The influence of natural biologically active additives on the growth and development of stallions of the Karabair breed

A A Nurmarov¹*, B D Allashov¹, B Yunusov¹, and Sh Sh Jabborov¹

¹Scientific-Research Institute of Livestock and Poultry, Tashkent, Uzbekistan

Email: nurmatov.a.a@mail.ru

Abstract. The Karabair horse breed is the oldest breed created in Uzbekistan, and today their number is more than 90% of horses in the republic. It is a versatile breed used in sporting games, with good performance, well adapted to local conditions as well as for sports. It is important to study the needs of the Karabair horse breed for mineral supplements and vitamins, replenish them with natural biologically active additives, determine the norms and study the effect of non-traditional dietary supplements on the growth and development of Karabair horses. This article presents the results of a study of the effect of mineral and vitamin supplements obtained from by-products of the grape industry on the growth and development of stallions.

1. Introduction
The problem of fodder production is one of the key factors in the development of animal husbandry. Feeding performance is inextricably linked to the nutritional value and value of essential nutrients. Nutrient intake depends on a number of factors: the stage of plant development, chemical composition, soil properties, the study of animals with certain plant species, the growth of one plant with other plants in the pasture, the type of animal and, finally, macro- and microelements and vitamins.

Scientists Nechaev (1975) [1], Imangaliev (1967) [2], Rizabaev (2003) [3], Kikebaev (1992) [4], and Nurmatov (2004) [5] conducted research on the growth and development of stallions in Central Asia. These authors conducted research on the rearing of stallions of different breeds in different climatic conditions. According to them, the growth and development of stallions is not the same in different periods of growth, they have a high growth rate from birth to 6 months. According to the authors, all growth rates slow down with increasing age of stallions, especially when stallions are taken away from their mothers and kept in stable conditions until spring, their growth slows down significantly, and the daily growth of stallions up to 6 months can reach 0.7-2.0 kg.

When feeding stallions, it is important to take into account the laws of their growth and development. The rate of growth and development is different for different breeds. According to Kalashnikov (1985) [6], 40-45% of the live weight of adult stallions at 6 months, 56-60% at 12 months, 70-75% at 1.5 years, 75% at 2 years. If they weigh -85% and 90-92% at the age of 2.5 years, these stallions can be considered completely nutrient-rich. Minerals, especially calcium and phosphorus, are sufficient to form the musculoskeletal system of horses and should be in a 1: 1 or 1: 0.75 ratio in the diet. It is important to take into account the need for horse vitamins - A (retinol), D (calciferol), E (tokoferol), B1 (thiamine), B2 (riboflavin), B3 (pantothenic acid), B4 (choline), PP (niacin), B6 (pyridoxine), B12 (cyanocobalamin), Sun (folic acid).
The nutritional value of feed plays an important role in the growth and development of stallions. In this regard, Nechaev (2005) [7] in his study indicates that the growth and development of stallions on pastures is uneven, which is associated with seasonal nutrition. According to the observations of Samibekova (2000) [8] the growth of stallions is associated with their feeding, that is, they need to be fed 3 times a day. However, it was concluded that this feeding also depends on climatic conditions, that is, in hot climates, it is necessary to feed 4 times a day.

In the experiments of Kineeva and Adylbekova (1989) [9] studied the coefficient of digestion of pasture grasses. During the study, the digestibility coefficient of dry matter was 47.50%, organic matter - 50.65%, crude protein - 50.50%, crude fat - 45.87%, crude fiber - 44.88% and AEM - 56.11%. According to the authors, knowledge about the assimilation of pasture grasses makes it possible to give scientifically grounded recommendations on the productivity of pastures in conditions of feeding in pasture conditions.

Thus, according to many studies, one of the main factors influencing the formation of horses' meat productivity is nutrition, which is also significantly influenced by the breed, age, and conditions of horses. Taking these factors into account, feeding your horses is important to improve their meat production.

2. Research Methodology

The study was carried out in the military horse breeding farm “Karabair” of the Jizzakh region, Sharof, Rashidov region. The farm maintains more than 250 horses, including 82 stallions, which are kept in stables in winter, and from spring to autumn they are mainly grazed on pastures.

The aim of the research is to study the effect of non-traditional dietary supplements on the growth and development of Karabair horses.

Research objectives:
- introduction of mineral and vitamin supplements from by-products of the grape industry into the diet of stallions and the development of standards;
- to study the effect of mineral and vitamin supplements on the growth and development of horses;
- production of a pilot batch of mineral and vitamin supplements from secondary products of grape production.

The subject of the research was the stallions of the Karabair breed, which were divided into three groups. For the experimental and control groups, 24 heads were allocated (in the control group (n = 8), in the I experimental group (n = 8), in the II experimental group (n = 8)). The control group was fed on the basis of the main diet, experimental I - 200-300 g of the main diet, II experimental group - 300-400 g of a biologically active additive to the main diet.

