

MULTI-RESIDUE MYCOTOXIN ANALYSIS
PHOTOCHEMICAL REACTOR
AUTOMATED SAMPLE CLEAN-UP
IMMUNOAFFINITY SAMPLE CLEAN-UP
ELISA TEST KITS

MYCOTOXIN
PRODUCT LINE

MYCOTOXIN ANALYSIS PRODUCTS

PICKERING
LABORATORIES

POST-COLUMN DERIVATIZATION

PINNACLE PCX

POST-COLUMN DERIVATIZATION INSTRUMENT

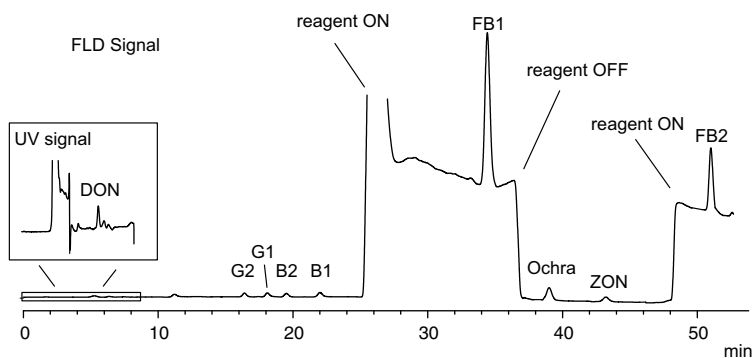
Part of the complete integrated system of instruments, chemicals, columns, methods and support from Pickering Laboratories.

Pinnacle PCX is custom designed for post-column applications matching chemistry, columns and application to optimize sensitivity and reliability of the results.

MULTI-RESIDUE ANALYSIS OF DEOXYNIVALENOL, AFLATOXINS, OCHRATOXIN A, ZEARALENONE AND FUMONISIN BY HPLC AND POST-COLUMN DERIVATIZATION

Although *Aspergillus* (Aflatoxins, Ochratoxin A) are generally associated with peanuts and *Fusarium* (Deoxynivalenol, Zearalenone) with wheat, these fungi and those that produce other toxins are not host selective and so can cross plant species. When infected grains are processed, any visible mold is lost but the toxic metabolites carry over into the finished products. Thus, multi-residue analytical screens for toxins in grain and finished goods are a wiser choice than single-family protocols.

We present a single screen to cover five families of toxins. This method is suitable for analyzing beverages, grains and feeds. The results of a single laboratory validation study of this method for corn grain were published in the *Journal of AOAC International* (Vol. 92, No. 1, 2009).



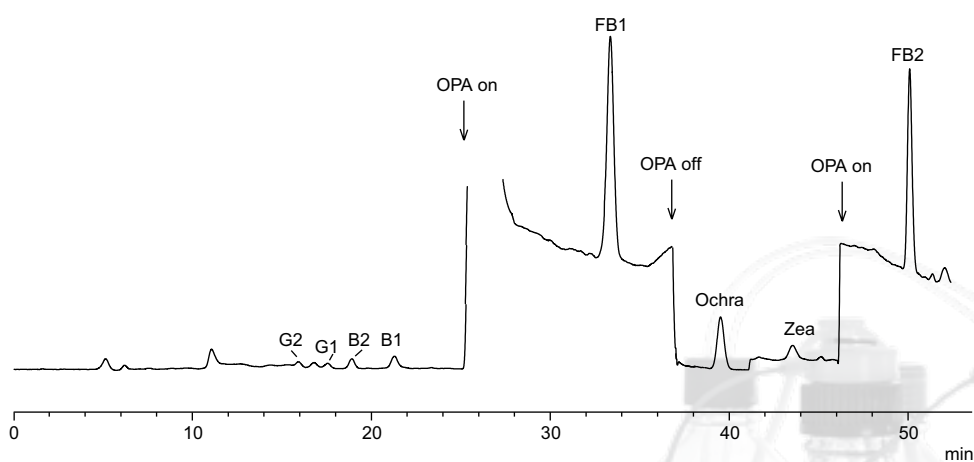
Corn Sample Spiked with Mycotoxins

DATA FOR SPIKED CORN SAMPLE				
MYCOTOXIN	SPIKE CONC, ppb	NATURAL CONTAMINATION LEVEL, ppb	RECOVERIES %	% RSD N=10
Aflatoxin B1	5.0	-	74	19.4
Aflatoxin B2	1.7	-	88	15.4
Aflatoxin G1	5.1	-	84	12.9
Aflatoxin G2	2.2	-	95	13.2
Ochratoxin A	521	-	82	5.5
Zearalenone	690	205	86	10.8
Fumonisin B1	529	3540	113	8.9
Fumonisin B2	102	1109	84	11.6
Deoxynivalenol	930	-	92	7.7

