PATENT CO.®

Mycotoxins in Horses

min-a-zel® Plus

ADVANCED MYCOTOXIN CONTROL

PATENT-CO.COM

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MINAZEL PLUS, total protection against mycotoxins!

360° SECURITY

TOTAL MYCOTOXINS PROTECTION

Mycotoxins

- Mycotoxins can be produced by moulds in grains, crops, grasses, and forages, under favourable environmental conditions. Once produced, mycotoxins are generally very stable and can persist for a long-time during storage and transport of feed commodities.

- Horses that consume grains, feed and forages contaminated with mycotoxins can suffer from a variety of health issues, because mycotoxins inhibit protein synthesis, which negatively impacts the animal's physiology and ability to function and repair tissues.

- Damaged cereals, processed cereals, and complete feed are most likely to be contaminated with *Aspergillus, Fusarium* and *Penicillium* mycotoxins. However, the mycotoxins most likely to be present in perennial ryegrass and tall fescue pastures that will cause health issues in horses are ergot alkaloids.

Fig 1: Grazing pastures and complete feed for horses can be contaminated with mycotoxins.

Some of the mycotoxins, their sources and allowed limits are shown in the table 1 below.

Mycotoxins	Mold/Fungus	Allowable Limit	Feed commodities affected
Aflatoxin B1	*Aspergillus flavus*	0.02 ppm*	Corn, hays, pasture
T-2 and HT2	*Fusarium langsethiae, F. poae, F. sporotrichioides*	0.5 ppm*	Corn, wheat, barley
Deoxynivalenol	*Fusarium graminearum, F. colmorum*	2 ppm*	Corn, wheat, barley
Zearalenone	*Fusarium spp*	0.5 ppm*	Corn, wheat, barley, grass
Fumonisins	*Fusarium moniliforme (verticillioides)*	5 ppm*	Corn
Ergot Alkaloids	*Claviceps spp Neotyphodium lolii*	0.3-0.5 ppm*	Pasture grasses, hay, wheat, barley
Lolitrem B	*Neotyphodium lolii*	2 ppm≠	Pasture grasses, hay, wheat, barley

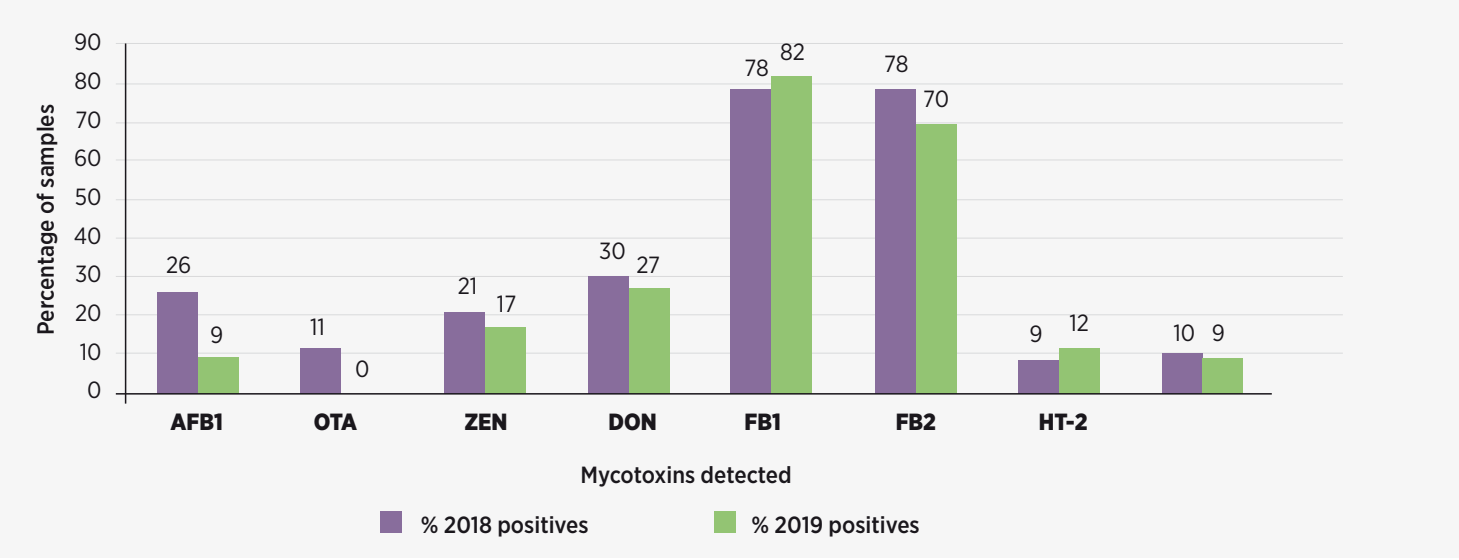
*Ministry of Agriculture, Canada, and EU Commission Recommendation 2016/1319
≠ thehorse.com

