Natural Feed materials for
Optimal Poultry Farming

HUMAC
SUPPLEMENTS

HUMAC Supplements Ltd. | www.humac-organic.ie | info@humac-organic.ie

HUMAC® Your Partner for Quality Feed

HUMAC Supplements Ltd. is a registered feed business distributor (IED242655) of natural feed materials made from Leonardite with a high content of humic acids produced without the use of any chemicals or additives. The HUMAC® Natur AFM product line offers broad-spectrum solutions to the many complex challenges faced by feed production and animal husbandry industries.

We own and oversee the entire production process of our feed materials. Starting with one of the purest sources of Leonardite, which is mechanically processed and activated without the use of chemicals based on our own unique technological know-how in our state-of-the-art facility. The final products are regularly tested to maintain the highest quality parameters stipulated EU norms and the GMP+ feed safety program. Upon request, deliveries can be supplied with product batch analysis.

Feed producers: achieve feed safety & efficiency with HUMAC® Natur AFM.

- Produce safe compound feeds with reduced risk of toxicity
- Produce more nutritious feed
- Compatible with all types of feed components

In the Winter of 2019, HUMAC® products were awarded multiple gold medals at the **Novosadski Sajam** agricultural fair in Novi Sad, Serbia. Products from our HUMAC® Natur AFM line were awarded three gold medals amongst strong competition from 66 countries.

HUMAC Natur AFM

0,3 – 0,7% per kg of feed

HUMAC Natur AFM MycotoxiSorb

0,3 – 0,5% per kg of feed

HUMAC Natur AFM Liquid

1% per 100 l of feed/water

HUMAC® products for animals are certified **GMP+FSA** and also certified for use in **organic** animal husbandry.

All HUMAC® products are **Kosher** certified and prepared in a 100% natural way.

The HUMAC® Natur AFM Product Line in Poultry Farming

Improved Immunity Equals Improved Productive Parameters

HUMAC® Natur AFM is a feed material made from Leonardite with a **high content of humic acids**. It is a 100% natural substance with high biological efficacy - **a natural growth stimulator**. By applying **HUMAC® Natur AFM** feed material, animals are provided with minerals and trace elements in chelated form which are readily absorbed by their organisms.

By adding **HUMAC® Natur AFM** feed material into the feed, intestinal microflora is regulated - it slows down the reproduction of noxious microflora and encourages the growth of beneficial microflora. It reduces the occurrence of inflammation and supports immunity. It favourably affects the pH of the digestive system. It prevents the absorption of toxic metals, xenobiotics, fungal toxins and other toxic compounds in the digestive system, which is then excreted by animals. It benefits the use of feed and its nutritional components, which improves the conversion of feed. Improves the microclimate in the stable, mainly by absorbing nitrogenous and other volatile substances, which results in decreased emissions of harmful (greenhouse) gases.
HUMAC® Natur AFM is also available as a liquid for easier application when using liquid feed and is faster acting.

Optimization of poultry farming economy

With poultry, just as with other animal species, humic acids accelerate the metabolism of cells, promote cell respiration and energy creation, and thereby stimulate the organism to increased nutrient intake, excretion of more digestive juices, support of immunity and of the overall health condition. This results in accelerated growth, higher production and improved health.
The usage of **HUMAC® Natur AFM and Natur AFM Liquid** in poultry farming has the following positive effects on breeding: increase of daily additions (by 6-8%)
reduced use of feed per addition's (by 4-7%)
reduced mortality of brood and grown ups (by 40-50%)
increased productivity of laying hen (by app. 4%) is a result of extended laying curve, which reflects their improved health higher carcase yield
higher share of breast and thigh muscle
significantly better sensory properties of carcase meat
increased serenity of the herd
improved feathering
reduced input costs such as for antibiotics and other medicine
elimination of the possibility of creating microbial resistance and the presence of residues of foreign substances in livestock products
besides higher egg production and better hatchability of laying hen, the weight of eggs slightly increases, while the thickness of eggshell remains unchanged, but its firmness increases

HUMAC® Natur AFM is admixed into feed or granules. Dosage: **0.5 – 0.7 %** per kg of feed.

