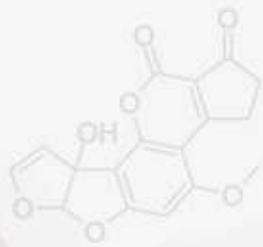




# Zarin Binder

Clay toxin binder and pellet binder



## Zarin Binder Introduction

Zarin Binder is a safe toxin binder and pellet binder. It consists of a mixture of processed aluminum silicates. Its high effectiveness in absorbing the aflatoxins has been demonstrated in more than 10 in vivo and in vitro studies.



## Why Zarin Binder?

According to in vivo and in vitro studies



### High absorption of aflatoxins in feed

- 90%-100% absorption of the aflatoxin B1 (In vitro studies)
- 77% effectiveness in reducing the secretion of feed aflatoxins in to Saanen goats milk.
- Improving the zinc and magnesium availability in acute aflatoxicosis with no adverse effects on the vitamin and minerals availability in broilers.
- Highest in vitro absorption of aflatoxin B1 compared to some other toxin binders.

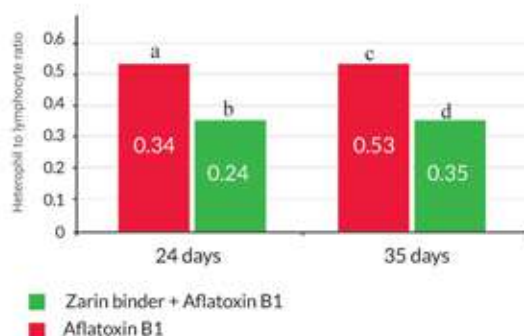
### The effect of Zarin Binder on reducing milk aflatoxin

(Farms Aflatoxin Assessment Research - 2018)



### The effect of Zarin Binder on reducing aflatoxin stress in poultry

In vivo study: Effects of organic and inorganic adsorbents in reducing the effects of aflatoxicosis in broilers, 2018



## Dosage to prevent aflatoxicosis

Livestock: 5-10 kg per ton of concentrate

Poultry: 5 kg per ton of feed

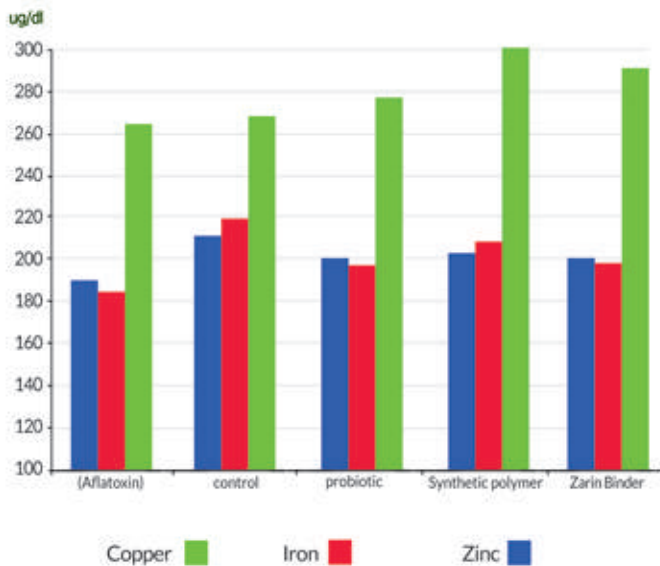


As results show, the heterophile-to-lymphocyte ratio (the stress indicator) was significantly decreased in the broilers by using Zarin Binder, indicating the beneficial effect of this product on the immune system and stress reduction in poultry.

## Why Zarin Binder?

According to in vivo and in vitro studies

Effect of toxin adsorbents on blood levels of minerals in broilers affected by aflatoxicosis, 2018



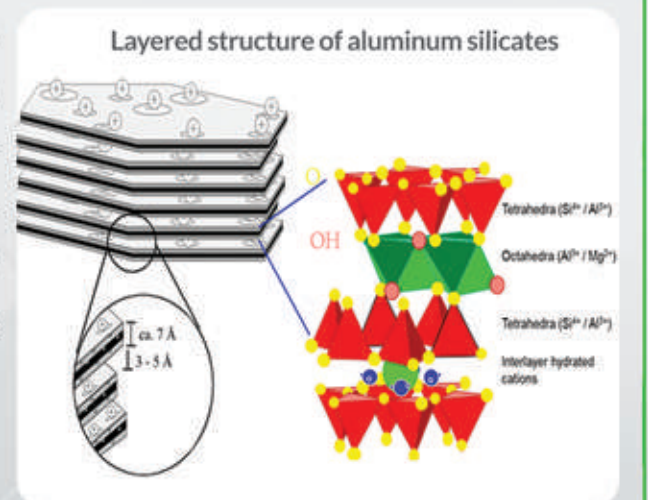
According to the results, aflatoxin reduces the levels of zinc, iron, and copper in the blood of broilers, while the use of Zarin Binder can improve the mineral availability in aflatoxicosis.

