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Influence of additives of humic nature on indices of natural protein and energy metabolism in pigs

To investigate the effect of the feed supplement of humidine on the energy and protein metabolism of sows and piglets. Methods. In blood plasma of animals, the glucose, total protein, alkaline phosphatase activity, aspartate aminotransferase and alanine aminotransferase were determined by well-known methods. Results It was established that the additive humilite normalizes the concentration of glucose, increases the content of total protein, the activity of alkaline phosphatase, aspartate aminotransferase and alanine aminotransferase in the blood of animals within the limits of the physiological norm, increases productivity and persistence of piglets. Conclusions The prolongation of the positive action of humidiv on the organism of animals was revealed.

Key words: sows, piglets, critical periods of ontogenesis, humilide, protein metabolism, energy metabolism.

The problem of increasing productivity, viability and preserving the health of vivo-productive agricultural animals is now paying great attention. The characteristic feature of high-producing animals is the increased sensitivity to the conditions of maintenance and feeding, the stresses of different etiologies, and the ability to adapt to various external influences. In different age and technological periods in pigs there is a mismatch between the biological nature of their organism, physiological capabilities and the environment. Therefore, for the purpose of prevention and correction of stressful conditions, special feed additives are used, which neutralize the negative influence on the immune system, antioxidant system, metabolism, and the hormonal status of the pig's body [1, 6]. To mitigate the effects of stress in animal breeding, including in the most critical periods of ontogenesis, the search, development and implementation of environmentally friendly, low-toxic and highly effective drugs based on domestic ingredients that can be used in feed with animals are relevant. Polifenol preparations derived from peat are known for their immunomodulatory, adaptogenic and antioxidant properties. They normalize the metabolism of animals and poultry, enhance the action of vitamins and minerals [3]. Preparations are non-toxic, in the organism of animals quickly metabolize, have functional groups and are capable of chelation formation. As biologically active compounds, humic substances (specific to each specific treatment) can be the source of new biologically active substances. This is used by scientists to produce broad-spectrum drugs on their basis. In an organism, they perform a unique function to support the constancy of internal homeostasis of the biosystem at the tissue, cellular and sub-cellular levels, contributing to the restoration of physiological functions in the case of a pathological condition and in extreme situations [5, 7, 8]. The purpose of the research is to study the influence of the biologically active feed supplement of humidil on the parameters of protein and energy metabolism in the blood of sows (during fertility and lactation) and piglets (newborns and periodis weaning). Materials and methods of research. The research was carried out in the private FG "Spadshchina" in the village of Bayatichi in the Kam'yansko-Buzka district, Lviv region. On the sows of a large white breed and of pigs born of them. On the principle of analogues were formed 3 groups of animals - control and 2 experimental, with 3 germinating sows in each. The animals are fed on a standard diet, balanced by basic nutrition indicators, with free access to feed and water. The entire study period is 68 days. The control bovine (SB K) and the second experimental group were kept on a standard diet, and in the sows of the experimental group II (СВ Д), starting from 14 days before and 9 days after the farrowing, a 1% solution of biologically active Feed additive humilide (TU U 15.7-00493675-004: 2009) at a rate of 0.5 ml / kg body weight (feeding