HUMAC® Natur AFM Liquid is admixed into water or liquid feed. Dosage: **1%** per 100 l of liuid feed / water.

Its application is recommended throughout the entire fattening/breeding period. Feed materials are without a protection period, the prepared feed can be fed immediately.

The HUMAC® Natur AFM Product Line in Poultry Farming

Humic acids impact on poultry health

Scientific trials have shown some of the following benefits of humic acids on animal health:

Detoxification properties

Neutralize endogenic and exogenic toxins by binding:

- Toxic metals into insoluble complexes, that are excreted from the organism
- Microbial toxins
- Mycotoxins
- Foreign chemical substances

Effects on the digestive system

- Stabilizes pH in the digestive tract
- Affects the function and composition of the intestinal microflora in favour of symbiotic microorganisms
- Promotes hormonal activity and creation of pancreatic enzymes and thus the decomposition of nutrients into simple substances (monosaccharides, amino acids, fatty acids)
- Positively affects all digestive system functions - digestion and resorption of nutrients - improved use of proteins and other nutritional components
- Maintains a balanced digestive system and minimizes disorders - diarrhea, constipation, and thus significantly impacts the air and litter quality and humidity (respiratory problems and inflammation of feet)
- Maintains the C:P ratio, which is important for bones development, feet length and the immune system. By optimization of the Na:Cl:K ratio it affects the intake and conversion of feed, pH, acid-base balance, bone strength, eggshell quality etc.
- The supply of trace elements in a chelated form and their optimal use from the feed material impacts almost all hormonal, enzyme and metabolic functions

Effects on liver

- Affects the regenerative capacity of liver tissue
- Actively participates in liver metabolism
- Impacts liver functions and partially protects it from diseases and disorders

Increases the biological availability of essential nutrients and trace elements

- Improves transport of nutrients and minerals into cells, improves the utilization of nutritional feed components
- Actively affects the transport mechanisms of macro and microelements and trace elements transmission from the intestine to the animal organism

Antibacterial, antimycotic and antiviral effects

- Interferes with protein metabolism and microbe saccharides through catalysation processes, which leads to inhibition of pathogenic bacteria reproduction
- Promotes the organism's natural ability to prevent replication and spread of viruses

Effects on the immune system

- When protecting against pathogens, stimulates immune system receptors in the intestinal villi
- By activation of immunocompetent cells supports and regulates the activity of the immune system and increases the defense capability of the organism
- By optimization of the metabolic environment improves the quality of immunological response of animals following their vaccination
- Reduces the production of stress hormones and helps to eliminate thermal and transport stress. Sufficient use of minerals such as creation of vitamins helps the animals to deal with thermal load (stress) through insufficient thermal regulation of the hall environment

Reduces odour in halls

- Lowers the amount of volatile ammonia and CO_2. Ammonia content from 10 ppm damages the lungs' surface, but over 50 ppm can significantly affect the breeding economy - the rate of poultry growth. Excess CO_2 besides respiratory issues, can also cause serious threats to animal immunity.

Anti-inflammatory, analgetic & anti-rheumatic properties

- Humic acids have shown to be beneficial for musculoskeletal system disabilities treatment (muscle, joints, ligaments, tendons and bone damage and inflammation, muscle spasms), vein inflammation, hematomas, sprains and skin diseases of various origin
- Significantly affects the creation and inhibition of anti-inflammatory cytokines

Broilers: growth performance and physicochemical parameters

Parameters	Control	HUMAC	Difference
Final weight	2319,00 g	2395,50 g	+3,3 %
Total weight gain	2272,10 g	2348,83 g	+3,4 %
Feed conversion	1,61	1,57	+2,5 %
Carcass yield	73,81 %	75,00 %	+1,61 %
Breast without bone	30,51 %	31,97 %	+4,8 %

Parameters	Control	HUMAC	Difference
Dry matter	25,46 %	25,31 %	−0,6 %
Water content	74,54 %	74,69 %	−0,2 %
Fat	2,94 %	2,28 %	−22,5 %
Total protein	21,48 %	22,03 %	+2,6%

