



## Use of Biophysical Methods in Animal Husbandry

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**Annotation:** Early assessment of the functional status of the organism of farm animals, the development of appropriate, reliable, highly sensitive methods to predict their future breeding and productivity remains the most important challenges of our industry.

**Basic terms:** qarakul breed, pasture, extreme conditions, meat, biophysics, environmental, factors, low intensity, laser radiation, immune status, natural resistance, T- and V-lymphocytes.

In order to achieve efficient and environmentally friendly sheep breeding, it is necessary to significantly increase the share of pasture fodder in the diet of sheep, to develop many new technological processes of growing fodder crops in different conditions.

It often takes many years to create technological methods to increase productivity (create new breeds) or negatively affect product quality (introduction of nutrients, biological additives, hormones, antibiotics), which remains dangerous for consumers. With the development of the natural sciences, technical and instrumental advances, it became possible to study the mechanisms of action of physical factors, especially electromagnetic radiation, on living tissue, body, system, individual organs, tissue, cell and molecular scale.

It is believed that the field of view of the white light spectrum has a special place among the influencing factors. Light plays a very important role in the growth and development of animals. Although the phenomenon of laser radiation has been widely used in photobiological processes, it is not sufficiently theoretically substantiated. It laser radiation through a high degree of statistical sorting (harmonization) increases the functional activity of living organisms.

In the conditions of feeding with nutrient rations that contain all the nutrients, effective methods of increasing the production of agricultural animal products are used. In particular, the most important aspect of laser radiation when used in a complex effect on the body of animals is that it penetrates deep into the tissues of the body. Laser radiation is used to treat animals, prevent disease, and increase animal productivity.

In veterinary medicine, the effects of laser radiation on animals have not been fully studied. In recent years, in animal husbandry, too, researchers have been using some properties of laser radiation. The most important aspects of laser radiation are: coherence — in which the radiation is simultaneously generated by atoms in the same phase; monochromaticity-radiation has the same oscillation frequency; high energy density, precise direction, the ability to form a beam of thin rays, the ability to control radiation - are widely used in all fields, including science and medicine.



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Low-intensity lasers are most commonly used in medicine and veterinary medicine for therapeutic purposes. Their strength is chosen so that even the effects of heat are not felt, do not damage the skin tissues of the body, but have a surprising effect, penetrating into the tissues to a depth of 5-7 cm. Only low-intensity lasers have this feature. The optimal laser device allows the body to "select" the specific (optimal) frequency range, that is, when electromagnetic vibrations are transmitted in a "floating" mode, the body "selects" the required range for itself[3]. According to many researchers, low-intensity laser radiation has a sensory-enhancing effect, stabilizing blood movement and absorption, as well as causing extensive photophysical and photochemical changes.

The term "laser" is derived from the English words "Light Amplification by Stimulated Emission of Radiation" and means "amplification of light through forced radiation." A laser is a light source created when the atoms of a certain substance are awakened by an external light source. When these atoms are initially exposed to external electromagnetic radiation, forced radiation of light occurs[4]. In the process of laser processing for industrial technologies, taking into account the depth of absorption of the laser into biostructures and the mechanism of action, in our opinion, the effect of lasers on the structures of a living organism is a very important issue. That is, not only frequency, consistent sensitivity, but also radiation modulation and polarization type have different effects on the organization and development of living things from the molecular cell to the whole organism. Experimental studies have shown that low-intensity laser beams do not pose a risk to the animal's body when used normally, as well as the effect of laser radiation on the biochemical and hematological parameters of the blood and the restoration of body functions can be described as "biostimulation"[5]. When laser radiation is used to treat animals, the wavelength, power, and method of application of the laser beam are important. Here, the intervals of laser radiation and the dose are selected depending on the type of disease identified. The results obtained depend on the intensity of the effect. There are 3 main methods used in the use of laser radiation in veterinary medicine. When using the methods are selected depending on the size or pathological type of the object

1. Interaction (contact) method - the illuminator is touched to the object or pressed to the skin with a little force (so that the light penetrates deeper and returns less and is scattered). With this method, maximum intensity energy flow through small surfaces can be achieved.
2. Stable method — for this method, the illuminator is fixed firmly in the immobile area and the object is irradiated for at least one minute.
3. In the unstable (unstable) method - the radiation is carried out along the affected area.

In contrast, there is a scanning method in which the movement of the luminaire is performed continuously over a period of time, and in the quasi-scanning (more efficient than scanning) method, a "jump-jump" movement is performed, holding for 15-30 seconds at each processing point. According to the above-mentioned authors, the unstable method is used to provide a large amount of damaged areas or minimal intensity[11].

The effect of laser light on the body can be observed through different magnitudes: wavelength, intensity, dose, monochromaticity of radiation. The organic effect of laser radiation on tissues depends on the wavelength, intensity and dose of radiation. The photobiological process of radiation causes specific changes in the neurohumoral linkage, providing the mechanism of rapid adaptation of the organism to the normalization of homeostasis.



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When the body is exposed to laser radiation, the effect on the skin's extrareceptors and the course of reactions that occur in the vascular system, as well as on the interreceptors of the nervous system shell, nerve fibers and vascular receptors is an important process.

It has been suggested that the distinctive feature of laser radiation over other types of electromagnetic fields is the inseparability of the concepts of "life and light"[6]. The effects of laser radiation on food digestion and for therapeutic purposes can be widely used in veterinary medicine as well as in animal husbandry. In particular, the biophysical method used in animal husbandry, poultry, pig breeding and agricultural industry, which is naturally clean, safe and highly productive, is the most optimal method for economic development.