Table 1: Mycotoxins their source and allowed limits for horses

Mycotoxins surveys

Regular monitoring of feed ingredients for presence of mycotoxins is necessary to understand the threat posed by mycotoxins. Therefore, **PATENT CO** has been conducting mycotoxins survey for the last two years. Mycotoxins survey conducted by **PATENT CO** in 2018 and 2019 have shown the occurrence of Fumonisins in corn as main mycotoxins. The summary of results is shown in **Fig 3**.

Fig 3. Percentage of toxins detected in corn samples in 2018 V 2019



- The data in **Fig 3** shows that the mean FB1, FB2, DON, ZEN, were higher in 2019 when compared with those present in the corn samples in 2018.
- **Fig 3** data also shows that the mean contaminations of AFB1, OTA, T-2 and HT-2 were lower in the 2019 samples when compared with the 2018 survey. There was thus a reduction in AFB1, OTA and type A trichothecenes in the 2019 survey.
- The results from 2019 corn survey demonstrated that globally, *Fusarium* mycotoxins (FB1, FB2, DON, ZEN) were the main mycotoxins detected in 2019 harvested corn.

Effects of mycotoxins in horses

Mycotoxins can affect horses in many ways and some of the effects are listed below in **Fig 2.**

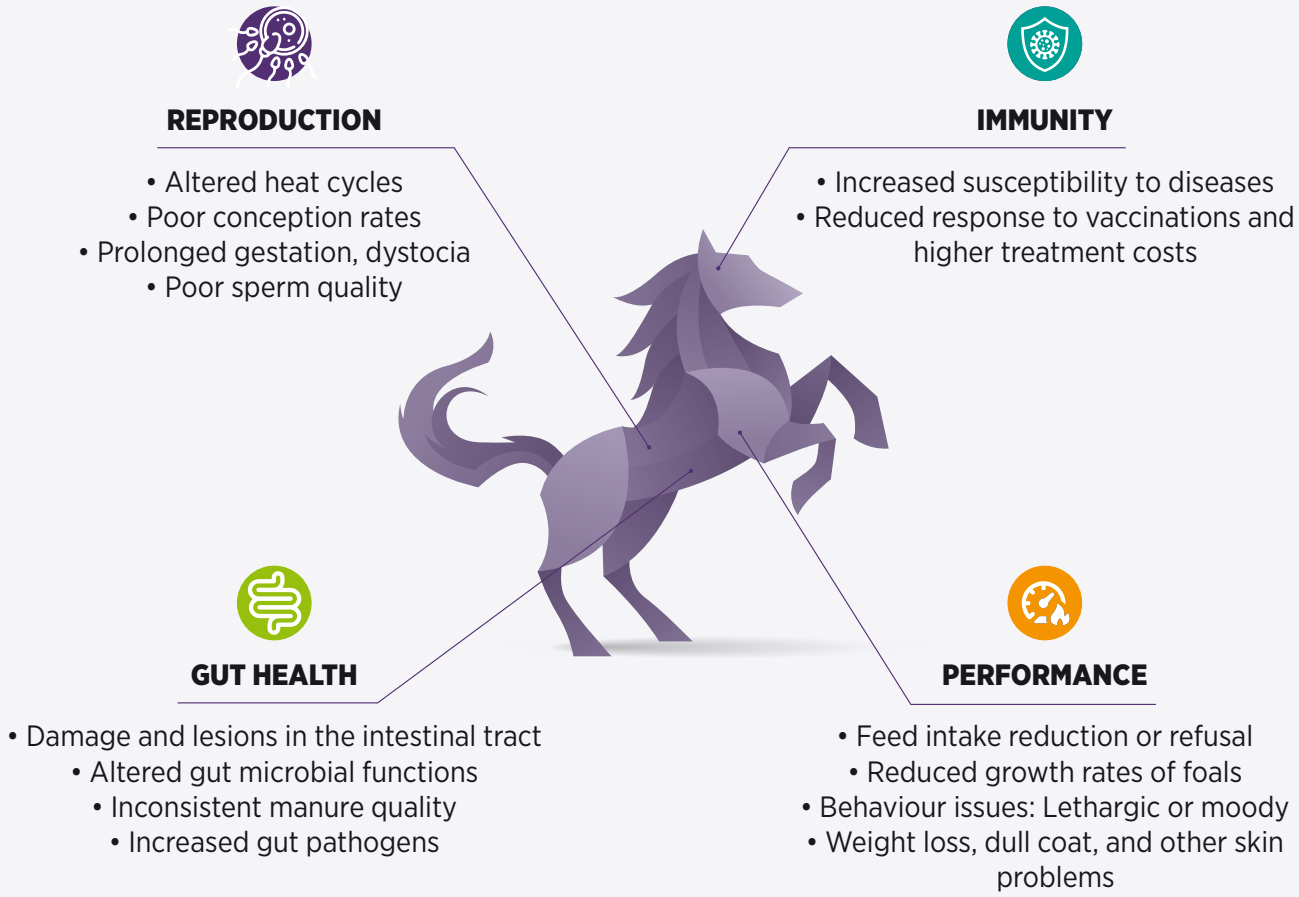


Fig 2: Effects of mycotoxins on horses

Mycotoxins that can affect horses in combination or alone are AFB1, fumonisins and ergot alkaloids.

1. Aflatoxins can cause **ataxia (incoordination), tremors, elevated temperature, anorexia, weight loss, icterus (yellowing of eyes and skin), haemorrhages and bloody faeces, and brown urine.**

2. Ergot alkaloids are probably the mycotoxins with which horse owners and managers are most familiar. They include ergovaline, found in tall fescue, and lolitrem, found in perennial ryegrass. **Horse owners should be concerned about ergovaline, as it can cause variety of issues in pregnant mares, including prolonged gestation, dystocia (difficult birth), thickened placenta, poor mammary development, and agalactia (lack of milk production).**

3. Other *Fusarium* toxins, which include deoxynivalenol (DON), horses usually refuse to consume DON–contaminated feeds and **begin to lose body condition.** Zearalenone mycotoxin mimics estrogens and **appears to target the reproductive system in many animal species, including horses, although research in this area is limited.**