MULTI-RESIDUE MYCOTOXIN ANALYSIS OF DRIED DISTILLERS GRAINS

Distillers grains (DG) are the still residues after the ethanol has been collected. Approximately 90% of US production is used in domestic animal feed. Any Mycotoxins present in the fresh corn can be concentrated by a factor of three. Contamination can also occur during storage. This raises concern about the potential animal and human health hazards from the use of Mycotoxin-contaminated distillers grains.

Corn entering the ethanol processing plant as well as distillers grains should be routinely tested for Mycotoxin contaminations to ensure compliance with guidelines set by FDA. We present a single screen method to cover 4 families of toxins that could be present in dried distillers grains (DDG).



DDG Sample Spiked with Mycotoxins

DATA FOR DRIED DISTILLERS GRAIN				
MYCOTOXIN	SPIKE CONC, ppb	NATURAL CONTAMINATION LEVEL, ppb	RECOVERIES %	% RSD N=4
Aflatoxin B1	10.0		65	7.6
Aflatoxin B2	3.4		79	6.3
Aflatoxin G1	10.2		75	9.4
Aflatoxin G2	4.4		82	9.1
Ochratoxin A	203		89	7.1
Zearalenone	1057	231	75	8.8
Fumonisin B1	1042	801	109	5.8
Fumonisin B2	1379	223	104	6.8



PHOTOCHEMICAL REACTOR

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PHOTOCHEMICAL REACTOR

Detection Enhancement for Aflatoxins, Phenylurea Pesticides, Barbiturates and Other Compounds

Photochemical derivatization is a simple, inexpensive and flexible technique that improves sensitivity and selectivity of detection for a broad range of analytes. Among the applications for the photochemical reactor are analysis of Aflatoxins in foods, Phenylurea Pesticides in water and Barbiturates in biological samples. Photochemical derivatization also allows identification of closely related compounds such as polyphenols.

Pickering Laboratories Multi residue Mycotoxins method for DON, Aflatoxins, Fumonisin, Ochratoxin A and Zearalenone employs photochemical derivatization for Aflatoxins allowing detection at sub-ppb levels.

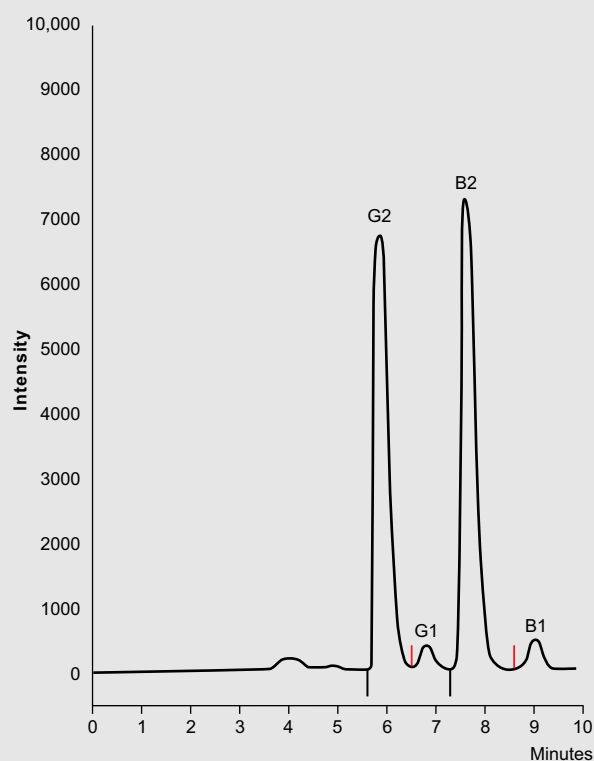
The photochemical reactor has a 254 nm lamp and a knitted reactor coil.

