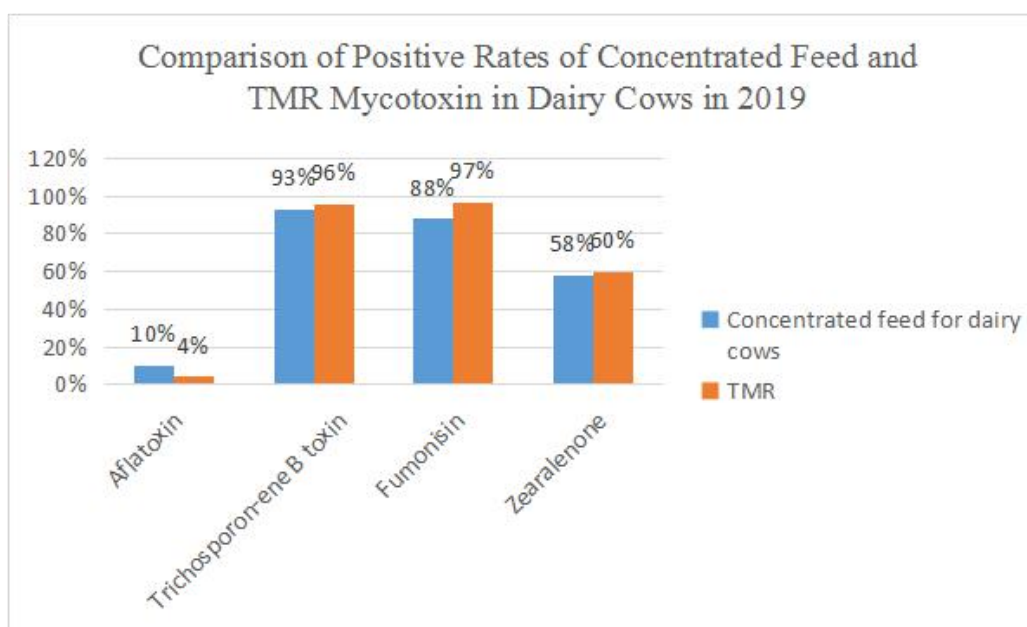
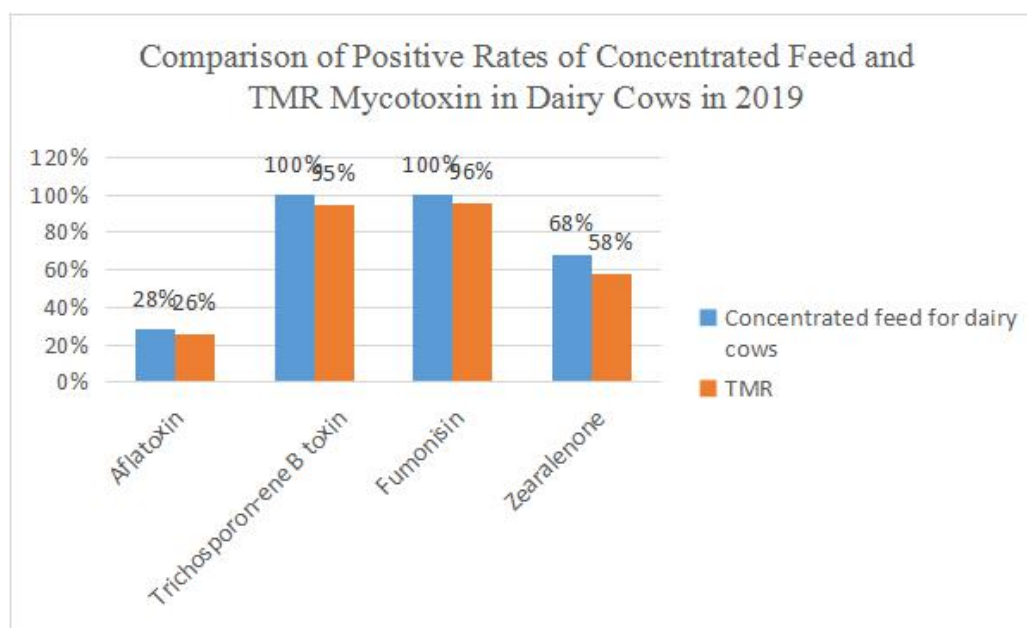


# How does the probiotics for removing mycotoxins work?



## How does the probiotics for removing mycotoxins work?

Mycotoxins are a class of small molecular weight compounds with great differences, which are commonly found in feed and feed raw materials.



