

# Prevention and Mitigation of Mycotoxin Contamination of Food and Feed Caused by Climate Change



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# Rapid Screening Methods for Detection of Mycotoxins in Food and Feed Samples

## Introduction

The analysis of mycotoxins requires specialist laboratory equipment and highly skilled staff to run tests. Also, many different methods are required to run a panel of regulated toxins, which can be very expensive. The establishment of LC-MS/MS (liquid chromatography coupled to tandem mass spectrometry) tests for mycotoxin provides more efficient analysis and cost efficient manner in a laboratory setting. However, LC-MS/MS is prohibitively expensive for many industrial laboratories, where only a small number of samples have to be analysed.

As an alternative Rapid Kit based methods have been commercially for a number of years and were developed in different formats for mycotoxin analysis. The majority of these kits are immunochemical based, which come in different formats such as 96 well assays, biosensor, strip and lateral flow devices. The majority of these kits can be implemented in an industry environment and can be even integrated with smartphone technology to record and process analytical results. Identification of individual mycotoxins can be easily achieved and in some cases rough quantitation of mycotoxin levels.

However, some form of laboratory infrastructure is required to guarantee the integrity of results. This will include protocols for representative sampling, extraction of heterogeneous solid sample, and trained staff. Sampling of mycotoxins in heterogeneous materials is critical and EU sampling guidelines need to be followed in order to achieve accurate and reproducible results. Once methods are implemented it is important to check the accuracy of the method through validation studies and by comparing with chemical analysis.

## Partners

## An overview of commercially available Mycotoxin Screening Kits

### Introduction

Rapid kits for mycotoxins are commercially available in different formats. They are designed depending on the sensitivity required, where and how they are applied. Very sensitive rapid kits can be developed for application in specialist laboratories, which can generate sensitivities comparable to if not better than LC-MS/MS. More robust kits have been developed for use in an industry setting than can be used by non-specialist staff.

End-users should carefully consider the suitability of a kit before applying it to samples. Kits should undergo a rigorous validation studies to ensure that they are fit for purposes such as evaluation and certification by a recognized evaluation programs such as the Association of Official Analytical Chemists (AOAC) or the Grain Inspection, Packers and Stockyards Administration (GIPSA). Alternatively, kits should undergo an in-house validation process, where their selectivity, specificity, sensitivity and precision are characterised. Kits should also be evaluated in inter-laboratory studies through participation in proficiency tests or through comparison of results with chemical analysis e.g. LC-MS/MS. Alternatively, methods can be evaluated using a certified reference material or a well characterised sample.

### Rapid kit formats

The **direct competitive enzyme-linked immunosorbent assay** (ELISA) is commonly used in mycotoxin analysis. A typical direct competitive ELISA involves the adding of standard/sample extract to a microtiter plate which contains of antibody onto the walls. Next, an enzyme coupled mycotoxin conjugate solution is added. The sample is incubated and finally the intensity of the colour is measured. Quantitative commercial tests are summarized in **Table 1**, while qualitative tests that only provide positive or negative results for a cut-off level are summarized in **Table 2**.

**Lateral flow test Lateral flow tests (LFT)** also called immunochromatographic strip test have been developed for the quantitative detection of mycotoxins. The general procedure for sample analysis involves the addition of extract to a dilution buffer; the resultant solution is added to a lateral flow test strip; and incubated for a short period of time and read using a trip reader device. A number of companies, provide lateral flow test which provides numerical result by comparing the binding intensities of test lines and control line, these quantitative commercial tests are summarized in **Table 3**, while test that only provide positive or negative results for a cut-off level are summarized in **Table 4**.

### Practicalities in using rapid kits

- An appropriate kit should be selected depending on the **sample type** and **sensitivity**.
- Validation data should be provided by the kit vendor, which will prove the kit works for that application. Kit validation should include performance data for different analytes e.g. T2/HT2 or different aflatoxins. This should ideally include **cross reactivity** and **sensitivity data** for the antibody used towards different mycotoxins.
- In order to get meaningful results, **representative samples** need to be taken. In the case of solid samples, the final laboratory sample (e.g. 1 kg) will need to be **milled and well mixed post milling**. Otherwise inaccurate results will be obtained.
- If samples have a **high prevalence of mycotoxin detections** e.g. for unprocessed cereals, kits may be unsuitable and it is more cost effective to go direct to chemical analysis. Alternatively, just use kits for processed cereals where the likelihood of positive samples is going to be lower.

