

Lecture 5

**Fungal (Mold)
Toxin (Mycotoxin)**



➤ **Mycotoxins:**

- **Are chemicals produced by fungi (molds) under certain conditions.**
- **They are not essential for fungal growth or reproduction, and are toxic to human and animals.**

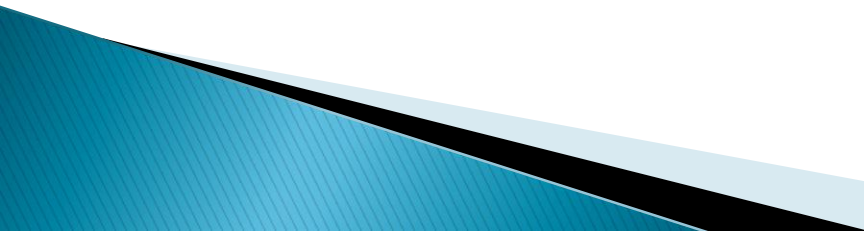
➤ **Mycotoxicoses:**

- **Diseases in animals caused by Mycotoxins**
- **Occur when mycotoxins enter the body, usually by consumption of contaminated feed.**
- **Mycotoxicoses are not contagious, nor is there significant stimulation of the immune system.**

Mycosis

- ▶ Diseases caused by mold (fungal) infections.
- ▶ They can be contagious.
- ▶ There may be stimulation of the immune system.
- ▶ Common mycoses include athlete's foot and ringworm.

▶ Diagnosis of Mycotoxicoses

- ▶ Although they all are called mycotoxicoses, they are very different from each other.
 - ▶ Diagnosis of mycotoxicoses is usually not very easy.
 - ▶ Exposure cannot be established by detection of mycotoxins in tissues from animals suspected of being poisoned by mycotoxins because analytical services for detection of mycotoxins in animal tissue are not commonly available.
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➤ Treatment of Mycotoxicoses:

- Treatment of animals suffering from Mycotoxicoses usually is Supportive and often not very effective.
- Antidotes for mycotoxins are generally not available.
- Stopping and preventing further exposure by Removing contaminated feed is important.

1) Aflatoxicosis

▶ Caused by:

- Aflatoxins produced by *Aspergillus flavus* and *A. parasiticus*.
- Aflatoxins are commonly found in corn, milo, cotton seed and peanuts.
- There are 5 important aflatoxins (Aflatoxin B1, B2, G1, G2, and M1).
- Aflatoxin M1 is a metabolite of aflatoxin B1 found in milk and urine.
- It is formed after aflatoxin B1 enters the body and it is not found in feed.

➤ Characters:

- Aflatoxins B1 is found most in highest concentration in naturally contaminated feed.
- Aflatoxin is a liver poison (Hepatotoxin) in all species that consume it. However, ruminants tolerate it better than do poultry.
- It causes liver damage at higher doses and liver cancer at lower doses.
- Aflatoxin exposure can depress the immune system and may cause abortions.

➤ Clinical signs:

1- Acute exposure.

2- Depression, anorexia, reduced gain or milk production, subnormal body temperature.

3- Lesions of aflatoxins:

-Acute exposure: Hemorrhage, ascites.

-Chronic exposure: Pale, soft, clay-colored liver, mild anemia, ascites.

4-Histopathological:

- **Hepatocytes degeneration and necrosis, fatty changes, bile duct epithelial proliferation progressing to interlobular fibroplasia, bile retention.**

➤ Diagnosis:

- Blood workup: Check for anemia, elevated liver enzymes, serum bile acids, albumin: globulin ratio and prothrombin activity.
- Tissue or fluid analysis: Aflatoxin M1 presents in milk or urine; parent compound may be present in kidney or liver.
- Grain or feed analysis: Aflatoxins are most present in corn, peanuts or cotton seed and they are not present in forages or silage at significant concentration.

- Dietary aflatoxin concentrations at which performance or clinical effects become noticeable depends upon species and effect.
- Performance may occur at low concentration as 200 ppb in young, sensitive species.
- Immunity may become impaired at concentration of about 200 ppb.
- Hepatic lesions may become noticeable at 200 to 400 ppb.
- Clinical illness may become obvious at about 400 ppb.

➤ Treatment:

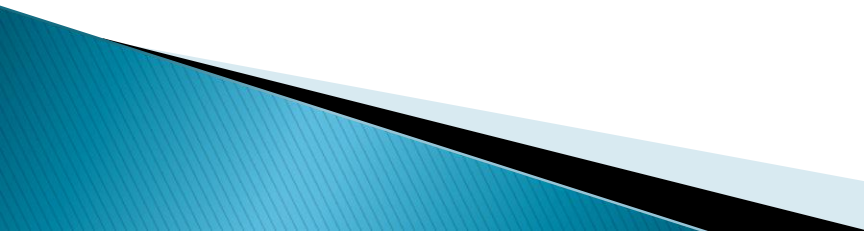
- Stop exposure: Stop feeding contaminated ration.
- Supportive treatment: Provide supportive treatments as clinical situation dictates.

