



nufense

Mycotoxin Management Solutions

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Mycotoxins are secondary metabolites of low molecular weight produced by a wide range of fungi, principally molds. There are over 200 species of molds that produce mycotoxins.

Aflatoxins (AF) • Zearalenone (ZEN) • Ochratoxin A (OTA) • Fumonisin (FUM)
• Trichothecenes such as deoxynivalenol (DON) and T-2 toxin

are some of the mycotoxins that can significantly impact health and productivity of all animal species.

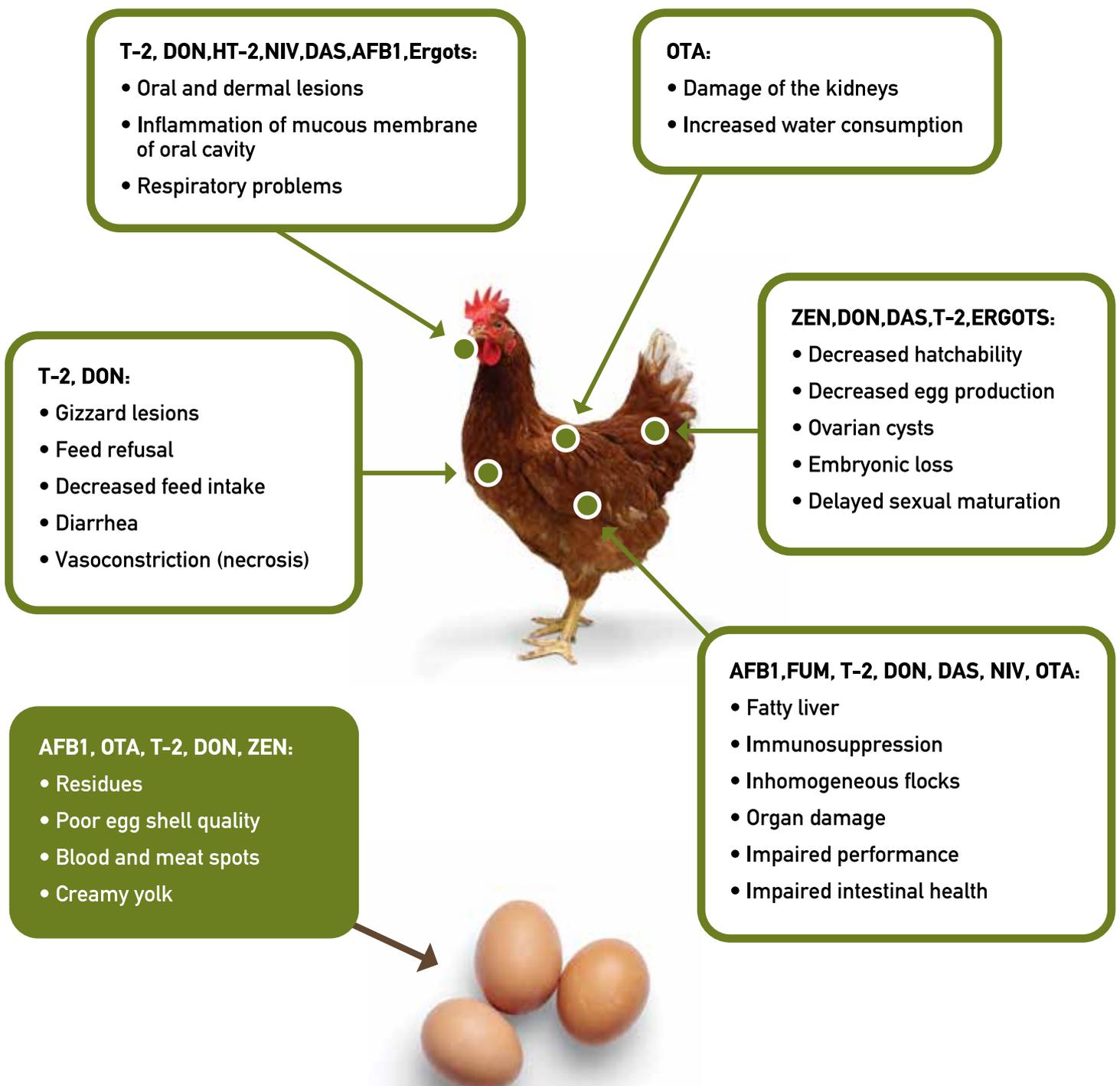
Fungal growth and subsequent mycotoxin formation is dependent on a range of factors including season of the year, origin of grain, weather conditions and time of harvest. Long term analysis of grain and feed samples worldwide has indicated that it is possible to have grains with extremely high concentrations of mycotoxins, even if the overall mycotoxin contamination is low. These data also revealed that mycotoxin contaminated grains typically contain more than just a single mycotoxin.