**Table 1. Quantitative ELISA methods**

Target compound	Quantification Range	Intended Matrices	Validated GIPSA/AOAC	Name of the product	Manufacturer
Aflatoxin	> 1.7 µg/kg	Maize	Yes	RIDASCREEN FAST Aflatoxin	R-Biopharm
Aflatoxin	1-8 µg/kg	Several commodities	Yes	Veratox for Aflatoxin HS	Neogen Corporation
Aflatoxin	5 – 100 µg/kg	Maize & peanut	Yes	Aflatoxin Plate Kit	Beacon Analytical Systems Inc.
Aflatoxin	5-100 µg/kg	Several commodities	Yes	Veratox for Aflatoxin Quantitative Test	Neogen Corporation
Aflatoxin	5-100 µg/kg	Maize	Yes	RIDASCREEN FAST Aflatoxin SC	R-Biopharm
Aflatoxin	> 0.05 µg/kg	Cereals, feed, meat, milk, peanuts and pistachios	No	MaxSignal Total Aflatoxin ELISA Test Kit	Bioo Scientific Corporation
Aflatoxin	> 0.5 µg/kg	Cereals, feed, meat, milk and milk powder, peanuts and peanut butter	No	MaxSignal Aflatoxin B1 ELISA Test Kit	Bioo Scientific Corporation
Aflatoxin	> 1 µg/kg	Cereals and feed	No	RIDASCREEN Aflatoxin B1 30/15	R-Biopharm
Aflatoxin	> 1.75 µg/kg	Cereals and feed	No	RIDASCREEN Aflatoxin Total	R-Biopharm
Aflatoxin	>0.05 µg/kg	Cereals, meat/fish, feed, milk ,oils,peanuts and pistachios	No	Aflatoxin B1 ELISA Test Kit	Reagen LLC
Aflatoxin	>0.05 µg/kg	Cereals, meat/fish, feed, milk ,oils,peanuts and pistachios	No	Total Aflatoxin ELISA Test Kit	Reagen LLC
Aflatoxin	>0.5 µg/kg	Several commodities	No	Aflatoxin Total ELISA	EuroProxima
Aflatoxin	1-20 µg/kg	Almond, beer, canola oil, chilli, maize, malted barley and pistachio	No	AgraQuant ELISA Total Aflatoxins	Romer Labs
Aflatoxin	1-81 µg/kg	Grains and feed	No	Aflatoxin B1 Direct ELISA Test Kit	AC Diagnostics Inc.
Aflatoxin	2 – 100 µg/kg	Maize & peanut	No	Aflatoxin Tube Kit	Beacon Analytical Systems Inc.
Aflatoxin	2-50 µg/kg	Several commodities	No	AgraQuant Aflatoxin B1	Romer Labs
Aflatoxin	4-40 µg/kg	Several commodities	No	AgraQuant ELISA Total Aflatoxins	Romer Labs
Aflatoxin	LOD 0.3-2 ng	Several commodities	No	Aflatoxin B1 ELISA	EuroProxima
Aflatoxin M1	> 0.1 µg/kg	Milk	No	MaxSignal Aflatoxin M1 ELISA Test Kit	Bioo Scientific Corporation
Aflatoxin M1	> 125 ng/kg	Milk and milk powder	No	RIDASCREEN FAST Aflatoxin M1	R-Biopharm
Aflatoxin M1	> 5 ng/kg	Milk, milk powder and cheese	No	RIDASCREEN Aflatoxin M1	R-Biopharm
Aflatoxin M1	>0.05 µg/kg	Milk and milk powder	No	Aflatoxin M1 ELISA Test Kit	Reagen LLC
Aflatoxin M1	>6 ng/kg	Milk, milk powder, cheese, and butter	No	Aflatoxin M1 ELISA	EuroProxima
Aflatoxin M1	0.3 – 300 ng/kg	Milk and milk powder	No	Aflatoxin M1 Plate Kit	Beacon Analytical Systems Inc.
Aflatoxin M1	100-2000 ng/kg	Milk, milk powder and cheese	No	AgraQuant Aflatoxin M1 fast	Romer Labs
Aflatoxin M1	25-500 ng/kg	Milk, milk powder and cheese	No	AgraQuant Aflatoxin M1 Sensitive	Romer Labs
Aflatoxin M1	5-100 ng/kg	Milk, milk powder, butter and cheese	No	Veratox for Aflatoxin M1	Neogen Corporation
Deoxynivalenol	0.25-5 mg/kg	Several commodities	Yes	AgraQuant DON	Romer Labs
Deoxynivalenol	0.5 – 5.0 mg/kg	Maize and wheat	Yes	DON (G) Plate Kit	Beacon Analytical Systems Inc.

