

The Effect of Vitamin Premixes on Some Physiological and Biochemical Indicators of the Body of Laying Hens

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The first is the feed itself. The largest number of them are of plant origin and are divided into bulk (hay, silage, beets, straw) and concentrated feed (grain of various crops, cakes, meal). Further, we can name feed of animal origin (skim milk, fish meal, meat meal, bone meal), feed of microbiological and chemical synthesis (yeast, synthetic amino acids), mineral supplements (chalk, table salt, monocalcium phosphate, dicalcium phosphate, etc.).

The second component of the modern feed market is a variety of functional components, which include vitamins, microelements, probiotics and prebiotics, organic acids and bacteria, dyes and more. To solve certain problems, they can be presented in the form of complex mixtures.

Another segment of the feed market – protein supplements (concentrates) – occupies an intermediate position between feed and premixes. Among them we can distinguish protein vitamin and mineral supplements (PVMD), protein vitamin supplements (PVS), protein vitamin and mineral concentrates (PVMC), vitamin and mineral concentrates (VMC). Their main function is to compensate for the deficiency of protein and certain amino acids in the diets of animals and poultry.

What is premix According to the modern classification of feed, premixes are classified into a separate group. Traditionally, they are a complex complex of functional components (mainly microelements and vitamins). Some premixes may also include amino acids (amino acid premixes). Premixes got their name from the combination of two words: “preliminary” and “mix.” Mixing of the active functional elements of the premix is carried out on the basis of a filler (bran, cake, meal, etc.). In this case, it becomes possible to evenly distribute the premix in the feed mixtures.

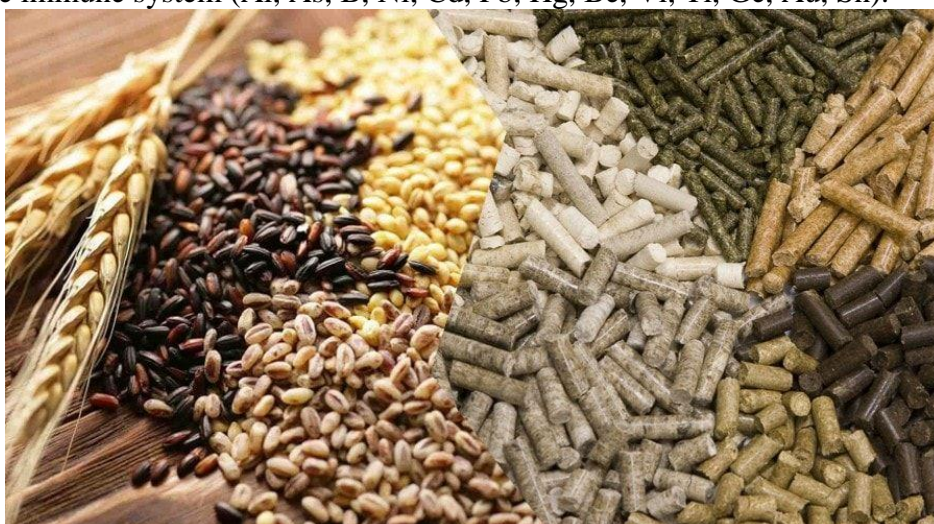
As part of the premix, microelements and vitamins are introduced into the filler, which improve the body's immune defense, ensure its performance and high level of productivity. Additionally, enzymes are added to increase the level of digestibility of feed and stimulate metabolism in the body of animals and poultry. Flavorings are used as part of premixes to enhance feeding behavior. Probiotics and prebiotics are administered to optimize the vital activity of microflora in the gastrointestinal tract. Antioxidants and preservatives ensure the quality of the feed additive during long-term storage.

The difference between premixes and dietary supplements Premixes differ from dietary supplements by a significantly lower dose of input into mixed feed (1-2% by weight versus 10-25%). This is due to the fact that they are mainly concentrates of microelements and vitamins, the amount of which is expressed in milligrams or even micrograms. In this case, the filler, in which the active components are evenly distributed, can occupy up to 90% or more by weight. It follows from this that the biological activity of the premix components is extremely high. Their main function is to compensate for the deficiency of microelements (the main ones are Cu, Zn, Mn, Co, I, Se) and vitamins (A, D, K, E, group B, etc.) in the diet of animals and poultry. A few tens of grams of premix are quite capable of making up for the lack of the above components in the diet of a cow weighing 500-600 kg. Intermediate forms between premixes and protein additives, which today are commonly called amino acid premixes, are also possible.



