



# EDAGUM<sup>Σ</sup>®

HUMIC FODDER ADDITIVE





# Edagum<sup>®</sup>SM is biologically

## EDAGUM<sup>®</sup>SM HUMIC FODDER ADDITIVE IN LIVESTOCK BREEDING

One of the most promising ways to enhance health care and productivity of farm animals with due consideration of high ecological requirements for meat and dairy products is the use of humic substances. Their environmental safety and unique ability to boost metabolic processes and increase cells energy have a very pronounced effect on living organisms.

Currently, humic preparations are used in livestock breeding (cattle, horse, sheep, pigs, poultry, and fish breeding, etc.) as fodder additives that serve to increase the productivity of animals, digestibility of fodder, and to improve the quality of blood, muscle, etc., in veterinary medicine - they are used as preventive means to boost general resistance of organism and to treat some diseases.

Humic substances have a pronounced stimulating effect on all the types of farm animals (including poultry), boost immune system and regulate metabolism: as a result of the use of such, substances high levels of weight gain are achieved, blood quality and, disease resistance are improved, survival rate of young stock reaches 98%.

In fish breeding, humic substances increase growth rates, enable high survival rate (98-99%), reduce fodder expenses by 29% (per weight gain unit), state of internal organs and air bladder is improved, egg functional activity is increased, eggs fertilization rate is increased, bladder germ development is boosted, and larva teratogenicity is reduced.

The EDAGUM<sup>®</sup>SM Humic Fodder Additive (HFA) is produced with the use of ecological natural plant raw materials - peat pursuant to the technical specifications TU 9283-002-52420467-2009, it looks like liquid of dark brown color, it is water-soluble and does not contain genetically modified products.

Enhanced bioactivity of the EDAGUM<sup>®</sup>SM HFA is driven by its contents that include a whole set of natural components: humic and fulvic acids, organic acids (amber, apple, oxalic acids etc.), amino acids, vitamins, macro- and micro-elements. The preparation has adsorption, binding, buffer and ion-exchange properties.

Scientific and industrial experimental research of the Stavropol Research Institute of Livestock and Fodder Production and the Ryazan State Agricultural Academy confirmed that the EDAGUM<sup>®</sup>SM HFA is highly efficient in use for young and adult livestock, including poultry.

In the course of the research it has been found that the introduction of EDAGUM<sup>®</sup>SM into diets of milking cows significantly increased their productivity and improved the quality of milk: milk productivity increased by 10.5%, the DM contents in milk increased by 1.4%, contents of fat - by 0.8%, protein - by 3.1%, lactose - by 1.05%, calcium - by 0.01 %, and ash - by 0.28%. Fodder expenditures per 1 kg of milk were reduced by 8.3%.

The fodder additive enabled improvement of nutrients digestibility, 1.6% increase in their fixation by DM, raw protein - by 1.7%, fiber - by 1.9%.

The EDAGUM<sup>®</sup>SM HFA had a positive effect on biochemical qualities of animals' blood - the contents of hemoglobin and reserve alkali increased, leading to improved metabolism and milk productivity boost. Moreover, the fodder additive increased the appetite and general state of animals.

Giving the fodder additive to milk-fed calves increased the feed conversion rate that had a positive effect on metabolic processes and digestion. The average daily gain in calves consuming the humic additive increased by 13.1% and amounted to 793 g, the morphological parameters of blood (whole protein, calcium and phosphorus contents, etc.) improved. Calves consuming the humic preparation looked healthier, more active and mobile, their hair looked shinier as compared to the controlled group.

Use of the EDAGUM<sup>®</sup>SM in the fodder of 2-months old gimmers enabled an increase in average daily gain by 6.7% as compared to the control group, and in the fodder of 10-months old ram-lambs the increase was 7.5% as compared to the control group.

EDAGUM<sup>®</sup>SM boosted milk production of ewes of 1.5 y.o. by 11.3%, ewes of 3-4 y.o. by 7.9% as compared to the control group.

Use of the EDAGUM<sup>®</sup>SM in the fodder of broiler chicken enabled the increase in weight gain by 1.96%, in gross and average daily gain - by 4.68% as compared to the control group, it also boosted the feed conversion rate, increased survival rate among young poultry from 94.2% to 96.3%.



