



# ProSid® TB

Making a difference in  
fighting mycotoxins

## Feed additives that give key benefits

- ➔ Inactivate mycotoxins
- ➔ Broad activity spectrum
- ➔ Support animal health
- ➔ Good distribution in feed
- ➔ Contribute to a profitable production

# Highly effective mycotoxin binders

Mycotoxin contamination of foodstuffs is a significant global problem. Approximately 25% of the world food crops are contaminated with mycotoxins according to the Food and Agricultural Organisation of the United Nations (FAO). Mycotoxins cause substantial economical losses and are a threat to public health.

Mycotoxins are secondary metabolites produced by fungi that can have detrimental effects on animal and human health. They can already be formed on the field and during storage. Even at low concentrations they can pose a threat to animal health causing severe problems or even lead to death (1 ppb of mycotoxin equates 2 grains of sugar in 1 tonne of wheat). Mycotoxins can be: carcinogenic, hepatotoxic, dermonecrotic, immunosuppressive, estrogenic, nephrotoxic, neurotoxic etc.

More than 300 different mycotoxins have already been recognised. The most important mycotoxins related to animal feedstuffs are:

- ➔ Trichotecenes (Deoxynivalenol, T-2)
- ➔ Aflatoxins (Aflatoxin B1 and M1)
- ➔ Ochratoxin (Ochratoxin A)
- ➔ Zearalenone
- ➔ Fumonisin (Fumonisin B1 and B2)

Mycotoxins are not equally harmful to all animal species and categories. Pigs, for example, are very susceptible to Deoxynivalenol (DON) and Zearalenone (ZEA) while poultry is very susceptible to Aflatoxin. Young animals are generally more susceptible to mycotoxins than older animals.

## Clinical symptoms

Not all clinical signs appear immediately after exposure to mycotoxins and the signs can be vague, especially in case of low exposure levels. In the table below the specific clinical signs of the different mycotoxins are given. Reduced growth, reduced feed efficiency, rough coat and immunosuppression are general clinical signs that are caused by all mycotoxins.

Mould	Toxin	Primary target organ	Clinical symptoms
Aspergillus	Aflatoxin	Liver	<ul style="list-style-type: none"> <li>➔ Reduced growth</li> <li>➔ Reduced feed efficiency</li> <li>➔ Liver damage</li> <li>➔ Anaemia</li> </ul>
Penicillium	Ochratoxin	Kidneys	<ul style="list-style-type: none"> <li>➔ Reduced growth</li> <li>➔ Kidney lesions/damage</li> <li>➔ Increased water intake and urine production</li> <li>➔ Immunomodulation</li> </ul>
Fusarium	Trichothecenes (DON, T-2)	Digestive tract	<ul style="list-style-type: none"> <li>➔ Reduced feed intake/complete feed refusal</li> <li>➔ Irritation/inflammation of intestinal tract</li> <li>➔ Vomiting</li> <li>➔ Dermatitis</li> </ul>
	Zearalenone	Reproduction organs	<ul style="list-style-type: none"> <li>➔ Swollen/enlarged reproductive organs</li> <li>➔ Stomach lesions</li> <li>➔ Fertility problems</li> <li>➔ Early embryonic death</li> </ul>
	Fumonisin	Respiratory organs	<ul style="list-style-type: none"> <li>➔ Decreased feed intake</li> <li>➔ Lung and liver damage</li> <li>➔ Pulmonary oedema</li> <li>➔ Haemorrhaging</li> </ul>

## EU regulation

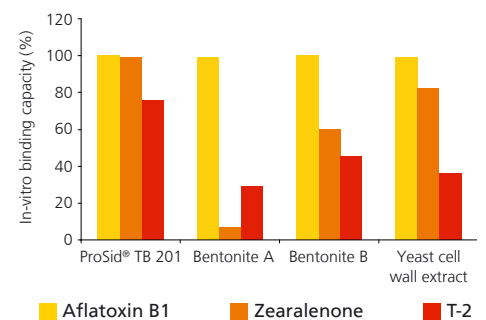
Because of the animal and human health risk of mycotoxin contamination, the European Union has decided to regulate maximum allowed concentrations of Aflatoxin B1 in animal feed (directive 2002/32/EG). Recommendations for the maximum allowed concentrations of Deoxynivalenol, Zearalenone, Ochratoxin A, Fumonisin B1 and B2 in feedstuffs were added later and are stated in commission recommendation 2006/576/EG.

