



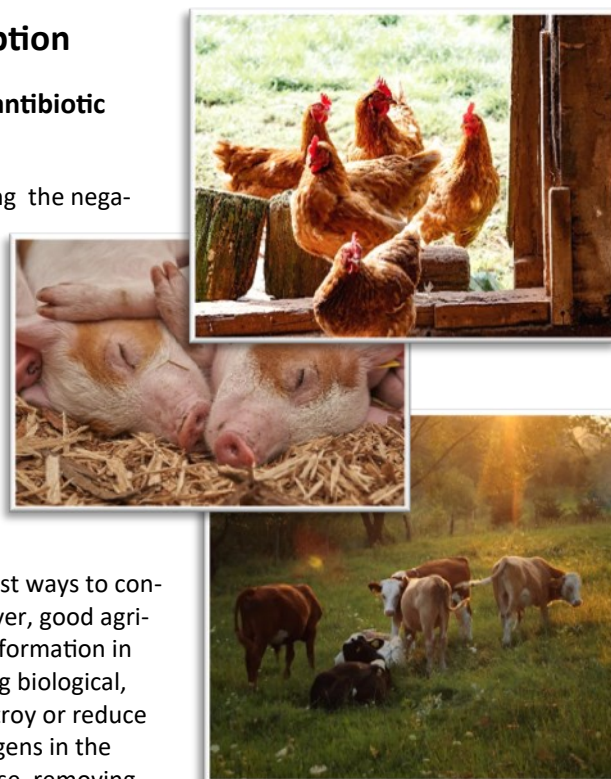
Sustainable Mineral Solutions

Animal Welfare - Antibiotic Free Toxin Adsorption

MINORE™ offer a mineral blend for applications within the antibiotic free animal welfare sector.

Our mineral profile provides a simple & effective solution preventing the negative effects of many mycotoxins such as zearalenone, aflatoxin, ochratoxin A & T-2 toxins, severely impacting the animal health sector.

The economic impact of mycotoxins includes mortality of domestic animals, increased costs due to veterinary care and decreased production efficiency, especially in poultry and swine operations. Consequently, considerable scientific efforts have been expended to investigate and develop strategies to prevent the formation of mycotoxins, as well as their elimination, inactivation or reduction of their bioavailability in feeds. Good agricultural practices at pre- and post-harvest levels are considered the best ways to control fungal contamination and the production of mycotoxins. However, good agricultural practices are not enough to completely prevent mycotoxin formation in field and storage conditions. Thus, detoxification processes including biological, chemical and physical methods are often necessary to remove, destroy or reduce toxic effects, without producing or leaving toxic residues or carcinogens in the food and feed material. Clay is a widely used additive for this purpose, removing the mycotoxins.



Under humid conditions, H-bonding on the surface of the clay particles is the dominant bonding force for aflatoxins. Due to these characteristics, the clay has a more pronounced ability to adsorb aflatoxins than zearalenone and ochratoxin. The incorporation of long-chain organic acids on the surface of aluminosilicate results in increased hydrophobicity of the clay surface, which raises the affinity for these non-polar molecules like Zearalenone, Ochratoxin and T-2 mycotoxins. This modification enables the aluminosilicate to sequester low polarity mycotoxins, such as Zearalenone, Ochratoxin and T-2.

Tests were carried out to investigate the toxin absorption potential of the untreated clay. The common mycotoxins Aflatoxin, Ochratoxin, Zearalenone, Vomitoxin, Fumonisin and T-2 Mycotoxin were tested. Of those, Aflatoxin is practically completely adsorbed by the clay. This is particularly important as Aflatoxin is one of the most potent carcinogens known and is found in wheat, rice, sweetcorn, sunflower, peanuts and many other products. The other toxins were adsorbed to varying degrees, a summary of the results is given in the following table.

	Virgin	450°	600°	unit
Aflatoxin	99.0	43.8	42.9	%
Zearalenone	53.2	98.7	90.2	%
Ochratoxin A	29.7	98.3	89.0	%
T-2 Toxin	17.6	92.4	92.4	%

Adsorption efficiency of mineral fired at different temperatures

Relative percentage of clay minerals in the <2µm clay size fraction		Major element geochemistry expressed as wt.% oxides, loss on ignition	
Kaolinite©	>25	SiO ₂	59.90%
Illite©	>17	Al ₂ O ₃	21.70%
I/S-ML©	>51	TiO ₂	0.97%
Vermiculite©	<5	Fe ₂ O ₃	6.30%
Chlorite (Tri)©	<5	MgO	1.30%
% Exp©	30 to 50	MnO	0.07%
		CaO	0.50%
		Na ₂ O	0.47%
		K ₂ O	2.47%
		LOI	6.37%