



## Pathology and prevention of diseases caused by fungi and their metabolites

Dr. Rakesh Kumar and Dr. R.K Asrani

Department of Veterinary Pathology, DGCN COVAS, CSKHPKV, Palampur, Himachal Pradesh, 176062.

<https://doi.org/10.5281/zenodo.7538748>

Fungus is a eukaryotic organism, which includes yeasts, mold and mushrooms. Fungal cell wall contains ergosterol, polysaccharides and not peptidoglycans. The respiratory system, nervous system and eyes the most common sites infected by the fungus. The most common fungal diseases reported in poultry includes *Aspergillus*, *Candida*, etc. However, fungal infections such as histoplasmosis and cryptococcosis are more important fungal species as far as zoonosis is concerned, but these mycotic problems are not very common in birds. A list of fungal diseases in poultry birds is depicted in Table.

No. 1

S. No.	Fungal diseases	Fungus involved	Pathology
1.	Brooder's pneumonia/Aspergillosis (mainly in newly hatched chicks)	<i>Aspergillus fumigatus</i>	Nodular lesions are formed on lungs, air sacs; in systemic form lesions may be present on intestine, kidneys etc.
2.	Candidiasis/Thrush/Crop Mycosis/Moniliasis/Sour crop/Oidiomycosis	<i>Candida albicans</i>	Whitish pseudo membrane/diphtheritic membrane formation giving "Turkish Towel appearance" of crop/esophagus and proventriculus
3.	Favus/White comb	<i>Trichophyton megnini</i>	White flour like material deposited on comb
4.	Cryptococcosis	<i>Cryptococcus neoformans</i>	Encephalitis and pneumonia

Table No. 1. Fungal diseases in poultry birds

Use of antibiotics for a longer duration, storage of litter and feed in sugarcane bags and increased moisture content in litter (>10%) enhances the chances of fungal growth. Most important route of entry of fungus is through inhalation. Chicks affected with brooder's pneumonia exhibit soundless gasping unlike IB and ILT (where gargling sounds are evident). On necropsy examination caseous granulomatous nodules on air sacs, lungs and trachea are observed. The birds affected with thrush shows typical pseudo membrane/diphtheritic membrane formation giving "Turkish Towel appearance" to the crop/esophagus and proventriculus. The confirmation of fungus is usually done by staining the impression smear taken from affected organ with lactophenol cotton blue and in tissue sections the fungal hyphae are observed with the help of staining the sections with PAS, GMS etc.

There are several harmful secondary metabolites produced by the fungus called Mycotoxins. These are low molecular weight compounds and are harmful even at very minute concentrations. These Mycotoxins are frequently observed in cereal grains especially maize and ground nut cake contaminated with fungus and are responsible to cause several detrimental effects in birds. Production of Mycotoxins in food items and cereal grains is favored by physical damage to the grains, high moisture content, rainy season etc. Cereal grains provided to the birds may be contaminated during harvesting, transport and storage processes. Ingestion of moldy feed is the most important mode of entry of Mycotoxins inside the body of the birds. Ducks are the most susceptible birds for mycotoxicosis. Order of mycotoxicosis in birds: duck > turkey > Japanese quail > chickens. The first outbreak on aflatoxicosis was reported in 1960 at UK, where ground nut meal was incorporated in the diet of in poultry and turkeys. Aflatoxins are categorized into four major types including AFB1, AFB2, AFG1, AFG2 and AFM1. AFB1 is most common and potent known mycotoxin as far as mortality in birds and animals are concerned. Aflatoxins are hepatotoxic, teratogenic, immunotoxic, mutagenic and carcinogenic in most of the species of the animals. Table No. 2 depicts the common Mycotoxins affecting the birds.