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Use of the EDAGUM<sup>®</sup>SM decreased the incidence of diarrhea in animals, which significantly reduced the consumption of antibiotics and improved the quality of the products.

Therefore, EDAGUM<sup>®</sup>SM enhances the body resistance of young and adult livestock and poultry to various diseases, regulates metabolism, activates the protein, carbohydrates, and enzymes synthesis in the body increasing their productivity, safety and overall profitability of production.

Humic additive EDAGUM<sup>®</sup>SM is a highly efficient source of animals state improvement, more intensive weight gain in the same alimentation and housing conditions.

**There are no side-effects or complications while using EDAGUM<sup>®</sup>SM.**

**The preparation is compatible with all medical products and other fodder additives. No known contraindications. After application of the fodder additive, animal products are eatable without any restriction.**

### **Dosage and application methods of the EDAGUM<sup>®</sup>SM HFA**

EDAGUM<sup>®</sup>SM Humic Fodder Additive shall be introduced into diet of farm animals by mixing with the fodder, including milk, once a day in accordance with the following scheme:

<b>Species and age of animals</b>	<b>Daily dosage, ml/kg of body weight</b>	<b>Course duration</b>
Gestation sows, 4 to 5 weeks prior to the farrowing time	0.5 ml mixed with concentrates	up to 60 days
Prenursery pigs, since the beginning of additional nutrition	0.4 ml mixed with milk/porridge	up to 2 months
Weaned pigs	0.5 ml mixed with fodder	up to 4 months
Sheep and goats	0.4 ml mixed with fodder	up to 60 days
Cattle	0.4 ml mixed with fodder	up to 60 days
Broiler chickens	4 l per 1 ton of fodder	from 2 to 40 days
Young fish	1-2 ml per 100 l of water	once every three days. Up to 90 days from the beginning of fish hatching

#### **EDAGUM<sup>®</sup>SM shall be introduced:**

- at combined fodder plants, agricultural enterprises and in feed processing rooms of the enterprises – mixed with compound fodder and concentrates by using current mixing technologies or kibble top coating;
- at agricultural enterprises – mixed with the ready-made fodder by mixing or spraying through atomizers, mixed with broths, milk (milk substitutes), serum and drinking water or orally as a stock solution.

While applying the EDAGUM<sup>®</sup>SM humic fodder additive, it is possible to replace part of the forage due to the better digestibility of fodder.

### **RESEARCH FINDINGS**

In 2007-2014, the Scientists from the State Scientific Institution Joint Research and Development Institute of Livestock and Fodder Production of the Russian Academy of Agricultural Sciences, Federal State Budgetary





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Scientific Institution All-Russian Research and Development Institute of Sheep and Goat Breeding (Stavropol) conducted research on the use of the EDAGUM<sup>®</sup>SM humic fodder additive in alimentation of various species of farm animals and poultry, and in fodder grass.

## **Results of the research on breeding and replacement goats**

In the course of the research:

- diets for different age-sex groups of farm animals were developed;
- chemical composition of fodder was studied;
- optimal feeding dosage of EDAGUM<sup>®</sup>SM was determined;
- digestibility of main nutrients of each diet was studied;
- biochemical blood tests of the animals under consideration were conducted.

Breeding and replacement goats housing and alimentation conditions were the same in the course of the scientific research experiment.

Given fodder and its remainder were calculated based on the results of control feeding during 2 following days on monthly basis. Alimentation diets were developed based on actual fodder consumption.

Body weight gain was determined through individual weighting in the mornings, before feeding. Absolute and average daily weight gain per animal were calculated based on the data collected during weighting.

Experimental group goats were getting fodder additive EDAGUM<sup>®</sup>SM in addition to basic fodder: II-experimental group - with the dosage of 0.4 ml per 1 kg of body weight; III-experimental group - 0.6 ml per 1 kg of body weight. Experimental feeding of replacement goats lasted 111 days.

For the purposes of study of the effect of the EDAGUM<sup>®</sup>SM HFA on the main nutrients digestibility, the nitrogen, calcium and phosphorus metabolism, a physiological experiment on goats of 12 months of age was conducted.

