

Aflaban®

Mycotoxin Adsorbent for Monogastric Animals

Introduction to "mycotoxins"

The problems caused by the development of fungi in animal feed and its raw materials are a source of concern for the animal feed industry. Not only due to the fact that these considerably reduce the nutrient value of the product in which the contaminated cereal is used, but also because of the mycotoxins found where ever there is fungal contamination.

The purpose of this paper is to briefly demonstrate the reasons why researchers ration manufacturers and others involved in the animal production chain seek efficient alternatives, if not to eliminate, then to minimize the losses caused as much by fungi as by their metabolic toxins, the "Mycotoxins".

Nutrient losses in animal feed

Whenever fungi are present in cereals and their by-products (basic raw materials for animal feed); the nutrient value drops drastically, because the fungi use the nutrients in their metabolic processes.

The principle nutrients affected by fungal contamination are proteins, carbohydrates, amino acids and fatty acids. The physic-chemical properties and content of the oil obtained from grain are also affected (Martinez, 1997).

Especially in tropical countries, the loss due to fungal contamination is around 4%, and can reach up to 30 % in some countries, principally due to high temperatures and high relative humidity, where constant rain doesn't permit adequate drying of the grain or where inadequate transport service and storage is responsible for the break up of the grain and insect contamination respectively.

Fungal development can occur without there being visible signs to the human eye. Fungi can attack grain, thereby destroying the embryo and breaking down the starch granules in the endosperm.

The losses in convertible energy in corn can vary from 5 to 25 %, as the fats are destroyed more quickly than the proteins and carbohydrates. A drop in the quantity of amino acids in mouldy wheat has also been observed, with cystin, lysine and arginine being the most affected.

Fungi also have an elevated level of lipase activity, which brings about changes that deteriorate the quality of oleaginous cereals, which is noted by the increase in number of free fatty acids in the cereals. However, perhaps of greater impact, is the presence of mycotoxins, products of fungal metabolism, which develop in oleaginous cereals and their by-products.

Mycotoxins in animal feed

There are numerous studies which relate the damaging effects of mycotoxins on domestic species. However, outbreaks of micotoxicosis don't occur with great frequency. Almost always, the predetermining factors provide warning of the possibility of greater risk, allowing time to implant rigorous security procedures. However, the more common type of infections caused by mycotoxins in the animal production system are of a more insidious form. For example, many of the mycotoxins impair the immunological system which results in specific reactions to antibiotics, and functions performed by cells, or both; which bring about a lowering in resistance, the possible failure of vaccines, an increase in sickness and mortality rate, which is characterized by infectious diseases of bacterial or viral origin. In these situations, the autopsy clearly reveals an infectious disease agent, whose etiological origin is promptly diagnosed. In this case, quite often predetermining factors, such as mycotoxins, are not discovered.

In this manner, chronic micotoxicosis, which occurs in the field, quite often passes unperceived or is mistaken for other diseases, which results in severe economic losses. Thankfully, nowadays these losses have begun to be quantified, and preventative measures such as diagnostic tests and products to combat mycotoxins are being used.

In general, mycotoxins are capable of causing stress in the immunological cells, which renders them incapable of combating infectious agents such as bacteria that invade the animal's organism. When ingested in small quantities, mycotoxins result in the premature death of such cells, a process which is know as "Apoptosis" and is responsible for the increase in

susceptibility to pathogenic microorganism infections. In larger quantities, mycotoxins can cause hepatic lesions which interfere in the workings of the liver and affect the production of bile, as is the case of Aflatoxina which together with other mycotoxins such as Ocratoxina, Toxina T-2 and Rubratoxina weaken the capillaries, resulting in hemorrhages and bruises principally in poultry, and consequently are responsible for the rejection of poultry carcasses in abattoirs due to bruising.

Zearalenona when ingested by means of contaminated feed has been responsible for abortions and irregular fertility cycles in sows. Citrinina and Ocratoxina have also been connected to cases of nephropathies in swine.

Parallel to the pathological case reports regarding the contamination of animal feed by mycotoxins, important data concerning studies of the occurrence of fungal contamination and its presence in raw material used for animal feed has come to light.