Feed and its raw materials contaminated by various mycotoxins affect livestock health and result in substantial economic loss

Mycotoxins can cause perturbation in the gut, particularly in the intestinal epithelium. In fact, there is a bi-directional relationship between mycotoxins and gut microflora, where the gut microbiota might be involved in the development of mycotoxicosis. It is known that a healthy gut microbiota is largely responsible for the overall health of the host.

EFFECTS OF MYCOTOXINS IN POULTRY



A number of mycotoxins resist rumen degradation, causing distinct clinical signs of intoxication. Moreover, due to their complex diet, dairy cows may be exposed to a varying number of mycotoxins, originating from different feed materials such as roughage and concentrates.

Exposure to these complex mixtures of mycotoxins may result in unexpected health risks.

Due to a pre-existing negative energy balance, cows in the transition period are considered to be particularly sensitive to the exposure to feeds contaminated with molds, fungal spores and mycotoxins.

EFFECTS OF MYCOTOXINS IN DAIRY

T-2, DON, AFB1:

- Gastroenteritis
- Intestinal hemorrhages
- Impaired rumen function
- Diarrhea
- Ketosis

ERGOT:

- Impaired thermoregulation
- Convulsions

ZEN, ERGOTS:

- Irregular heats
- Low conception rates
- Ovarian cysts
- Embryonic loss
- Abortions
- Low testicular development
- Low sperm production

DON, T-2, ERGOTS:

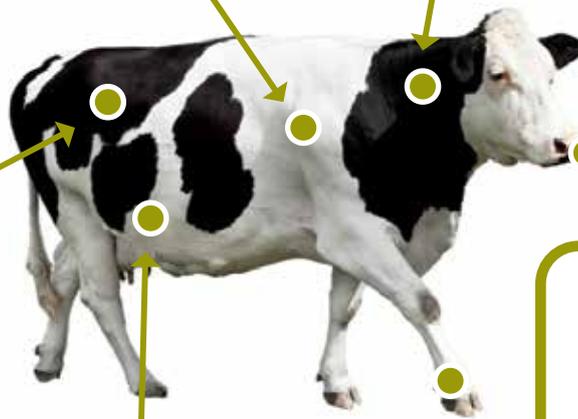
- Decreased feed intake
- Decreased feed efficiency

AFB1, T-2, DON:

- Milk contamination
- Decreased milk production
- Mastitis

DON, Ergots, Endotoxins:

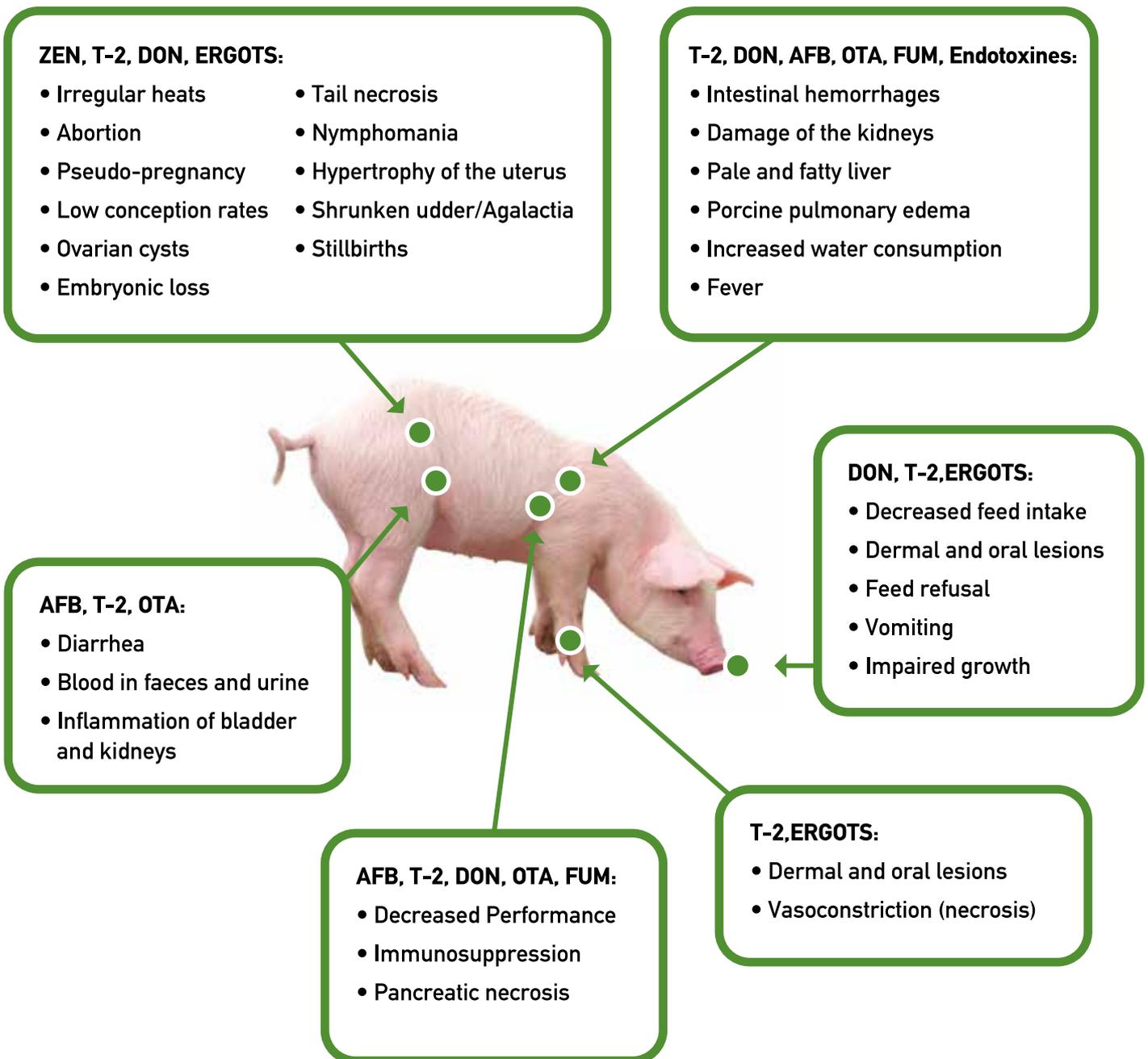
- Laminitis (lameness)