Deoxynivalenol	0.5-5 mg/kg	Several commodities	Yes	Veratox for DON 5/5	Neogen Corporation
Deoxynivalenol	0.5-5 mg/kg	Wheat, maize, barley, malted barley, and oats	Yes	RIDASCREEN FAST DON SC	R-Biopharm
Deoxynivalenol	0.5-5 mg/kg	Wheat, maize, barley, malted barley, and oats	Yes	RIDASCREEN FAST DON	R-Biopharm
Deoxynivalenol	0.5-5 mg/kg	Several commodities	Yes	Veratox for DON 2/3	Neogen Corporation
Deoxynivalenol	> 18.5 µg/kg	Cereals, malt, feed, beer and wort	No	RIDASCREEN DON	R-Biopharm
Deoxynivalenol	>30 µg/kg	Cereal, beer, silage, feed and food	No	Deoxynivalenol ELISA (DON)	EuroProxima
Deoxynivalenol	0.1-25 mg/kg	Grains and feed	No	Vomitoxin ELISA Kit	AC Diagnostics Inc.
Deoxynivalenol	0.2 – 2.5 mg/kg	Wheat, barley, malted barley, maize and oats	No	DON Plate Kit	Beacon Analytical Systems Inc.
Deoxynivalenol	0.2 – 2.5 mg/kg	Wheat, barley, malted barley, maize and oats	No	DON-Z Plate Kit	Beacon Analytical Systems Inc.
Deoxynivalenol	15 – 1000 µg/kg	Cereals, dried meat, fish, feed, milk and seed	No	MaxSignal Deoxynivalenol ELISA Test Kit	Bioo Scientific Corporation
Deoxynivalenol	25-250 µg/kg	Several commodities	No	Veratox for DON HS (High Sensitivity)	Neogen Corporation
Fumonisin	0.25-5 mg/kg	Maize, corn meal, popcorn, milo, wheat and DDGs	Yes	AgraQuant Total Fumonisin	Romer Labs
Fumonisin	0.5-5 mg/kg	Maize	Yes	RIDASCREEN FAST Fumonisin	R-Biopharm
Fumonisin	1-6 mg/kg	Barley, maize, DDGS, milo, popcorn, rice, soybeans and wheat	Yes	Veratox for Fumonisin	Neogen Corporation
Fumonisin	>1 µg/kg	Cereals, dried meat, fish, feed, milk and seed	No	MaxSignal Fumonisin ELISA Test Kit	Bioo Scientific Corporation
Fumonisin	>1 µg/kg	Cereals, dried meat/fish, feed, milk and seed	No	Fumonisin Toxin ELISA Test Kit	Reagen LLC
Fumonisin	>2.3 µg/kg	Maize	No	Fumonisin ELISA	EuroProxima
Fumonisin	>25 µg/kg	Maize	No	RIDASCREEN Fumonisin	R-Biopharm
Fumonisin	0.3 – 6.0 mg/kg	Maize, corn meal, corn germ meal, corn gluten meal and Maize/soy blend	No	Fumonisin Plate Kit	Beacon Analytical Systems Inc.
Fumonisin	0.5-6 mg/kg	Barley, maize, DDGS, milo, popcorn, rice, soybeans and wheat	No	Veratox for Fumonisin 5/10	Neogen Corporation
Fumonisin	500-600 µg/kg	Barley, maize, DDGS, milo, popcorn, rice, soybeans and wheat	No	Veratox for Fumonisin HS (High Sensitivity)	Neogen Corporation
Ochratoxin	> 1.25 µg/kg	Cereals and feed	No	RIDASCREEN Ochratoxin A 30/15	R-Biopharm
Ochratoxin	>0.015 µg/kg	Cereals, dried meat, fish, feed, milk and seed	No	MaxSignal Ochratoxin A ELISA Test Kit	Bioo Scientific Corporation
Ochratoxin	>0.015 µg/kg	Cereals, meat/fish, feed, milk, oils, peanuts and pistachios	No	Ochratoxin A ELISA Test Kit	Reagen LLC
Ochratoxin	>0.5 µg/kg	Barley, soy and oat	No	Ochratoxin-A	EuroProxima
Ochratoxin	>5 µg/kg	Cereals and feed	No	RIDASCREEN FAST Ochratoxin A	R-Biopharm
Ochratoxin	1-150 µg/kg	Several commodities	No	Helica Ochratoxin ELISA	Bio-Check (UK)
Ochratoxin	2 – 25 µg/kg	Maize, corn meal, and other grains	No	Ochratoxin Plate Kit	Beacon Analytical Systems Inc.

