
EM-1 Application In Animal Husbandry, Poultry Farming, and its Action Mechanisms

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The perspectives of development of EM-1 use in agriculture production have three directions:

1. Broadening the geography of EM-1 application on different continents.
2. Seeking efficiency of EM-1 use in new field and spheres.
3. Decoding the mechanism of EM-1 action in order to rise the efficiency of its application.

EM-1 in Belarus is used in different fields: plant growing, gardening, floriculture, animal husbandry and poultry farming. New spheres of EM-1 application have been determined too, and we'll discuss them later on.

In present report we'll touch only two question:

1. Efficiency of application in swine breeding and poultry farming.
2. Mechanisms of EM-1 action.

In the last year, we reported the mechanism of EM-1 effect in plant growing. Now the principal attention will be paid to some mechanism of EM-1 effect on animal and birds.

The result of EM-1 influence on gain in swine are adduced on given slide EM-1 was used by standard method in the form of bokashi (rye-flour), as 3%, additive to fodder at the beginning, and afterwards, 1%. The feeding of piglets was begun since 4 months age. At the beginning of feeding and even by the end of first month, the pigs which obtained EM-1 were behind the control animals up to 78g/day. By the end of second month, the indices of both groups became equal and then the EM-1 group had the daily gain higher. The highest result was obtained on the third month of feeding: the difference in daily gain with control group constituted 250.0g, and total gain 750g/day. During the following months the difference in gain remained the same and became some lower as the age and weight of animals increased. This result is typical, and we obtain such results constantly with separate variations independence of fodder equality and strictness in technology.

The next conclusions can be made from this:

1. The maximum effect in EM-1 application in swine breeding is obtained 2.3 months after the beginning of feeding.
2. In more remote terms, the EM-1 effect remains in case when moderate supporting doses of EM-1 are used.

It is necessary to add also that the EM-1 administration to small weaned piglets decreases the rate of gastrointestinal disorders and by 10% death rate.

The result of EM-1 application in poultry farming are adduced on given slide (EM-1 effect on the weight of broiler hens). The EM-1 application in the form of bokashi began in the age of 10 days and already after 20 days the effect was registered: the gain increased: the gain increase as compared with chickens without EM-1 the end of month, the gain increased more and continued increasing during the following two months. Thereby in this case too there was certain time period needed for obtaining effect of EM-1.

We would continue demonstrating similar result; however we would like to touch the data on the mechanisms of EM-1 effect in the organism . This is important in principle because we have to know on what this effect is based and how EM-1 affect the state of animals. It was studied with this objective as follows:

1. General state
2. Protein formation-especially in muscles
3. Mineral exchange and its regulation
4. Immune system-inorder to assess the effect on health
5. Endocrine system
6. Per oxidation system-for assessing the protective force
7. State of blood
8. State of genetic material etc.

As the result show on given slide, the principal gain in chickens is reached for account of protein formation both in white muscles and red ones. The protein content in spleen increases too (in a lesser degree however). EM-1 does not affect the protein content in liver. Thus it is important to stress that the gain of animals takes place for account of increase of muscles mass and protein content in muscles. This improves the quality and the value of produce. On the other hand, the protein increase in spleen is perhaps one of ways promoting the activation of formation of factors of immune system.

The data are also adduced on this slide concerning the EM-1 effect on contents of DNA and RNA which relate to hereditary material of cell. As it is seen, EM-1 does not affect considerably DNA and RNA contents in liver, spleen and muscles. This indicates that EM-1 does not affect the genetic material of cell, and this is important. Another important factor of EM-1 action is its effect on calcium-phosphorus and receiver alkalinity of blood. As it is known, calcium and phosphorus are the macro elements which provide the formation of bone tissue, and consequently, of skeleton. They are needed also for many exchange processes as well as regulatory ones, e.g. of heart muscle. You may see that the calcium content in blood cocks and hens does not change practically. At the same time, the EM-1 application leads to the increase of phosphorus content in blood (more in cocks).

It also follows from these data that the content of protein increases in blood. This can be considered as a positive fact. The reserve alkalinity of organism does not change; this can testify to the preservation of balance of many processes including synthesis and decay.

As it has been regard, the principal place of Ca and P content is bone tissue. While the contents of Ca and P in blood remain more balanced, the changes in bone tissue of birds are more expressed. In particular, both in cocks and in hens takes place the fall of Ca content and the rise of P. The Ca/P ratio decreases also in both groups.

The increase of phosphorus content in blood and especially in bone tissue takes place against the background of growth of alkaline phosphates actively. The increase takes mainly in its thermolabile fraction which is responsible for calcium-phosphorus exchange in bone tissue. The thermolabile fraction of alkaline phosphates does not change significantly. Namely the thermolabile fraction regulates the calcium-phosphorus exchange on the level of liver. The rise of alkaline phosphates activity conditions the increase of P content. The revealed fact did not attract our attention at first because there was a situation analogous to the resorption of bone tissue which arose under the EM-1 effect. The deeper investigation and analysis have shown the next: the organism is young and under the EM-1 effect, the activation of all processes takes place including growth, therefore the bone tissue resorption is not performed and the Ca content which is usually balanced in fodder is not sufficient. Owing to this, the application of higher Ca content simultaneously with EM-1 will strengthen EM-1 effect on growth and development of bird.

