

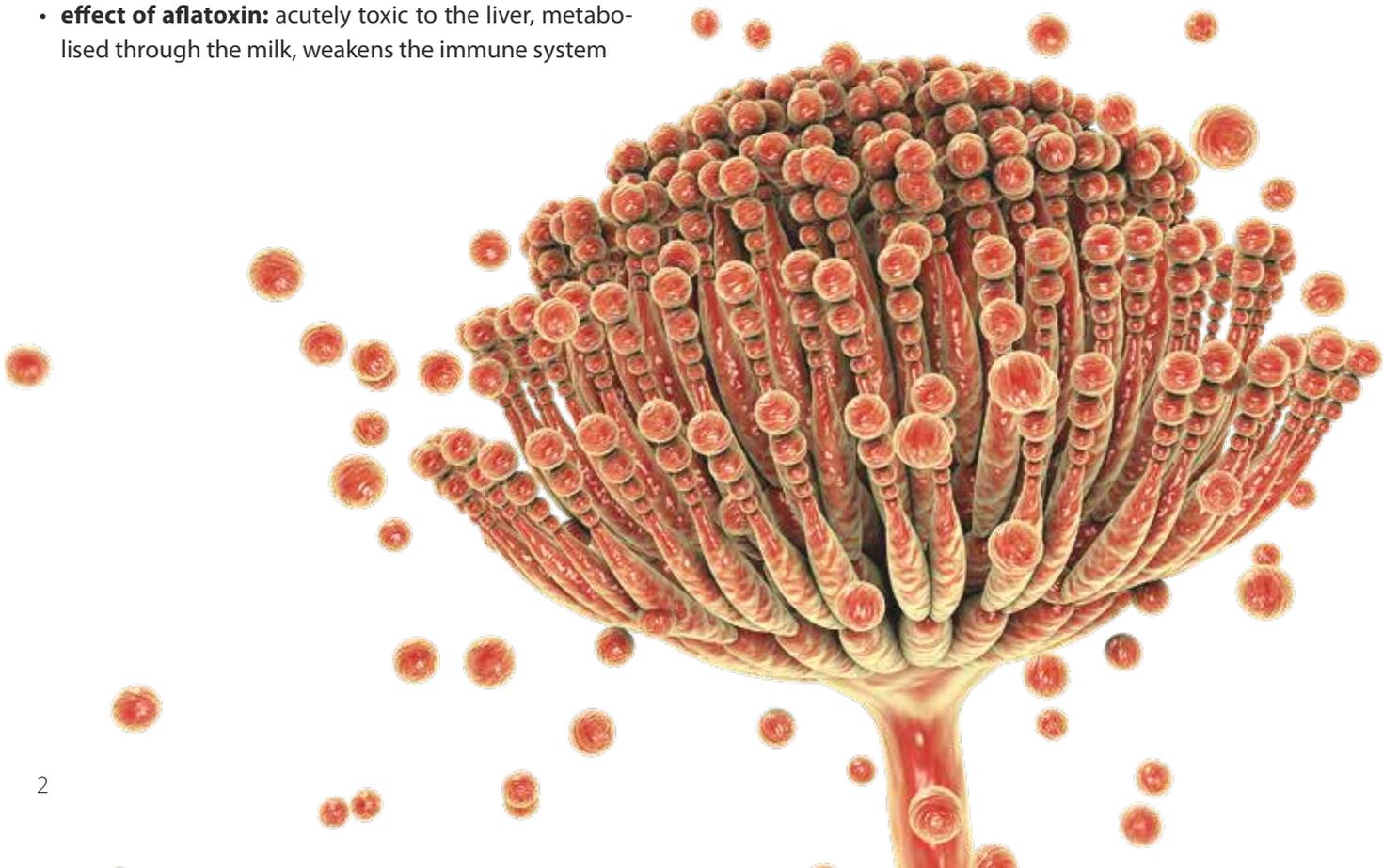
MiaBond product line



Mycotoxins

Facts

- mycotoxins are secondary and toxic metabolites produced by fungi
- depending on the weather conditions, they can contaminate plants either on the field (field fungi) or occur after harvest due to storage fungi as a result of insufficient preservation and poor storage conditions
- mycotoxins are resistant to extreme temperatures, chemicals and acids
- they are toxic even in small quantities, weaken the immune system and lead to impaired performance
- in addition to the storage toxin aflatoxin, the field mycotoxins deoxynivalenol (DON), zearalenone (ZEN) and fumonisin have a major effect on animal nutrition around the world
- **effect of aflatoxin:** acutely toxic to the liver, metabolised through the milk, weakens the immune system
- **effect of DON:** it mainly affects intestinal health and can lead to reduced effectiveness of vaccine titre
- **effect of ZEN:** has oestrogenic effect and can, in some cases, cause changes to menstrual cycle, abortions and changes to the uterus
- **effect of fumonisin:** fumonisin is frequently found in corn. It damages the kidneys and the liver as well as affects the function of the immune system
- typical disease patterns are rarely seen, as chronic performance and health disorders dominate
- **one thing is certain:** mycotoxins mean economic losses in livestock farming



Endotoxins

Facts

- endotoxins, also called lipopolysaccharides, can be found wherever there is bacterial activity (feed, water, air, etc.)
- they are part of the outer membrane of gram-negative bacteria, such as *E. coli* and *Salmonella*
- lipopolysaccharides are released when bacteria die, e. g. by using antibiotics
- endotoxins can enter into the bloodstream to a certain extent, where proteins can bind them in the blood (complex formation)
- this complex binds to a part of the body's own immune system, prompts an immune response and sets off an inflammation cascade
- even small quantities of endotoxins can lead to considerable immune reactions, ranging from the loss of performance to endotoxic shock