## Mode of action

Adsorption of mycotoxins is based on neutralisation of electric charges. Both the mycotoxin and the binder have a specific distribution of charges. When these charges are able to neutralise each other, the toxin will be adsorbed on the surface of the binder. This process can be compared to the mechanism of a magnet where positive poles and negative poles attract each other. Adsorbed mycotoxins are excreted with the faeces, reducing their bioavailability which leads to a reduced mycotoxin uptake as well as distribution to the blood and target organs.

## Broad range of activity

Mycotoxins are very heat stable and have chemically different structures which makes them difficult to inactivate. A single control method is therefore ineffective to ensure the inactivation of different mycotoxins. In addition, mycotoxins have a negative synergy with each other. This means that the negative effects when multiple mycotoxins are present will be higher compared to the sum of the effects of the individual mycotoxins. ProSid TB products consist of synergistic combinations of ingredients to ensure a broad range of activity. In the graph below, the binding capacity of ProSid® TB 201 is shown in comparison with single materials.



# User guide

Using a mycotoxin binder is a good tool to minimize mycotoxin related problems, but an effective mycotoxin control requires a multifaceted approach, including:

1. Good Agricultural Practices
2. Usage of a mould inhibitor alongside a mycotoxin binder
3. Quality control program

Good Agricultural Practices:

1. Pre-harvest
  - a. Soil condition / fertilisation
  - b. Management of crop residues (ploughing)
  - c. Choice of high resistant crop variety
  - d. Crop rotation
  - e. Management of insect infestations
  - f. Irrigation (drought periods)
2. Harvest
  - a. Time management (harvest crop at right moisture content and maturity, time planning of harvesting activities)
  - b. Usage of adequate and clean material
  - c. Drying of product / application of mould inhibitor
3. Storage
  - a. Clean storage facilities
  - b. Optimize storage conditions (cool and dry)

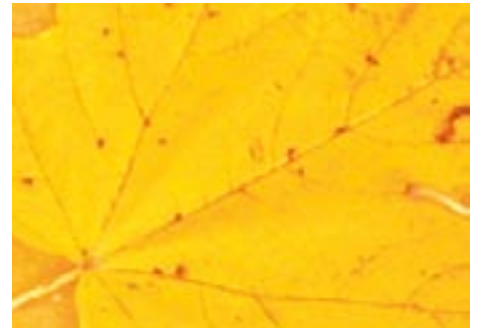
## Dosage advice

The contamination level and presence of single or multiple mycotoxins are important for the dosage recommendation. A high mycotoxin contamination level or the presence of multiple mycotoxins require a higher dosage rate. In the table below, a general recommendation is given.

Contamination level	Mycotoxin (ppb)	Second toxin present?	Dosage recommendation
Low	<500	No	1 kg/ton
Medium	500 > DON > 1000	Yes	2 kg/ton
High	Don > 1000	Yes	min. 3 kg/ton*

\* For severe contaminations higher dosage rates can be recommendable.





## Your Winning Formula

The Perstorp Group is the world leader in several sectors of the specialty chemicals market. Few chemical companies in the world can rival its 125 years of success. Today we have a rich performance culture distilled from our long history and extensive knowledge in the chemical industry. That culture and knowledge base enables us to produce Winning Formulas for a wide variety of industries and applications.

Our products are used in the aerospace, marine, coatings, chemicals, plastics, engineering and construction industries. They can also be found in automotive, agricultural feed, food, packaging, textile, paper and electronics applications.

Our production plants are strategically located in Europe, North America and Asia and are supplemented by sales offices in all major markets. We can offer you speedy regional support and a flexible attitude to suit your business needs.

If you want a partner for feed additives who can offer you focused innovation to enhance your product or application, which is delivered reliably and responsibly, look no further. We have a winning formula waiting for you.