Zearalenone fact sheet

The term "mycotoxin" is usually reserved for potentially toxic chemical products produced by fungi that infect and colonize, especially grains. A single mold species may produce many different mycotoxins. Several mold species may produce the same mycotoxin. Mycotoxins can affect human or animal health if they consume contaminated food or feed.

A. What is "zearalenone"?

1. Estrogen-like compound most commonly produced by *Fusarium* fungi
- a. *F. graminearum, F. culmorum, F. cerealis, F. equiseti, F. verticillioides,* and *F. incarnatum*
- b. Also produced by *Gibberella* fungi

2. Also known as mycotoxin "F-2" or "RAL"
- a. May develop in corn, barley, oats, wheat, rice, or sorghum

B. Conditions favoring zearalenone production

1. Mycotoxins may or may not be present if visible molds are present
- a. Absence of visible mold does not guarantee absence of mycotoxins

2. *Fusarium* molds
- a. Are associated with ear rots and stalk rots
- b. Develop under wide range of environmental conditions
- c. Can infect seedlings and developing kernels
  - i. Affected kernels may appear purple, tan, or brown
  - ii. Visible mold appears white to pink or salmon-colored
- d. Wheat
  - i. Excessive moisture at flowering and early grainfill stages
  - ii. Warm, wet weather at harvest
- e. Corn
  - i. Cool, wet growing season
    - 1) Also, dry conditions in midseason followed by wet weather
  - ii. Insect or hail damage to ears
  - iii. Warm, wet weather at harvest
  - iv. Infection usually has minimal effect on yield

3. *Gibberella* molds
- a. Responsible for *Gibberella* ear rot
  - i. Pinkish mold; usually begins at ear tip
- b. Produces both DON and zearalenone
- c. Overwinters on corn and small grain residue
- d. More prevalent when:
  - i. rotation is continuous corn
  - ii. wheat is affected by *Fusarium* head blight
  - iii. cool, wet weather occurs during early silking
  - iv. fall rains delay harvest

C. Interpreting zearalenone results

1. Are not action levels or advisory levels for zearalenone
- a. "Concern" levels
- a. "Potentially harmful" levels

2. Concern level
- a. Level indicating possible favorable conditions for mycotoxin development
  - i. Additional testing of feed ingredients or rations may be prudent
- b. Limit amounts fed to livestock if moderate performance effects are observed
- c. Discontinue use (at least temporarily) if pronounced chronic symptoms or acute clinical symptoms are observed
  - i. Continue checking for other possible causes
- d. Grain, ingredients, or rations exceeding concern levels are <u>not</u> subject to reporting or seizure

3. Potentially harmful level
- a. Indicates probable involvement of zearalenone in reduced performance, chronic symptoms, or acute clinical symptoms
- b. Discontinue feeding - at least temporarily - if either chronic or acute symptoms are noted
- c. Observe animals closely if symptoms are absent
  - i. Continue testing feedstuffs or rations

D. Zearalenone effects

1. Mycotoxins can interact to produce symptoms different or more severe than expected
- a. May be due to the presence of multiple mycotoxins in contaminated feeds

Table 1. Interpreting zearalenone tests in livestock feeds.

Feedstuff type:	Concern level:	Potentially harmful for:	
		Cattle	Swine
	---------- *mg/kg or ppm* ----------		
Grain or grain products	0.56	5.6 to 10.0	1.1 to 5.6
Total ration dry matter	0.56	3.9 to 7.0	0.6 to 3.9

2. Swine disorders

a. Swine more susceptible than other livestock types
b. Typically little or no effect on growth.
c. Estrogenic effects.
   i. Lengthened or absent estrus cycle.
   ii. Interrupted reproductive cycles

3. Cattle disorders

a. Enlarged vulva
b. Possible irregular heats and infertility
c. Typically no abortions

E. Sampling and analysis for zearalenone

1. Survey fields before harvest

a. From dent through to harvest, check five to ten field locations
b. Target areas with plants that appear most stressed.
c. Peel back the husks of 10 ears at each location and inspect for mold

Figure 1. Ears with Fusarium ear rot have white to purple mold visible on kernels. (cornmycotoxins.com)

2. Suggested sampling procedures

a. Standing grain: Collect 25 ears or heads at random throughout the field
b. Grain cart/truck: Take multiple probes for a composite 10 lb. sample
c. Moving grain stream: Take a composite 10-lb sample consisting of 12 to 20 subsamples from the grain stream
d. Keep samples cool, but do not freeze
e. Ship promptly, early in the week, to avoid weekend delays

3. Analytical methods

a. Immunoassay test kits: screening, provide yes/no answer
b. Immunoassay with reader: can test several mycotoxins; provides quantitative data
c. Chromatography: can test all mycotoxins; provides quantitative data

References

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