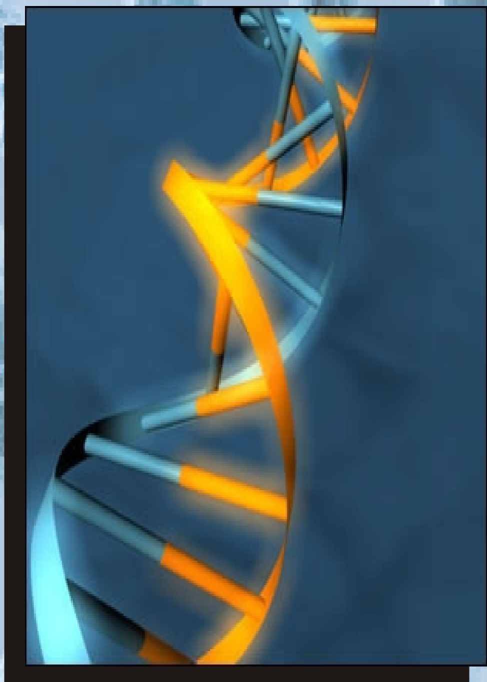


Applying Biotechnology to the Problems of Mycotoxins in Feed

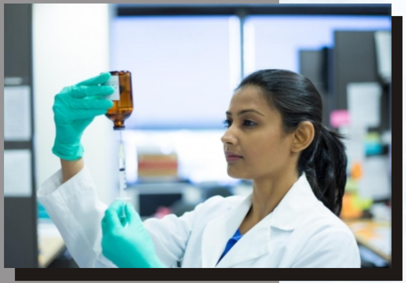
TOXITROL

Total Quality Company

At Nutriosys all product designed are part of its ISO9001 quality process in which the requirements of the customer are defined, the science is described and ingredient compatibilities are considered.

Formulated products are then produced to a strict protocol and release criteria. They are subject to further quality checks on packaging, transport and the evaluation of customer satisfaction.

Nutriosys believes that quality is the essence of success with all biotechnological products.



Toxitrol dynamic equilibrium is created between binders, acidulants, enzymes and microorganismsin the digestive system.

Toxitrol combines the best aspects of microbiology, enzymology, biochemistry, immunology and physiology.

In the following product we exploit a combination of yeast, enzymes, acidulants, mineral and biological binders to breakdown or inactivate the mycotoxins.

Mycotoxins and their effects

The fact that mycotoxins effect the nutrition and health of humans and other mammals is now well accepted.

Such toxins are produced by a wide range of fungi which are exemplified by Aspergillus, (Aflatoxin and Ochratoxin); Fusarium, (Zearalenone, Deoxynivalenol and Fumonisin) and Penicillium (Ochratoxin and Roquefortin).

These toxins have considerable pharmacological effects even at very low concentrations (ppb) and toxicity may be further enhanced by subsequent metabolism in vivo particularly by the liver.

In addition to detoxification within the liver, detoxification can also be achieved in the gastrointestinal tract by certain organisms and enzymes under appropriate conditions.

The Fusarium fungus is here seen growing inside the maize stover

A large number of mycotoxins have been identified. There are currently five main groups of particular agricultural interest, the Aflatoxins, the Trichothecenes as examplified by DON, the Zearalenone group, the Fumonisins and the Endophyte toxins.

Toxins have considerable pharmacological effects even at very low concentrations.

Zearalenone

Zearalenone, a Fusarium toxin produces a considerable reduction in reproductive performance, reduced growth, reduced milk production and reduced feed efficiency in cattle and pigs. In poultry increased mortality is observed.

Deoxynivalenol

Deoxynivalenol (DON), a trichothecene toxin, causes severe symptoms in cattle, pigs and poultry. These include reduced feed intake, poor production scours and reduced feed fficiency.

DON, T2, Zearalenone and other toxins often cause the shedding of the intestinal mucosa this manifests itself as mucus tags in the material defecated.

Fumonisin

Fumonisin produces effects via a reduction in blood circulation and cardiac output. In this way it can reduce growth and cause pulmonary edema in swine and poultry. This reduction of circulation affects all major organs, including the liver, exacerbates and enhances the effects of other toxins when found in combination.