The growth and development of stallions was determined at 6-12, 18-24 month periods. Live weight was determined by weighing. The main measurements of the body were studied: height at the withers, oblique body length, chest circumference, width at the shoulders, and on their basis body indices were calculated. Clinical parameters (body temperature, pulse rate, respiration) were studied on stallions (n = 3) according to the method of E.A. Arzumanyan (1957). Hematological and biochemical blood parameters (n = 3) were determined in the leukocyte and erythrocyte chambers of Goryaev using the Sali hemoglobin method. On the basis of the results obtained, the absolute growth was investigated according to the formula of V.I. Fedorov (1973). The relative growth of stallions was studied according to the formula of S.T. Brody (1945).

3. Research Results

Squeezed waste of wine production is a secondary raw material, very rich in biologically active substances. Grape juice contains more than 150 biologically active substances. More than 120 thousand tons of grapes are processed at 73 enterprises of Uzvinsanoat-holding. As a result, more than 10,000 tons of grape pomace were produced. The use of such waste as a biologically active additive to the diet of animals in animal husbandry is of great practical importance.
We use grape flour and bentonite as a dietary supplement. Currently, bentonite is widely used in the preparation of various feed mixtures and granular animal feed. Research conducted by world scientists since the middle of the twentieth century shows that the addition of bentonite to feed increases the milk yield of cattle, increases the amount of fat in it and improves the taste of beef by increasing its productivity; increases the number of eggs in birds; leads to an increase in live weight and wool yield in sheep. In addition, some biochemical parameters of animal blood are improved, including an increase in the amount of calcium, magnesium and inorganic phosphorus in the blood. Analyzing the results of studies on the use of bentonite in animal husbandry, American scientists interpret the above facts as follows: bentonite in the digestive tract of animals, due to the adsorption (absorption) of water and gastric juice, increases the surface area of food bacteria, which, in turn, is good for animal feed ... leads to absorption. In addition, the selective adsorption of chemical elements by bentonite helps animals to remove toxins and other harmful elements from the digestive system. It was found that lowering the moisture content of grape flour to 8-10% improves the preparation of grape flour and minerals rich in trace elements in dietary supplements. If in our laboratory experiments the mixing process was carried out in bristle mixers, then in production it is recommended to mix biologically active additives using a twin-screw mixer. The squeeze of freshly harvested sweet grapes (SHUT) must be quickly dried so that it does not lose its biologically valuable substances, which manifest as a result of alcoholic fermentation. Grape flour obtained by grinding dried grape pomace contains vitamin E, B1, B2, P, PP, provitamin A, minerals, potassium, calcium, as well as polyunsaturated acids and caffeine. The following table shows the composition of grape flour obtained from grape seeds.

| №   | Chemical composition      | Amount, % |
|-----|--------------------------|-----------|
| 1.  | Humidity                 | 8-11      |
| 2.  | Lipids (fats)            | 4-10      |
| 3.  | Protein                  | 12-15     |
| 4.  | Polysaccharides          | 36-46     |
| 5.  | Nutrients                | 5-7       |
| 6.  | Calcium                  | 0.88      |
| 7.  | Potassium                | 0.38      |
| 8.  | Phosphorus               | 0.36      |
| 9.  | Ash                      | 2-4       |

The addition of grape flour to cattle and poultry feed allows increasing their immunity, gain in live weight, and the quality of the products obtained from them.

| №   | Indicators   | Amount, % |
|-----|--------------|-----------|
| 1   | Humidity     | 8-11      |
| 2   | Lipids (fats)| 0.8-4.2   |
| 3   | Protein      | 8-10      |
| 4   | Polysaccharides | 36-46   |
| 5   | Organic acids | 2.5-3.0    |
| 6   | Apple acid   | 2.2-2.7   |
| 7   | Wine acid    | 0.2-0.3   |
| 8   | Pectin       | 1.0-3.0   |
| 9   | Ash          | 3.0-4.0   |
Among the biologically valuable components of grape pomace there is pectin. The content of additives from grape pomace in feed has a positive effect on the metabolism of cattle and the fight against certain diseases.

When processing grapes and wine materials, the yield of secondary raw materials reaches 15-20%. These are: clusters, pomace, yeast sediments, tartar, leaves and twigs. In the production of white and red wines and juices, pectin is released after the grape juice extraction process. Grape pomace quickly deteriorates, molds and loses most of its useful components, even if it is stored for a very short time in poor conditions. In this regard, grape pomace is controlled organoleptically and chemically.

Если экстракты, образовавшиеся при переработке красного и белого винограда, well preserved, the color of the product will be dark red and light brown, respectively. The pomace, which has not fermented fully, appears fatter when palpated with your hands, due to the fact that they contain sugar. Freshly squeezed pomace retains the wort smell. The smell of alcohol indicates the beginning of the fermentation process and the breakdown of substances with biological value.

Mini-technological system for obtaining grape flour and BAA BK. As mentioned above, BC consists of a mixture of biologically active grape flour and bentonite powder. Below is information about this system.

