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Research Article



# Age Related Changes in the Biochemical Parameters of the Blood Plasma of Partridges (*Alectoris chukar*)

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## Abstract

The presented work presents experimental data on the detection of age-related changes in blood biochemical parameters in partridges. The purpose of the work was to determine the total protein content in the blood plasma of partridges (*Alectoris chukar*) in postembryogenesis in comparison with the indicators in the chicks of the original line when using a complex of vitamins and anti-stress drugs. Experimentally revealed a change in the total protein of the blood plasma of partridge chicks from the moment of hatching and up to 2 months of age, with the complex use of vitamins (A-20000 IU, D3 -1250 IU, E-50mg), as well as anti-stress drugs (phenozepam and succinic acid) at the rate of 0.03g per 1kg of mass. It was found that anti-stress drugs do not significantly affect the dynamics of changes in the total protein of the blood plasma of partridges. It was experimentally established that a more intensive development and increase in the growth of partridge mass corresponded to a lower content of total protein in blood serum and vice versa.

**Keywords:** *Alectoris Chukar*; Blood; Total Protein; Vitamins; Anti Stress Drugs

## Introduction

Biochemical parameters of blood are important in determining the physiological status and health status of birds. It is known that the biochemical parameters of blood in birds change with age [1,2]. The literature presents extensive and contradictory material on the biochemistry of chickens [3,4], including when using various additives [5-7] and depending on age. According to the literature, in poultry farming, succinic acid is used in the initial period of bird life; in this case, the daily dose is taken at the rate of 0.03g per 1kg of body weight. Succinic acid is mixed into food or diluted in drink for 2-3 weeks for adults in the period before and after the appearance of offspring. Dose- 0.03g per 1kg of weight per day for a week. Succinic acid, which has an anti-stress, adaptogenic effect, contributes to a sharp decrease in the incidence in birds and allows you to get environmentally friendly eggs and meat. It is based on powerful energy support for the activity of adaptation systems. In addition, succinic acid is used as a biological additive in the nutrition of birds. The unique property of succinic acid makes it possible to activate the adaptation processes in the body of the bird and stabilize the metabolism, thereby increasing the meat productivity of chickens, as well as the quality of meat [8-10]. Although biochemical analyzes of blood plasma in birds are important and widely used for the diagnosis of various diseases, however, there is a very limited amount of information on pheasants and partridges [11,12]. For this reason, reliable and useful biochemical analyzes are extremely important and necessary. However, a blood test may be performed for several reasons including as a screening procedure to assess the general health of birds [13,14]. Because clinical signs of disease in birds are often very subtle, clinical chemistry is needed to assess cellular damage [15-17].

In the study, 36 (n=12 by species, n=6 by sex) blood samples were taken from a captive, adult, clinically healthy, Black-necked pheasants, or Southern Caucasus pheasants (*Phasianus col. colchicus*), Gray partridge (*Perdix perdix*), and Chukar partridge (*Alectoris chukar*) for plasma biochemical analyses. The investigated plasma biochemical parameters were Creatinine, Uric acid, Aspartate Amino Transferase (AST), and Alanine Amino Transferase (ALT). Significant differences ($P<0.05$) among both sexes were found in the activity of ALT in Black-necked pheasants. Creatinine levels are relatively close in value between the sexes in all three species, slightly higher in males. Uric acid values in male birds are much higher than in female game birds in all three species. AST and ALT activities in male pheasants were higher when compared to the females, while the trend was reversed in sex at gray partridges [18].

It follows from the foregoing that the experimental data presented in the literature on the detection of age-related changes in blood biochemical parameters in partridges are insignificant. The presented experimental data on the determination of the total blood plasma protein of partridges (*Alectoris chukar*) in postembryogenesis with the use of a complex of vitamins and anti-stress drugs are contradictory. Thus, biochemical parameters of blood are important in determining the state of health of birds. In the presented work, for the first time, biochemical parameters of blood are given in partridge chickens (*Alectoris chukar*) when a complex of vitamins and anti-stress drugs are used in the diet. The aim of the work was to determine the biochemical parameters of blood (total protein content) in partridges (*Alectoris chukar*) in postembryogenesis in comparison with the parameters in birds of the original line when using a complex of vitamins and anti-stress drugs fenozepam and succinic acid.

## Material and Research Methods

In the experiment, industrial compound feed was used as feed, which was enriched with protein and vitamin supplements. At the same time, a complex of vitamins was added to the feed to bring the nutritional level of 100g of dry food to vitamins A-20000 IU, D3-1250 IU, E-50mg. Succinic acid and fenozepam were mixed into food or diluted in drink at a dose of 0.03g per 1kg of body weight per day. In the experiment, the chicks had constant access to clean water.

Determination of biochemical parameters of blood was carried out by spectrophotometric method on a Specord 210 Plus spectrophotometer (Analytic Jena). Sodium citrate solution was added to the tubes, blood was centrifuged at 5000rpm in an SM-50 centrifuge for 15 minutes. Plasma was separated, followed by determination of total protein by the Lowry method.

## Research Results

Chickens were divided into two groups, experimental and control, 10 heads in each group. For the experiments, 5 individuals were taken from each group, the studies were carried out in duplicate. The live weight and safety of birds at the age of 1, 7, 13, 22, 31, 60 days were considered. Blood samples were taken from the cubital wing vein (superficial ulnar vein) in 35 partridges. Approximately 0.5ml of whole blood was taken from each bird and immediately placed into blood collection tubes containing sodium citrate solution. Male and female birds were analyzed separately as gender may affect the reliability of the study. All values were expressed as mean M±m with standard error and $P\leq0.05$ was determined to be statistically significant. In 1-day-old chickens, a low content of total protein in blood plasma was noted compared to that in subsequent age periods, which is associated with a low function of protein biosynthesis. An increase in blood biochemical parameters was observed by the 7-day age. This was due to the intensive growth and functional development of the digestive system.