Common toxins include aflatoxin, zearalenone, emetic toxin, etc. Studies have shown that one kind of raw material often contains two or more mycotoxins, and there

will be superposition effect among different mycotoxins. In addition, due to the malnutrition of animal feed, some special physiological stages and other stress factors, the low concentration of mycotoxins in feed will have adverse effects on animal health and production performance.

Type	Raw material	Sensitive animal	Harm
Aflatoxin	Peanut, corn and its by-products, wheat, cottonseed, fish meal, etc.	Chickens and ducklings are the most sensitive. Pigs, chickens and ducks are very sensitive	Causes liver necrosis, leads to growth retardation, production performance decline and suppression of immune system
Zearalenone	Corn, wheat and rice, sorghum, fish meal, etc.	Pigs, cattle, poultry and young sows have the strongest sensitivity	Destroy the reproductive ability of animals, such as infertility of sows, stillbirth, and decreased semen quality of boars, etc.
Vomitoxin	Corn, wheat, barley, oats, rice, malt, etc	Pigs are the most sensitive, followed by chickens, ducks and adult ruminants	Causes loss of appetite or refusal to eat, vomiting, weight loss, and infringes on the digestive tract of livestock and poultry
T-2 toxin	Corn, wheat, barley, oats, rice, fish meal, etc	Pigs are the most sensitive, followed by poultry	Causes loss of appetite or refusal to eat, weight loss, diarrhea and vomiting, blood dysentery, abortion and even death of animals
Ochratoxin	Corn, wheat and barley, etc.	Pigs and poultry are the most sensitive	Loss of appetite, slow growth, listlessness, uncoordinated movements, increased drinking water and decreased feed utilization rate
Aspergillus fumigatus toxin	Corn, rice, soybean, sorghum, etc.	Horses are the most sensitive, pigs are more sensitive	Pig pulmonary edema, respiratory disturbance, heart function injury, horse leukomalacia

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mycotoxins, and there will be superposition effect among different mycotoxins. In addition, due to the malnutrition of animal feed, some special physiological stages and other stress factors, the low concentration of mycotoxins in feed will have adverse effects on animal health and production performance.