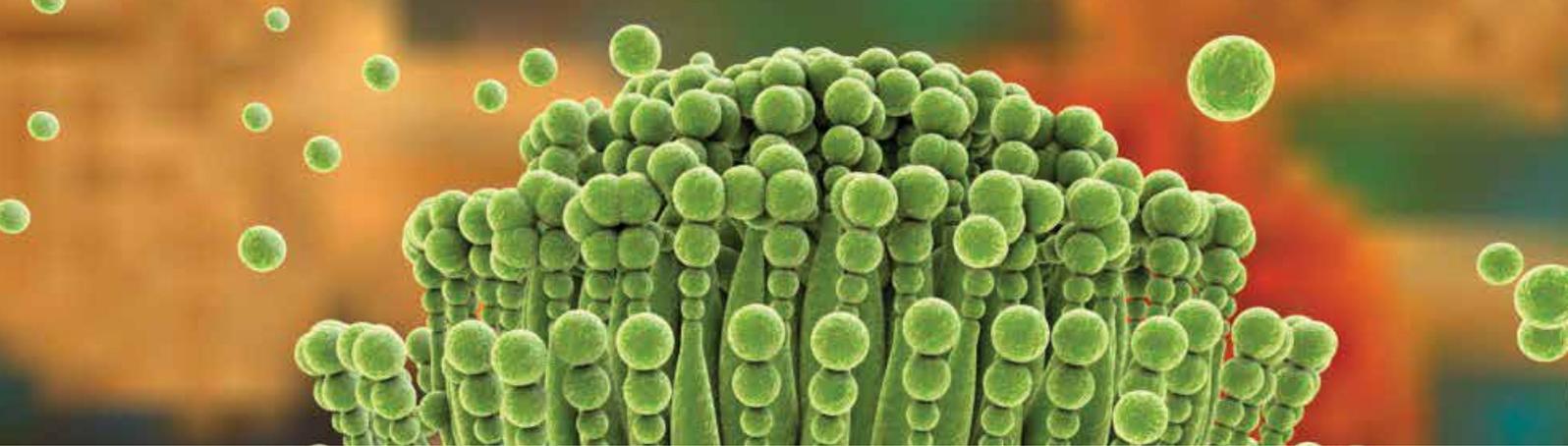


Due to their high consumption of cereals, pigs are exposed to toxins. In the European Union, regulations and/or recommendations exist in pig feed for aflatoxins, ochratoxin, fumoniosins, zearalenone, and trichothecenes, deoxynivalenol and T-2 toxin. These mycotoxins have different toxic effects, but they all target the immune system.

They have immunostimulatory or immunosuppressive effects depending on the toxin, the concentration and the parameter investigated. The immune system is primarily responsible for defense against invading organisms. The consequences of the ingestion of mycotoxin-contaminated feed are an increased susceptibility to infectious diseases, a reactivation of chronic infection and a decreased vaccine efficacy. On the chart below are summarized the data available on the effect of mycotoxins on the immune system and the consequences for pig health.

EFFECTS OF MYCOTOXINS IN PIGS





Mycotoxin Management Solutions

The most well-known approach for detoxification of mycotoxins involves the use of nutritionally inert adsorbents with the capacity to bind and immobilize mycotoxins in the gastrointestinal tract (GIT) of animals, thus reducing their bioavailability (Magnoli et al., 2011).