Incidents of mycotoxins

In the south of Brazil, between 1986 and 1997 more than 5,000 samples of grain used in the production of animal feed were analyzed. Of these, 42.6 % tested positive for Aflatoxina, with the average concentration of the toxin being 34.5 ppb and a maximum registered level of 14200 ppb. Corn was responsible for more than 50% of the Aflatoxina positive samples, 2.9 % of the Zearalenona positive samples and 0,4 % of the Ocratoxina A positive samples. This study also included samples of animal feed rations, of which 44.7 % tested positive for Aflatoxina with average concentration levels of 35.6 ppb and a maximum of 5,1 ppm being recorded. Zearalenona tested positive in 2.62 % of the cases with average levels of 15.07 ppb recorded and Ocratoxina A tested positive in 1.07 % of the cases with average levels registered at 0.14 ppb. In another study, 47.1 % of corn samples tested were contaminated by Fumonisina B1 registering average levels of 8.4 ppm and 26.6 % of the ration samples were contaminated registering average levels of 13.1 ppm.

More than 200 mycotoxins (Toxins produced by fungi) have already been identified worldwide, each one of which is responsible for specific symptoms in animals which consume contaminated feed. Aflatoxina the first Mycotoxin discovered is consequently the most documented. See the chart "The harmful effects of Aflatoxina on Poultry and Swine".

The harmful effects of Aflatoxina on poultry and swine

Based on the data presented above, it is totally justifiable that greater care be taken in the control of Aflatoxina, because its occurrence is much more frequent in relation to the other mycotoxins and the damage caused is much greater, principally because of the low immunological resistance which results in the appearance of other problems which have a direct influence on animal productivity both in poultry and in swine. The adsorption of Aflatoxina by means of the addition of aluminosilicates to animal feed is the most common and most efficient method in controlling Aflatoxins. It has been established that this method is highly efficient for the disintoxification of animal feed.

Based on this information, QUINABRA® has used the adsorption qualities of aluminosilicates to develop the mycotoxin adsorbent Aflaban®.

ITEM	HARMFUL EFFECTS OF AFLATOXINS ON ANIMALS	POULTRY	SWINE
1°	Drop in egg production due to the reduction of follicles responsible for the formation of the yolk	✓	
2°	Reduction of growth rate	✓	✓
3°	Increase in mortality rate	✓	✓
4°	Drop in the feed efficiency rate	✓	✓
5°	Liver intoxication (can be lethal)	✓	✓
6°	Increase in the blood coagulation time	✓	✓
7°	Reduction in immunity against infections	✓	✓
8°	Increase in the seriousness of infections	✓	✓
9°	Anemia	✓	
10°	Reduction in the capacity to metabolize fats, starch and proteins	✓	
11°	Splayed legs	✓	✓
12°	Reduction in skin pigment	✓	
13°	Increase in sensibility in relation to extreme environmental changes(temperature)	✓	
14°	Lethargy (drowsiness)	✓	✓
15°	Loss of appetite (anorexia)	✓	✓
16°	Reduction in fertility levels in breeding stock	✓	✓
17°	Reduction in the efficiency of antibiotics	✓	✓
18°	Petechial hemorrhages	✓	
19°	Poor adsorbtion syndrome	✓	

Aflaban®

Aflaban® is an additive adsorbent developed and tested to combat the most frequently occurring mycotoxins and those of greatest impact on animal production.

The capacity of the aluminosilicates to connect themselves ionically to the mycotoxins molecules makes Aflaban® an excellent adsorbent which forms an irreversible compound with the mycotoxins, making it impossible for them to be adsorbed by the animal's gastrointestinal tract, thereby creating a highly efficient protection system against the effects of these metabolic toxins, because if not adsorbed the mycotoxin is expelled in the feces.

We have paid particular importance to the adsorption of Aflatoxin, because it is the mycotoxin of greatest impact in poultry and pig production.

The table below shows the effects of aluminosilicate on aflatoxicosis in broilers which demonstrates a significant weight gain in birds exposed to a 5ppm of Aflatoxina and then treated with HSCAS (hydrate of Sodium and Calcium Aluminosilicate).

Table 1. The effect of the addition of HSCAS* and Bentonite on aflatoxicosis in broilers

Adsorbent	Aflatoxina (ppm)	Weight up to the 3rd week (g)
0	0	652 ^a
0	5	438 ^e
HSCAS*	0	635 ^{ab}
HSCAS*	5	518 ^d

Values with different letters are significantly different ($P \leq 0,05$).

(Wyatt, 1990)

* HSCAS - Hydrate of Sodium and Calcium Aluminosilicate.

