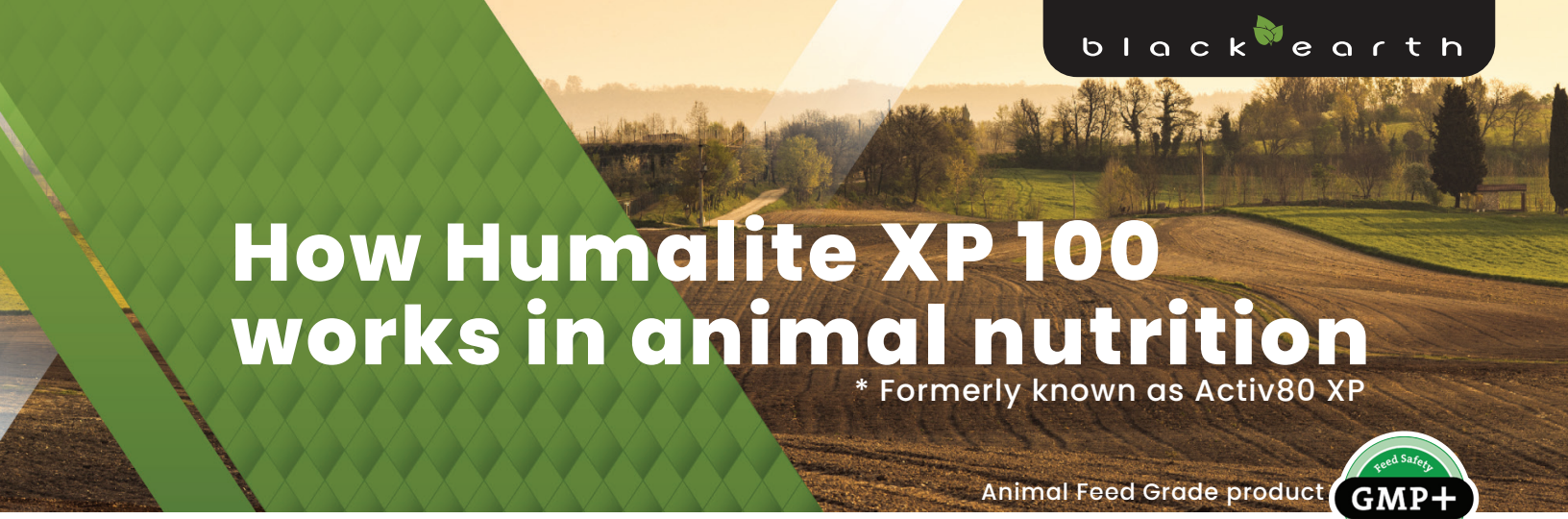


How Humalite XP 100 works in animal nutrition

* Formerly known as Activ80 XP

Animal Feed Grade product

Humalite is a naturally formed oxidized lignite deposition, which consists of dead prehistorical organic matter. This layer is often found very close to the surface. It is located between a peat and coal layer in the ground. Humalite is formed in certain sedimentary layers by bacteria converting dead organic material. Due to the fact that the chemical structure of Humalite is oxidized, free binding sites on the molecule exist causing the molecule to have a negative charge so it can absorb micronutrients.

Humalite has a black (dark) color and it is a strong stabilizer and ion exchanger. It is approved as feed material. Humalite consists of various components, such as humate, humic acids and fulvic acids. These components have different functions in the body. The Humalite has a high content of humic acids and fulvic acids; this is at least 64% (HPTA testing method). The majority of the components in the Humalite are humic acids.

The 'Cation Exchange Capacity' (CEC) value of Humalite is high, namely 3.0-4.0 meq/gr, which means that a high quantity of cations can be exchanged. Humalite contains many free binding sites and due to the negative charge cations, mycotoxins and heavy metals can be bound in the cavities in the polymer structure. For this reason, Humalite, or more specifically humic acid, is already used in soil, animal feeds and human and veterinary medicine.

Improved nutrient uptake and digestion

Humic acids in animal feeds can provide improved growth and a better feed conversion. This improves animal performance and reduces animal disease. These improvements are caused by the intestinal flora being stabilized and by improved nutrient uptake and better digestion. In addition, harmful heavy metals and toxins are bound. As a result, different animal yields (such as slaughter weight, egg production or milk values) can be improved and mortality due to several possible illnesses is reduced.

Intestinal health

Due to improved digestion and better processing of proteins a healthier intestinal flora is achieved, which results in improved bowel health and manure consistency. Humalite also causes the formation of a protected film on the intestinal epithelium, so that infections and toxins are less likely to penetrate the intestinal wall (Kuhnert et al., 1991). The development of a good intestinal structure (villi and crypts) is also promoted by Humalite. These factors reduce diarrhea. Humalite may also be suitable as an alternative for using ZnO against diarrhea (Trckova et al., 2015).

A secondary effect of the improvement of intestinal health is that animals have less stress (producing less stress hormone), which can reduce stress-related problems (such as tail and ear biting in pigs). This has been demonstrated in poultry, where chickens that received humic acids were able to cope better with stress initiated by full cages compared to the control (Cetin et al., 2011).

