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Managing Mycotoxins in Poultry Feed and Their Management

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Mycotoxins are poisonous chemicals produced by certain molds (fungi) that grow on agricultural crops. In poultry farming, these molds commonly infect feed ingredients like maize (corn), groundnut cake, cottonseed cake, and soybean meal. Unlike the mold itself, which can sometimes be killed by heat or processing, mycotoxins are invisible, heat-resistant, and highly stable. Even if the feed looks clean and the mold has died off, the dangerous toxins remain behind. For a poultry farmer, mycotoxins act as a "hidden thief"-directly damaging bird health, reducing growth, ruining egg production, and cutting down farm profits.

The Three Major Mycotoxins on the Farm

While there are hundreds of mycotoxins, three cause the most damage in everyday poultry operations:

- **Aflatoxin:** The most widespread and dangerous toxin. It targets the **liver**, stopping the bird from processing nutrients properly. It severely crushes the immune system, making vaccines fail and making birds highly susceptible to regular diseases.
- **Ochratoxin:** This toxin primarily attacks the **kidneys**. It causes birds to drink excessive amounts of water, leading to severe wet litter issues and rapid dehydration.
- **T-2 Toxin / HT-2 Toxin:** A highly corrosive toxin that causes **chemical burns and ulcers** inside the bird's mouth, crop, and gizzard.

Mycotoxin	Fungal Origin	Vulnerable Raw Ingredients	Primary Target System
Aflatoxins (AFB1)	*Aspergillus flavus / parasiticus*	Corn, Groundnut cake, Cottonseed	Hepatic tissue & immune suppression.
Ochratoxin A (OTA)	*Aspergillus / Penicillium*	Wheat, Barley, Rye, Maize	Renal tubules & visceral gout.
T-2 / HT-2 Toxin	*Fusarium sporotrichioides*	Oats, Barley, Maize silages	Oral mucosa, beak, and gizzard lesions.
Fumonisin (FB1)	*Fusarium verticillioides*	Maize (Corn) and screenings	Sphingolipid metabolism & gut barrier.
Zearalenone (ZEN)	*Fusarium graminearum*	Maize, Wheat, Soybean meal	Estrogenic activity & reproductive tract.
DON (Vomitoxin)	*Fusarium culmorum*	Wheat, Barley, Triticale	Anorexia, gut erosion, poor growth.

Favourable Conditions for Mycotoxin Fungal Growth in Grains

Condition	Risk Level: High	Safe Level: Low Risk
Grain Moisture	Above 13%	Below 12%
Air Humidity	Above 70%	Below 60%
Grain Quality	Broken / Insect Damaged	Whole / Clean Grains
Air Circulation	Stagnant / Hot air pockets	Well-ventilated / Cool

Effect of Mycotoxins on Poultry Production

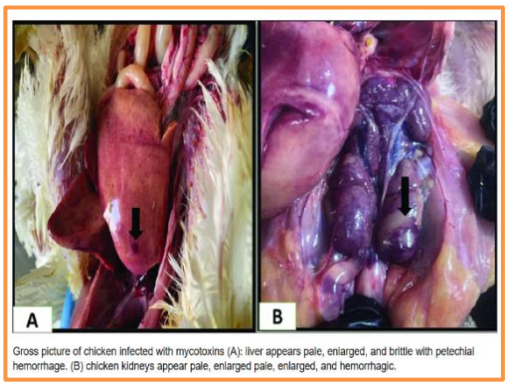
Severe Economic Performance Loss: Mycotoxins corrode the bird's intestinal lining, blocking nutrient absorption and causing the Feed Conversion Ratio (FCR) to skyrocket. Birds eat but fail to convert feed into meat or eggs, leading to high feed costs for zero financial return. In broilers, this causes stunted growth and highly uneven flocks because toxins concentrate in hidden "hot pockets" within the feed. In layers and breeders, toxic liver damage stops yolk protein synthesis, causing egg production to plummet overnight by 10% to 30%.

Destruction of Egg and Hatchability Quality: Toxins disrupt Calcium and Vitamin D3 absorption, causing a massive spike in thin, fragile, and soft-shelled eggs that cannot be marketed. In breeder operations, mycotoxins pass directly into the egg yolk. This triggers high embryonic mortality (chicks dying inside the shell) and results in weak, unviable day-old chicks that face high early mortality rates.

Extreme Suppression of the Immune System (Immunosuppression): Mycotoxins act as a silent killer by shrinking vital immune organs like the Bursa of Fabricius and thymus. This causes widespread vaccination failure; when vaccinated against killer diseases like Newcastle Disease (Ranikhet) or Gumboro (IBD), the birds fail to produce protective antibodies. With their immune systems crushed, the flock suffers from secondary outbreaks of common infections like *E. coli*, Coccidiosis, and Salmonellosis, triggering sudden mortality spikes.

