



## SAMPLING FOR MYCOTOXIN ANALYSIS

Testing for mycotoxins is a complicated process that generally consists of three steps:

1. Several small samples are taken at random from the lot and composed into one larger “lot sample”.
2. The entire lot sample is ground to a fine particle size and a representative subsample, the “analytical sample”, is removed for analysis.
3. The mycotoxins are extracted from the analytical sample and finally quantified.

However, there is variability associated with each of the three steps even when accepted test procedures are used. Sampling has been shown to be the largest source of variation associated with the mycotoxin test procedure in several studies. For example, nearly 90% of the errors associated with aflatoxin testing can be attributed to sampling. The high levels of sampling errors are due to two main factors; low concentration of mycotoxins in a given sample (the “ppb-problem”) and the uneven distribution in the lot. Effective sampling is crucial for replicable mycotoxin results as the mycotoxin analysis costs time and money.

# 1. CONTAINER / TRUCK SAMPLING

**Example of a sampling program:** 4 samples/month

**Corn Volume:** 4,000 tonnes/month

**Volume:** 20 containers per week = 1,000 tonnes/week

## 1st Sample: Inside container

(Association of American Feed Control Officials. Inc. Second Edition. May 1.2000)

- Collect: 11 probes/container of 50 tonnes
- Volume/probe: 0,5 kg
- Blend all 11 samples and collect 1 final sample

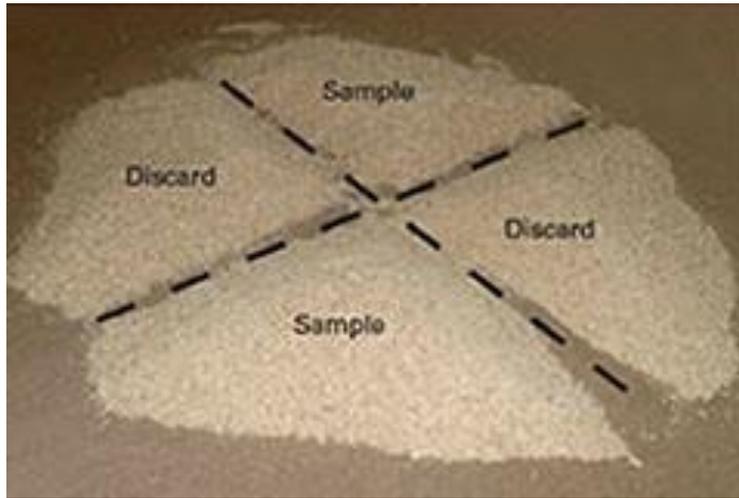
## 2nd Sample: Composite sample of 20 containers

- 1 sample/container x 20 containers = 20 samples/week
- Blend all 20 samples
- Grind all 20 samples

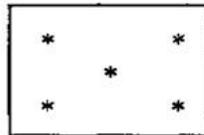
## 3rd Sample: 1 kg of ground corn

- Quarter:  
Send to lab: 0.5 kg/week  
Hold: 0.5 kg/week

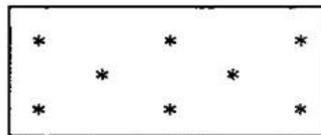
## Quartering



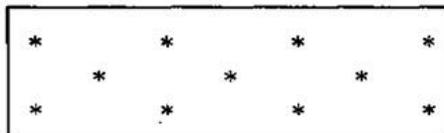
## Sample Points



Truck containing up to 15 tonnes:  
five sampling points (middle and  
approximately 50 cm from sides).



Truck containing 15 to 30 tonnes:  
eight sampling points.

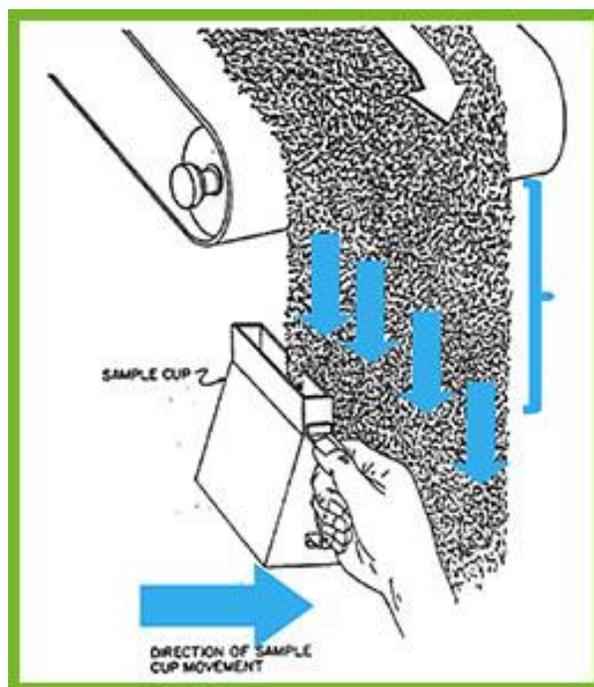


Truck containing 30 to 50 tonnes:  
eleven sampling points.

Source: International Standard ISO 950

## 2. FALLING STREAM SAMPLING

- Need to use the correct equipment (Stream Cutter)
  - Cut the stream 10 times in homogeneous amount of time and interval
1. Collect 4 samples/day, 1 kg every 2 hours.
  2. Blend the 4 samples quarter and collect 1 sample of 0.5 kg/day, getting the total of 5 samples a week.
  3. Blend all samples and grind them.
  4. Quarter: Collect 1 kg of ground corn.  
Lab: 0.5 kg/week  
Hold: 0.5 kg/week



## SAMPLING PROGRAM FOR 4,000 TONNES A WEEK OF FEED OR GRAIN

### Ground Corn:

Install the collecting tube between  
the hammer mill and the mixer

### Complete Feed:

Install the collecting tube after the  
mixer

1. The collection bulk should be of 4.5 kg and placed on the end of the pipe.
  2. The hole should be large enough to discharge 4.5 kg in approximately 2 hours.
  3. Quarter each bulk and collect 200 g of each getting a total of 1 kg a day (average).
  4. By the end of the week, blend the 5 samples and quarter them collecting 1 kg.
- Lab: 0.5 kg/week  
Hold: 0.5 kg/week



*Source: Mallman 2005*

The overall concentration of mycotoxins in a lot of grain is usually very low despite the extremely high levels of mycotoxins in some kernels. The unit of measurement is commonly “parts per billion” (ppb). It is important to remember that mycotoxins affect human and animal health even at these low concentrations!

1 ppb is...

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- 1 part in 1.000.000.000
  - 1 second in 32 years
  - 1 grain of sand in 22 kg
  - 1 corn plant in 40.000 acres of corn
  - 1 kernel of corn in 3.5 railcars
  - 1 g in 1.000 tonnes grain

## REMEMBER:

Mycotoxins are not evenly spread in wheat or corn kernels unlike protein and moisture which are evenly distributed. In extreme cases, mycotoxins may only be present in a few ears or heads in an entire field. This means that some kernels may contain high toxin levels while others contain no toxin at all. This is due to the fact that fungi do not grow evenly throughout a field or a bin of grain. Therefore, mycotoxins tend to be concentrated in certain spots, so called “hot spots” or “nuggets”, whereas the remainder of the lot is toxin free. However, the greater the extent of contamination, the more likely that the distribution is even. Conversely, when the overall concentration of a toxin in a lot of grain is low, uneven distribution is accentuated.