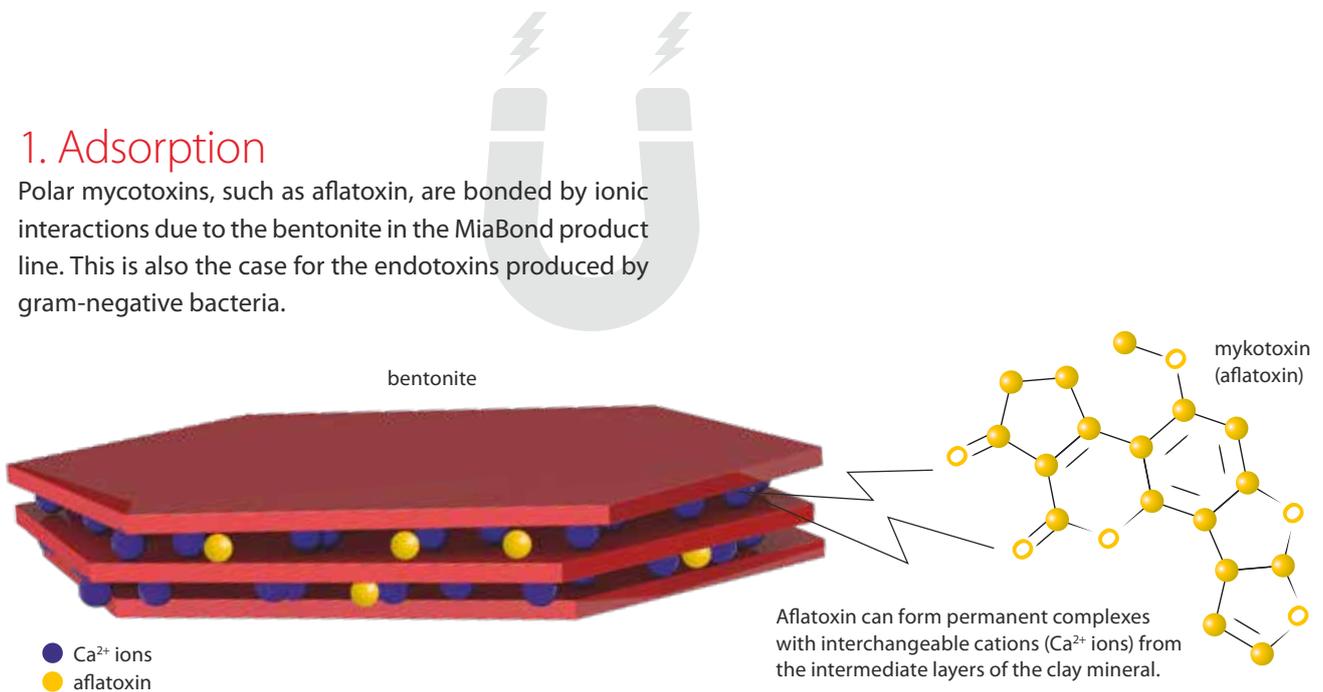


How can various mycotoxins and endotoxins with different chemical and structural properties be controlled?

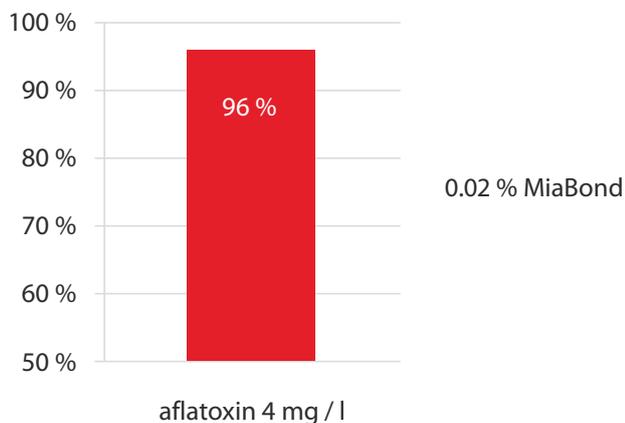
The MiaBond product line combines **3 various modes of action** to optimise the toxin risk management for your animals:

1. Adsorption

Polar mycotoxins, such as aflatoxin, are bonded by ionic interactions due to the bentonite in the MiaBond product line. This is also the case for the endotoxins produced by gram-negative bacteria.