A trial conducted by researchers of the UVLF* observed the effects on multiple parameters by supplementing broilers diet with humic acids (HUMAC® Natur AFM) at a rate of 0,7% per kg of feed. In addition to the above findings, the authors conclude the study as follows:
"From the results that have been carried out, we can conclude that 0.7% supplementation of HS in natural, as well as acidified form to broilers' feed significantly affected the composition and quality of breast meat. The content of meat fat and pH decreased and meat had a lighter colour. ***We also recorded a significant impact of HS feed addition on meat quality during storage.*** *The oxidative stability and sensory variables of meat were better when compared to the control. When evaluating the natural and acidified form of HS on the quality of breast muscle meat, we observed a comparable effect. The improved effect of the acidified form of HS on growth parameters or meat quality was not confirmed.* ***The addition of 0.7% natural HS represents a good potential for a significant increase in the quality of the meat produced, as well as for a potential improvement in the growth parameters of the poultry.*** *However, the revealing of the detailed mechanism of HS action requires further research."*
* University of Veterinary Medicine & Pharmacology in Kosice, Slovakia

Source: Hudák M, Semjon B, Marcinčáková D, Bujňák L, Naď P, Koréneková B, Nagy J, Bartkovský M, Marcinčák S. Effect of Broilers Chicken Diet Supplementation with Natural and Acidified Humic Substances on Quality of Produced Breast Meat. *Animals*. 2021; 11(4):1087. https://doi.org/10.3390/ani11041087

Broilers: physicochemical and organoleptic properties of chicken breasts and thighs

Parameters	Control	HUMAC	Difference
Breast meat samples			
Dry matter	24,78 %	26,21 %	+5,8 %
Fat	3,40 %	2,76 %	-18,8 %
Water	75,22 %	73,79 %	+1,9 %
Protein	22,02 %	23,71 %	+7,7 %
Water loss after cooking	31,12 %	29,98 %	-3,7 %
Lactic acid	1,77 %	2,00 %	+13,0 %
Phosphates	1,76 %	0,90 %	-48,9 %
pH	5,96	5,86	-1,7 %

A trial conducted by researchers at UVLF* observed the effects of humic acids (HUMAC® Natur AFM) on the physicochemical parameters and organoleptic properties of chicken breast and thighs. Positive changes in dry matter, far, water contents, proteins, phosphate content and pH were observed for both breasts and thighs in the test group over the control group. **Sensory variables such as the smell, taste, juiciness, brittleness and overall acceptability were rated higher in the HUMAC group over the Control group by an average of 21,4 % for chicken breasts and 5,8% for chicken thighs.** The authors conclude that one of the factors that may contribute to the improved sensory variables is the reduced water loss during cooking in the HUMAC group over the Control group.

* University of Veterinary Medicine & Pharmacology in Kosice, Slovakia

Source: Boris Semjon, Dana Marcinčáková, Beáta Koréneková, Martin Bartkovský, Jozef Nagy, Peter Turek, Slavomír Marcinčák (2020) Multiple factorial analysis of physicochemical and organoleptic properties of breast and thigh meat of broilers fed a diet supplemented with humic substances, *Poultry Science,* 99: 3, p.1750-1760, ISSN 0032-5791, https://doi.org/10.1016/j.psj.2019.11.012

Laying Hens: effects on egg production & quality, hen immunity and gastrointestinal health

Parameter	Control	HUMAC	Difference
Laying rate	84,29 %	95,91 %	+13,8 %
Daily egg mass, hen / day	47,50 g	57,06 g	+20,1 %
Egg weight	56,36 g	59,50 g	+5,6 %
Feed consumption, hen / day	115,86 g	116,00 g	+0,1 %
Feed conversion	2,46	2,04	+17,1 %