Aflaban® is a very complex Poli-Aluminosilicate, made up of a very special Calcium, Sodium, Potassium and Magnesium base, which guarantees a quicker more stable cationic exchange with mycotoxin adsorption than the existing aluminosilicates on the international market.

Aflaban® is manufactured according to a rigidly controlled process and quality control system which guarantees an excellent standardization of production batches, as required by the Good Manufacturing Practices - USA.

Tests carried out at the Universidade Federal Rural do Rio de Janeiro (UFRRJ) and Universidade Federal Santa Maria, proved that Aflaban® exerts an excellent adsorption activity over Aflatoxina B1, (Graph1), which is commonly responsible for the contamination of grain, its byproducts and animal feed and that it has a greater cationic capacity in comparison to other adsorbers tested (Graph 2).

Grafh. 01 - Adsorption Capacity of Aflaban®

In vitro adsorption capacity of Aflatoxin B1 at a concentration of 2.5 ppm after being diluted in twice distilled deionized water.



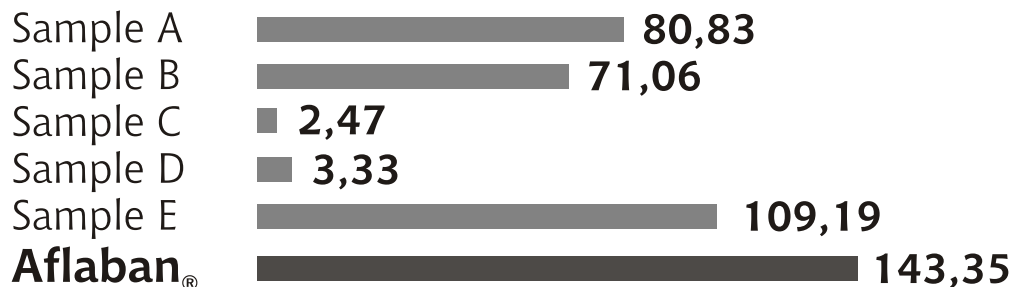
Fonte: Universidade Federal Rural do Rio de Janeiro - UFRRJ

Capacity of Aflaban at a concentration of 0.5% and a pH of 3.0 to adsorb Aflatoxin B1 in vitro at a concentration of 2.0 mg/ml.



Fonte: Universidade Federal de Santa Maria - UFSM/RS

Graph. 02 - Cationic exchange capacity of some aluminosilicates



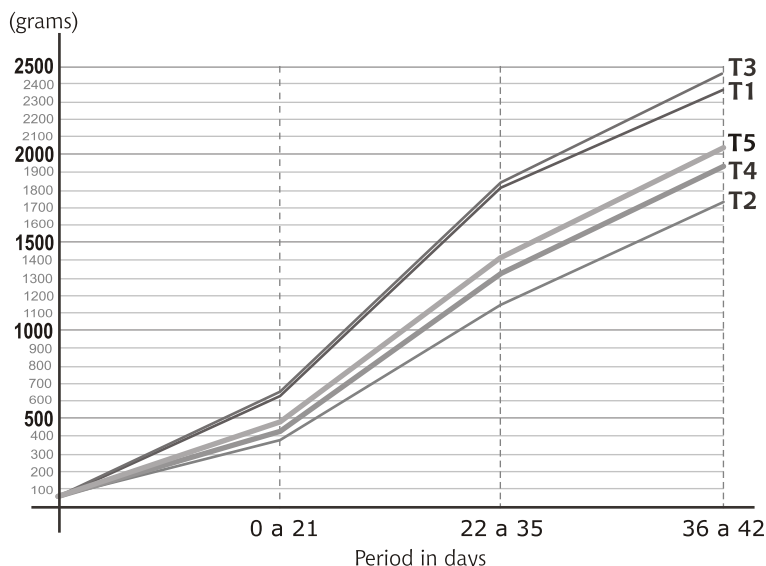
Universidade Federal Rural do Rio de Janeiro - UFRRJ - BRAZIL



The graphs below are related to the projects developed by the Laboratory of Mycological Researches - Universidade Federal de Santa Maria/RS

Body weight Gain

As can be seen from the graph below, treatments (T4 & T6), which received the indicated dosages of Aflaban®, demonstrated excellent efficiency in adsorbing Aflatoxins in the gastrointestinal tract of the animals. This efficiency is directly reflected in the weight gain of the animals.