FEATURE HIGHLIGHTS

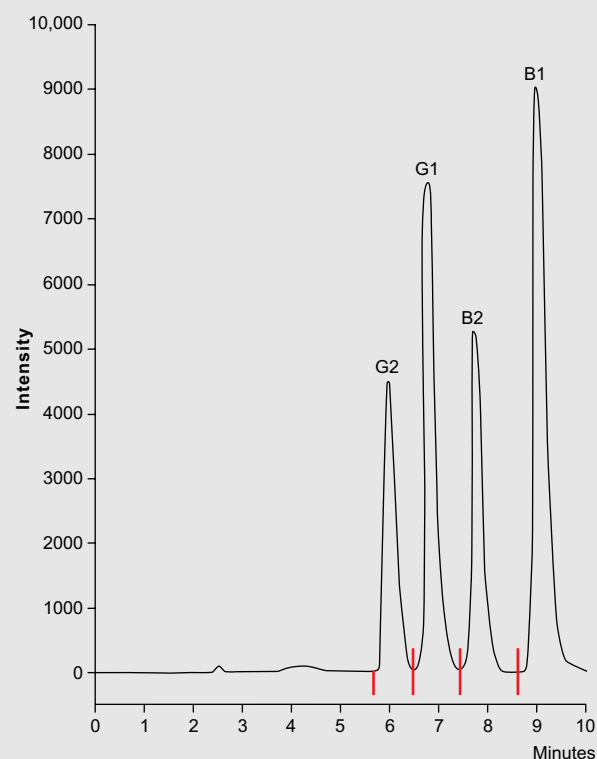
- ➔ 254 NM UV LOW PRESSURE LAMP WITH COOLED REFLECTOR TUBE
- ➔ LONG TERM STABILITY OF LAMP AND COIL
- ➔ HIGH LIGHT TRANSMISSION
- ➔ ROBUST STEEL HOUSING TO MEET LABORATORY REQUIREMENTS
- ➔ SPECIAL DESIGNED FLUOROCARBON COIL
- ➔ PHOTOCHEMICAL POST-COLUMN DERIVATIZATION OF AFLATOXINS IN A SPECIAL REACTOR LOOP WITH UV LIGHT
- ➔ RESULT: CLEAR PEAKS
- ➔ COMPARABLE TO ELECTROCHEMICAL DERIVATIZATION WITH COBRA CELL (*DG Joint Research Center of the European Commission in the Institute for Health and Consumer Protection*)
- ➔ AOAC ACCEPTED METHODOLOGY
- ➔ STANDARD REACTOR VOLUME IS 1.0 ML

UV DERIVATIZATION RESULTS IN CLEAR PEAKS FOR ALL AFLATOXINS

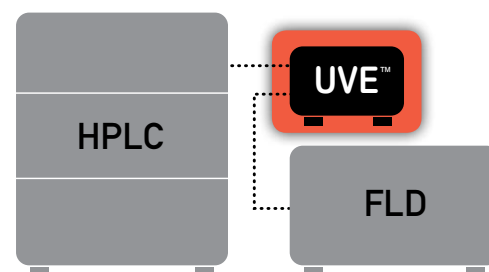
Note the short run time B1 elutes at 9.5 Min



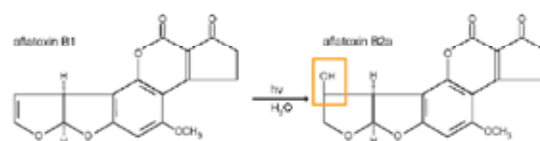
Without UVE: Low response for G1 and B1



With UVE: High response and no band spreading

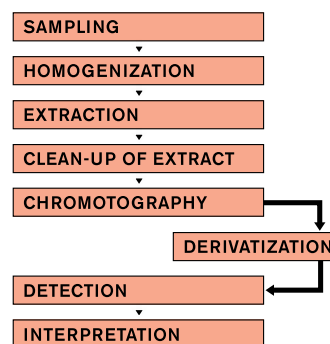


Easy Handling: Simply put the UVE between your HPLC device and detector, switch it on - ready to use!



What actually happens?

