



ProSid®

Making a difference in fighting  
mould problems

#### Feed additives that give key benefits

- Strong effect against mould
- Broad spectrum of activity
- Preserve full nutritional value of feed
- Adsorption of mycotoxins
- Help maintain high resistance in animals

# Highly effective mould inhibitors for feed

It is estimated that more than 25% of world wheat, barley and maize production is contaminated with mycotoxins resulting from mould growth. In warm and humid regions, and under difficult conditions, this could be even higher.

Mould and yeast spoilage of feed, as well as mycotoxins, have a direct negative influence on the health and production performance of animals. As feed costs represent 50 to 70% of livestock production expenses, feed spoilage by mould and the resulting problems have a serious detrimental impact on livestock profitability.

Mycotoxins cause decreases in feed intake, reproduction rate, growth efficiency and immunological defense. They also lead to damage of the liver, kidneys, central nervous system and blood clotting functions. This is why limits are placed on their presence in feed, such as:

Aflatoxin B1	All feed material	0.02 ppm
Ochratoxin A	Cereals	0.25 ppm
Zearalenone	Cereals	2 ppm
Deoxynivalenol	Cereals	8 ppm

	Corn	Wheat	Barley
Loss of nutritional value due to fungi	5 %	5 %	5 %
Average cost of raw material/tonne (LEI 2007)	€ 170	€ 160	€ 150
Loss in value per tonne	€ 8.5	€ 8.0	€ 7.5

Feed mill	
Total feed production per year:	100,000 tonnes
Average use of grains (ca. 60 %) per year:	60,000 tonnes
Loss of profitability per year (at € 8.0/tonne)	€ 480,000 per year!

## Bottom line loss

The above is an example of how mould contamination can lead to a loss of profitability for a feed mill. Moulds and yeasts can easily result in a 5-10% devaluation of nutritional value of raw materials.

## Dedicated feed additives

ProSid® feed additives from Perstorp include a number of products that are dedicated to preventing or minimizing mould damage in order to improve animal health and performance. Their properties have been fully investigated and product formulations have been developed to ensure you achieve optimal results.

Our solid and liquid mould inhibitors are based on organic acids that prevent mould growth. Our mycotoxin binder comprises a mix of binders that remove toxins by adsorbing them so that they can be readily excreted from the animal. All our immune stimulants enhance the natural resistance of animals to pathogenic attack.

## Choosing the right ones

The core ProSid® feed additives developed to make a difference in fighting mould problems are presented below. They are grouped into three application areas:

- Mould inhibitors
- Mycotoxin binders
- Immune stimulants

You can obtain detailed information on product properties, application and effectivity on animal performance from our application specialists or our website: [www.perstorpfeed.com](http://www.perstorpfeed.com)



# ProSid® mould inhibitors

ProSid® mould inhibitors (ProSid® MI) consist of synergistic blends of organic acids that have proved effective in preventing mould growth in animal feed and feed ingredients. Preservation of feed with these products provides major advantages including:

- Inhibition of mould growth
- Prevention of mycotoxin build-up
- Preservation of full nutritional value
- Prolonged feed storage time

## Effect of mould growth

When mould grows on grain stored under unfavorable conditions, two important negative changes take place: the grain becomes spoiled and its nutritional value decreases. This can be seen in the following table:

	ME (MJ/kg)	cP (%)	cFat (%)	cFiber (%)	Starch (%)	Sugar (%)
Quality corn	14.25	8.9	4.0	3.1	57.6	4.3
Mouldy corn	13.59	8.3	1.5	3.4	58.1	4.6

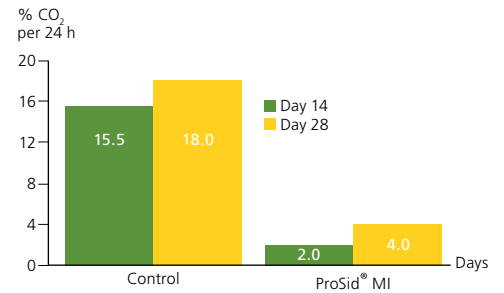
The feeding value of quality corn and mouldy corn.

Metabolizable energy losses in corn range from about 5-25% depending on the mould species and extent of corn spoilage. Fats are broken down more rapidly than carbohydrates or proteins.

## Mould inhibition activity

Field data recorded by Perstorp show the strong anti-mould effect of a ProSid® Mould Inhibitor on mould growth (taken as CO<sub>2</sub> production) after 14 days. See graph to the right.

The most important parameter that effects mould growth on feed is its moisture content. A high free water content ( $a_w$ ) stimulates mould metabolism, which initiates mould growth and mycotoxin formation.



Effect of ProSid® Mould Inhibitor (2 kg/tonne grain) on in-vitro carbon dioxide production.

To prevent these problems, Perstorp adds surfactants to its liquid ProSid® mould inhibitors to promote the rapid spread of the products throughout the feed they are applied to.