Low-intensity laser radiation has different effects on different animals. The advantages of these rays are also combined, which creates a wide range of applications for the practical application of the wavelength and intensity range of laser beams in veterinary and zootechnics.

Using a complex of biological and biophysical methods of exposure to laser light is used to increase the healthy growth rate of lambs, including young cattle. Good performance results in lambs were 18.8–26.4% superior to the control group[7].

The study of the field effect of low-intensity laser radiation in the stratum corneum shows that the number of "suckers" in the stratum of experimental animals increased in the uninvolved control group ( $R > 0.99$ ). The results of the experiments showed that when laser cows were exposed to laser light, the number of large abdominal protozoa increased and the volume of milk produced increased. It was observed that the mass of irradiated control calves was much higher than that of other group calves. It is possible to conclude that the productivity of dairy products and the increase in live mass depend on the composition of the protozoa in the large abdominal fluid[8].

An average daily increase in the age of 10 days to 21 days was observed with a 27.3% increase compared to control piglets, i.e., an increase in the intensity of growth in pigs under the influence of laser radiation. The use of low-intensity laser radiation also showed a daily increase in ontogeny between the first and last treatments in pigs up to one month of age in the primary, experimental groups, with 37.1 and 38.4% increases, respectively, compared with other observed pigs. This leads to the neutralization of unwanted environmental influences during the exposure period.

The increase in live weight and average daily growth of large white and early-maturing meat breeds of animals shows that laser radiation has a positive effect on the pig body, i.e. the effect of low-intensity laser radiation showed increased resistance to stress and accelerated anabolic processes in restless, restless species. It was concluded that using biophysical methods in farm animals can achieve positive results in their development and growth. In their opinion, the isolated showed that the live mass of the group of animals exposed to laser radiation at a moderate level was 26.0-38.0% superior to the rest of their peers[9].

Exposure to laser beams has been effective on the body of calves, balancing the effects of various external stressors on the body of young calves in the newborn period and leading to an increase in growth of up to 10.0%. In cattle, laser irradiation of the udder area of dairy cows reduced the difference in milk yield between the anterior and posterior calves. After 7 days of laser exposure, the productivity of narrow-bodied cows increased by 9%, while that of broad-bodied cows increased by 3.6%. It should be noted that when the mammary gland is exposed to low-



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intensity laser radiation, its function is activated, after which it is possible to observe a genetic activation of milk production in the cow's body.

Optimal values for exposure to helium-neon lasers are power 0.1 mW / cm<sup>2</sup> and exposure time 10 minutes, laser light frequency at 80-160 Gts (infrared rays), exposure time 1-3 minutes during the first 10 days after calving. the effect of laser light on the mammary glands increased the milk yield of cows by 6-9% and increased the amount of milk fat by 10.3% and protein by 10.5%.

The females were irradiated with a low-intensity laser. The researchers note that the laser has a positive effect on the increase in milk yield and changes in milk quality and caloric intake. The use of lasers in pigs ensures the appearance of signs of sexual heat, the ability to reproduce highly reproductive germ cells. Increased sperm production and quality of pedigree rams under the influence of laser (density increased by 2.2-2.4 times, activity increased by 22.2-24.9%) and the volume of loose (when exposed): 2 minutes-31.1-31, An increase of up to 9%, 4 minutes-90.1-91.5% was found. According to the results, the application of specific methods of assessing the genetic potential of males using low intensity of laser radiation in the development of breeding increases their reproductive function, which allows for the practical reproduction of species that need to be used in the future.

In poultry, lasers have been used to open chickens, raise them, and increase their productivity. They reduce the number of frozen embryos under the influence of laser light before incubation and during the incubation period of the egg, shorten the incubation period of eggs to an average of 8-15 hours, increase opening, enhance the growth of feathers and post-embryonic development of chickens and geese[10].

They noted that biophysical methods play an important role in solving the breeding problems of birds. In this case, the effect of low-intensity laser radiation on the body of roosters from the experimental group of the Alatau cross has an effective effect on the regulation and potency of the composition of blood flowing in the body, metabolic processes, androgen proliferation. It also has a positive effect on the growth and development of birds. In active men in the experimental group, the level of sex hormones was 9.6%; average activity was found to be 5.20%, which is 2.4% higher than the rest of the group of birds. It is recommended that poultry broilers be irradiated with laser radiation before incubation to improve their viability, productivity, and quality of the meat grown. According to him, the effect of laser light increases muscle tissue by 90 g and high-quality meat by 6.6%. In order to treat horses in horse farms and when horses participating in sports competitions are exposed to laser light, it has been found that horses' endurance and physical endurance are increased, allowing rapid breathing adjustment to be achieved by showing that horses do not exceed pulse and respiration rates when used in heavy work. After 5 months of biophysical therapeutic treatment, the pulse and respiratory rate remained virtually unchanged[11].

It has been stated that the effect of carbon dioxide (SO<sub>2</sub>) laser radiation on silkworms can be expected to be high in improving product quality while enhancing and accelerating partogenesis processes. During the embryonic development stage, irradiated with laser light corresponding to the infrared spectrum, 50-day-old juvenile ocean fish were confirmed to be 1.9 times their live weight and 1.2 times their length longer than their peers. It should also be noted that in fish farms, a rise in the critical temperature for fish also increases the likelihood of survival in juveniles when their viability is significantly increased as a result of exposure to laser radiation[12].



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Summarizing the experimental data, it is believed that using low-intensity laser radiation in the thymus area can increase productivity, increase the body's immune system to fight infections, metabolic processes in animals and safety in lambs.

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