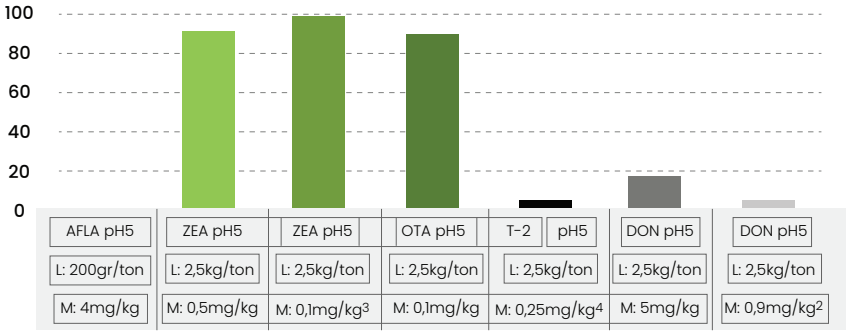
Humalite also has a pH-lowering effect in the gastrointestinal tract (Kamel et al., 2015), so gastric ulcers may also be reduced.

Mycotoxin control

Humalite is effective in binding mycotoxins, such as Zearalenone (ZEA) and Ochratoxin (OTA). By adding Humalite to animal feed, total mycotoxin pressure can be reduced resulting in less health problems (such as fertility problems, MMA in pigs, diarrhea, immune problems, etc.). The mycotoxins are bound by the Humalite and then excreted with the manure. Humalite binds the mycotoxins, so they cannot pass the intestinal wall and get through the circulation to reach the organs.

However, it is important to mention that there is a patent for Humalite as a Zearalenone binder and therefore it cannot be declared as such.

Mycotoxin binding Leonardite, UU 2016



Note: These study is performed at pH=5, different doses of Leonardite (L) and different mycotoxin (M) concentrations.

Antibacterial

Humic acids positively affect microflora, stimulating 'good' microbes and inhibiting 'bad' microbes (Islam et al., 2005). This feature, along with the improvement of bowel health, can lead to less diarrhea. Humic acids consist of polymer chains which expand in an aqueous environment. As a result, long chains are present in the digestive system of the animals and bacteria (such as E. Coli, Clostridium and Salmonella) are attracted to these chains, so as a result they can are removed from the body via the manure. For this reason, Humalite can be used against diarrhea caused by bacteria. It may also contribute to reduction of Mastitis, Metritis and Agalactia (MIVIA) Syndrome in Pigs.

Antiviral

In addition to the inhibition of harmful bacteria, the humic acids in the Humalite can also reduce viruses, especially rhinoviruses. Humic acids were used in the past for the treatment of various diseases caused by viruses, such as Foot and Mouth Disease (FMD) (Schultz et al., (1965)).

Anti-inflammatory

Humic acids contain flavonoids, which have an anti-inflammatory function. In addition, red blood cells should be able to carry more oxygen under the influence of Humalite (Lotosh, 1991), which could cause inflammation and injuries to cure faster. In addition, Humalite is a fairly acidic product, which is expected to contribute to the reduction of bladder inflammation in pigs (possibly replacing benzoic acid).

Influence on the immune System

Humalite can positively influence the immune system by increasing the number of lymphocytes (Cetin et al., 2011) and also phagocytosis activity increases (Terratol, 2002). Humic acids have been shown to improve the immune status of chickens (Nagaraju et al., 2014). It has also been found in other studies that humic acids increase antibodies to bursitis (IBD) in poultry, even more than in poultry that has received antibiotics (Nagaraju et al., 2014).

Growth promoter

Antibiotics were often used as growth promoters, but alternatives are needed due to the reduction of antibiotic use. Studies with humic acids in poultry have shown that Humalite may be a suitable alternative growth promoter (Ceylan and Ciftci, 2002 and Nagaraju et al., 2014). In addition, research in calves showed that Humalite improves growth and weaning weight increases (Livestock R. Us, 2003, Cusack et al., 2008).

Ammonia binding and odor reduction

Leonardiet has a NH/ specific Cation Exchange Capacity (CEC) value of 1.0-1.3 meq /gr. This means that Humalite has affinity for NH/, which allows the excess ammonia to be bound in the digestive tract which is then excreted via the manure. In the manure the ammonia molecules are bound, reducing free ammonia and odor. In addition, the utilization of nitrogen in bovine liquid manure is promoted.

- Improved nutrient uptake and digestion
- Improved intestinal health and manure consistency.
- Less stress and less stress-related problems
- Mycotoxin binding
- Antibacterial and antiviral properties
- Anti-inflammatory properties and positive influence on the immune system
- Alternative growth promoter
- Higher ammonia binding in manure and consequently lower odor load.
- Better health and fertility

All animal species: Maximal dosage 2.5% of total feed per day.

Other references:

www.humintech.com/fileadmin/Humintech/assets/literature_Hints_pdf/str_25-32.pdf
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