S. No	Mycotoxin	Fungal source	Pathology
1.	<b>Aflatoxin</b>	<i>Aspergillus flavus</i>	<ul style="list-style-type: none"> <li>• In acute cases fatty liver, hemorrhages, anemia, jaundice and periportal hepatic necrosis is observed.</li> <li>• In chronic cases bile duct hyperplasia (most important feature), periportal fibrosis/cirrhosis, hepatocellular carcinoma and sometimes ‘veno-occlusive disease’ is evident.</li> </ul>
2.	<b>Ochratoxin</b>	<i>Aspergillus ochraceus</i>	<ul style="list-style-type: none"> <li>• Acute tubular necrosis and visceral gout</li> </ul>
3.	<b>T-2 toxin</b>	<i>Fusarium sporotrichoides</i>	<ul style="list-style-type: none"> <li>• Cheesy plaques on palate and incoordination</li> </ul>
4.	<b>Citrin</b>	<i>Pencillin citrinum</i>	<ul style="list-style-type: none"> <li>• Kidney damage</li> </ul>
5.	<b>Oosporein</b>	<i>Beauveria bassiana</i>	<ul style="list-style-type: none"> <li>• Kidney damage</li> </ul>

Table No. 2. Mycotoxins in birds

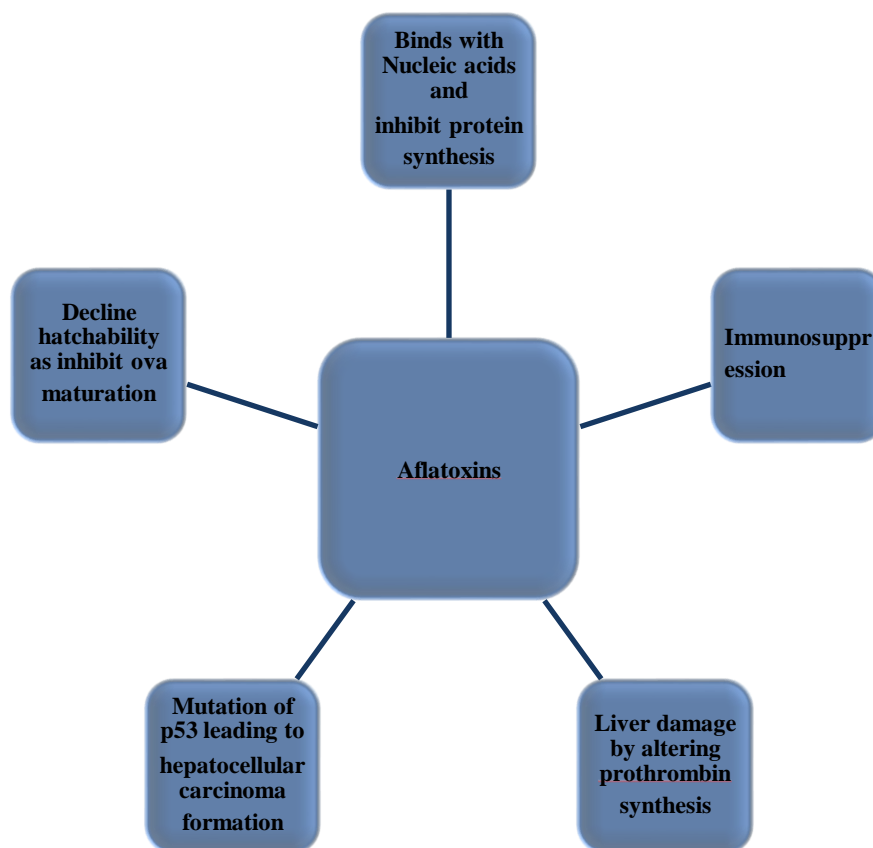


Fig. 1. Mechanism of action of aflatoxins



### **Prevention and control**

- Proper screening of feed samples for examination of any Mycotoxins.
- Reduce the moisture content of feed below 10%.
- Maintain proper ventilation and dust free environment in the house.
- Gunny bags should only be used after boiling and proper drying in sunlight.
- Increase the quantity of protein and vitamin A in feed.
- Toxin binders such as acetates, aluminum silicates, propionate etc. can be used to reduce the effect of mycotoxins.
- In case of fungal growth gentian violet or  $\text{CuSO}_4$  are also recommended.