Ochratoxin

Ochratoxin can be carcinogenic in man and produce immuno-supression in farm animals.

Endophyte Toxins

Lolterm B

Lolitrem B, (from Acremonium lolii in Ryegrass). This is an example of an endophyte toxin that produces a form of grass staggers often confused with hypomagnesaemia.

Ergovaline

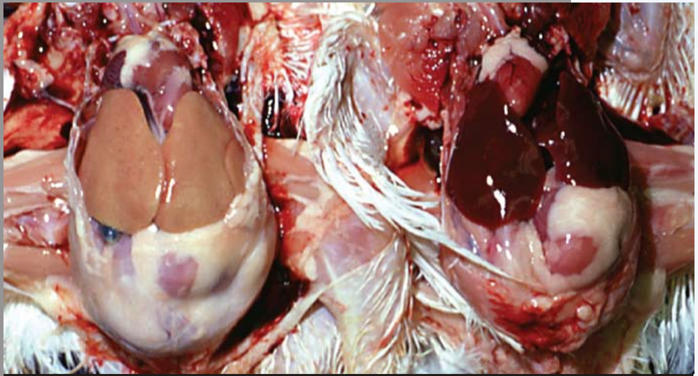
Ergovaline (From Acremonium coenophialum). This is an endophyte toxin found in fescues. Ergovaline is a major toxin which reduces prolactin release and reduces blood flow and milk production as a consequence.

Sporidesmin

Sporidesmin (from Pithomyces spp. in ryegrass).
This endophyte causes facial exema and liver damage in sheep.

Aflatoxin

Aflatoxins in cattle can cause growth reduction, and suppressed immunity, reduced feed efficiency and increased mortality among other symptoms. Likewise in pigs, reduced feed efficiency, increased mortality, lower growth rates can be observed. While in poultry there are similar symptoms and a decreased ability to metabolize fat, protein and starch.



Fatty infiltration of the liver due to Aflatoxin on the left compared to normal on the right

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Nutriosys, Toxitrol is the leading product in the field of mycotoxin degradation.

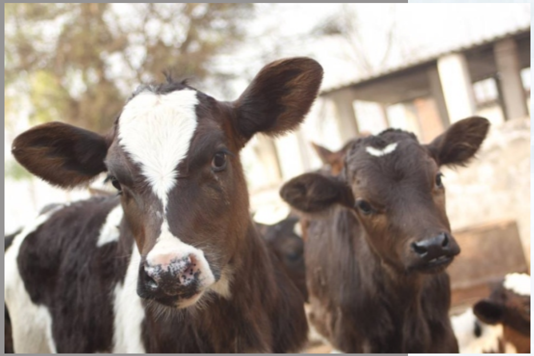
A combination of toxin binders, yeast, yeast extract and enzymes produces results where many other products fail.

The yeast in Toxitrol produces enzymes that are themselves capable of degrading Zearalenone, Deoxynivalenol and Fumonisin.

Toxitrol is preferred for high levels of toxin and in monogastric animals.
In cattle treatment with Toxitrol is always recommended where the nature of the toxin is unknown or its presence uncertain.

Salient Features & Benefits

Prevents the growth of bacteria, viruses, moulds & fungi
Does not damage micro nutrients like vitamins & amino acids
Stable during pelletization
Increased the shell life of finished feed & feed ingredients
Controlled pathogen growth in veg-feed ingredients & animal protein sources like meat and bone meal, fish meal etc.



Benefits in Broiler

Prevents early chick mortality
Reduces incidence of pasty vent
Controls necrotic enteritis

Benefits in Layer

Reduces perching
Controls necrotic enteritis
Improves production & livability

Benefits in Breeder

Controls white diarrhoea
Controls necrotic enteritis
Improves production & livability

Benefits in Calves

Improved performance due to synergistic benefits
Better feed efficiency
Reduces incidence of scours

Benefits in Lactating Animals

Increases milk yield
Improved manure consistency
Reduces incidence of mastitis

TOXITROL

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Dosage in Poultry

Routine Use - 1 kg per ton of feed
During Contamination - 2 kg per ton of feed
or As directed by Consultant

Dosage in Livestock

Administered at 1 kg per ton of feed or TMR
or As directed by Consultant.

Packing Available

25 Kg