Aflatoxins B1 and G1 are transformed to stable fluorescent derivatives resulting in clear peaks



SPECIFICATIONS

CE CERTIFIED	Yes
UV LAMP	254 nm
REACTOR COIL	Special
DIMENSIONS	14.5 x 8.5 x 27 cm
POWER INPUT	50 W
WEIGHT	3 kg

ORDERING INFORMATION	
PART NO.	DESCRIPTION
1100-3347	Photochemical Reactor 1.0 mL, 120 V
1100-3348	Photochemical Reactor 1.0 mL, 240 V
1552-0024	Lamp, 254 UV, Photochemical



AUTOMATED SAMPLE CLEAN-UP

AcceCLEAN

THREE NEEDLE PARALLEL SAMPLE CLEAN-UP FOR IMMUNOAFFINITY COLUMNS

The LCTech AcceCLEAN processes up to 30 samples in one batch, three samples simultaneously. Sample clean-up of crude extracts for a broad range of matrices is performed using immunoaffinity columns.

FEATURE HIGHLIGHTS

- ➔ THREE PARALLEL OPERATING NEEDLES
- ➔ NO CROSS-CONTAMINATION OR CARRY-OVER FROM SAMPLE-TO-SAMPLE
- ➔ EIGHT-PORT VALVE ENABLES SEVEN DIFFERENT SOLVENTS IN ADDITION TO AIR FLOW
- ➔ RACK PLATFORM WITH UP TO TEN RACKS, 3 SAMPLES EACH
- ➔ DIFFERENT METHOD FOR EACH RACK AVAILABLE
- ➔ HOLDS UP TO 50 STORED METHODS
- ➔ RUGGED CONSTRUCTION FOR LOW MAINTENANCE AND CONTINUOUS OPERATION
- ➔ EASY-TO-USE KEYPAD OPERATION

CONSISTENCY AND PERFORMANCE

Aflatoxins	G2	G1	B2	B1
Area Count Sample	865	1490	1108	2390
Area Count Blank	0	0	0	0

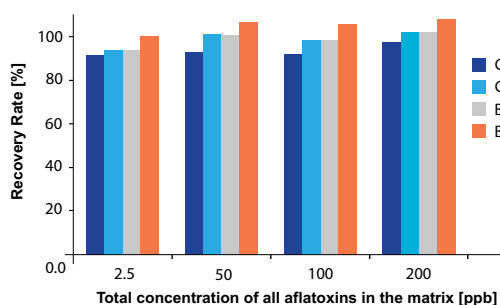
➔ **No Cross-Contamination**

Comparison of recovered area counts of a 300 ppb sample with the immediately following blank

LCtech Column Type	Matrix	Rec. Rate Manual (%)	Rec. Rate Automated with AcceCLEAN (%)
OtaCLEAN	Peanut Butter	97	97
OtaCLEAN	Maize	94	93
Afla-OtaCLEAN	Rice	91	93

➔ **High Recovery Rates**

Comparison of recovery rates of Ochratoxin A with manual and automated operation of Immunoaffinity columns with different matrices



➔ **Low Detection Limits Possible**

Recovery rates of Aflatoxins in peanut butter, using 3 mL AflaCLEAN columns in AcceCLEAN

RECOMMENDED LCTECH IMMUNOAFFINITY COLUMNS



For aflatoxins
P/N 1705-0003



For ochratoxin A
P/N 1705-0004



For aflatoxins & ochratoxin A
P/N 1705-0005

LCtech Immunoaffinity columns available for sample preparation for your Mycotoxin analysis

ORDERING INFORMATION

AcceCLEAN robotic system for the automated handling of IAC columns

P/N 11020

Racks of 30 mL vials, three samples simultaneously

P/N 11262



IMMUNOAFFINITY SAMPLE CLEAN-UP COLUMNS

AflaCLEAN, OtaCLEAN & AflaOtaCLEAN COMBINATION CLEAN-UP COLUMN

AFLATOXIN & OCHRATOXIN IMMUNOAFFINITY CLEAN-UP COLUMNS

Aflatoxins and Ochratoxin A are produced by fungi, e.g. *Aspergillus* and *Penicillium* species. Therefore both toxin types are found together in many foods and animal feeds, e.g. cereals. Thus it is appropriate to analyze one extract for the occurrence of both mycotoxins in a single step.

A significant assistance is the clean-up of extracts by a combined immunoaffinity column for both mycotoxin types in one step. The subsequent analysis may then be performed by HPLC with post-column derivatization or other techniques.