2) Ergot toxicosis

➤ Caused by:

- ▶ Ingestion of ergot alkaloids contained in the sclerotia of *Claviceps* spp.
- ▶ They are commonly found in cereal grains, especially rye.
- ▶ Different ergot alkaloids may be present in Sclerotia.

➤ Characters:

- Sclerotia are dark brown, brownish–purple or black colored bodies that stick out from the seed heads of infected plants.
 - They are visible to the naked eye and look similar to rodent droppings when removed from the seed heads.
 - They may become quite large, up to an inch in length.
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➤ Clinical signs:

1-CNS syndrome: Hyperexcitability, tremors, heat intolerance in cattle.

2-Peripheral vascular syndrome: Swelling of feet, ears or tail and in severe cases, hooves or feet, or tail may slough.

-Dry gangrene: These effects are due to ischemia resulting from constriction of arterioles in peripheral vascular beds.

3-Lactating females: Cessation of milk production and Agalactia in post-partum females.

-Ergot alkaloids are potent smooth muscle stimulants (especially arterioles). Uterine contractions may be stimulated (abortion).

➤ Diagnosis

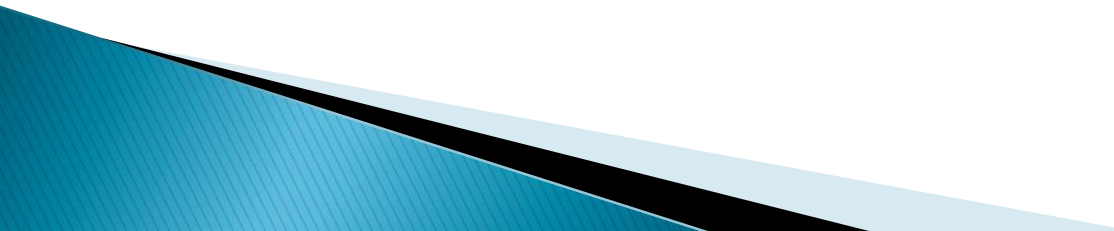
1. Analysis of stomach or rumen content for ergot alkaloids.

2. Detection of ergot alkaloids in stomach or rumen content is evidence of exposure.

3. Analysis of feed or grains for ergot alkaloids ingested by affected animals.

4. Sclerotia may be visible if the feed has not been ground.

▶ **Treatment:**

- ▶ **Stop exposure and Place animals in worm, clean environment.**
 - ▶ **Location may commence 5 to 7 days afterwards.**
 - ▶ **Control 2ry infections in limbs suffering from dry gangrene.**
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3) Fumonisin Toxicosis

➤ Caused by:

- *Fusarium moniliforme* and *F. proliferatum*, and is found primarily in white and yellow corn.
- There are three kinds, called Fumonisin B1, B2, and B3.
- Fumonisin B1 is most prevalent in naturally contaminated corn and it is the most toxic.

➤ Characters:

- The mechanism of action is believed to be inhibition of enzymes involved in the production of sphingosine from sphinganine.
- Sphingosine is an important component of cell membranes, especially for neurons.

➤ Diagnosis:

1. Blood workup: Evidence of hepatic dysfunction.
2. Tissue analysis: Sphingosine ratio is increased.
 - It is not readily available.
3. Analysis of corn or corn-containing feed for fumonisins.

➤ Treatment:

1. Stop exposure:

- Remove contaminated feed from ration.
- Because of the long time between consumption of feed and onset of signs, oral detoxification is not recommended.

2. Supportive treatment.



4) Vomitoxins (Deoxynivalenol, DON) Toxicosis

➤ Caused by:

- *Fusarium roseum* (*F. graminearum*) and *F. moniliforme*.
- It is found in corn, wheat, barley, milo and occasionally in oats.

It is rarely found in hay or forages.

- *F. roseum* also produces zearalenone (it is a chemical that can act similarly to the female sex hormone estrogen).
- Excessive exposure can disrupt estrus cycle, causes infertility and feminization of males, so DON may also be found with zearalenone.

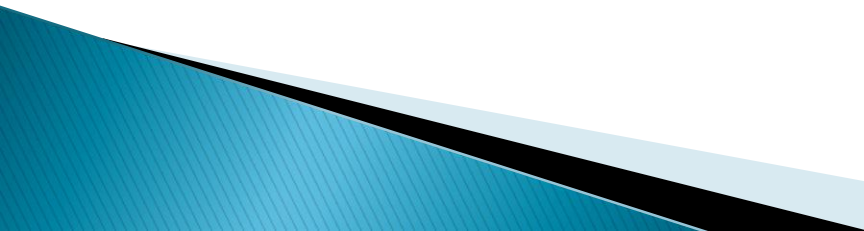
▶ Characters:

- Vomitoxin is a chemical that belongs to a group of mycotoxins called trichothecenes.
 - There are at least 140 chemicals in that class.
- The mechanism by which vomitoxin acts has not been elucidated.
- Other trichothecenes inhibit protein and nucleic acid synthesis.

➤ Treatment:

- Remove vomitoxin-contaminated grain/feed from ration.

Mycoses

1. Athlete's foot (*Tinea pedis*)
 2. Yeast infection (*Candida albicans*)
 3. Jock itch (*Tinea cruris*)
 4. Ring worm (*Tinea corporis*)
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