**The production conditions of mycotoxins are usually as follows:**

Temperature: 25-30℃

Oxygen: Most need aerobic environment

pH: 4-8

Feed moisture: 17-18%

Humidity: 70%

**Harm of mold and mycotoxin:**

Affect the palatability of feed

Reduce the nutrient content of feed

Cause mold infection

Cause mycotoxin poisoning

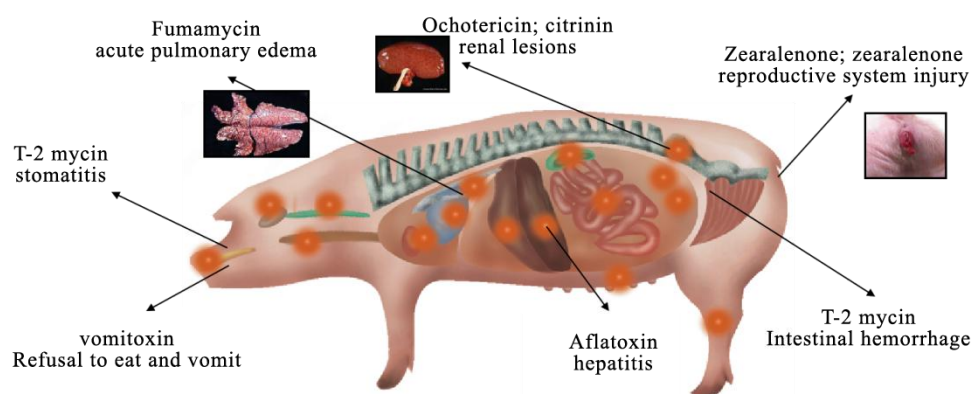
Reduce the intake of nutrients

Change animal endocrine and

neuroendocrine system

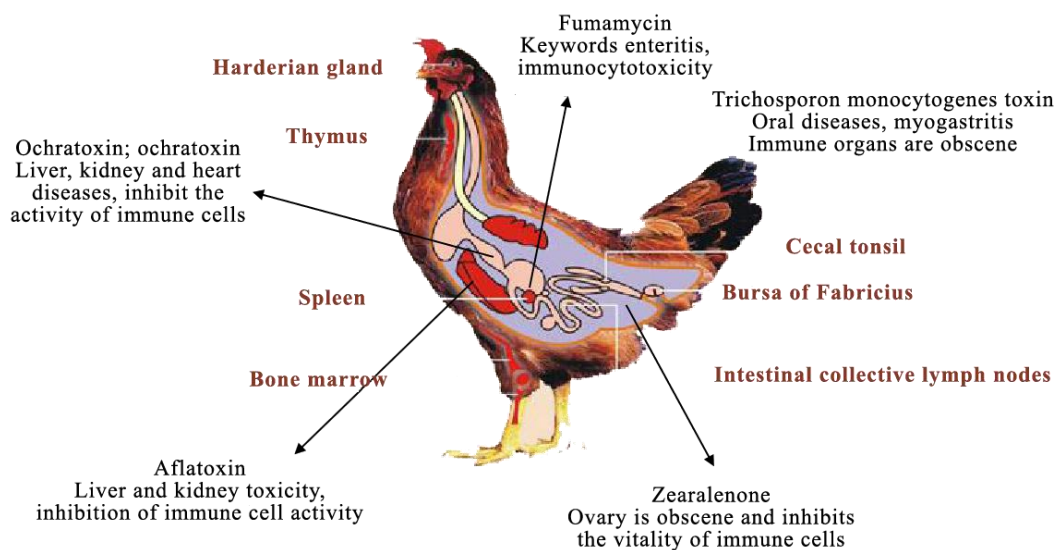
Inhibition of animal immune function

**Harm to swines**

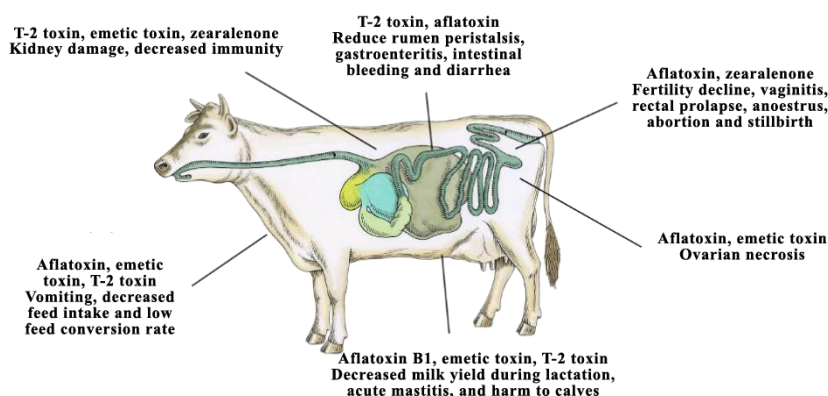


**Harm to poultries**





### Harm to cattle



At present, detoxification methods mainly include physical method, chemical method and biological method. Physical and chemical methods to remove toxins can not completely and effectively control toxins or cause great damage to nutrients. Biological detoxification means that secondary metabolites produced by microorganisms or enzymes secreted by microorganisms decompose and destroy toxin molecules to produce nontoxic or low-toxic degradation products.

Compared with other detoxification methods, the biological detoxification method has higher safety and practicability, which has strong specificity and less loss

to the nutritional components of cereal crops. Therefore, microbial degradation of toxins has become a hot spot in recent years.

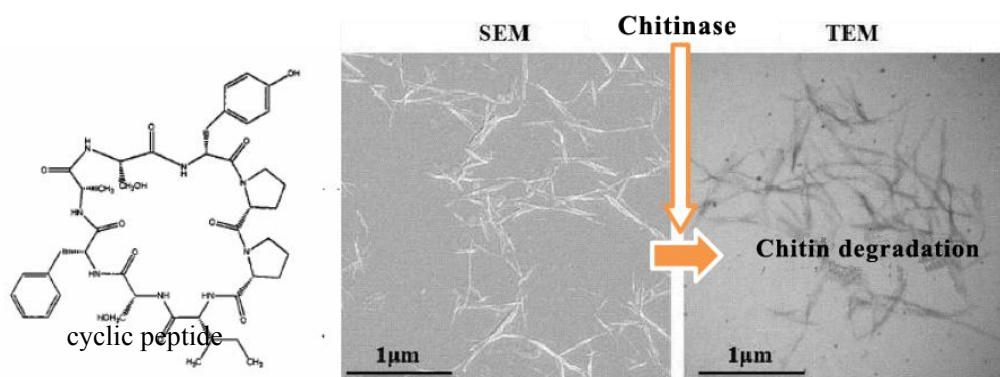
So, how do microorganisms get rid of mildew?

### **Antagonistic scavenging effect of microorganisms on fungi and mycotoxins**

Many microorganisms have antagonistic effects on fungi and mycotoxins, including lactic acid bacteria, *Bacillus subtilis*, yeast and colorless bacteria. The main mechanisms are:

(1) Metabolism produces some protein analogues or exopolysaccharides, which inhibit the growth of fungi and block or delay the biosynthesis of toxins

Protein analogues such as cyclic peptides and chitinase produced by microbial metabolism can inhibit the growth of fungi. Chitin is an important component of many fungal cell walls. Chitinase can catalyze the hydrolysis of chitin, which shows its antifungal ability.