Ochratoxin	2-25 µg/kg	Maize, barley, wheat, green coffee and various dried fruits.	No	Veratox for Ochratoxin	Neogen Corporation
Ochratoxin	2-25 µg/kg	Maize, barley, and other grains	No	Veratox for Ochratoxin Grain	Neogen Corporation
Ochratoxin	2-40 µg/kg	Barley, beer, cocoa, maize, cereal, green coffee, milo, soybeans, wheat and wine	No	AgraQuant Ochratoxin	Romer Labs
T2/HT2	> 50 µg/kg	Cereals and feed	No	RIDASCREEN FAST T-2 Toxin	R-Biopharm
T2/HT2	> 5µg/kg	Cereals and feed	No	RIDASCREEN T-2 Toxin	R-Biopharm
T2/HT2	>1 µg/kg	Cereals, dried meat/fish, feed, milk and seed	No	T-2 Toxin ELISA Test Kit	Reagen LLC
T2/HT2	>10 µg/kg	Cereals, dried meat, fish, feed, milk and seed	No	MaxSignal T-2 Toxin ELISA Test Kit	Bioo Scientific Corporation
T2/HT2	>20 µg/kg	Several commodities	No	T-2 toxin ELISA	EuroProxima
T2/HT2	25 – 500 µg/kg	Maize, corn meal, corn germ meal, corn gluten meal and Maize/soy blend	No	T2 Toxin Plate Kit	Beacon Analytical Systems Inc.
T2/HT2	25 – 500 µg/kg	Maize, corn meal, corn germ meal, corn gluten meal and maize/soy blend	No	T2/HT2 Toxin Plate Kit	Beacon Analytical Systems Inc.
T2/HT2	25-250 µg/kg	Wheat, maize, barley, oats and rye	No	Veratox for T-2/HT-2	Neogen Corporation
T2/HT2	25-500 µg/kg	Barley, maize, rice, sorghum and wheat	No	AgraQuant T-2 Toxin	Romer Labs
T2/HT2	37-500 µg/kg	Maize, corn meal, corn germ meal and Maize/soy blend	No	AgraQuant T-2/HT-2 Toxin	Romer Labs
Zearalenone	> 1.75 µg/kg	Cereals, feed, beer, serum and urine	No	RIDASCREEN Zearalenon	R-Biopharm
Zearalenone	>0.13 µg/kg	Cereal	No	Zearalenone ELISA	EuroProxima
Zearalenone	>0.25 µg/kg	Cereals, dried meat, fish, feed, milk and seed	No	MaxSignal Zearalenone ELISA Test Kit-Rapid	Bioo Scientific Corporation
Zearalenone	>1 µg/kg	Cereals, dried meat/fish, feed, milk and seed	No	Zearalenone ELISA Test Kit	Reagen LLC
Zearalenone	>16 µg/kg	Cereal	No	RIDASCREEN FAST Zearalenon SC	R-Biopharm
Zearalenone	>50 µg/kg	Cereals and feed	No	RIDASCREEN FAST Zearalenon	R-Biopharm
Zearalenone	20 – 1000 µg/kg	Maize, corn meal, corn germ meal, corn gluten meal and Maize/soy blend	No	Zearalenone Plate Kit	Beacon Analytical Systems Inc.
Zearalenone	20-500 µg/kg	Maize, wheat, barley and DDGS	No	Veratox for Zearalenone	Neogen Corporation
Zearalenone	25-1000 µg/kg	Several commodities	No	AgraQuant ZON	Romer Labs
Zearalenone	50-2500 µg/kg	Grains and feed	No	Zearalenone ELISA Test	AC Diagnostics Inc.