Although this approach successfully eliminates the risk of certain mycotoxins, such as aflatoxins, it does not work comprehensively on all of the mycotoxins relevant to the livestock industry.

Biotransformation has been one of the proven approaches for the detoxification of the non-adsorbable mycotoxins by altering their molecular structure into non-toxic metabolites, which are excreted (Grenier et al., 2013).

Therefore suppression of mycotoxicosis requires an integrated approach from detection to detoxification.



Advantages

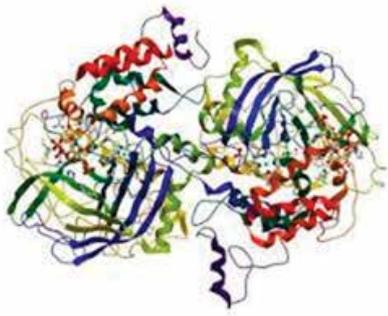
- Minimize the direct and indirect effects of mycotoxin contamination of the feed
 - Lower occurrence of gastro-intestinal and respiratory diseases
 - Enhanced efficacy of immune system
 - Improved production parameters

Mycotoxin Management Solutions are based on a three-way approach:

ADSORPTION

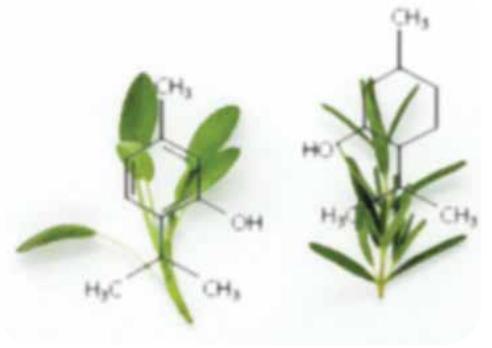
BIOTRANSFORMATION

BIODEGRADATION



nufense contains biologically active enzymes and glucans with excellent adsorption capacity. The glucans originated from *Saccharomyces* have an adsorption surface of 22-25 m²/gram. The enzymes are produced by selected microorganisms and have the capability to deactivate mycotoxins (OTA, DON, T-2, FUM, ZEN) by biotransformation and biodegradation in the GIT protecting the animal from the harmful actions of mycotoxins.

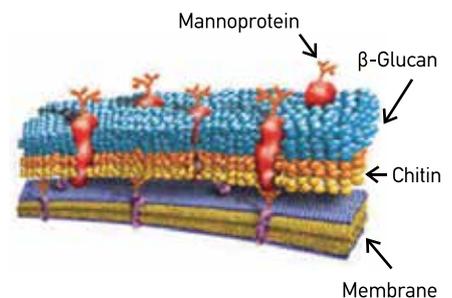
Natural bioactive ingredients: mycotoxins not only reduce animal performance, but they also cause significant liver damage. Certain mycotoxins have a strong hepatotoxic and hepatocarcinogenic effect in exposed animals. **nufense** contains natural phenolic compounds (lyophilized hydroxytyrosol and oleuropein) with proven anti-inflammatory and antioxidant activity that protects liver from the free radical damage produced by mycotoxins.



The blend of mineral clays used is involved in many biochemical processes through ion exchange, adsorption and catalysis with a highly sorbitive capacity and enhanced hydrophilic (anti-diarrhea) and oleophilic (toxin-binding) activity.

In addition, **nufense** mineral clay has an adsorption activity against enterotoxins (Enterotoxinogenic *E.coli*) and decomposition protein products. The major property of this mineral clay is to protect the GIT of the animal from mycotoxins present in the feed.

The yeast used in **nufense**, is a premium yeast fraction rich in β -glucans and mannan-oligosaccharides (MOS). It prevents colonization of the GIT by pathogens, stimulates the immune activity of the phagocytic cells, and enhances the action of beneficial bacteria such as *Lactobacillus* and *Bifidobacterium*, creating an immunological wall against diseases. It is a rich source of β -glucans, which have powerful mycotoxin adsorption properties. Moreover, this yeast is produced in a challenging environment aiming at ethanol production. The yeast culture undergoes numerous fermentation cycles, making the yeast cell wall much denser with the highest β -glucans concentration and lower fat content in its composition, so it is less digestible in the intestinal tract.



Solutions for the Mycotoxin Challenges for all animal species

nufense

standard

- Mineral clays with a selective polar binding capacity
- Dry Yeast Cell wall
- Natural bioactive ingredients

nufense

gold

- Mineral clays with a selective polar binding capacity
- Enzymes for DON, FUM, OTA, T-2, ZEN
- Natural bioactive ingredients
- Dry Yeast Cell wall

Dosage for ruminants: 10–20 g/head/day

Dosage for all species: 1 kg /ton of feed

Note: Dosage depends on the mycotoxin risk level

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