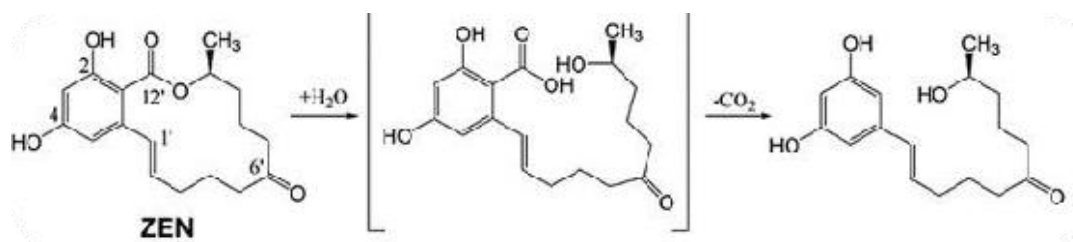


Some protein analogues or exopolysaccharides block or delay the biosynthesis of toxins, for example, cyclic peptides can inhibit the transcription of toxin-related genes, thus inhibiting the production of toxins. This effect of cyclic peptide is related to its cyclic structure, and cyclic peptide must contain proline and hydrophobic amino acid to show antibacterial activity.

(2) Intracellular and extracellular enzymes degrade toxins into less toxic or non-toxic

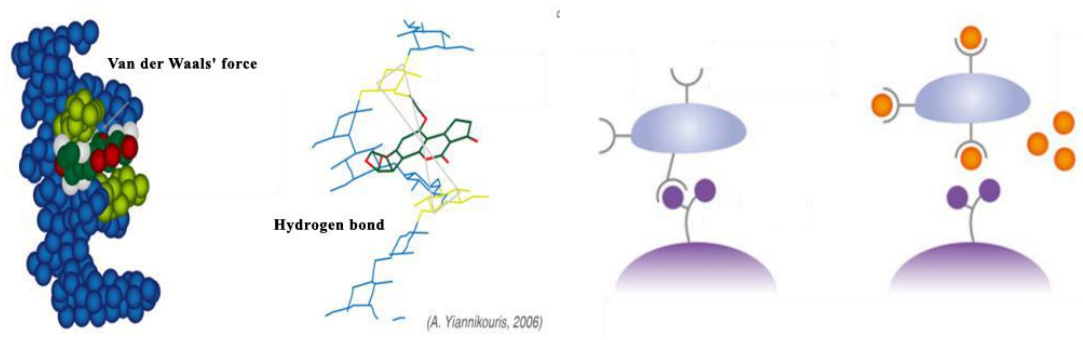
substances

For example, *Bacillus* decomposes toxins into degradation products without estrogenic toxicity in the process of metabolism of toxins under the action of extracellular enzymes, which has a good detoxification effect.



### (3) Physical adsorption of cell wall

For example, there are many binding sites in the spatial structure of yeast cell wall, which adsorb various mycotoxins through hydrogen bonds, ionic bonds and hydrophobic forces, thus preventing the damage of mycotoxins to animal bodies.



### (4) Organic acids produced by metabolism inhibit fungal growth

Low pH environment can make the enzymes on cell wall and cell membrane lose some activity and increase the permeability of cell membrane, thus inhibiting the growth of fungi. Lipophilic organic weak acids such as acetic acid, propionic acid and lactic acid diffuse into cytoplasm through lipid bilayer membrane, which reduces pH value in cells, leads to protein denaturation and interferes with cell growth and survival.

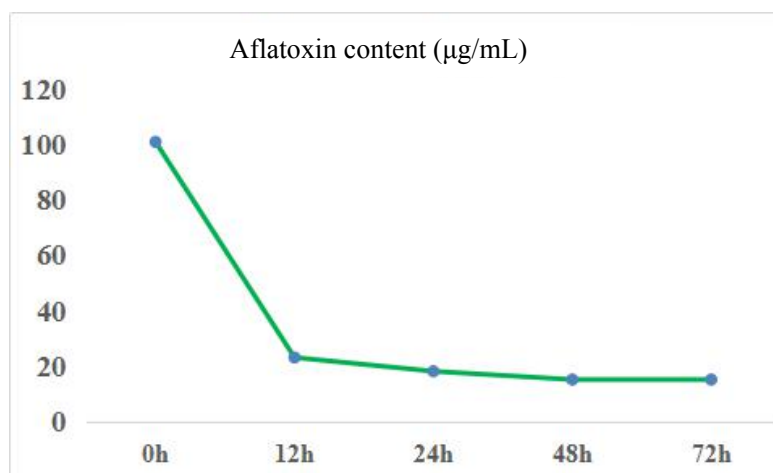
How to judge microbial degradation.