SIMULTANEOUS ANALYSIS OF AFLATOXINS AND OCHRATOXIN A – SAMPLE CLEAN-UP

Pickering Laboratories' combination sample clean-up column Afla-OtaClean from LCTech provides an ideal immunoaffinity column. This combination column is very tolerant towards many matrices and allows for a comprehensive clean-up of the aflatoxins B1, B2, G1 and G2 as well as Ochratoxin A. The high maximum capacity of 150 ng for Aflatoxin B1 and Ochratoxin A provides a wide measurement range.

HIGH RECOVERIES OF AFLATOXIN AND OCHRATOXINS					
MATRIX	B1	B2	G1	G2	OTA
Maize (Afla 10 ppb, OTA 14.3 ppb)	107 %	91 %	103 %	75 %	97 %
Rice (Afla 10 ppb, OTA 14.3 ppb)	107 %	93 %	98 %	85 %	101 %
Malt (Afla 10 ppb, OTA 14.3 ppb)	98 %	99 %	97 %	70 %	96 %
Raisins (Afla 10 ppb, OTA 14.3 ppb)	99 %	106 %	101 %	69 %	97 %

AFLATOXINS & OCHRATOXIN A SAMPLE CLEAN-UP COLUMN CATALOG INFORMATION		
CATALOG NO.	DESCRIPTION	QTY
1705-0005	Afla-OtaClean sample clean-up column	25/pkg

SAMPLE CLEAN-UP COLUMN FOR AFLATOXIN ANALYSIS

The new Pickering Laboratory immunoaffinity column AflaCLEAN from LCTech was developed for the sample clean-up of foods, grains, feeds, etc. for aflatoxin analysis using HPLC post-column derivatization or other techniques. With a maximum loading capacity of 150 ng Aflatoxin B1 and a selectivity against Aflatoxins B1, B2, G1 and G2. AflaCLEAN columns are available in practical 3 mL polypropylene format.

HIGH RECOVERIES OF AFLATOXIN				
MATRIX	B1	B2	G1	G2
Chili	116 %	117 %	121 %	92 %
Dates	108 %	96 %	116 %	72 %
Peanut Butter	95 %	98 %	93 %	84 %
Peanuts	114 %	113 %	102 %	91 %
Figs	115 %	104 %	110 %	74 %
Hazelnuts	98 %	100 %	95 %	83 %
Maize	101 %	98 %	103 %	80 %
Almonds	91 %	91 %	90 %	79 %
Pistachios	90 %	90 %	100 %	75 %
Rice	103 %	104 %	104 %	89 %
Cinnamon	87 %	85 %	86 %	87 %
Dried Distillers Grain	109 %	97 %	90 %	77 %

AFLATOXIN SAMPLE CLEAN-UP COLUMN CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QTY
1705-0003	AlfaClean sample clean-up column	25/pkg

SAMPLE CLEAN-UP COLUMN FOR OCHRATOXIN ANALYSIS

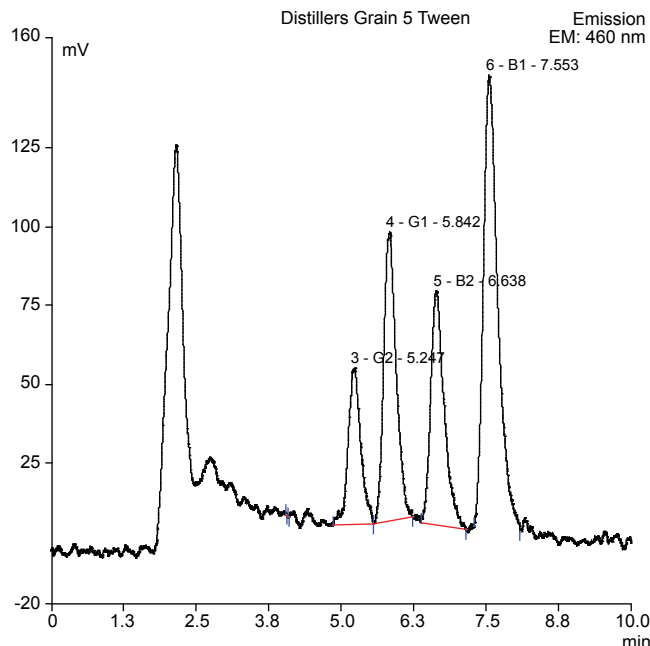
The new Pickering Laboratories immunoaffinity column OtaCLEAN was developed for sample clean-up of foods, grains, feeds, etc. for Ochratoxin A analysis using HPLC or other techniques. The antibody employed possesses a very high Ochratoxin A specificity. This leads to exceptional chromatographic results without any interfering secondary signals and very high recovery rates. Independent of the complexity of the matrix, excellent results can be achieved.