4. Fumonisins are a significant **health risk to livestock, horses and potentially also to humans.** Fumonisin can be extremely hazardous to horses. When present in corn or other grains, fumonisin can result in moldy corn poisoning or leukoencephalmalcia. The disease syndrome was named leukoencephalomalacia due to the type (malacia = softening [due to necrosis]) and distribution (leuko = white matter) of the most prominent lesion in the brain. Equids are the only species in which fumonisins induce this lesion. **Common symptoms are horses become disoriented, walk aimlessly, circling, deranged behaviour, colic, press head against solid objects, blindness, and death.** Feed manufacturers selling corn or horse feed containing corn should consider conducting sufficient testing to ensure these feeds are safe for horses.

How to minimise the risk of mycotoxins

Minimizing mycotoxin exposure is the key to avoid the negative effects of mycotoxins in horses as below:

- Keep grain and hay storage areas clean, cool, and dry.
- Ask your feed manufacturer for mycotoxins tested in grains before mixing feeds and avoid using businesses that do not test their feeds routinely.
- Avoid corn screenings (small parts of corn grain that routinely carry very high levels of fumonisins) completely!
- Late-gestation mares should never be allowed to consume cereal-rye straw, infected hay or stubble or eat sclerotia-containing grain.
- All pasture/hay seed mixes containing tall fescue and perennial ryegrass must be guaranteed endophyte-free.
- Testing for mycotoxins for all feed materials should be carried out in the labs that are using HPLC based methodology.
- If issues persist then a mycotoxin adsorbent should be used regularly for horses.

Did you know?

- Horses are more sensitive to fumonisins and ergot alkaloids!
- Mature horses should not be fed feeds containing more than 20 ppb Aflatoxins!
- Breeding stock and hardworking horses should be fed aflatoxin-free diets!
- Pregnant mares should be removed from pastures contaminated with endophytes by day 300 of gestation!

MINAZEL PLUS

MINAZEL PLUS is the result of an ion-exchange reaction between inorganic cations on the mineral surface and organic cations. The addition of organic cations serves to change the mineral surface. The result of this addition is not a simple mixture of mineral and organic phase, but a completely new compound, organo-mineral complex (Fig 4). MINAZEL PLUS has been tested for adsorption and desorption of mycotoxins and ergot alkaloids using LC-MS/MS (**Table 2**).

