



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	€ 170	€ 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.



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

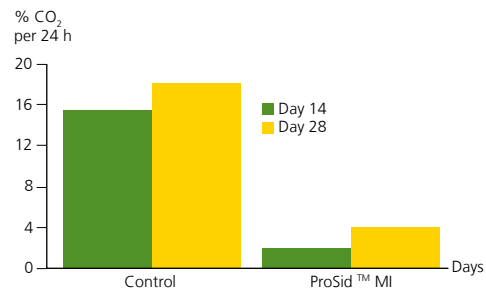
The feeding value of quality corn and mouldy corn.

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 CO₂ 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. Common mycotoxins are aflatoxin, deoxynivalenol (DON) and zearalenone (ZEA). Young pigs are very sensitive to ingestion of DON, and dietary concentrations of 1 ppm result in a 10-20% reduction of feed consumption and feed conversion. Poultry exposed to aflatoxin in layer meal show the same detrimental effects on animal performance and physiology.

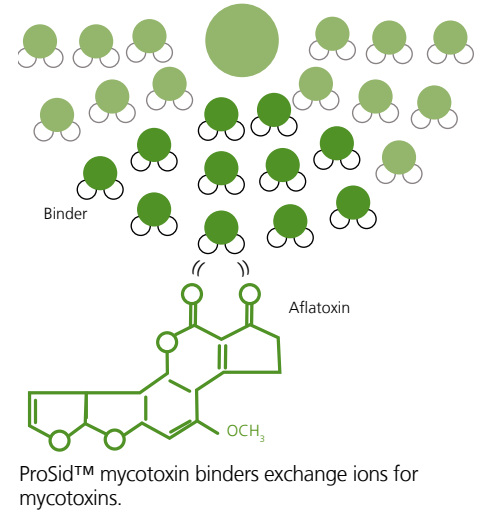
The best way to avoid this problem is to prevent the growth of moulds that secrete mycotoxins in feed by using mould inhibitors. However, a mycotoxin binder is often used as a complementary anti-mould measure, especially as a product that binds mycotoxins produced by fungi in fields. ProSid™ mycotoxin binders (ProSid™ TB),

which are based on different mycotoxin-binding components, provide the following benefits by:

- ➔ Adsorbing mycotoxins
- ➔ Providing a broad spectrum of activity
- ➔ Helping animals to maintain a high level of resistance

Mode of action

The toxin binders of our ProSid™ products adsorb different types of mycotoxins. Binding takes place by an exchange of ions on the binder for mycotoxins in the feed. The bound mycotoxins are then excreted along with the binder in animal faeces. ProSid™ mycotoxin binders also protect the microvilli in the gastrointestinal tract against the damaging effects of mycotoxins. A schematic diagram of the binding action is given to the right.



An innovative leader in the feed additive market

For over fifty years Perstorp has been involved in developing a range of highly effective feed additives. Perstorp was one of the first companies to introduce acid-based silage additives to the market in the 1960s, and pioneered the use of lactic acid in formulas for acidifiers and antibacterials in the 1980s.

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 area, we aim to keep it this way.

Maintaining feed value

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

- ➔ Inhibiting microbial growth to preserve the nutritional value of feed.
- ➔ Specifically inhibiting the growth of pathogenic bacteria such as *Salmonella*, *Campylobacter* and *E. coli*.
- ➔ Prolonging shelf-life.
- ➔ Improving the digestibility of nutrients.
- ➔ 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 for inhibiting the growth of pathogens and improving the digestibility of nutrients.

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. 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 130 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.