Adapted from: Li, W., Powers, S., & Dai, S. Y. (2014). Using commercial immunoassay kits for mycotoxins: ‘joys and sorrows’?. World Mycotoxin Journal, 7(4), 417-430.

**Table 2. Screening ELISA methods that do not give numerical values**

Target compound	Cut-off value	Intended Matrices	Validated GIPSA/AOAC	Name of the product	Manufacturer
Aflatoxin	20 µg/kg	Maize	Yes	Agri-Screen for Aflatoxin	Neogen Corporation
Deoxynivalenol	0.1 mg/kg	Several commodities	Yes	Agri-Screen for DON	Neogen Corporation
Fumonisin	5 mg/kg	Barley, maize, DDGS, milo, popcorn, rice, soybeans and wheat	No	Agri-Screen for Fumonisin	Neogen Corporation

Adapted from: Li, W., Powers, S., & Dai, S. Y. (2014). Using commercial immunoassay kits for mycotoxins: 'joys and sorrows'?. World Mycotoxin Journal, 7(4), 417-430.

**Table 3. Quantitative Lateral Flow Tests**

Target compound	Quantification Range	Intended Matrices	Validated GIPSA/AOAC	Name of the product	Manufacturer
Aflatoxin	5-100 µg/kg	Maize	Yes	ROSA FAST Aflatoxin Quantitative Test	Charm Sciences, Inc.
Aflatoxin	5-100 µg/kg	Several commodities	Yes	ROSA FAST Aflatoxin Quantitative Test	Charm Sciences, Inc.
Aflatoxin	5-100 µg/kg	Several commodities	Yes	ROSA WET Aflatoxin Quantitative Test	Charm Sciences, Inc.
Aflatoxin	5-100 µg/kg	Several commodities	Yes	ROSA WET XR Aflatoxin Quantitative Test	Charm Sciences, Inc.
Aflatoxin	5-100 µg/kg	Maize, wheat and brown rice	Yes	QuickTox Kit for QuickScan Aflatoxin FREE	EnviroLogix Inc.
Aflatoxin	5-100 µg/kg	Several commodities	Yes	Reveal Q+ for Aflatoxin	Neogen Corporation
Aflatoxin	5-100 µg/kg	Several commodities	Yes	Reveal Q+ for Aflatoxin Green	Neogen Corporation
Aflatoxin	5-100 µg/kg	Several commodities	Yes	RIDA QUICK Aflatoxin RQS	R-Biopharm
Aflatoxin	5-100 µg/kg	Maize, wheat, sorghum and soybean meal	Yes	QuickTox Kit for QuickScan Aflatoxin	EnviroLogix Inc.
Aflatoxin	> 20 µg/kg	Cereals, nuts, oil seeds, edible oil and most contaminated food	No	GrainPro Aflatoxin Test Kits	GrainPro Inc.
Aflatoxin	0-100 µg/kg	Several commodities	No	AgraStrip Quantitative Total Aflatoxin	Romer Labs
Aflatoxin	0-150 µg/kg	Soybean hulls and soybean meal	No	ROSA FAST Aflatoxin Quantitative Test	Charm Sciences, Inc.
Aflatoxin	0-150 µg/kg	Several commodities	No	ROSA FAST Aflatoxin Quantitative Test - Ethanol Extraction	Charm Sciences, Inc.
Aflatoxin	2-100 µg/kg	Several commodities	No	Afla-V	Waters Vicam
Aflatoxin	5-100 µg/kg	DDGS	No	QuickTox Kit for Aflatoxin Bulk Grain	EnviroLogix Inc.
Deoxynivalenol	0.5-5 mg/kg	Several commodities	Yes	Reveal Q+ for DON	Neogen Corporation
Deoxynivalenol	0.5-5.0 mg/kg	Several commodities	Yes	ROSA FAST5 DON Quantitative Test	Charm Sciences, Inc.
Deoxynivalenol	0.5-5.0 mg/kg	Several commodities	Yes	QuickTox Kit for QuickScan DON3	EnviroLogix Inc.
Deoxynivalenol	0.5-5.0 mg/kg	Maize, wheat bran, wheat flour, barley, DDGS	Yes	QuickTox Kit for QuickScan DON	EnviroLogix Inc.
Deoxynivalenol	>1.25 mg/kg	Wheat, triticale and maize	No	RIDA QUICK DON	R-Biopharm
Deoxynivalenol	0.25-5 mg/kg	Grains and grain products	No	AgraStrip Quantitative DON	Romer Labs
Deoxynivalenol	0.25-5 mg/kg	Maize and wheat	No	DON-V Quantitative Strip Tests	Waters Vicam