The third important aspect of mechanism of EM-1 action is its positive influence on immune system.

The first and the simplest index EM-1 effect on immune system is the assessment of state of organs of immunogenesis-spleen and thymus-and state of peripheral blood.

The given slide shows the effect EM-1 on the state of peripheral blood. In this case, in order to reveal the most expressed effects, it was used the additional action injuring organism: the chronic irradiation in low doses. For it is absolutely proved the injury of immune system with appearance of immune deficiency. This could be also any other injuring factor: infection or other animal diseases.

The irradiation of animals led to the decrease of content of leukocytes in blood. The EM-1 application allayed this effect in blood. Approximately the same dependence was found in neutrophils content. It is important to stress that EM-1 use prevented the decrease of content of lymphocytes which play paramount role in formation of organism's immunity. The levels of contents of eosinophils and basophils changed insignificantly in all cases.

The organs of immunogenesis spleen and thymus-responded to the injury with the increase of their mass. The last relates more to the spleen. The EM-1 application allayed the injuring effect on the function of these organs.

Very interesting and important data were obtained at the study of T- and B- lymphocytes function.

In this case, the injury of animal organism caused by the irradiation conditioned the increase of spontaneous proliferation (we had seen this in case of content of neutrophils in blood). The EM-1 application lowered this effect without preventing it at all. This is connected, probably with strength of injuring factor.

At the assessment of function T-lymphocytes which play an important role in cell immunity of organism it was established that the EM-1 application preserved the activation ability of T-lymphocytes in response to the action of injuring factor inhibiting their function.

The analysis of proliferation ability of T-lymphocytes in response to their stimulation with concavaline

and phorbolacetatemiristate has shown also protective effect. However it has been less expressed as compared with T-lymphocytes activation.

It is important that one year after the action of injuring factor and one month long application of EM-1 its effect remain like the consequences of injuring factor. In animals which have obtained EM-1 there has not been found the increase of spontaneous proliferation of lymphocytes and is absent practically the inhibition of activation of T-lymphocytes; this has been revealed with application of concavaline. The proliferation ability of T-lymphocytes remain higher in animals which have obtained EM-1.

The effect of EM-1 on the function of B-lymphocytes is less expressed than that on T-lymphocytes. Nevertheless the activation ability of lymphocytes in response to the pokwitmitogen incorporation and their proliferation ability in response to the incorporation of pokwitmitogen and phorbolmiristate in animals which have obtained EM-1 are higher than in those without EM-1.

EM-1 exerts an expressed effect on the function of interleukine-2 which plays an important role in the activation of inactive T-lymphocytes. The interleukine-2 function has been assessed by the stimulation of its reception on lymphocytes.

Thereby the activation ability of interleukine-2 lowers under the effect of injuring factor on organism, and the EM-1 application promotes the preservation and even the increase of it.

The effect of EM-1 on the function of B-lymphocytes remains one year after its application, though these changes are less expressed in B-lymphocytes. So, the activation ability of B-lymphocytes in response to *Phytolacca Americana* is practically on the level of normal animals, though, by the moment, the injuring effect has lowered itself. However the application of lipopolysaccharides in B-lymphocytes stimulation reveals the protective effect of EM-1 which remains also relating to interleukin-2 reception.

The forth important factor-which may be considered as protective one-is the effect of EM-1 on processes of lipids per oxidation. Their activation leads to the formation of free radicals in organism which are very toxic substances.

Malonic dialdehyde is one of final toxic products of lipids per oxidation. Its growth takes place under the effect of injuring factor. The application of EM-1 has caused in considerable decrease: its level has become even lower than the control one.

EM-1 influences also the fermentative link of antioxidant system of organism. When the EM-1 is being administered to animals, the activation of super oxide dismutase takes place, however it is not so considerable as it is without EM-1.

The activity of another enzyme of antioxidant system-catalase of blood-is analogous to that of super oxide dismutase. In particular, when the EM-1 is being administered, its activity remains on the control level.

The antioxidant activity of liver in given conditions has not changed significantly. However the administration of EM-1 to animals increased the antioxidant activity in liver.

Thereby the EM-1 in animal organism influences many functions and system: immune, system of lipids per oxidation, mineral exchange, protein formation. It does not influence or influences in lesser degree of nucleic acids which play an important role in hereditary apparatus.

As a result we have, firstly, the acceleration of metabolic processes. This promotes the development of organism and increase of its mass. Secondly, the increase of productivity. Thirdly, the improvement of product quality and, fourthly, the EM-1 exerts protective and normalizing effect under the action of injuring factors, diseases including contagious ones, promoting thus the preservation and recovery of organism's health.



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