**The key lies in strain screening!**

Most microorganisms do not degrade mycotoxins. Only through long-term research, targeted and carefully screened strains can degrade mycotoxins.

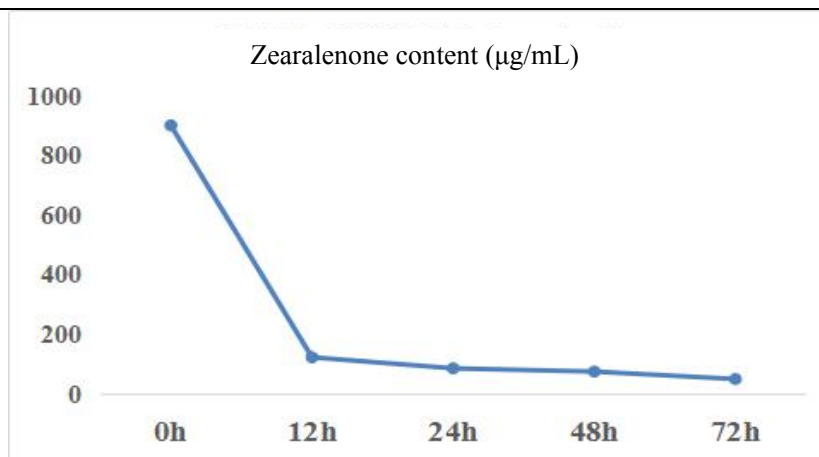
Vegamax screened out strains with strong degradation effect on mycotoxins through five steps of strain screening, and evaluated their degradation effect on mycotoxins through in vitro evaluation method. The main test process is to add a certain concentration of toxin to the fermentation broth of the strain for co-culture, and regularly detect the toxin content with ELISA ELISA kit.

**\* The degradation rate of aflatoxin by *Bacillus subtilis* 29 is over 90%!**

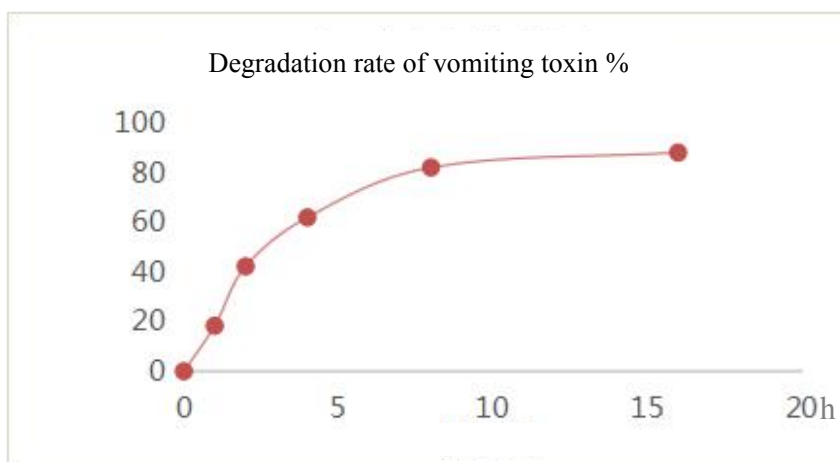


**\* The degradation rate of zearalenone by *Bacillus subtilis* 30 is over 90%!**





**\* The degradation rate of vomitoxin by Bacillus subtilis 31 is over 80%!**



On this basis, Vegamax has developed a mycotoxin degradation product with excellent performance---**Moldics**---a new tool with double desorption effect and biological mildew removal.

First of all, aiming at aflatoxin, zearalenone and vomitoxin, which are common in feed, we select enzyme-producing probiotics, which can significantly reduce the toxicity of mycotoxin in intestinal environment.



Secondly, nano-modified montmorillonite and yeast cell wall were used to enhance product performance. Modified montmorillonite is a new chemical modified product of nano-montmorillonite, with more stable structure, higher adsorption rate, larger adsorption range and lower desorption rate. Yeast cell wall, as a biological adsorbent, has a strong ability to adsorb mycotoxins! At the same time, the active factors in metabolites have the function of enhancing immunity!

\* The advertising materials, data and conclusions related to product performance contained in this publicity do not constitute assertions and guarantees on the efficacy and safety of related product technologies, and may change due to different use environments and conditions. Please contact Vegamax Product Manager for details.