Field Symptoms - How to Spot It in the Shed

Live bird symptoms offer the first warning signs of feed contamination in the shed. A sudden, unexplained drop in daily feed consumption-known as feed refusal-frequently happens because grains contaminated with T-2 toxin taste extremely bitter and cause immediate mouth pain, forcing birds to stop eating. As the toxins irritate the digestive tract, the flock will produce loose, watery droppings filled with a yellowish slime or completely undigested feed particles. Physically, affected birds develop pale combs, wattles, and legs due to toxin-induced anemia and internal bleeding, while appearing ruffled, chilled, and lethargic. These factors culminate in severe production drops; broiler flocks show a drastic failure to gain weight, while layer and breeder flocks suffer a sharp drop in daily egg collection alongside a massive increase in thin-shelled, cracked, or misshapen eggs. Post-mortem signs reveal clear internal organ destruction when dead birds are opened for inspection on the farm. The most prominent indicator is severe liver damage, where a healthy dark red liver becomes swollen, highly fragile, and turns a distinct pale yellow or fatty cream color. Concurrently, the corrosive nature of specific mycotoxins causes noticeable mouth and gizzard ulcers, leaving painful yellowish crusts or open sores inside the mouth, under the tongue, and clear erosion throughout the gizzard lining. Finally, the kidneys bear a heavy burden, appearing as enlarged, swollen, and pale kidneys heavily congested with white chalky deposits of urates, indicating complete renal stress.



Gross picture of chicken infected with mycotoxins (A): liver appears pale, enlarged, and brittle with petechial hemorrhage. (B) chicken kidneys appear pale, enlarged pale, enlarged, and hemorrhagic.

Field-Level Prevention and Physical Detoxification Strategies

Preventing and physically removing mycotoxins is always cheaper than treating a flock, as organ damage in poultry cannot be easily reversed. Since these field-level strategies share the same goal-controlling moisture, air, and physical grain defects to stop or eliminate toxins-they form a complete, practical defense line during procurement, storage, and milling. Smart procurement and mechanical sorting serve as the first entry barriers. Farmers must strictly reject raw grain batches with moisture levels above 12% to 13%, as high moisture is the primary trigger for mold growth. Grains should be screened through mechanical vibrating sieves to remove dust and broken fragments, which contain 60-80% of the total mycotoxin concentration. Furthermore, density separators help split lightweight, fungi-damaged kernels

from heavy, healthy ones, while smaller farms can use visual hand-sorting to manually pick out and discard shriveled, black-tipped, or visibly moldy grains. Dehulling and safe storage protocols protect the grain's physical integrity and isolate the flock from external moisture. Because fungal spores land on the outer seed coat first, running ingredients like maize or groundnuts through a mechanical huller can cut total aflatoxin levels by 30% to 50%, leaving the inner kernel clean and safe for milling. Once processed, feed bags must never sit directly on bare concrete floors, which sweat and transfer moisture; instead, always stack bags on wooden or plastic pallets. To ensure continuous air circulation and prevent damp build-up, store stacks at least 1 foot (30 cm) away from walls, and strictly follow the FIFO (First-In, First-Out) stock rotation rule so old feed is used before it sits long enough to spoil.

Thermal processing, surface washing, and feeder hygiene tackle the final stages before consumption. While normal sun-drying halts new mold growth, it cannot destroy existing toxins; however, the extreme heat and friction (above 100°C to 120°C) used in extrusion and pelleting can physically disrupt toxin structures to lower their threat. Surface contamination can also be reduced by rinsing grains with water to remove up to 80% of outer toxins-provided the grains are dried back below 12% moisture immediately to prevent instant spoilage. Finally, because humid air and bird saliva cause feed to cake and mold rapidly in feeder corners, farmers must clean and scrape out farm feeders at least twice a week to ensure birds do not ingest toxic, crusted residues at the bottom of the tray.

Action Plan & Treatment Protocol

Feeding interventions using toxin binders and mold inhibitors form the core of the recovery strategy. You should immediately mix a high-quality commercial Toxin Binder into the feed batch. If you are dealing with Aflatoxins, incorporate HSCAS (Hydrated Sodium Calcium Aluminosilicate) or bentonite clays into the mix. However, if multiple or complex toxins like Ochratoxin and T-2 are suspected, utilize Organic/Yeast Cell Wall Binders (MOS), which physically trap the toxins in the digestive tract so they pass out safely in the droppings. Concurrently, you should apply Mold Inhibitors like propionic acid or organic acid powders into the feed-especially during humid seasons—to prevent any remaining dormant mold spores from waking up and multiplying.

Flock supportive care through water medication provides immediate relief to damaged organs and stabilizes production. You should administer high-quality Liver Tonics via drinking water for 5 to 7 days to accelerate the regeneration of damaged liver cells and restore proper nutrient processing. Additionally, adding Vitamins C and E to the water serves as a powerful antioxidant boost, helping the birds recover from cellular stress and tissue damage. Finally, if the flock is suffering from watery diarrhea or wet litter issues, provide Electrolytes in the drinking water to prevent rapid dehydration and maintain mineral balance until the gut fully heals.