

Herbal advancement in total mycotoxin control

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In modern livestock operations, mycotoxins have become a menace especially for the livestock industry despite all measures taken during harvesting, storage and processing of food grains. The problem of mycotoxicosis is more grave in tropical countries including India and South East Asia due to the conducive climate for growth.

Mycotoxins are profit eaters for poultry farms and mycotoxins in combination can greatly affect their performance and productivity.

In South East Asian countries, farm profits in porcine production have reduced by approximately 8.1% without taking meat quality and medication cost into consideration. The threats posed by mycotoxins to the animal food and feed industries are thus significant and vary from farm to farm.

The ease and frequency with which mycotoxins contaminate agricultural commodities, concomitant with the chronic exposure of poultry via contaminated animal feeds, can be the difference between profit or loss for the poultry industry.

Although traditional remedies and plant materials have been in use for hundreds of years to control fungal infection in humans and animals, recent advances in research have validated their use in various stages of mycotoxin control – fungal growth, toxin production, neutralisation and detoxification in the body. *Allium sativum*, *Solanum nigrum* and *Azadirachta indica* are examples of plants which have been validated for their anti-mycotoxin property.

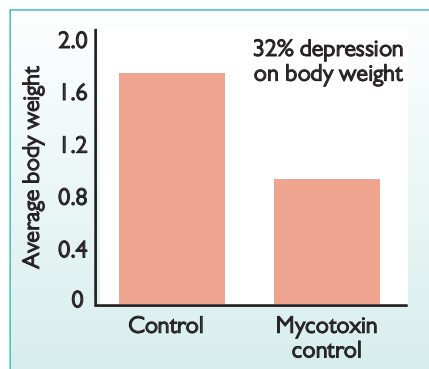


Fig. 1. Scenario one. Economic losses when broilers are fed on mycotoxin contaminated feed (Group I vs II).

Allium sativum extract exhibited 100% inhibitory action on growth of the fungus and aflatoxin AFB1 production with the spores of *Aspergillus parasiticus* in rice culture incubated at 30°C for five days.

Azadirachta indica leaf extracts added to fungal growth media at 1, 5, 10, 20 and 50% v/v concentration prior to inoculation essentially blocked (98%) aflatoxin biosynthesis at concentrations greater than 10% v/v.

The addition of *Solanum nigrum* to diets of Wistar Albino female rats, which received daily intraperitoneal injection of aflatoxin B1, improved the quantity of some nutrients having a direct influence on drug metabolising enzyme and, in turn, the activity of liver drug metabolising enzymes which help in detoxification of aflatoxin B1.

These herbs have also shown the clinical benefits when used in feed contaminated

with commonly found mycotoxins aflatoxin B1 and ochratoxin on day old broiler birds reared for 42 days.

The ameliorative effects of these herbs, along with commonly used mycotoxin binder HSCAS, was evident by 10-15% higher body weight, better FCR reflecting efficient feed conversion along with higher humoral and cellular immune response in treated groups vis a vis contamination group.

The above instances are but glimpses from the vast and virgin world of herbals through the clear eye of modern science.

A wide variety of physical, chemical and biological methods for detoxifying mycotoxins have been reported but none of them have been found to be viable for large scale, practical detoxification of mycotoxin containing feedstuffs.

Adsorption of mycotoxins by many binders is based entirely on electrostatic reactions such that their range of activity has been limited to polar mycotoxins such as aflatoxins. Non-polar mycotoxins, such as ochratoxins are largely unaffected.

The inclusion rate and nature of such products, along with non-specific binding mechanism also tend to reduce availability of vital reactive nutrients like mineral and vitamins. Mycotoxin binding by oligosaccharides is characterised by a variety of interactions, ranging from dipolar to electrostatic and hydrogen bond combinations.

So, a very potent broad spectrum mycotoxin binder, along with growth promoting herbs, can hold the baton in combating the total mycotoxin menace.

Continued on page 16

Table 1. Design of experimental groups.

Group	No. of birds	Treatment
I	25	Control (standard feeding)
II	25	Standard feeding + aflatoxin (100ppb) + ochratoxin (100ppb)
III	25	Standard feeding + Vilocym Z (1g/kg)
IV	25	Standard feeding + aflatoxin (100ppb) + ochratoxin (100ppb) + Vilocym (1g/kg)

Table 2. Parameters of evaluation.

Parameters	
Performance	Body weight, feed consumption, FCR
Organ weight	Liver weight, kidney weight, spleen weight and bursa weight
Haematological	Haemoglobin, packed cell volume, total erythrocyte count, total leukocyte count
Serum biochemical	Total serum proteins, serum albumins, serum globulins, serum triglycerides, serum cholesterol, liver marker enzyme

Continued from page 15

Vilocym Z is one such herbal product with comprehensive power of herbs, activated HSCAS, MOS, organic acids and PVP.

Vilocym Z is a broad spectrum multiple mycotoxin binder and neutraliser, hepatoprotector, immunomodulator and growth promoter formula for poultry.

Supplementation of Vilocym Z can improve the production performance such as higher growth promotion along with considerably less feed conversion rate (FCR). It is also known to improve digestion for better feed conversion efficiency, growth and production.