The processing of grape pomace (pressing waste) generated in primary wineries and grape juice factories is carried out in a technological system consisting of mini-apparatus. As shown in the Figure 1, grape flour, formed by pressing the grapes in a screw press (1) and containing 50% moisture, is transferred to a two-layer conveyor dryer (3) through a hopper dispenser using a screw seed separator (2). Hot air is supplied to the bottom of the drying chamber from a heater with a temperature of up to 80 degrees. The moist grape pomace moves against the stream of hot air coming out of the solar collector to the outlet at the bottom of the chamber on the conveyor belt. At the outlet of the dryer, the grape pomace contains a residual moisture content of 10-14%. Then the dried grape pomace is sieved in a vibrating sieve (4), and the seeds are collected in a collection box (5). Dried grape pomace is ground in a mini-mill (6) and turned into grape flour. To obtain a biologically active additive, BC is mixed and coated with powdered bentonite in a mini-mill in proportion with grape flour (7).

![Figure 1. Technological system for the production of biologically active additives BC: 1-screw press, 2-screw conveyor seeder, 3-x solar convection drying device, 4-vibrating sieve, 5-seed collection, 6-mini mill, 7-finished product](image)

Minimum mill 3000 rpm. can produce up to 2 tons of powder per day. In general, the mini-technological system is capable of mixing and preparing 4 tons of dietary supplements per day.
In order to study the effect of mineral and vitamin biologically active substances obtained from secondary products of grape production on metabolism (assimilation and dissimilation) in the stallion's body, a balance experiment was carried out at the age of 12 months. The metabolic process (assimilation and dissimilation) in the body of animals depends not only on their breed, age, sex, conditions of detention, but also on minerals and vitamins in the diet. To get a complete picture of the digestion level of these nutrients by studying metabolism (body weight change), an experiment was carried out on stallions aged 3 to 12 months from each experimental group.

During the experiment, 2.2 kg of barley grain, 6 kg of pasture hay, 3 kg of alfalfa mixture were added to the feed ration of stallions in the control, I and II experimental groups, and also added as an additive to the I experimental group - 200 g and to the II experimental group - 300 g vitamin and mineral supplements. The feed unit of the total feed in all groups averaged 6.5 kg.

The first 3 days of stallions were the preparatory period, during which the main balance experiment was carried out for 8 days. The stallions were kept separately in stalls for 8 days, the fed feed, feed residues and manure were examined by weighing. One-day manure was weighed as a sample and 1% of the total amount of manure was taken, the obtained 10% of the samples were preserved with a furacin solution. Samples of feed 1 kg were taken, and the chemical composition of feed and manure was studied in the chemical laboratory of the Institute.

The data in Table 3 show that the coefficient of assimilation of dry matter was significantly higher in I and II experimental groups than in the control group, on average this indicator was: in the control group by 63.3%, in I and II groups, respectively, by 1.73% and 3.81%, protein by 1.5 and 2.53%, fiber by 3.3 and 3.68%. Other indicators, such as the absorption of organic substances, fats, nitrogen-free extractives, were also significantly higher in stallions that were supplemented with dietary supplements.

The data obtained indicate that the enrichment of the diet of stallions with mineral and vitamin supplements has a positive effect on the metabolism in their body, accelerating their growth and development.

Analyzing the results obtained, we used diagrams. Changes in live weight and body measurements in stallions in winter are shown in Figure 2.
As shown from the diagram above, the live weight of experimental group I increased from 247.0 kg to 322.9 kg, where the weight gain was 76 kg, the live weight of the stallions in the control group increased from 230.9 to 291.2 kg, or 69 kg of weight gain, and the live weight of the II experimental group increased from 259.0 to 340.1 kg, or amounted to 81 kg of weight gain. It should be noted that the difference in live weight of 18-month-old heifers is the result of the effect of dietary supplements introduced into the diet in the previous winter season.

In particular, the difference between the control and treatment groups in the height of the withers (Figure 3) confirms that the supplements introduced last winter accelerated the growth of the stallions. In the Figures 4, 5, and 6 for the main body measurements of the experimental stallions, it can be seen that the chest circumference, oblique body length and the circumference of the hips at 18-19 months of age increased due to the introduction of dietary supplements, when due to the lack of macro- and microelements, these indicators were lower in pasture conditions.
Figure 4. Changes in stallion chest circumference: 1-Control group, 2-I experimental group, 3-II experimental group

Figure 5. Changes in the oblique body length of stallions: 1-Control group, 2-I experimental group, 3-II experimental group

Figure 6. Changes in stallion circumference: 1-Control group, 2-I experimental group, 3-II experimental group
Analyzing the change in body measurements on the diagrams, it was found that the growth of stallions in the 2nd experimental group was much higher than in other groups. In the diet of the II experimental group, at most 400 g of a dietary supplement was added. Thus, we can conclude that the more dietary supplement is added to the diet of stallions, the faster their growth will accelerate. However, an analysis of scientific articles on this topic and our previous experiments show that the addition of biologically active mineral supplements to the diet of animals of more than 3% of dry matter leads to an unreasonable increase in costs without significant positive results.

4. Conclusions
Thus, the addition of biologically active mineral supplements obtained from local raw materials to the diet will not only have a positive effect on the growth and development of stallions, but will also increase the economic efficiency of their rearing.
It was determined that the improvement of the processes of preparation of biologically active mineral supplements rich in microelements, where the moisture content in grape flour was 8-10%, leads to good results.

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