Lateral Flow Immunoassay Capable of Measuring Aflatoxins in Finished Animal Feeds

Justine Yu, Danrey Toth and Jianmin Liu, Waters Corporation, VICAM, Milford, Massachusetts, USA



Introduction

Mycotoxins are secondary metabolites produced by certain molds that grow on food and feed crops. Aflatoxins produced by molds of the Aspergillus species are one of the most toxic and known carcinogen of mycotoxins. Consumption by humans, animals and livestock can result in illness or even death. Therefore, aflatoxins are regulated in most countries.

Livestock that consume aflatoxin contaminated feed can transfer the toxins to meat, eggs and milk which can potentially expose humans to health hazards. This emphasizes the need for routine testing of finished animal feeds. Animal feeds are composed of various agricultural commodities and by-products. Each type of animal have their own feed formula. The Afla-V[™] ONE is a lateral flow strip test kit that can provide accurate and rapid testing of finished animal feeds.

Materials and Methods



Results and Conclusion

Accuracy

Accuracy was determined by spiking commercially purchased animal feed samples. Each type of feed were spiked at 5 and 20 ppb levels. Samples were tested according to the method described. Table 1 and 2 summarizes the mean, STD, CV% and percent recovery for spike level 5 and 20 ppb.

Feed	Mean	STD	CV%	Recovery (%)
Hog finisher	4.8	1.2	25.5	94.6
Pig starter	5.0	0.5	9.0	94.2
Laying chickens	4.3	0.9	21.2	86.1
Bird/turkey	5.9	0.8	13.2	106.4
Dog food 1	5.5	1.0	18.2	76.1
Dog food 2	5.3	0.2	3.5	100.2
Horses	5.6	0.9	15.7	111.8
Equine senior	5.9	0.1	1.3	106.9
Equine/beef	5.7	0.0	0.5	102.9
Beef calves	5.1	0.5	10.4	85.6
Cattle	5.5	0.2	3.3	102.4
Goat grower	6.5	0.6	8.7	94.6
Goat snax	5.5	1.0	19.0	91.4
Cat food	5.4	0.6	11.0	96.4
Rabbit	4.3	0.1	3.3	82.4
Fish	5.5	0.7	12.5	87.5

Table 1. Total aflatoxins (B_1 , B_2 , G_1 , and G_2) determination using Afla-V ONE for finished feed – spike level: 5 ppb.

Feed	Mean	STD	CV%	Recovery (%)
Hog finisher	20.1	1.4	7.0	100.3
Pig starter	19.8	0.3	1.6	97.9
Laying chickens	20.1	0.6	3.2	100.3
Bird/turkey	19.6	0.1	0.6	95.3
Dog food 1	19.4	3.8	19.8	87.6
Dog food 2	19.7	1.4	6.9	97.1
Horses	17.9	0.2	1.3	89.5
Equine senior	19.9	0.9	4.7	96.8
Equine/beef	22.2	0.1	0.2	108.4
Beef calves	18.7	1.6	8.6	88.5
Cattle	20.6	0.1	0.7	101.1
Goat grower	18.6	0.5	2.9	85.0
Goat snax	18.8	0.7	3.5	89.3
Cat food	19.3	0.9	4.6	93.4
Rabbit	18.1	0.5	2.9	89.3
Fish	22.4	1.4	6.4	104.9

Table 2. Total aflatoxins (B_1 , B_2 , G_1 , and G_2) determination using Afla-V ONE for finished feed – spike level: 20 ppb.

Trace levels of naturally occurring aflatoxins were determined by LC prior to sample fortification.

Download scienific posters at waters.com/posters

Linearity and Test Range

In this report, only pig feed was examined for extended range method of Afla-V ONE. Aflatoxin non-detectable feed sample was spiked with naturally contaminated corn sample (LC reference material) to achieve levels 0, 4.7, 9.4, 18.8, 37.5, 75 and 150 ppb. Level 300 ppb was a commercially available naturally contaminated corn sample.

Spiking (ppb)	R1	R2	R3	Mean	STD	CV%	Recovery (%)
0.0	2.4	0.0	0.0	0.0	1.4	_	_
4.7	5.3	3.4	4.4	4.4	0.0	21.5	92.9
9.4	8.6	8.4	7.0	8.0	0.9	11.0	85.4
18.8	26.6	25.1	20.9	24.2	3.0	12.2	129.2
37.5	36.6	36.9	35.7	36.4	0.6	1.7	97.0
75.0	80.3	91.6	82.6	84.8	5.9	7.0	113.1
150.0	122.5	135.6	138.2	132.1	8.4	6.4	88.1
300.0	228.0	276.9	244.7	249.9	24.9	9.9	83.3

the test ranging from 0 to 300 ppb.

300)
250)
200)
150)
100)
50)
C)



Afla-V[™] ONE provides accurate and rapid results for aflatoxins testing in finished animal feeds.



$\mathsf{Woters}^{\mathsf{TM}}$

Table 3. Aflatoxin-free pig feed spiked with naturally contaminated corn.

The correlation coefficient (R²) for the method of Afla-V ONE ranging from 0 to 300 ppb in pig feed is 0.992, indicating that the linearity of the current method is excellent for



Figure 1. Linearity of Afla-V^m ONE test ranging from 0 to 300 ppb in pig feed.