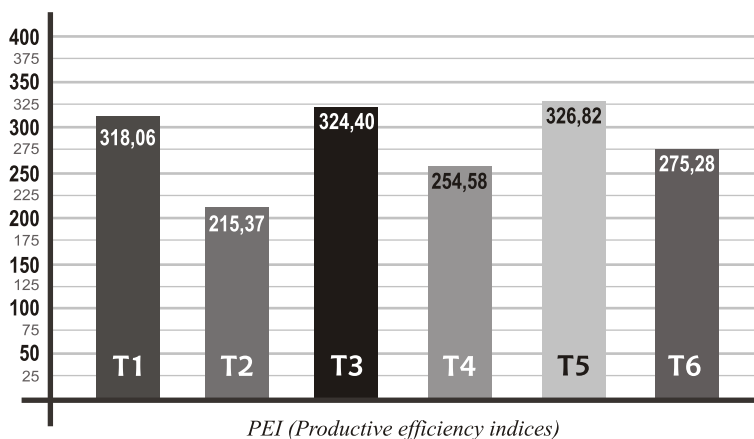


Fonte: Laboratório de Pesquisas Micológicas - UFSM/RS.

- 1 T1 = 0 ppm of Aflatoxin
- 2 T2 = 3 ppm of Aflatoxin
- 3 T3 = 0 ppm of Aflatoxin and 0,25% of Aflaban®
- 4 T4 = 3 ppm of Aflatoxin and 0,25% of Aflaban®
- 5 T5 = 3 ppm of Aflatoxin and 0,50% of Aflaban®

Productive efficiency indices

The use of Aflaban® had no negative effect on treatments (T3 & T5), which indicates the product does not adsorb minerals or vitamins present in the diet.



Fonte: Laboratório de Pesquisas Micológicas - UFSM/RS.

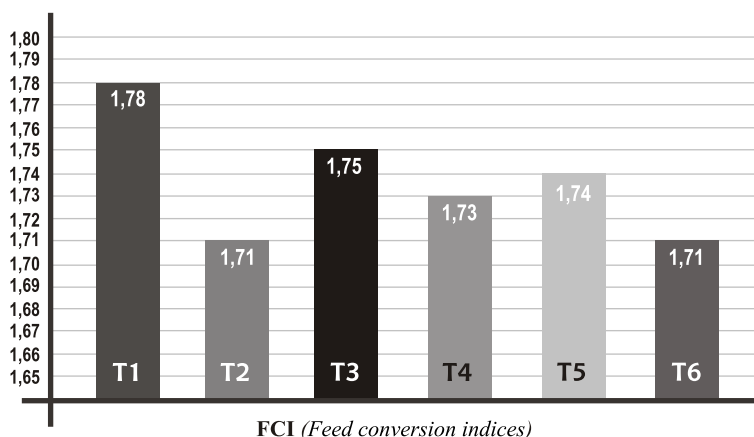
- | | |
|---|---|
| 1 T1 = 0 ppm of Aflatoxin | 4 T4 = 3 ppm of Aflatoxin and 0,25% of Aflaban® |
| 2 T2 = 3 ppm of Aflatoxin | 5 T5 = 0 ppm of Aflatoxin and 0,50% of Aflaban® |
| 3 T3 = 0 ppm of Aflatoxin and 0,25% of Aflaban® | 6 T6 = 3 ppm of Aflatoxin and 0,50% of Aflaban® |

Feed conversion

The graph below demonstrates the adsorbing action of Aflaban® regarding the productive development of poultry.

The results show that the digestion and absorption of nutrients of the treatments that received Aflaban® in the diet were not affected. This is directly reflected in the feed conversion levels of the animals.

Feed conversion level reductions would directly affect the efficiency and profitability of the poultry breeding system.



Fonte: Laboratório de Pesquisas Micológicas - UFSM/RS.

- | | |
|---|---|
| 1 T1 = 0 ppm of Aflatoxin | 4 T4 = 3 ppm of Aflatoxin and 0,25% of Aflaban® |
| 2 T2 = 3 ppm of Aflatoxin | 5 T5 = 0 ppm of Aflatoxin and 0,50% of Aflaban® |
| 3 T3 = 0 ppm of Aflatoxin and 0,25% of Aflaban® | 6 T6 = 3 ppm of Aflatoxin and 0,50% of Aflaban® |

Applications of Aflaban®

A) Prevention of Mycotoxins

In Brazil, Aflatoxicosis causes serious problems of Immunosuppression in animals, particularly young animals.

