column cleanup CEN standards page
Food	ISO 16050:2003	Foodstuffs -- Determination of aflatoxin B1, and the total content of aflatoxins B1, B2, G1 and G2 in cereals, nuts and derived products -- High-performance liquid chromatographic method ISO purchase page
Food	EN 12955:1999	Foodstuffs - Determination of aflatoxin B1, and the sum of aflatoxins B1, B2, G1 and G2 in cereals, shell-fruits and derived products - High performance liquid chromatographic method with post column derivatisation and immunoaffinity column clean up CEN standards page
Food	2008.02 (AOAC Methods Adopted as First Action Official Methods^{SM})	Total Aflatoxins B1, B2, G1, and G2 and Ochratoxin A in Ginseng and Ginger by Multitoxin Immunoaffinity Column Cleanup and Liquid Chromatographic Quantitation AOAC - link to list of official methods
Feed	ISO 17375:2006	Animal feeding stuffs -- Determination of aflatoxin B1 ISO purchase page

Matrix	Method	Comments/links
Feed	ISO 6651:2001	Animal feeding stuffs -- Semi-quantitative determination of aflatoxin B1 -- Thin-layer chromatographic methods ISO purchase page
Feed	ISO 14718:1998	Animal feeding stuffs -- Determination of aflatoxin B1 content of mixed feeding stuffs -- Method using high-performance liquid chromatography ISO purchase page
Food	PVM 2: 1997 (AOAC peer-verified method)	Determination of Deoxynivalenol in White Flour, Whole Wheat Flour, and Bran by Solid-Phase Extraction/Liquid Chromatography AOAC - List of Approved peer-verified methods
Food	EN 14352:2004	Document title Foodstuffs - Determination of fumonisin B1 and B2 in maize based foods - HPLC method with immunoaffinity column clean up CEN standards page
Food	EN 13585:2001	Foodstuffs - Determination of fumonisins B1 and B2 in maize - HPLC method with solid phase extraction clean-up CEN standards page
Food	EN 14352:2004	Foodstuffs - Determination of Fumonisin B1 and B2 in maize based foods - HPLC method with immunoaffinity column clean up CEN standards page
Food	EN ISO 15141-1:1998 EN ISO 15141-2:1998	Foodstuffs - Determination of ochratoxin A in cereals and cereal products - Part 1: High performance liquid chromatographic method with silica gel clean up Foodstuffs - Determination of ochratoxin A in cereals and cereal products - Part 2: High performance liquid chromatographic method with bicarbonate clean up CEN standards page
Food	EN 14132:2003/AC:2006	Foodstuffs - Determination of ochratoxin A in barley and roasted coffee - HPLC method with immunoaffinity column clean-up CEN standards page
Food	EN 14177:2003	Foodstuffs - Determination of Patulin in clear and cloudy apple juice and puree - HPLC method with liquid/liquid partition clean-up CEN standards page
Food	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 ISO purchase page
Food	ISO 8128-2:1993	Apple juice, apple juice concentrates and drinks containing apple juice -- Determination of patulin content -- Part 2: Method using thin-layer chromatography ISO purchase page
Feed	ISO 17372:2008	Animal feeding stuffs -- Determination of zearalenone by immunoaffinity column chromatography and high performance liquid chromatography

Matrix	*Method*	*Comments/links*
		ISO purchase page
Feed	ISO 6870:2002	Animal feeding stuffs -- Qualitative determination of zearalenone ISO purchase page
Cereals	AACC approved methods 10th edition	Chapter 45 is dedicated to analytical methods for mycotoxins. Access restricted to members AACC International approved methods
Food and feed	No Official Reference but reference to literature	EMAS - link to the method for Patulin
		EMAS - link to method for Ochratoxin A
		EMAS - link to method for Trichothecenes
		EMAS - link to method for Fumonisins
		EMAS - link to method for Zearalenon
		EMAS - link to method for Aflatoxins
Food	AOAC Official Methods of Analysis - Chapter 49	Mycotoxins (Aflatoxins B1/B2/G1/G2, Aflatoxin M1, Deoxynivalenol, Ochratoxins, Patulin, Sterigmatocystin, Zearalenon)

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Abstract
This Technical Report of the Community Reference Laboratory (CRL) for Mycotoxins aims to deliver useful scientific information to all laboratories dealing with mycotoxins determination in food, but also in other matrices. Chemical data of the mycotoxins of concern, European legislation related to mycotoxins in food and feed and web-links to toxicological information on these compounds are reported. Also the occurrence and analytical methods are included. A long list of links to international organisations of general interest for analytical chemistry and food safety and of organisations of specific interest as well as some e-publications is included. Also links for books, international guidelines, proficiency test providers, standards and consumables suppliers can be found. From the first edition, links were checked and, when necessary, corrected; some information was added.

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