Aflatoxin Sampling

Take great care when sampling

The greatest source for error or variability in mycotoxin testing is improper sampling, regardless of the testing method being used. In fact, USDA/GIPSA reports that nearly 90% of the error associated with aflatoxin testing can be attributed to how the original sample was obtained and processed for analysis. After the sample has been accurately probed, it needs to be properly ground, mixed and sub-sampled for analysis.

Toxins are not uniformly distributed in a load

Mycotoxin producing molds do not grow uniformly throughout the field. They may affect one ear of corn and not the next one, or only a few kernels within an ear. Also, low toxin levels at either ppm (parts per million) or ppb (parts per billion) contribute to non-uniformities. So, unlike protein or moisture content where every kernel tested has some level of content (a uniform distribution), mycotoxin content varies, thus affecting the sampling protocol.

GIPSA recommendations

GIPSA has determined that the optimum aflatoxin sample size for corn is a minimum of 10 pounds. This sample is ground, mixed and a sub-sample of 500 grams is taken. This sub-sample is then mixed and a 50 gram analytical sub-sample is taken for testing.

Risks for reduced sample size

It is very important to note that reducing the sample size significantly increases the sample variability. This is shown in the chart below.

Truck containing 20ppb aflatoxin contaminated corn

Sample Size	Kernels (estimate)	Variability (ppb)
10 lbs	30,000	11.6-28.4
5.0 lbs	15,000	8.1-31.9
2.5 lbs	7,500	3.2-38.8
1.0 lbs	3,000	1-46.9

Proper grinding reduces errors

Grinding opens the infected kernel and distributes the particles throughout the sample. Proper grinding increases your chances of detecting contaminated particles. Various types of grinders can be used to achieve the proper 20 mesh screen size required for aflatoxin testing. Examples include the Romer mill, Glen mill, Bunn Model G3, Viking Hammermill and Falling Number Mill.

Mix and separate

After the sample is ground, it must be mixed and split out into a 50 gram sub-sample for analysis. A riffler or other effective sample splitter can be used. Mills are available that can grind and split the sample simultaneously.

False negatives

Sampling and/or grinding errors create more false negatives than false positives. As previously stated, USDA/GIPSA attributes 90% of the error associated with Aflatoxin testing to inadequate or improper sampling procedures, which can lead to false negative results. This risk is increased when using a one pound sample ground in a blender or by taking the sample from the top of the ground corn before mixing. Releasing a load from which a false negative result has been obtained can contaminate a much larger container.

Potential sources of variability

Sample size too small
Sample not ground to the proper mesh size
Ground sample is not mixed and split properly
Test kit procedures not followed properly

Resources

USDA/GIPSA website, www.usda.gov/gipsa/pubs/mycobook.pdf, pages 24-29.

Correct 20 mesh grind

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