period - 23 days). After birth of piglets from sows I (P D1) and II (P D2) experimental groups, from the age of 25 to the diet, a 1% solution of the biologically active feed additive humilide was added to the diet at a rate of 0.5 Ml / kg body weight for 26 days. Piglets, born from sows of the control group (P K), received only pie-starter feed PigCombiPrestart, which is used in this farm for tvarins until they reach a live weight of 15 kg. Weaning the piglets at 40-day age. Material for the study is swine blood collected from the vein, piglets from the inferior vena cava. In sows of all groups, blood was collected 14 days before, 10 and 25 days after fertilization. The pigs were taken in 10-, 25-, 35-day old (5 days before weaning) and 4- (44-day old) and 14-day (54-day age) after weaning from sows. Blood glucose, total protein, alkaline phosphatase (LF) activity, aspartate aminotransferase (ASAT) and alanine aminotransferase (ALAT) are commonly known in plasma blood plasma [4]. The received digital data was processed statistically with the use of average values, their deviations and the degree of probability by the Student's coefficient. Research results. As is known from literary sources, protein metabolism coordinates, regulates and integrates most of the chemical transformations in the body. It is precisely with the protein state that the onset and spread of percolation, muscle contraction, oxygen transport, blood properties, immune protection, the transmission of hereditary information, etc., is associated with the state of proteins. In addition, proteins are a source of energy [9]. For a better understanding of the mechanisms of adaptation occurring in the organsism of sows and piglets, a great strategic importance is the determination of the intensity of protein metabolism in blood plasma of animals in the most critical periods of their development.

Fig. 1. The content of total protein in the blood plasma of sows and piglets (M ± t; n = 5): SH - SV K; □ - CB Д; □- PC; SH - PID; □- P D2 (the reliable difference of the indicators of the experimental groups is compared with the control: * P <0,05; ** P <0,01; *** P <0,001) (for Fig. 1 -5)

As a result of the studies, the positive effect of humilida on the protein metabolism of sows and piglets was established. Thus, in the sows of the trained group (CWD), at 10 and 25 days after farrowing, the increase of the total protein concentration was found to be 15 and 11% (P <0.01), respectively, in the animals of the control group (Fig. 1) In piglets A1, a higher protein content was set at 10- (1.2 times) (P <0.01) and 25-day-old age (1.6 times) (P <0.001) for control. Feeding to humilis piglets contributed to the increase in the concentration of total protein in animals D1 in the 4th day after weaning at 8% (P <0.05), especially in piglets D2 for control of 4- (13%) and 14- (18%) (P <0.01 - 0.001) days after weaning (see Fig. 1). The obtained data can be explained by the fact that rubber substances, due to their donor-acceptor properties, can enter the cells in the ion-dispersed state and thus influence the intensification of oxidative phosphorylation processes. The extra energy that is produced during this process primarily uses cells to enhance protein synthesis [1]. The influence of humates in the liver activates the system of intracellular hydrolases, which increases the synthesis of blood proteins, as well as stimulates the cleavage and assimilation of feed [5]. The level of protein metabolism in the body is also evidenced by the intensity of reamination (the inverse transfer of amino groups between amino acids and ketoacids), which occurs with aminotransferase. We have established the positive influence of humic substances on these processes in the blood of sows and piglets of both experimental groups. The activity of ALT was significantly increased in sows of the experimental group with respect to the control of the 10th (1.2 times) and the 25th (1.5 times) days after the fertilization (Fig. 2). Particularly, the activity of this enzyme in the limits of the physiological norm was increased in piglets D1 in relation to control animals. This can be explained by stimulation of gluconeogenesis under the influence of humilida in sows and piglets from piglets from them [3]. Thus, in the period from the 25th day of life to 4 days after weaning, the activity of AlAT in piglets D1 was likely to increase in relation to control from 13% to 22%, and at the 14th day after weaning at piglets D2 - by 30 % (See Figure 2).

Fig. 2. Activity of AlAT in blood plasma of pigs and piglets

AST activity increased significantly in svy¬nomatok on the 25th day after farrowing 2.3 times relative to control, especially in naro¬dzhenyh of these pigs, on the 10th day zhyt¬tya - 1.3 times, and after Additional feeding of humilid: for 5 days to weaning - 1.5 times and for the 4th day after removal - 1.2 times (Fig. 3). In the piglets of D2, the enzyme activity increased by the 5th day after weaning by 13% (P