aflatoxin B1 adsorption



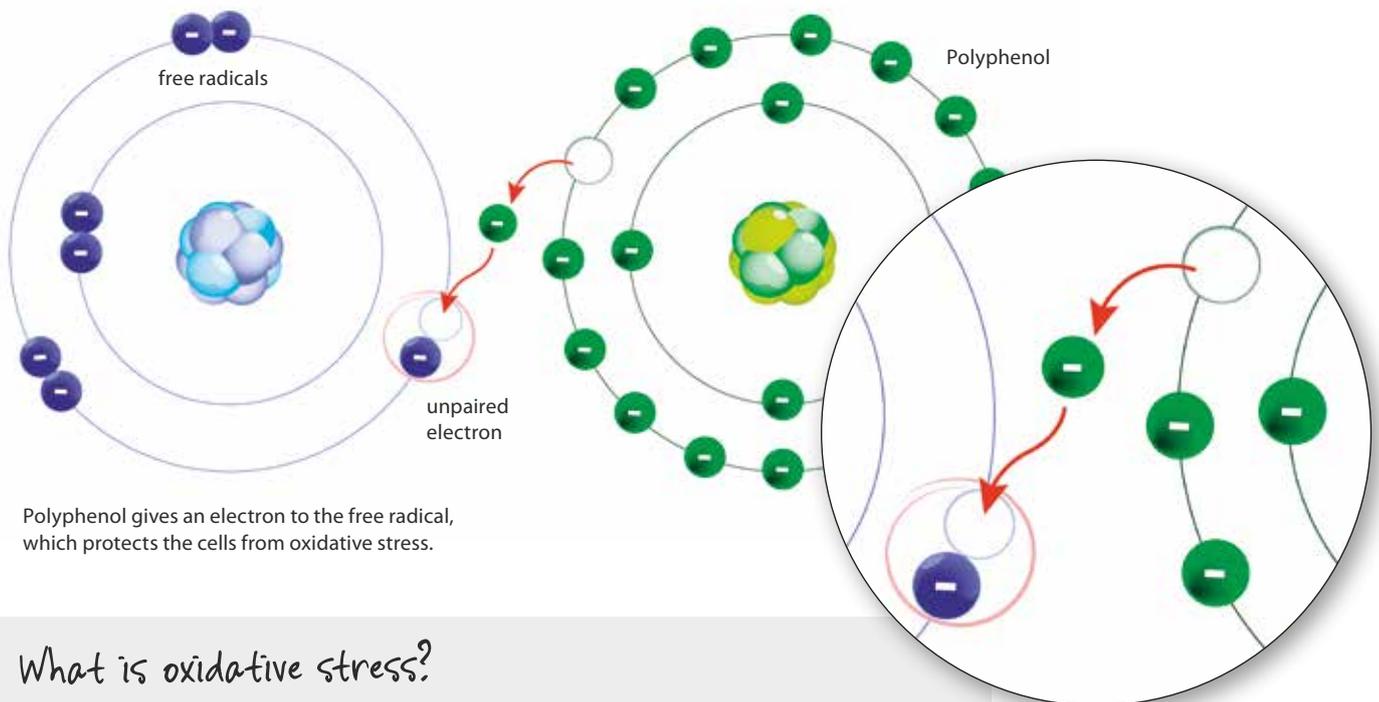
The bentonite in the MiaBond product line is registered under the Implementing Regulation (EU) No. 1060/2013. As such, the binder meets the composition criteria (Bentonite: $\geq 70\%$ smectite (dioctahedral montmorillonite)) and aflatoxin binding capacity (EURL method) prescribed by the EU.

Intensive binding study at pH 5 (EURL method)



2. Advanced cell protection

Defined water-soluble and fat-soluble polyphenols in the MiaBond product line help the immune system to fight against oxidative stress caused by mycotoxins.



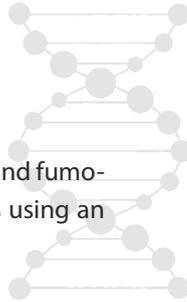
What is oxidative stress?

If too many free radicals are formed (e. g. due to a mycotoxicosis) and the antioxidative protection mechanism is not effectual to break them down, oxidative stress occurs in the body:

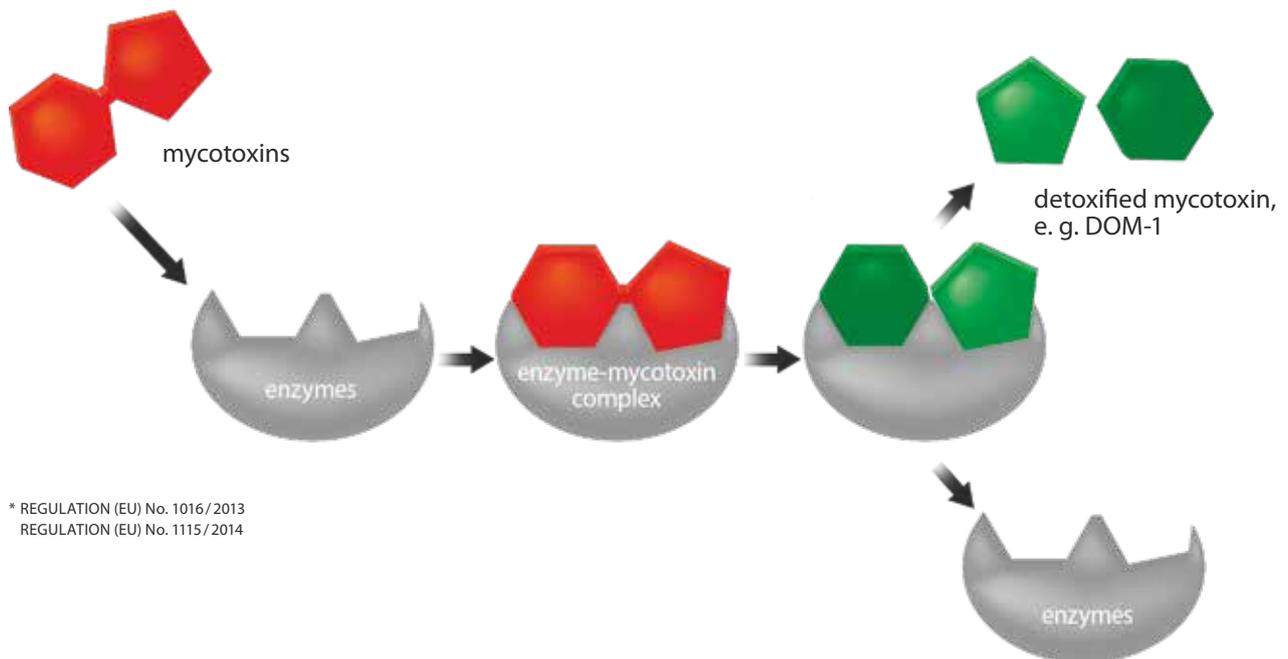
- Free radicals are oxygen-containing compounds that are dangerously unstable because an electron is missing in their chemical structure. They are incomplete. So they look for a suitable electron to become complete again.
- The free radical aggressively steals the electron it needs from the next best intact molecule (e.g. molecules in the cell membrane, proteins or DNA).
- Antioxidants can help here. They voluntarily give an electron to the free radical, which protects the cells and reduces oxidative stress.

3. Biotransformation

Less polar mycotoxins, such as deoxynivalenol and fumonisin, are converted into non-toxic metabolites using an enzymatic complex.



This simple representation shows how enzymatic detoxification* works in the MiaBond product line.



* REGULATION (EU) No. 1016/2013
REGULATION (EU) No. 1115/2014

MiaBond

- EU-registered and approved bentonite (1m558)
- highly efficient in binding aflatoxin (feed safety)
- Reduced AFM1 secretion in milk (food safety)

Packaging:
20 kg bag



MiaBond BP

- EU-registered and approved bentonite (1m558)
- contains a mixture of 100 % natural polyphenols

Packaging:
20 kg bag



MiaBond 360

- product approved for a wide spectrum of mycotoxins
- proven biotransformation of deoxynivalenol, T-2 and fumonisin into non-toxic metabolites

Packaging:
20 kg bag



	aflatoxin	ZEN	fumonisin	DON	T-2	ochratoxin A	ergotalkaloide	endotoxine	mode of action
MiaBond	✓	✓				✓	✓	✓	⌚
MiaBond BP	✓	✓				✓	✓	✓	⌚ ⌚
MiaBond 360	✓	✓	✓	✓	✓	✓	✓	✓	⌚ ⌚ ⌚

The art of mixture.



Why is it so important to take correct samples before the mycotoxin analysis?

- An effective mycotoxin risk management should begin by checking the quality of the feed.
- The two methods routinely used in practice and performed by laboratories currently are: the antibody detection method ELISA (Enzyme-Linked Immunosorbent Assay) and the physiochemical analysis method, HPLC (High-Performance Liquid Chromatography).
- The most important step is taking a correct sample of the feed because around 80 % of errors in the mycotoxin analysis are due to the sample and only 2 % due to the analysis.
- Mycotoxins are unevenly distributed. They can be found in so-called hot spots. This means that various parts of the batch contain various concentrations of mycotoxins.