- Feed for chickens, piglets, calves, colts, etc.

Mix 5.0kg of Aflaban® per ton of feed, homogeneously.

- Feed for adult animals, monogastric (breeders, broilers, laying hens, swine, rabbits, horses, etc.).

Mix 2.5 to 5.0 kg of Aflaban® per ton of feed homogeneously.

Remember that the mycotoxins are the principle cause of fertility reduction and productivity loss in animals.

B) Coadjuvant in the Control of Micotoxicosis

Aflaban® is an excellent co adjuvant in controlling intoxications caused by mycotoxins, in particular Aflatoxins, which are the most common mycotoxins in Brazil and tropical countries, and which cause the greatest losses in farming.

Mix 5.0 kg of Aflaban® per ton of feed homogeneously (5 g of Aflaban® per kg of feed).

C) Fungistatic and Anti-Cohesion (Anti-Caking) Action in Grain, Bran, Meal and Rations

Aflaban® improves homogenous mixing (anti-cohesion) of solids in silos and warehouses, which avoids the generation of hotspots, which are fertile breeding ground for fungi (the first step in the production of mycotoxins).

Aflaban® also acts as an excellent feed lubricant thereby reducing the strain on ration manufacturing equipment and reducing electrical costs.

Mix 5.0 kg of Aflaban® per ton of feed (grain, bran, meal or rations).

Characteristics of the product

Aflaban® is a beige colored fine powder, stable even in the presence of organic material, sunlight and high temperatures (120°C), and can therefore be used before the feed are made into pellets.

Aflaban® is a product which is totally non-toxic to man and animals. It doesn't irritate skin or mucous membranes during handling.

Aflaban® is non volatile, and remains active in the feed rations without emitting toxic fumes or altering the taste or smell of the ration, consequently there is no chance of the animals rejecting the treated product.

Aflaban® is compatible with antibiotics, chemo-therapeutics and the rest of products usually found in the make up of feed.

Advantages in using Aflaban®

- Increases food conversion;
- Increases weight gain;
- Acts as a hepatic protector;
- Minimizes utilization of antibiotics
- Compatible with antibiotics and chemo-therapeutics;
- Increases homogeneity of the ration;
- Reduces mortality taxes;
- More productivity;
- Anti-Cohesion / Anti-caking action;
- Non-toxic and biodegradable.

Method of use

Aflaban® must be added directly into the feed (rations, grains, bran, meals) always making a pre-mix for a better product distribution; proportion: 2.0 to 5.0 kg of Aflaban® per ton of feed.

Packaging

25 kg multi paper bags.

Storage

Maintain the bags of Aflaban® closed and store in a fresh, dry place far from contaminating and toxic products.

Validity

Three years after the manufacturing date.

Other bibliographical references

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Aflaban®

ADITIVO ADSORVENTE DE MICOTOXINAS DE RAÇÃO ANIMAL

Indicação do produto:

O Aflaban_g é um produto derivado de Aluminossilicatos indicado para alimentação animal, agindo onde existe maior concentração de umidade adsorvendo micotoxinas, melhorando o fluxo de sólidos e evitando a formação de pontos quentes dentro dos silos, locais de desenvolvimento de fungos e leveduras.

Seu uso é recomendado sempre em:

- Períodos de alta umidade relativa;
- Rações ou farelos que contenham umidade maior que 12 %;
- Rações ou farelos armazenados por longos períodos.

Composição básica do produto:

Aluminossilicatos 95 % e Veículo Q.S.P.

Níveis de garantia do produto:

Óxido de Magnésio	1,71 %
Óxido de Alumínio	21,28 %
Óxido de Cálcio	0,86 %
Óxido de Ferro	2,38 %
Óxido de Sódio	2,10 %
Umidade (máx.)	10,00 %

Modo de usar:

O Aflaban_g deve ser adicionado diretamente às rações e/ou farelos (sem pré-executando uma pré-mistura para melhor distribuição do produto) na proporção de 2,5 a 5,0 kg de Aflaban_g por tonelada de ração e/ou farelo.

Condições de conservação:

Estocar/guardar as embalagens de Aflaban_g bem fechadas em local fresco, seco e longe de produtos contaminantes e tóxicos.

Lote N.º:

Data de Fabricação:

Prazo de Validade: 2 anos.

Peso Líquido: 25 kg.

Fabricante



Quinabra
Qualidade em Benefício da Natureza

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