Modern classification of mineral elements

The range of biologically active substances included in premixes is constantly expanding. This process will continue further as the role of individual mineral elements and vitamins in the body of animals and poultry is clarified. At the moment, the function of most components of modern dietary supplements has already been studied. On this basis, in the reference book of the module “Diets of Highly Productive Cows” of the 1C: Cattle program, a classification of mineral elements is proposed, which distinguishes: vital (Ca, P, K, Na, S, Cl, Mg, Fe, Zn, Mo, Cu, I, Mn, Se, Co, Cr); probably necessary (As, B, Br, F, Li, Ni, V, Si); toxic (Al, Cd, Pb, Hg, Be, Ba, Vi, Tl); potentially toxic elements (Ge, Au, In, Rb, Ag, Ti, Te, U, W, Sn, Zr). There is also a classification of mineral elements according to their immunostimulating effect: necessary for the immune system (Fe, I, Cu, Zn, Co, Cr, Mo, Se, Mn, Li) and toxic to the immune system (Al, As, B, Ni, Cd, Pb, Hg, Be, Vi, Tl, Ge, Au, Sn).



The role of vitamins in premixes for the body and its immune system

Vitamin A and carotenoids. A group of compounds with the biological activity of retinol is combined under the name vitamin A. It plays an important role in the animal body, including the processes of vision, regulation of membrane penetration, transport of monosaccharides, metabolism of proteins, lipids and carbohydrates. It is important that vitamin A maintains the integrity of anatomical barriers, such as epithelial and mucosal surfaces, which constitute the body's primary nonspecific defense.

Characteristic signs of vitamin A deficiency include inflammation of the cornea and keratinization of the epithelium of the lacrimal canals. This is accompanied by closing and drying of the eyes. In parallel with this, the degree of keratinization and desquamation of the epithelium of the respiratory tract, digestive canal and urinary tract increases. Separately, it should be emphasized that in this case the immunity against infectious diseases is weakened. Vitamin A is added to premixes in the form of retinol (stabilized vitamin A). It is a yellow powder with good flowability. Stabilized with gelatin. Soluble in water, ethanol, acetone and fat.

Vitamin D. Can be found in two main forms: ergocalciferol (D2) and cholecalciferol (D3). The action of the ultraviolet spectrum of sunlight with a wavelength of about 256 nm converts 7-dihydrocholesterol in the upper layers of the animal's skin into cholecalciferol. Next, the active form of vitamin D3 acts on the mucous membrane of the small intestine, causing the formation of Ca-bound proteins that facilitate the absorption of Ca and Mg by the body. This vitamin also affects the absorption of phosphorus in the intestines.

Lack of vitamin D in the body of animals and poultry causes disturbances in the metabolism of calcium and phosphorus. The consequence of this is rickets in young animals, and in adult animals - osteomalacia due to insufficient bone calcification. With an acute deficiency, symptoms of calcium and magnesium deficiency sharply appear - tetany of smooth and skeletal muscles. As part of feed additives, cholecalciferol appears as colorless crystals, soluble in ether, gasoline, fats and oils, but insoluble in water.

Vitamin E. A general name for compounds similar in chemical structure that exhibit the biological activity of α -tocopherol. The function of vitamin E is to protect the cell membrane from oxidation. Tocopherol plays the role of a biological antioxidant in animal tissues, inactivating free radicals and thereby preventing the development of lipid oxidation processes by molecular oxygen. At the same time, it functions as a regulator of energy metabolism and affects the functionality of the immune system (biosynthesis of prostaglandins, helper activity of T-lymphocytes, etc.).

With a lack of vitamin E in feed, disturbances in the reproduction of animals and poultry occur. It has also been established that the lack of this vitamin affects the morphological and functional state of the endocrine system. The result is degeneration of skeletal and cardiac muscles, thrombotic vascular damage, anemia, and liver necrosis. In this case, the unexpected death of the animal is quite likely. As part of premixes, vitamin E has the form of a gray powder, with a faint odor of meat and bone meal and good flowability. Soluble in acids and fat solvents.

Vitamin K. Necessary for the synthesis of the blood plasma protein prothrombin and other proteins involved in the blood clotting process. The action is to convert the inactive blood plasma protein prothrombin into active thrombin. In turn, thrombin converts the plasma protein fibrinogen into fibrin. In this way, a dense protein clot is formed that covers the damaged blood vessel.

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