The highest nutrients digestibility level was observed in the goats of the II-experimental group and exceeded the results of the control group as the digestibility of dry, organic matter; protein, fat, fiber and nitrogen-free extractive substance by: 2.25%; 2.20%; 3.05%; 1.23%; 2.35%; 2.29% respectively.

Biochemical blood tests were conducted at the beginning and end of the experiment for the purposes of monitoring of the physiological state of the animals.

Hemoglobin contents is a significant parameter that characterizes the body state of animals. A higher level of hemoglobin is reported for animals getting EDAGUM<sup>®</sup>SM additive with their fodder. Thus, animals of II and III-experimental groups had higher level of hemoglobin contents as compared to the control group (4.69% and 2.34% respectively).

Research characterizing the state of humoral factors of immune system (in particular, antibacterial and lysozyme activities) was used during the experiments. Animals of the II-experimental group had higher levels of antibacterial activity than the control and III-experimental groups (by 3.94% and 2.04% respectively).

Succulent breeding females research results showed that animals getting the fodder additive EDAGUM<sup>®</sup>SM at the dosage of 0.4 ml per 1 kg of body weight differed from the control group by certain parameters.

The result analysis showed that the absolute weight gain during the second half of the succulence amounted to 9.7 kg, which is 19.8% higher than in the control group. Average daily weight gain of breeding females of the control group during the experiment amounted to 135 g, which is 19.6% lower than in the experimental group.

The application of the fodder additive EDAGUM<sup>®</sup>SM in addition to the basic diet enabled the increase in milk productivity of breeding goats by 9.32% and 2.68% respectively.

As the experiments showed, giving EDAGUM<sup>®</sup>SM HFA in addition to the basic diet allowed:

- to increase the average daily weight gain of breeding goats by 24.4%, milk productivity - by 10.3%; absolute body weight gain during the experiment increased by 19.8%; lambs body weight at birth - by 6.1%, at 22 day of age - by 8.4%;
- to increase average daily weight gain of young females of the I-experimental group up to 64 g, which is 23.1% higher than in the control group, and 12.3% higher than in II-experimental group, to increase body weight by





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- 3.8%;
- to improve hematological and biochemical blood parameters of young females: as to hemoglobin contents - by 4.69%, as to antibacterial parameter - by 2.45%;
- to reduce fodder consumption for body weight gain by 17.73%.

### **Results of the research on pigs**

The aim of the scientific research experiment conducted by experts of the Federal State Budgetary Scientific Institution All-Russian Research and Development Institute of Sheep and Goat Breeding (Stavropol) in 2014 was study of impact of the EDAGUM<sup>®</sup>SM HFA on productivity of young pigs and boars. Due to this, the research task included study of the effect of the fodder additive produced on:

- increase in weight gain of store pigs during nursing and growing;
- sperm production of breeding boars;
- digestibility of nutrients of each diet;
- fodder consumption per unit of body weight gain.

According to the principle of analogous pairs, experts created two groups of Large White store pigs aged 0-2 and 2-4 months with 25 animal units and 4 breeding boars in each group. The experiment lasted 60 days, including 15 days of equalization period and 45 days of basic period.

Individual monthly weight checks were conducted to control the weight gain of store pigs during nursing and growing periods.

Blood samples for biochemical analysis (total protein, albumins, globulins, bactericidal and lysozyme activity) were drawn from jugular veins at the beginning and the end of the experiment; the experts conducted a complete zoo-technical and chemical analysis of fodder used in diets and feeding of store pigs aged 2-4 months.

Sperm production of boars was estimated according to quantitative and qualitative indicators. Quantitative indicators estimated include ejaculate volume (its filtered part), sperm concentration, number of sperm cells in ejaculate.

Piglets of the experimental group received 0.4 ml of EDAGUM<sup>®</sup>SM HFA per 1 kg of body weight additionally to their basic diets.

It shall be noted that the average body weight of piglets at birth was practically the same and amounted to 1.2-1.1 kg. It was 6.1 kg in the control group at the age of 1 month, while the body weight in the group consuming the fodder additive was 6.4 kg or 4.92% higher. Animals of the experimental group gained more weight at the age of 2 months, so at the end of the experiment, their weight increased by 3.48 kg or by 21.9%. The average daily gain witnessed the same changes.