## ProSid® mycotoxin binders

Mycotoxins are secondary metabolites of moulds that can have a detrimental effect on animal and human health. The most common mycotoxins are aflatoxin, ochratoxin, deoxynivalenol (DON), zearalenone (ZEA), T-2 and Fumonisin B1. Different livestock species react differently to mycotoxins. Piglets are very sensitive to ingestion of DON, and dietary concentrations of 1 ppm can result in a 10–20% reduction of feed consumption and feed conversion, while DON does not have major consequences in poultry. However, when layers are exposed to aflatoxin they show the same negative effects on animal physiology and performance.

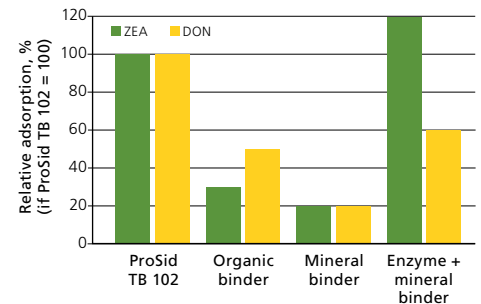
The mycotoxin problem can be reduced by preventing mould growth that secrete mycotoxins during the storage by using mould inhibitors. However some mycotoxins are produced already on the field and in this case the only solution is using a proper toxin binder.

ProSid® mycotoxin binders (ProSid® TB) are based on different mycotoxin-binding components with the following functions:

- Adsorbing mycotoxins with broad activity spectrum
- Adsorbing pathogens
- Enhance the activity of gut microflora
- Stimulating the immune system

### Binding capacity

Toxin binders with single component are not able to bind all types of toxins. A mixture can cover the toxin spectrum better as they have complementary, synergistic effect together. The following in vitro test shows the difference between single and blended component binders.



In-vitro trial by Faculty of Vet. Medicine (Utrecht, Netherlands). Dosage rate: 0.2 %, Toxin level: 1 ppm, pH: 8

## ProSid® immune stimulants

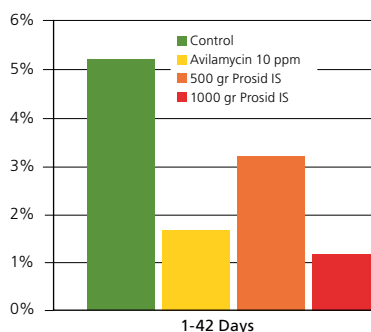
ProSid® immune stimulants (ProSid® IS) comprise active ingredients that have proved to be very effective. They provide the following benefits in animals:

- Help animals to maintain a high level of resistance
- Support production of immune cells
- Contains beta-glucans to trigger the immune system
- Contains beta mannan oligosaccharides (MOS), which provide an alternative attachment site for harmful bacteria

The active ingredients in ProSid® products (see table below) act in the following way:

Active ingredient	Immune stimulant	Pathogen adsorber	Villi enhancer
β-mannans	++	+++	++
β-glucans	+++	+	+
Nucleotides	++++	0	+++

The effect of our ProSid® immune stimulant on the mortality rate of broilers is shown in the graph.



Effect of ProSid® immune stimulant on the mortality rate of broilers.



# An innovative leader in the feed additive market

For nearly fifty years Perstorp has been involved with developing a range of highly effective feed additives to improve the performance of farm animals.

During the 1960s Perstorp was one of the first companies to introduce acid-based silage additives to the market. And in the '80s, Franklin Products International – now integrated with Perstorp – was pioneering the use of lactic acid in formulas for acidifiers and antibacterials in the European market.

Today, the range, quality and properties of our feed additives make a real difference in helping you to become more competitive. As a world leader in this arena, we aim to keep it this way.

## Maintaining feed value and animal health

There are a number of ways that Perstorp feed additives maintain the nutritional and economic value of feed, and protect animal health:

- Inhibiting microbial growth to preserve the nutritional value of feed.
- Specifically inhibiting the growth of pathogenic bacteria like *Salmonella*, *Campylobacter* and enteric bacteria like *Escherichia coli* to protect animal and human health along the food chain.
- Acidifying the gastrointestinal tract for rapid adjustment of farm animals to compound feed after weaning.
- Prevention of diarrhea in animals.
- Prolonging shelf-life.
- Improving the digestibility of feed.
- Stabilizing feed ingredients.



## Our “Pro” lines for professionals

The core product lines and benefits of Perstorp feed additives are:

### ProSid®

Mould inhibitors, toxin binders and immune stimulants for preventing and overcoming mould-related problems.

### ProMyr®

Silage additives for the preservation of nutrients, minimizing bacterial spores and increasing the storage life of roughage.

### ProPhorce®

Acidifiers, antibacterials and feed preservatives that result in healthier animals and higher performance.

### ProFare®

Enzymes for increasing the digestibility of feed and the nutritional value of feed ingredients.

### ProTain®

Antioxidants for stabilizing feed ingredients and prolonging product shelf-life.

## An extensive program of customer care

As our product knowledge is complemented with thorough technical support, you can depend on us for your feed needs along the food chain. Perstorp employs several application specialists to promote good customer care through personal contact, discussing relevant feed topics, and following up our activities with you.

As we like to form a partnership with you, we do our best to satisfy your feed additive requirements and foster long-term relationships. Through our unique raw material position and know-how with formic acids, formates, propionic acids and propionates, we are able to continue developing cost-effective customer solutions.

When you choose Perstorp as your partner, we strive to safeguard your investment.





## 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.