HIGH RECOVERIES OF OCHRATOXIN A	
MATRIX	RECOVERY RATE
Beer	96 %
Cocoa	92 %
Coffee	100 %
Coffee Decaf	91 %
Duran Wheat	92 %
Grapes	91 %
Horse Feed	94 %
Instant Coffee	97 %
Liquorices	99 %
Malt	104 %
Nut Cream	91 %
Paprika	92 %
Pig feed	88 %
Raisins	96 %
Roast Coffee	101 %
Rice	90 %
Dried Distillers Grain	102 %
Red Wine	108 %
Rye Bran	91 %
Wort	107 %

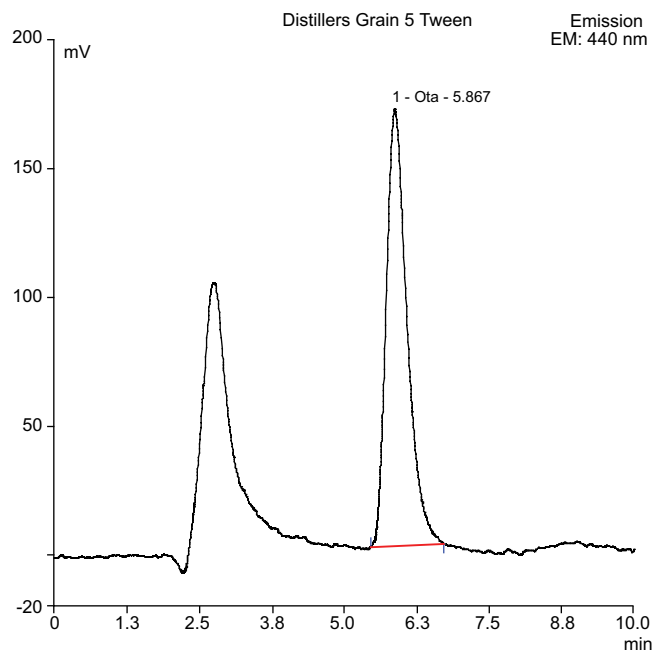
OCHRATOXIN A SAMPLE CLEAN-UP COLUMN CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QTY
1705-0004	OtaClean sample clean-up column	25/pkg

NOTE: Columns are available in the practical 3 mL polypropylene format



Distillers grain spiked with 5 ppb Aflatoxins



Distillers grain spiked with 5 ppb Ochratoxin A

ELISA TEST KITS

OtaREAD™ & AflaREAD™

AFLATOXIN AND OCHRATOXIN ELISA TEST KITS

The contamination of food and feed is a worldwide problem. Under inappropriate storage conditions fungi will produce secondary metabolites like mycotoxins, which often render consumption or further processing impossible. Because of the toxic and hazardous characteristics, resulting in strict regulations, analysis needs to be extremely effective, sensitive and reliable.

The ELISA Test kits from LCTech OtaREAD and AflaREAD met and exceed all regulatory requirements. OtaREAD quantitatively detects Ochratoxin A and AflaREAD™ quantitatively detects Aflatoxin B1. The immunological test procedure is based on antibody-antigen recognition and enzymatic color reaction. It leads to a reliable result after a short incubation period and performs quick and sensitive screening of a variety of food products like rice, maize, cocoa, coffee, peanut butter, beer, wine, liquorice and animal feed.

AflaREAD has an extremely low detection limit of 0.1 ppb unattainable by similar screening products. This makes it possible to perform a reliable screening of food products with very strict regulations like baby food. Due to this excellent sensitivity interfering matrix effects can be significantly reduced by simple dilution.

OtaREAD and AflaREAD kits are delivered ready-to-use and can directly be used for screening sample extracts without further pre-treatment. These kits consist of a shrink-wrapped, coated ELISA plate, the standard solutions and all necessary reagents and a comprehensive manual to guide you through the effective and easy analysis.