Another trial conducted by researchers at UVLF* focused on the effects of humic acids (HUMAC® Natur AFM) on egg production & quality, eggshell mineral content, hen immunity and gut microbiota. **The results listed in the table indicate the ability of humic acids to stabilize intestinal microbiota resulting in improved feed conversion**. The finding also showed that **eggshell mineral content (Ca, Mg, P, Na, K, Cu, Zn, Mn) increased by an average of 20,5%.** Minerals play a vital part in eggshell quality and the results showed that supplementation with humic acids favourably influences the quality of eggshells. Regarding the immunomodulatory properties of humic acids, they have been shown to positively effect the production of cytokines which play a primary role in immune response and regulation of inflammation. Furthermore, the study confirmed that **humic acids "significantly increased the percentage of active phagocytes as well as the engulfing capacity."** Simply put, phagocytes play a vital role in the engulfing of bacteria, foreign particles and dying cells to protect the body. The study concludes that *"The presented results confirm that HS can be used for the improvement of egg production and quality and for activation of phagocytosis and specific antibody immunity, but their influence on the intestinal microbiota will need to be further studied with respect to a wider range of microbial species inhabiting the digestive tract of laying hens."*

Mudroňová D, Karaffová V, Semjon B, Naď P, Koščová J, Bartkovský M, Makiš A, Bujňák L, Nagy J, Mojžišová J, Marcinčák S. Effects of Dietary Supplementation of Humic Substances on Production Parameters, Immune Status and Gut Microbiota of Laying Hens. *Agriculture*. 2021; 11(8):744. https://doi.org/10.3390/agriculture11080744

D. Mudroňová, V. Karaffová, T. Pešulová, J. Koščová, I. Cingeľová Maruščáková, M. Bartkovský, D. Marcinčáková, Z. Ševčíková & S. Marcinčák (2020) The effect of humic substances on gut microbiota and immune response of broilers, *Food and Agricultural Immunology*, 31:1, 137-149, DOI: 10.1080/09540105.2019.1707780

ABSTRACT
The work focused on the study of the immunomodulatory and gut- protecting effect of humic substances (HS) in broilers. The diet of experimental chicks was enriched with 0.8% of HS. We noted that HS had a stimulatory effect on the phagocytic activity and the engulfing capacity of phagocytes, however, the level of oxidative burst of phagocytes was not affected. We observed a significant increase of CD4+: CD8+ lymphocyte ratio, an indicator of immune stimulation. HS did not influence the IgA gene expression. In contrast, we observed a significant increase in the expression of MUC-2 (intestinal mucin 2) gene, and a decrease in the expression of IGF-2 (insulin-like growth factor 2) and also AvBD2 (avian beta defensin 2) genes. A decreased Enterobacteriaceae counts in the gut of experimental animals showed a positive effect on intestinal microbiota. We confirmed a gut-protecting and an immunostimulatory effect of HS in broiler chickens.

Janka Vašková, J., Patlevič, P., Žatko, D., Marcinčák, S., Vaško, L., Krempaská, K., Nagy, J. (2018) *EFFECTS OF HUMIC ACIDS ON POULTRY UNDER STRESS CONDITIONS*. *Slovenian Veterinary Research*, 55:4, 245 – 253, DOI 10.26873/SVR-469-2018

ABSTRACT
The transportation of chickens from the poultry farm to the slaughterhouse causes stress conditions that influence the oxidative status of the whole organism and subsequently change the organoleptic properties of the meat delivered to the consumer. The aim of this work was to investigate how administering 0.6% humic acids to broiler chickens for a period of 42 days affects the level of selected enzymes directly involved in oxidative stress elimination. For the most objective estimation of the oxidative state, parameters were determined in liver and kidney mitochondria, and in the blood plasma. With regards to the chelating properties of humic acids, our interest was in monitoring the effects on the distribution of the transition metals Fe, Zn, Cu, Mn, which serve as cofactors of antioxidant enzymes. We have found that, under normal conditions, 42 days of humic acid administration do not cause significant metal redistribution. It has a significant effect on Se excretion, according to the pronounced deposition of Se in kidney tissue, without significantly increased activity of the corresponding enzyme. This led to compensation by changes in other antioxidant enzyme activities. This is a noteworthy finding, especially after administration of longer than 42 days. In conditions caused by sudden stress, according to the detected element levels, it is possible to expect a better response in the case of humic acid administration. The effect of humic acid supplementation appeared to be organ-specific and may ultimately be beneficial for the chickens' health, stress elimination and, finally, the quality of the meat.