According to the research done by the Tarbiat Modarres University in 2018 on the effect of toxin adsorbents on the serum levels of vitamins in broiler chickens affected by aflatoxin poisoning, Zarin Binder showed no adverse effect on vitamin absorption. Moreover, it could improve the digestion and absorption of nutrients, including vitamins, due to the longer retention of feed in the gastrointestinal tract.

Experimental groups	Additive g/kg	Aflatoxin ug/kg	Vitamin A ug/dl	Vitamin D3 ug/ml
Positive control	0	500	97.28 <sup>b</sup>	8.59 <sup>ab</sup>
Negative control	0	0	107.42 <sup>a</sup>	6.65 <sup>b</sup>
Prebiotic	5	500	108.25 <sup>a</sup>	9.51 <sup>a</sup>
Probiotic	1	500	107.68 <sup>a</sup>	8.03 <sup>ab</sup>
Synthetic polymer adsorbent	5	500	106.95 <sup>a</sup>	6.58 <sup>b</sup>
Zarin Binder	5	500	111.30 <sup>a</sup>	8.18 <sup>ab</sup>
SEM			2.45	0.50
P-value			0.016	0.004

## Mechanism of Action

With micronized particles (<37 μm) and high adsorption surface, aluminum silicates in the Zarin Binder can adsorb aflatoxin molecules to the polar edges and surfaces of their nanostructured sheets, making them inaccessible for the gastrointestinal tract. Zarin Binder binds toxin molecules at different pH and temperature conditions, and the thermal processes during feed production have no adverse effects on its effectiveness.



## Pellet Binder Properties of Zarin Binder

Several studies by the Vivan company showed that various pellet binders have different effects on the pellet hardness and feed production process. These differences depend on the structure and purity of pellet binder.

Zarin Binder Aluminum silicates increase the hardness and quality of pellets and lead to their gelatinizing without adverse effects on the pellet production speed.

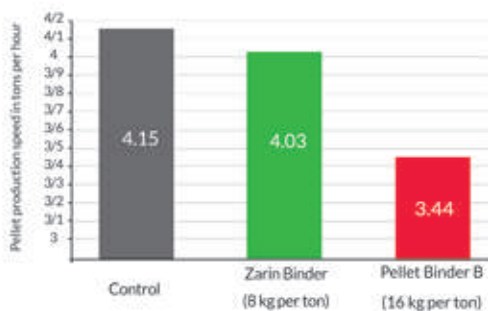
Moreover, they significantly decrease the production costs, including electricity consumption, equipment depreciation, and others.



## Study results on pellet strength and quality

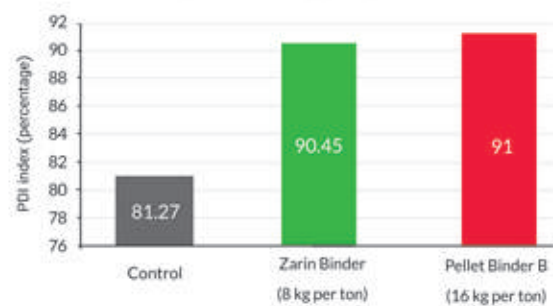
- Increasing the Pellet Durability Index (PDI) to over 90% and decreasing the pellet dust to <2% (2014-2017).
- Increasing the Pellet Durability Index (PDI) from 71% to 92%, improving the production speed, and decreasing the electricity consumption by 18% (2015-2017)
- Increasing the Pellet Durability Index (PDI) from 78% to over 83%

The effect of pellet binders on the pellet production speed



Increasing the consumption of pellet binder B to compensate for its poor binding ability compared to Zarin Binder reduced production speed by 1.17%.

The effect of pellet binder type on pellet PDI index



According to this diagram both pellet binders led to the same increase in the Pellet Durability Index (PDI). Zarin Binder a dose of 8 kg per ton and pellet binder B with 16 kg per ton led to the same effect.

## Dosage for pellet quality improvement



- In 1.8 - 2 mm dies : a maximum of 5 kg per ton of feed
- In 3 mm dies : 8-12 kg per ton of feed
- In 3.5 - 4 mm dies : 12-15 kg per ton of feed
- In 6-8 dies : a maximum of 15 kg per ton of feed