FEATURES

- ➔ REDUCED COSTS
(NO ANALYTICAL INSTRUMENTS NEEDED)
- ➔ VERY HIGH SAMPLE THROUGHPUT
(88 SAMPLES IN LESS THAN 2 HOURS)
- ➔ UNMATCHED AFLATOXIN B1 SENSITIVITY (0.1 PPB)
- ➔ UNMATCHED OCHRATOXIN A SENSITIVITY OF (0.5 PPB)
- ➔ FAST AND RELIABLE RESULTS
- ➔ HIGHEST REPRODUCIBILITY
- ➔ LONG SHELF-LIFE (AT LEAST 12 MONTHS)
- ➔ EASY HANDLING
- ➔ WIDE RANGE OF MATRICES INCLUDING DRIED DISTILLERS GRAIN

CONSISTING OF

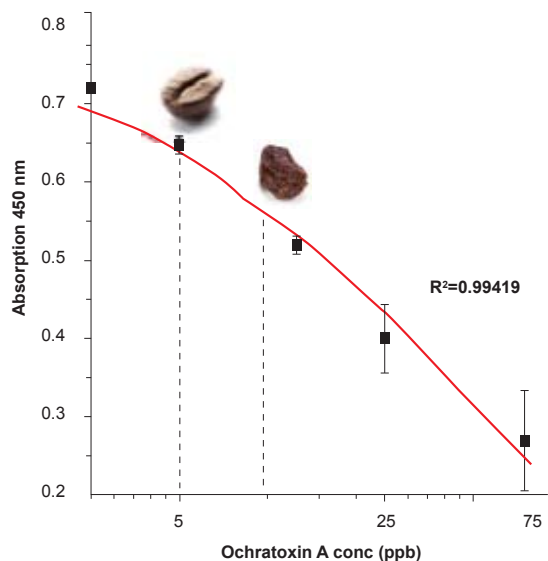
- ➔ ELISA PLATE, COATED
- ➔ STANDARD SOLUTIONS 1-8 (0-15 NG/ML)
- ➔ DETECTION SOLUTION
- ➔ WASHING SOLUTION
- ➔ DYING SOLUTION
- ➔ STOPPING SOLUTION
- ➔ DILUTION BUFFER

ELISA KITS

CATALOG NO.	DESCRIPTION
11139	AflaREAD, ELISA Kit (96 well) for the Detection of Aflatoxin B1
11068	OtaREAD, ELISA Kit (96 well) for the Detection of Ochratoxin A

OTAREAD OCHRATOXIN A

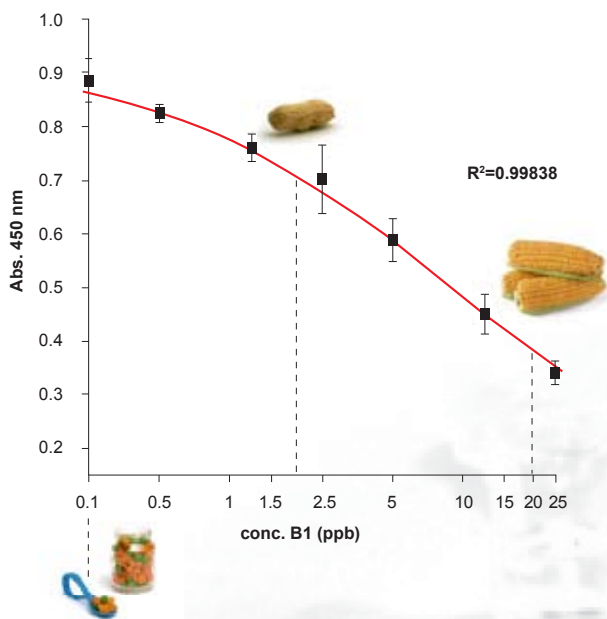
The LCTech ELISA kit has a detection limit of 5 ppb and thus is a very sensitive method. The detection maximum is 75 ppb, for higher concentrations the sample is diluted in the run-up to the analysis.



Representative test of a standard, with exemplary limits in accordance with EU regulations.

ALFAREAD AFLATOXIN A

The detection maximum is 25 ppb, for higher concentrations the sample is diluted in the run-up to the analysis.



Representative test of a standard, with exemplary limits in accordance with EU regulations.



CATALYST FOR SUCCESS

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