<0.01) for control. The increase in AST activity within the physiological norm under the influence of humic re¬chovyn evidence of catabolic stimulation of thermogenesis in the body of sows and piglets research groups [9]. An intensification of energy and activation processes of aerobic oxidation tka¬nynah animals in research groups under the influence humilidu indicates increasing concentrations of key metabolite obmi¬nu energy - glucose. Thus, in the blood plasma of experimental sows at the 10th and 25th day after farrowing, a reliable increase in its content in relation to control animals was found to be 10% (Fig. 4). The increase in glucose under the influence of humates in the blood of sows during lactation suggests that they increase the intensity conversion nevuhlevodnyh hlikohennyh po¬perednykiv into glucose, which is a precursor of milk sugar - lactose, glycerol skeleton triglycerides, and elevated vykorystovu¬yetsya to provide the energy Vital processes in the mammary gland [10, 11]. In the pigs of both experimental groups, after reconstitution of the humilid on the 4th day after removal, the opposite was observed - a probable decrease in the control of glucose concentration (in animals D1 - in 1,2 and D2 - in 1,3 times) (see. Figure 4). These results can be explained by increased utilization in the body hlyuko¬zy pigs under the influence of rubber-ing, thus reducing its level in the blood to the physiological norm, and use as a structural plastic material multicomponent compounds intensyv¬noho cells during growth [3]. The activation of energy processes and the increase in the level of an additional phosphate source in the body under the influence of humidines is evidenced by the growth of LF activity in pigs and piglets of experimental groups. This fermentation catalyzes the cleavage of the phosphate group from the organic mono-ethers of orthophosphoric acid, and also responsible for the absorption of phosphorus from animal rations. In the sows, the activity of LF significantly increased in the 10th day after the farrowing at 2.19, at 25th - 3.8 times relative to the control animals (Fig. 5). It is known that in the 2nd half of fertility and during farrowing, active growth and destruction of the placenta cause an increase in enzyme activity due to placental isoform [6, 9]. In the blood plasma of piglets D1, the activity of LF increased in the 10th day of life in 1,6 (P <0,001), on the 25th day - in 1,8 times (P <0,001). Feeding humilidu caused pidvyschen¬nya enzyme activity of control on the 5th day before weaning piglets D1 2.4 (P <0.001) in D2 - 1.5 times (P <0.01), and the 14- That day after weaning - in animals D1 - in 1,6 (P <0,001), and in D2 - in 1,4 times (p <0,01) (see Figure 5). The high activity of LF in the blood of young animals is due to the intensive function of osteoblasts in bone tissue, which is due to processes of active growth of organism, especially in piglets of experimental groups. During this period, the activity of the enzyme in the blood increases due to bone isoenzymes.

Fig. 3. Activity of AsAT in the blood plasma of pigs and piglets

Fig. 4. The content of glucose in the blood plasma of sows and piglets

Fig. 5. Activity of LF in the blood plasma of piglets and piglets The higher activity of LF in the blood of experimental herbivores is also explained by the intensification of phosphorylation processes due to the better absorption of phosphorus from the body by the influence of humic substances [1, 11]. The studies conducted by us have also established the positive influence of humidine on the system of antioxidant protection (activeness of superoxide dismutase and catalase) and the inhibition of free radical processes (concentration of TBK-active products, lipid hydroperoxides and carbonyl protein groups) in sows and born Their piglets. This indicates an increase in the adaptive capacity of the animal organism for the influence of humates in the most critical periods of animal life (male fertility, lactation, newborn infections and exacerbation) [2]. Taking into account the performance indicators, it was found that the live weight of 1-day pigs born from sows, which added to the diet of humilide, was higher in relation to control by 13%. At the end of the experiment, the live weight of the 54-to-bovine pigs of the I experimental group was 16%, and the preservation was 12% higher than that of the animals kept in the standard diet.

Conclusions

Thanks to the addition of a biologically active feed additive, humidol to the standard diet of sows and piglets in critical periods of ontogeny in their body intensifies energy and anabolic processes, increasing performance and preservation. It has been established that humidide has a prolonged effect - it supports

the metabolism of the body at the highest level even after it has stopped feeding, which is positive for animals when exposed to various stressors.

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