Deoxynivalenol	0.5-5.0 mg/kg	Several commodities	No	ROSA DON Quantitative Test	Charm Sciences, Inc.
Fumonisin	0.5-5 mg/kg	Maize	Yes	Reveal Q+ for Fumonisin	Neogen Corporation
Fumonisin	0.5-5.0 mg/kg	Several commodities	Yes	ROSA FAST5 Fumonisin Quantitative Test	Charm Sciences, Inc.
Fumonisin	0.5-5.0 mg/kg	Several commodities	Yes	ROSA WET Fumonisin Quantitative Test	Charm Sciences, Inc.
Fumonisin	> 4 mg/kg	Maize	No	RIDA QUICK Fumonisin	R-Biopharm
Fumonisin	> 4 mg/kg	Maize	No	RIDA QUICK Fumonisin RQS	R-Biopharm
Fumonisin	0.2-20 mg/kg	Maize, sorghum	No	QuickTox Kit for QuickScan Fumonisin	EnviroLogix Inc.
Fumonisin	0.2-5 mg/kg	Several commodities	No	Fumo-V	Waters Vicam
Fumonisin	0.25-5 mg/kg	Several commodities	No	AgraStrip Quantitative FUM	Romer Labs
Fumonisin	0.25-6 mg/kg	Several commodities	No	ROSA Fumonisin Quantitative Test	Charm Sciences, Inc.
Fumonisin	0.25-6 mg/kg	Several commodities	No	ROSA Fumonisin Quantitative Test - Ethanol Extraction	Charm Sciences, Inc.
Ochratoxin	1.5-100 µg/kg	Wheat	Yes	QuickTox Kit for QuickScan Ochratoxin-A	EnviroLogix Inc.
Ochratoxin	5-100 µg/kg	Several commodities	Yes	ROSA Ochratoxin Quantitative Test	Charm Sciences, Inc.
Ochratoxin	2-20 µg/kg	Grain and grain products	No	Reveal Q+ for Ochratoxin	Neogen Corporation
T2/HT2	10-2500 µg/kg	Several commodities	No	ROSA T2-HT2 Quantitative Test	Charm Sciences, Inc.
T2/HT2	5-600 µg/kg	Grain and grain products	No	Reveal Q+ for T-2/HT-2	Neogen Corporation
Zearalenone	100-1000 µg/kg	Several commodities	Yes	ROSA Zearalenone Quantitative Test	Charm Sciences, Inc.
Zearalenone	50-1200 µg/kg	Several commodities	Yes	Reveal Q+ for Zearalenone	Neogen Corporation
Zearalenone	>75 µg/kg	Maize	No	RIDA®QUICK Zearalenon RQS	R-Biopharm
Zearalenone	100-1000 µg/kg	Several commodities	No	ROSA Zearalenone Quantitative Test- Ethanol Extraction	Charm Sciences, Inc.
Zearalenone	50-520 µg/kg	Maize	No	QuickTox Kit for QuickScan Zearalenone	EnviroLogix Inc.
Zearalenone	50-520 µg/kg	Wheat, wheat bran, sorghum	No	QuickTox Kit for QuickScan Zearalenone	EnviroLogix Inc.