Livability of young pigs is an important indicator in the period. It is apparent from the indicators shown in the table that use of the EDAGUM<sup>®</sup>SM fodder additive prevents animals from gastrointestinal diseases, so EDAGUM<sup>®</sup>SM is some kind of probiotic.

Thus, the EDAGUM<sup>®</sup>SM fodder additive has a probiotic effect, inhibits the growth of undesirable microorganisms and has a positive effect on productivity of piglets.

Results of feeding of piglets with the EDAGUM<sup>®</sup>SM HFA during the post-weaning period have shown that additional application of EDAGUM<sup>®</sup>SM to the basic diet increases the body weight to 38.1 kg against 35.1 kg or by 8.5% at the end of nursery period, while the average daily gain grows by 21.4%. So, application of humic additives has a positive effect on productivity of young pigs.

Breeding boars of the experimental group received 0.4 ml of HFA per 1 kg of body weight additionally to their basic diets according to the experiment scheme.

The experiment has shown that the ejaculate volume of boars from the experimental group consuming EDAGUM<sup>®</sup>SM is 4.5% higher. Due to a higher concentration of sperm cells per 1 ml (253 ml and 258 million), concentration of sperm cells in ejaculate in the experimental group is 6.6% higher. It shows that the fodder additive has a positive effect on boars.

The research on application of EDAGUM<sup>®</sup>SM HFA to the diets of farm animals and its effect on productivity of pigs has the following results:





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1. It is found that addition of the EDAGUM<sup>®</sup>SM fodder additive to the diets of prenursery pigs at the dosage of 0.4 ml per 1 kg of body weight increases the average daily weight gain by 13.8%, reduces gastrointestinal diseases and maintains livability at the level of 95%;
2. Use of the fodder additive in the diets of pigs aged 2-4 months increases the body weight to 38.1 kg at the end of growing period with the average daily gain of 323 g which is 21.4% higher in comparison with the control group of the same age;
3. The EDAGUM<sup>®</sup>SM fodder additive improves digestibility of some nutrients: dry matter by 1.06%, raw protein by 0.58%;
4. Use of humic additives in the diet of breeding boars improves qualitative indicators of sperm production: ejaculate volume is 4.47% higher than the control group, sperm concentration (in million terms) is 1.97% higher, and the number of sperm cells in ejaculate (in billion terms) is 6.59% higher.

It means that use of the EDAGUM<sup>®</sup>SM humic additives in the diets of young pigs aged 0-2, 2-4 months and breeding boars, increases productivity of animals which leads to a higher profitability of production.

## **Results of the research on ewes**

Diets of experimental groups were developed according to the experiment scheme. All groups had the basic diet, including cereal and grass hay, a concentrated feed mixture (wheat, barley, peas) and mineral feed.

Ewes of the I-experimental group consumed the fodder additive EDAGUM<sup>®</sup>SM at the dosage of 0.4 ml per 1 kg of body weight, animals of the II-experimental group consumed 0.6 g per 1 kg of body weight daily. Hay consumption in the groups was: 86.4%, 79.5%, 85.5%.

According to the analysis results of the research the following conclusions can be made:

1. The most effective use of EDAGUM<sup>®</sup>SM in the diets of ewes was at the dosage of 0.4 ml per 1 kg of body weight;
2. Application of the EDAGUM<sup>®</sup>SM additive to the diets of pregnant ewes of the North-Caucasian meat-wool breed with the body weight of 60-65 kg at the dosage of 0.4 ml increased the average daily weight gain by 28.4%, the amount of wool shorn by 4.25% and fertility by 18%;
3. Animals consuming the additive at the dosage of 24 ml per head had a higher digestibility of dry matter (by 1.95%), organic matter (by 2.08%), protein (by 2.28%), fat (by 3.12%), fiber (by 0.77%) and nitrogen-free extractive substance (by 1.84%);
4. In order to increase productivity of pregnant ewes of the North-Caucasian meat-wool breed with the body weight of 60-65 kg, it is required to add 0.4 ml of the EDAGUM<sup>®</sup>SM fodder additive per 1 kg of body weight to their diets.