It optimises liver functions, appetite and feed intake for increased availability of nutri-

Parameters	I (std control)	II (mycotoxin control)	III (Vilocym Z control)	IV (Treat Vilocym Z)
Average body weight at sixth week (kg)	1.89	1.28	1.91	1.88
Average feed consumed (kg)	3.78	3.40	3.72	3.65
FCR	2.00	2.66	1.95	1.94

Table 3. Performance parameters.

ents for higher growth. It also acts as a metabolic and liver stimulant that increases the efficiency of utilisation of nutrients reaching the tissues for productive purposes. As a liver stimulant it protects the liver and helps maintain the regeneration of

liver tissues damaged by toxins and feed contaminants. Its constituent herbs may also increase the palatability of diets; thereby increasing feed intake, feed conversion rate and body weight gain.

Constituent herbs *Phyllanthus emblica*, *Andrographis paniculata* and *Solanum nigrum* owe potent hepatoprotective and liver stimulant activity and play a significant role in the bionutralisation of toxins in liver. *Curcuma longa* and *Azadirachta indica* are known to have strong antimicrobial and antioxidant action. Vilocym Z also helps in bio-neutralisation of the toxins in the liver by maintaining and improving liver functions.

The addition of lipotropic herbs such as *Allium sativum* and *Trigonella foenumgraecum* helps to inhibit lipid accumulation, helping to prevent fatty liver syndrome.

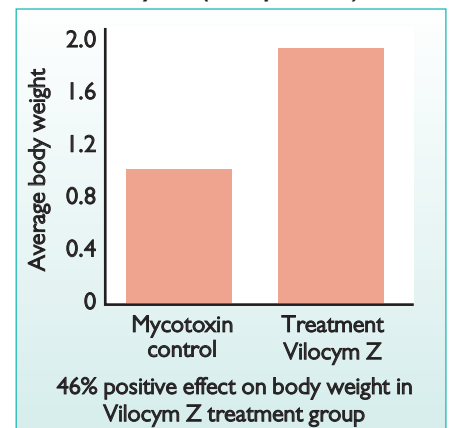
In an experiment carried out at the Veterinary College Parbhani, Maharashtra, India, to judge the efficacy of Vilocym Z on induced mycotoxicosis, excellent assurance of mycotoxin protection for performance in all scenarios was reported.

The experiment was carried out to test the efficacy of herbal product Vilocym Z on experimentally induced mycotoxicosis (aflatoxin + ochratoxin 100ppb each) in broilers.

While initiating the study, 100 day old chicks were randomly divided into four different groups of 25 chicks in each group and were subjected to standard feeding under the same management conditions for 42 days.

Mycotoxicosis was induced by supplementing aflatoxin at 100ppb + ochratoxin at 100ppb in group II and mycotoxins along with Vilocym Z was supplemented in feed in group IV from the first day of the trial.

Fig. 2. Scenario two. Counteracting mycotoxin associated losses using herbal Vilocym Z (Group II vs IV).



Parameters (mean value)	I (std control)	II (mycotoxin control)	IV (treat Vilocym Z)
Haemoglobin (g/dL)	9.97	7.18	9.63
Packed cell volume	30.17	20.67	29.00
Total leucocyte count (10 ⁶ /cu.mm)	23.67	19.3	22.33
Total erythrocyte count (10 ⁶ /cu.mm)	3.33	2.95	3.20

Table 4. Highlights of other parameters at day 42.

The parameters in Table 2 were studied in the four groups to evaluate the efficacy of Vilocym Z. Body weight gain and feed consumption were noted at weekly intervals and FCR was calculated for each group.

Vilocym Z converts losses into profits and saves birds from other damages. Vilocym Z increases the feed efficiency by giving more body weight per kg of feed consumed. It gives 139g more live body weight per bird per kg of feed consumed.

● **Key findings from scenario three (Fig. 3).** Vilocym Z is even profitable when used as a growth promoter in mycotoxin free feed for broiler birds. It gives insurance of mycotoxin protection and assurance for performance in all scenarios. Vilocym Z boosts productivity and saves the bird from damage associated with multiple mycotoxins.

The above findings clearly reveal that mycotoxin menace management through Ayurved's comprehensive research based herbal solution is an intelligent choice which not only takes care of inhibition of moulds, binding/neutralisation of polar or non-polar toxins but also reverses the damages already done to liver or other vital organs by various mycotoxin assaults. ■

Results

A significant improvement in overall growth and performance was observed in groups of birds supplemented with Vilocym Z (Table 3). From Table 4, the protective role of Vilocym Z in normalising the altered haematological values by mycotoxins is evident.

Birds in Group IV (standard feed + aflatoxin 100ppb + ochratoxin 100ppb + Vilocym Z 1g/kg) did not show any adverse changes in gross, histopathological or haematological parameters due to supplementation of Vilocym Z.

● **Key findings from scenario one (Fig. 1).**

Multiple mycotoxicosis is a big problem affecting not only the health of the bird but also leading to huge economic losses, therefore prevention strategy is strongly required for protecting economic losses against mycotoxin menace.

Formulating mycotoxin free feed is a big challenge for nutritionists because of ingredient contamination and mycotoxin levels ranging above the safe level of 20ppb. Survey reports contamination level > 30ppb are significant to cause economic losses without showing any symptoms.

● **Key findings from scenario two (Fig. 2).**

Vilocym Z is very effectively capable of counteracting the economic losses associated with multiple mycotoxins. Even when the contamination level of mycotoxin is high,

Fig. 3. Scenario three. Using Vilocym Z as a growth promoter in mycotoxin free feed.