The concentration of total blood protein increased with age, which was due to the formation and improvement of protein biosynthesis processes. There were no significant differences in the concentration of total blood protein in chickens of the control initial group and chickens that were fed with the anti-stress drug fenozepam and succinic acid until the age of 60 days. (Table 1) presents experimental data on changes in total blood plasma protein and live weight of partridges (Alectoris chukar) with the complex use of vitamins and anti-stress drugs. At least 5 measurements were made in each age group. Statistical processing of the results included the calculation of the mean value (M±m). Significance of differences was assessed by Student's t-test. Differences were considered statistically significant at $P<0.05$. It should be noted that 1-day-old chickens have the lowest total protein content in blood plasma, the most significant increase in blood biochemical parameters is observed by the age of 7 days, which is associated with the intensive growth and development of the digestive system in partridges (Figure 1). By the age of 14 days, the protein conten.t decreased on average in the control group to 25.0±0.2g/l, and in the experimental group to 25.3±0.2g/l and remained during the next week of life.

**Table 1:** Dynamics of total blood plasma protein and body weight of partridges (Alectoris chukar) with the complex use of vitamins and anti-stress drugs depending on age (M±m).

| Age Live | Weight (g) | | Total Protein (g/l) | |
|---|---|---|---|---|
| | Control | Experience | Control | Experience |
| 1 | 14.5 | 17.5 | 22.1±0.2 | 22.4±0.2 |
| 7 | 18.1 | 19.2 | 26.5±0.4 | 26.8±0.4 |
| 13 | 37.5 | 40.5 | 25.0±0.2 | 25.3±0.2 |
| 22 | 62.1 | 67.5 | 26.5±0.3 | 26.1±0.3 |
| 31 | 112.6 | 117.8 | 30.2±0.5 | 30.4±0.5 |
| 60 | 270.2 | 275.3 | 34.5±0.4 | 34.7±0.4 |

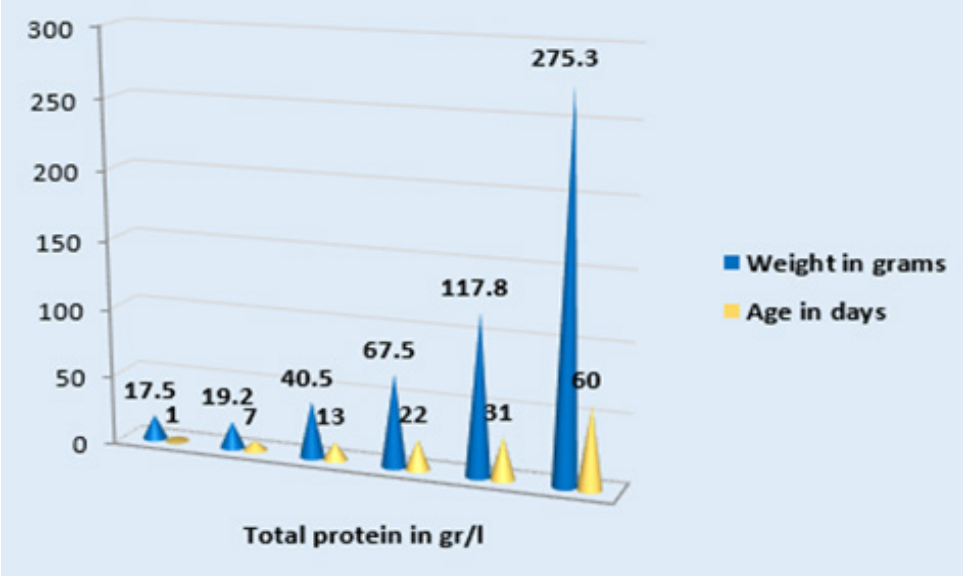


**Figure 1:** Dynamics of changes in the total protein of partridge blood plasma with the complex use of vitamins and anti-stress drugs.

By the age of 30 days, it increased to 30.2±0.5g/l in the control group and 30.4±0.5g/l in the experimental group of birds. And by the age of 60, it increased to 34.5±0.4g/l in the control group, and in the experimental group to 34.7±0.4 and then almost did not change, and there was a slight fluctuation in the total blood plasma protein in partridges. Thus, the amount of protein increases with age and reaches its maximum value by the age of 60, due to the formation of the body and the improvement of the protein-educational function. As a result of the experimental data obtained to identify the effect of anti-stress drugs and a complex of vitamins on the biochemical parameters of partridge blood, the dynamics of changes in the total protein of partridge blood serum during 2 months of postembryogenesis was revealed. However, the experimental data obtained did not reveal significant changes in the total protein when using the anti-stress drugs fenozepam and succinic acid in the experimental groups of partridges.

## Conclusion

Experimentally revealed a change in the total protein of the blood plasma of partridge chicks from the moment of hatching and up to 2 months of age with the complex use of vitamins (A-20000 IU, D3-1250 IU, E-50mg) and anti-stress drugs. It was found that the anti-stress drugs fenozepam and succinic acid do not significantly affect the dynamics of changes in the total protein of the blood plasma of partridges. It was found that a more intensive development and an increase in the growth of partridge mass corresponded to a lower content of total protein in blood serum and vice versa.

## Acknowledgement

None.

## Conflict of Interest

None.

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