Adapted from: Li, W., Powers, S., & Dai, S. Y. (2014). Using commercial immunoassay kits for mycotoxins: 'joys and sorrows'?. *World Mycotoxin Journal*, 7(4), 417-430

**Table 4. Lateral Flow Tests that do not give numerical values**

Target compound	Cut-off value	Intended Matrices	Validated GIPSA/AOAC	Name of the product	Manufacturer
Aflatoxin	10 or 20 µg/kg	Maize	Yes	ROSA Aflatoxin P/N	Charm Sciences, Inc.
Aflatoxin	10 or 20 µg/kg	Maize	Yes	ROSA BEST Aflatoxin P/N	Charm Sciences, Inc.
Aflatoxin	10 µg/kg	Maize	Yes	AgraStrip Total Aflatoxin	Romer Labs
Aflatoxin	20 µg/kg	Maize	Yes	Reveal for Aflatoxin	Neogen Corporation
Aflatoxin	20 µg/kg	Maize	Yes	RIDA Quick Aflatoxin Test	R-Biopharm
Aflatoxin	20 µg/kg	Maize	Yes	AgraStrip Total Aflatoxin	Romer Labs
Aflatoxin	20 µg/kg	Maize	Yes	AflaCheck	Waters Vicam
Aflatoxin	4 µg/kg	Several commodities	Yes	AgraStrip Total Aflatoxin	Romer Labs
Aflatoxin	5 µg/kg	Feed	No	Aflatoxin B1 Rapid Test	AC Diagnostics Inc.
Aflatoxin M1	0.5 µg/kg	Milk	No	AuroFlow™ Aflatoxin M1 Strip Test Kit	Bioo Scientific Corporation
Aflatoxin M1	0.5 µg/kg	Milk	No	Aflatoxin M1 Strip Test	Reagen LLC
Aflatoxin M1	500 ng/kg	Milk, milk powder, butter and cheese	No	Reveal for Aflatoxin M1	Neogen Corporation
Deoxynivalenol	0.5 mg/kg	Maize, wheat	Yes	ROSA DON P/N	Charm Sciences, Inc.
Deoxynivalenol	1 mg/kg	Maize, wheat and barley	Yes	ROSA DON P/N	Charm Sciences, Inc.
Deoxynivalenol	2 mg/kg	Maize, wheat	Yes	ROSA DON P/N	Charm Sciences, Inc.
Deoxynivalenol	5 mg/kg	Maize, wheat	Yes	ROSA DON P/N	Charm Sciences, Inc.
Deoxynivalenol	200 µg/kg	Grains and feed	No	Deoxynivalenol (Vomitoxin) Rapid Test	AC Diagnostics Inc.
Deoxynivalenol	1 mg/kg	Barley, maize and wheat	No	DONCheck	Waters Vicam
Fumonisin	200 µg/kg	Grains and feed	No	Fumonisin B1 Rapid Test	AC Diagnostics Inc.
Ochratoxin	30 µg/kg	Grains and feed	No	Ochratoxin A Rapid Test	AC Diagnostics Inc.
T2/HT2	100 µg/kg	Grains and feed	No	T-2 Toxin Rapid Test	AC Diagnostics Inc.
Zearalenone	60 µg/kg	Grains and feed	No	Zearalenone Rapid Test	AC Diagnostics Inc.

Adapted from: Li, W., Powers, S., & Dai, S. Y. (2014). Using commercial immunoassay kits for mycotoxins: 'joys and sorrows'?. *World Mycotoxin Journal*, 7(4), 417-430