

## HUMIC AND FULVIC ACIDS IN LIVESTOCK INDUSTRY

Humic and fulvic acids can be successfully used as an additive in animal feed. Various research trials conducted worldwide have all showed positive results concerning the use of humic and fulvic acids as an organic feed ingredient. Increases in liveweight of animals, improved growth rates, increased feed intakes and food conversion ratios and a stronger resistance against diseases are the common results of these trials. By improving immune function of animals, especially of young animals, humic and fulvic acids also reduce the incidence of enteric disease and diarrhoea.

Increasing mass production of animal husbandry throughout the globe has had undesired impacts on the nature of animals, i.e. the natural development of animals and their immune systems. First vitamins, then antibiotics and finally hormones have been used extensively as growth promoters in livestock production. Recently, however, the negative effects of such growth promoters on animal and human health has been evidenced through various studies as well as real-life cases. Consequently, at present there is a new search for natural growth promoters without any environmental or residual problems.

As a result of increasing consumer pressure and in particular concerns about increased microbial resistance to antibiotics, a ban on the use of antibiotic growth promoters in animal feed has been already introduced in some European countries recently. Already back in 1998, the European Union had banned antibiotics important in human medicine from use as growth promoters in livestock production.

There is considerable evidence that antibiotic arsenals are being depleted due to the development of resistant organisms. The more microorganisms that become resistant to antibiotics, the greater the risk of a resurgence of untreatable infectious diseases. The overuse of antibiotics not only in human medicine but also in livestock feeding is the major cause of antibiotic resistance in food-borne illness.

Almost 80% of antibiotics used in animal husbandry today are not used to treat sick animals, but merely to promote efficient growth of chickens, cows and pigs.

Similar to antibiotics, the use of hormones in animal feed can also have direct impacts on human health through their residues left in animal products. As of today, these effects have not yet been thoroughly studied.

There is quite a number of animal feed additives in the market currently, that do not contain any antimicrobial substances or hormones. These are mainly, prebiotics, plant extracts and organic acids presently enjoying a resurgence of interest following the EU-wide ban on antibiotics. These substances however present certain deficits regarding their effects on animal health and growth promotion.

Probiotics do not have any activity other than providing beneficial microorganisms to the natural microflora of the digestive system. The benefit of prebiotics is also limited to supporting the development of microflora. Both probiotics and prebiotics do not have any proven effects on the immune system of animals nor adstringent effects on the mucous membrane of the gastro-intestinal tract. They also do not have any antibacterial or virucidal effects against pathogens either. Various performance studies have shown that both probiotics and prebiotics fail to show any considerable effects on animal growth.

Plant extracts are believed to be beneficial for the digestive system, but their functioning mechanism is not completely known and should be different for each product under this category. Organic acids give better results as protective agents rather than as growth promoters.

### **Humic and Fulvic Acids as Animal Feed Ingredient**

The use of humic and fulvic acids in animal feed produces a number of advantages for animal health and growth. Humic acids inhibit pathogenic bacterial growth and growth of moulds, thus decreasing levels of mycotoxins. They improve protein digestion and calcium and trace element utilisation. Humic and fulvic acids improve gut health, nutrient absorption, nutritional status and immune response in animals.

Humic and fulvic acids also improve diet digestibility as a result of maintaining optimum pH within the gut, resulting in lower levels of nitrogen excretion and less odour. By improving digestibility and food utilisation, humic and fulvic acids improve gastric and intestinal conditions of animals. It follows from this that as well as improving physical and financial performance, humic and fulvic acids also have a positive impact on the environment by improving digestibility.

Replacing antibiotics with humic and fulvic acids as growth promoter in animal feed does not cause any loss in the performance of animals. On the contrary, performance factors (daily liveweight gain, feed intake, food conversion ratio and the level of looseness of faeces - scour assessment - ) of animals are considerably improved.

Tests have shown that the use of humic and fulvic acids as animal feed supplement leads to increased milk production and increased butterfat percentage in dairy cows. Using humic and fulvic acids also resulted in improved feed efficiency, decreased feed costs, reduced fly population and reduced costs for insect control. Furthermore, the weaning weights increased and faster weight gains were observed in dairy cows, while problems with scours greatly decreased. On the whole, humic and fulvic acids increase the animal's resistance against stress factors such as heat.

One of the most beneficial effects of humic and fulvic acids on animals is the overall immune response increase in animals. By improving immune functions in the animal, humic acids are able to reduce the incidence of diarrhoea and other digestive upsets to a considerable extent as well as to improve the animal's defenses against pathogens such as E.coli.

## **Observed Effects of Humic and Fulvic Acids on Animals**

### **Covering mucous membrane and adstringent effects**

Humic and fulvic acids are able to form a protective film on the mucous epithel of the gastro-intestinal tract against infections and toxins. The macrocolloidal structure of humic acids ensures a good shielding on the mucous membrane of the stomach and gut, the peripheral capillaries and damaged mucous cells. As a result of this process, the resorption of toxic metabolites is reduced or fully prevented, especially after infections, in case of residues of harmful substances in animal feed or when it is switched to new feeds. Furthermore, humic and fulvic acids also help to prevent excessive loss of water via the intestine.

### **Antibacterial and virucidal effects**

Humic and fulvic acids have the ability to influence in particular the metabolism of proteins and carbohydrates of microbes by catalytic means. This leads to a direct devastating effect against bacteria cells or virus particles. A second mechanism is related to the interionic bonds of high-molecular protein fractions (toxins) of infectious microbes. Their toxic impact on physiological processes of mucous membrane cells can be weakened considerably or even blocked completely.

### **Antiphlogical effects**

Dermal, oral or subcutaneous application of humic acids leads to inhibitory effects on inflammation. The ability to inhibit inflammation is believed to be related with the flavonoid groups contained in humic acids.

### **Antiresorptive and adsorptive effects**

Humic and fulvic acids remain in the gastro-intestinal tract almost entirely following the enteral application (there is no self-resorption), antiresorptive and adsorptive effects take place where they are needed: in the digestive tract. Primarily cationoid noxes (protein toxins, toxic substances) are fixed, their resorption is reduced considerably or even prevented completely and their elimination through faeces is promoted. As adsorption by humic acids includes not only physical and chemical reactions, but also complex-formation and ion-exchange, it is more intensive and dynamic compared to pure physical adsorbents.

### **Effects on the immune system**

Humic and fulvic acids stimulate the resistance forces of the body and lead to an increase in the phagocytosis activity. The inducer effect of phenolic components (groups) of humic acids is believed to be responsible for the immunological effects and is the basis for the success of the treatment of the so-called factor diseases in young animals.

### **Ergotropic effects**

Humic and fulvic acids stabilize the intestinal flora and thus ensures an improved utilization of nutrients in animal feed (improved feed efficiency). This leads to an increase in liveweight of the animal without increasing the amount of feed given to the animal.

### **Humic and fulvic acids are purely natural**

The use of humic and fulvic acids in animal feed excludes any possibility of antibiotic residue or microbial resistance. Simultaneously, as a result of a higher food conversion rate and enhanced absorption of nitrogen by the animal, nitrogenous wastes and odour are reduced.