

## INCREASING THE STABILITY OF COMBINED FEEDS DURING THEIR STORAGE

Dudarev I., associate professor, E mail: [247531@ukr.net](mailto:247531@ukr.net)  
Umyskyi S., Ph.D., associate professor, E mail: [ymoshi@ukr.net](mailto:ymoshi@ukr.net)  
Vysotsky A., getter, E mail: [and@gmail.com](mailto:and@gmail.com)

*Odessa State Agrarian University*

***Abstract.** Effective fodder with stable quality indicators allows to maximize the efficiency of feeding in animal husbandry. The effectiveness of the use of compound feed is explained by their quality. The desired result can be obtained under the condition that the formulation and dosage of the constituent components fully meet the needs of the animal body, a certain species, age, direction of productivity and physiological indicators. During storage, compound feed changes its quality characteristics, which leads to a change in the useful properties of the product and can cause diseases in animals. The addition of antioxidants to compound feed increases the stability of vitamins and contributes to the improvement of the quality of livestock products. It was established that the mechanism of action of antioxidants consists in the formation of a slow passage of a chain of oxidation processes, and antioxidant molecules come into interaction and contact with active radicals that are in the product. As a result, less active radicals appear and they do not interact with the molecules of the starting substances. Due to this, oxidation is either slowed down or stopped, but the action of antioxidants is slowly stopped.*

***Key words:** compound feed, spoilage, storage, stability, antioxidant.*

**Introduction.** The use of feeds that are balanced in terms of nutrients, vitamins, minerals, amino acid composition, antibiotics, antioxidants and other biologically active substances and that meet scientific zootechnological requirements is important for increasing productivity in animal husbandry[1,4,5]. compound feed in animal feeding depends on the quality of feed, which deteriorates during storage. Compound feed (roughage) is animal feed, which is a mixture of grain components, high-protein products, vitamins and trace elements [2,3,14]. Compound feed is a complex, homogeneous mixture of different feed ingredients, which are pre-cleaned, crushed and selected according to a scientifically based recipe[6,8,11]. During the storage of feed and raw materials, the amount of protein, fiber and ash usually remains constant, but the content of carbohydrates changes, and some vitamins, carotenes and other biologically active substances are destroyed as a result of oxidation, reduction and hydrolysis. Since feed storage processes are known to be accompanied by deterioration of quality indicators, the addition of antioxidants to feed compositions should increase feed stability and ensure their safe use in animal husbandry. [7,13,10].

**Analysis of recent research and publications.** Compound feed is divided into three types:

- Complete ration combined feeds, which are intended to meet all the needs of livestock or poultry in nutrients, minerals and biologically active substances and are fed as a single ration, are marked with the index letter PC;
- Concentrates intended for feeding animals, except for juices and coarse fodder, are marked with the index letter KK;
- balanced feed additives (protein-vitamin, protein-vitamin-mineral complexes, nutritional yeast, malt, premix).

Raw materials for the production of compound feed can be divided into vegetable, animal and mineral raw materials, animal feed, by-products of the food industry, chemical products and products of microbiological origin[8,9,12].

Complex feed mixtures are a favorable environment for many bacteria, including mold fungi. With sufficient humidity (above critical values) and moderate temperatures (above 10-20°C), mold can develop quickly and emit a lot of heat, which is the main cause of spontaneous combustion. Heating The level of microflora contamination is much higher in bulk feed than in briquettes and pellets. This is due to the effect of high temperatures on the microflora during the granulation process. The difficulty of storing compound feed can also be explained by its high sorption capacity. The stability of compound feed during storage and the duration of its storage without noticeable loss of nutritional value depends on the following reasons:

- Raw material quality and shelf life
- Recipes and cooking technologies.
- Structural, moisture and environmental factors.

The maximum moisture content in various feeds is from 10 to 14.5%. When humidity exceeds a critical value, microorganisms and insects begin to multiply, and biochemical processes are activated. When the temperature and humidity fall below critical values, the safe storage conditions for feed are greatly expanded. [1,11,14]. To stabilize carotenes, domestic industry produces antioxidants santoquin and diludin. Materials and methods of research The object of research was compound feed for broilers of the first (6-30 days) and second (31-70 days) growing periods (recipes No. PC-1 and PC-2). Research results. The three-month loss of vitamin A in the control compound feed on the PK-2 diet was 22.6%, while in the compound feed that received the antioxidant, it varied from 6.7 to 14.6%. The antioxidant properties of santoquine and diludin were at a similar level in this experiment. A comparative analysis of vitamin A content in treated diets showed that vitamin A content was higher in diets with PC-2 preparations containing animal fat. This is consistent with the data obtained in our study on peroxide and acid indices of feed fats. To investigate the influence of different combinations of humidity and temperature on feed stability, chemical composition, and changes in microflora during storage, experiments were carried out on storing products with humidity of 10, 12, 13, 14.5, 16, and 18% at temperatures of 20, 10, 5, and -5°C. For products containing antioxidants, changes in sensory parameters before quality deterioration and the time during which a light malty odor appeared in the product were measured.

**Table. Change in quality indicators**

Storage mode	The storage period of loose compound feed before the appearance of a malty odor without santoquin, days	The storage period of loose compound feed before the appearance of a malty smell with santoquin 0.005%, days	Storage period of loose compound feed before the appearance of a malty smell with santoquin 0.05%, days	Storage period of loose compound feed before the appearance of a malty smell with santoquin 0.02%, days	The shelf life of briquette compound feed before the appearance of a malty smell with santoquin 0.05%, days	The shelf life of granulated compound feed before the appearance of a malty smell with santoquin 0.05%, days
Humidity, %						
18	12	23	37	32	61	75
16	30	43	53	47	82	105
14,5	60	61	71	67	97	142
13	70	92	103	98	121	175
12	85	115	127	120	163	203
Temperature, °C						
20	14	25	35	30	73	89
10	30	45	56	51	92	135
5	45	63	74	69	141	205
5	115	129	141	130	-	-

As can be seen from the table, with a decrease in humidity from 18 to 12%, the duration of storage of compound feed at a temperature of 10 ° C until the appearance of a malty smell increased from 12 to 85 days (i.e. 7 times), and with a decrease in temperature from +20 to - At 5 ° C, the shelf life of products with a moisture content of 16% increased from 14 to 120 days (approximately 8 times).

It was observed that the chemical composition changed slightly, but the number of microorganisms decreased by 2 times. The influence of different combinations of humidity and temperature on the duration of storage of compound feed was also studied before the appearance of a specific smell.

**Conclusions.** It has been proven that compound feed with a moisture content of up to 13% should be stored in production conditions for no more than 21 days from the day of their production. The obtained data confirm a significant dependence on the humidity and temperature of the environment. Studies show that the addition of an antioxidant to the compound feed significantly increases its stability and contributes to its long-term storage. The production of compound feed with the addition of the antioxidant santoquin, in the amount of 0.05%, ensures storage for three months without significant changes in quality.

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