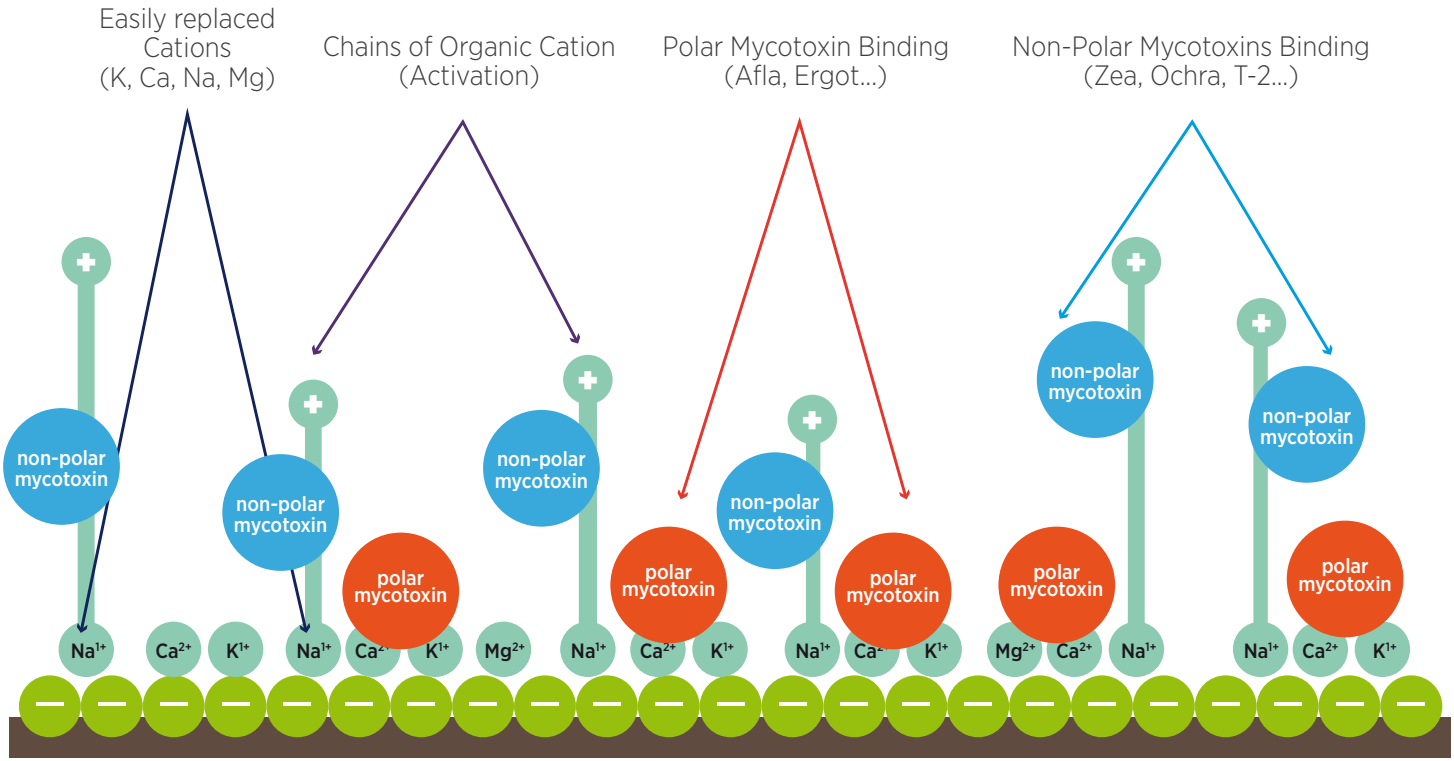


Fig 4: a schematic presentation of MINAZEL PLUS technology

MINAZEL PLUS – is highly effective

Table 2: IN VITRO adsorption and desorption of mycotoxins with MINAZEL PLUS using LC-MS/MS

Mycotoxins	% Adsorption at pH 3.0	% Desorption at pH 6.5
AFB1	99%	0.1%
FB1	88%	3.9%
OTA	89%	1.0%
ZEN	92%	2.3%
Citrinin	80%	5.0%
Ergot alkaloids	98%	0.2%

MINAZEL PLUS

› Mycotoxins binder based on EU patented technology
› Speed of adsorption
› Stable at pH 3.0 and 7.0
› Stable during pelleting conditions
› Does not adsorb vitamins and amino acids
› Proven efficacy for all animal species under various climatic conditions (tested all over the world)

Instructions for use:

› **Horses/Ponies:**
Feed 5-20 g daily, mixed in the compound feed

The molds

grow on a variety of different crops and foodstuffs including cereals, nuts, spices, dried fruits, apples and coffee beans, often under warm and humid conditions. According to FAO, at least 25 percent of the world's food crops are contaminated with mycotoxins, at a time when the production of agricultural commodities is barely sustaining the increasing population.

min-a-zel® Plus

PATENT CO.®

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