## **Results of the research on cows and growing calves**

During the scientific research experiments on additional feeding of milk cows with EDAGUM<sup>®</sup>SM HFA, the HFA was added to their basic diet at the dosage of 0.5 ml per 1 kg of body weight. 0.4 ml of EDAGUM<sup>®</sup>SM per 1 kg of body weight was added to the diet of growing calves.

The experiments focused on the following indicators:

- milk productivity and milk composition;
- digestibility of nutrients of each diet;
- biochemical blood parameters.

The research has shown that the fodder additive significantly effects productivity and milk composition and increases both the fat and protein content.

It is found that giving the fodder additive to milk-fed calves significantly increases the feed conversion rate that has a positive effect on metabolic processes, digestion and, finally, productivity of animals.



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## CONCLUSIONS

1. Addition of the EDAGUM<sup>®</sup>SM fodder additive to the diets of milk cows causes a higher nutrient intake: dry matter (by 0.6%); dry protein (by 1.0%); fiber (by 0.9%);
2. Application of EDAGUM<sup>®</sup>SM significantly increases milk productivity by up to 10.5%, improves the milk quality and reduces feed costs (while feed costs per 1 kg of milk decrease by up to 8.3%), significantly improves biochemical blood parameters;
3. Application of the EDAGUM<sup>®</sup>SM humic fodder additive to the diets of milk-fed calves as a component of a calf milk replacer, increases digestibility of nutrients from 1.01% to 7.42%, improves morphological blood parameters (total protein, content of calcium and phosphorus, etc.); feed costs per production unit decrease by 10.9% in the experimental group.
4. The fodder additive increases the average daily gain to 793 g, which is 13.1% higher in comparison with the control group.

### Results of the research on broiler chickens

A scientific and industrial experiment was conducted in 2007 and focused on application of EDAGUM<sup>®</sup>SM HFA to breeding of broiler chickens through its addition to the diet at the dosage of 4 l per 1 ton of fodder.

The results of weight checks have shown that chickens of the experimental group have the highest dynamics of the average weight gain.

Application of the EDAGUM<sup>®</sup>SM HFA increases the feed conversion rate and both the weight gain in gross and the average daily gain by 4.68%. Livability of young animals in the experimental group is 96.3%, while it is -94.2% in the control group.

Conclusions: EDAGUM<sup>®</sup>SM HFA increases the average daily gain, improves the feed conversion rate, increases livability of young animals and, thus, production profitability.

### Application of humic fertilizer EDAGUM<sup>®</sup>SM to fodder cultivation

The scientific and industrial experimental research conducted by experts of the Stavropol Research Institute of Livestock and Fodder Production in 2014, focuses on application of the EDAGUM<sup>®</sup>SM humic fertilizer to cultivation of leguminous plants such as medick (medicago) and grama grass, which is the main feed supplier for animal breeding.

Application of the EDAGUM<sup>®</sup>SM humic fertilizer increases productivity of feed crops with the main indicators such as protein (by 19.0%), fat (by 9.1%), minerals (calcium, phosphorus by 11.1%). Such indicators are important for increasing productivity of farm animals, as detailed balanced diets are prepared according to them to achieve the highest productivity and effect the increase and development of the offspring.

The analyzed composition and nutrition of the fodder treated with EDAGUM<sup>®</sup>SM has shown that feed materials improve their indicators in regard to the content of main nutrients and essential aminoacids.

According to the research, the following conclusions are made:

- use of the EDAGUM<sup>®</sup>SM humic fertilizer increases productivity of range lands and leguminous plants grown for fodder by 100 to 240 kg per 1 ha and reduces the mowing period by 3 to 8 days;
- application of EDAGUM<sup>®</sup>SM allows to harvest fodder for farm animals of a higher quality with a higher concentration of the main nutrients (protein, fat, nitrogen-free extractive substance, vitamins and aminoacids) in a more available form;
- use of EDAGUM<sup>®</sup>SM makes it possible to allocate scarce resources in a more rational way, reduce land degradation and improve soil fertility.

**THANK YOU!**

**EDAGUM**<sup>SM</sup>

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