

Dynamics of Indicators of Total Protein of Blood Serum of Partridges (*Alectoris Chukar*) in Postembryogenesis

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ABSTRACT

The studies were carried out on partridges, which were bred in the (incubator) vivarium of the Institute of Zoology of ANAS. The aim of the research is to study the dynamics of total protein in blood serum in connection with changes in the mass of partridges. In the experiment, a commercial feed was used, which was enriched with protein and vitamin supplements to bring the nutritional level of 100 g of dry feed to: vitamins A - 20,000 IU, 1250 IU, E - 50 mg. As a result of the data obtained, the dynamics of changes in the parameters of the total protein of the blood serum of partridges was revealed during 2 months of postembryogenesis. As a result of the experimental data, it was revealed that with age, there is a change in the total protein of blood serum inversely proportional to the increase in live weight of partridges. The change in the total protein content of the blood serum of partridges is closely related to their growth, while a higher growth rate of partridge mass (17.5, 19.2, 40.5, 67.5, 117.8, 275.3) corresponded to a lower total protein content (2.46, 2.35, 2.50, 2.80, 3.10, 3.65%) of blood serum and vice versa. Based on the data obtained, it can be stated that with a decrease in the growth rate of partridges, an increase in the total protein of blood serum was noted. In turn, this is associated with a large expenditure of protein during a given period of development of partridges, that is, during a period when the construction of body tissues is observed.

Introduction

The problem of studying the growth and development of partridges is of theoretical and practical interest for the development of criteria for choosing feeding regimes and keeping young stock. For different age periods, a certain protein composition is characteristic, fluctuations in its level in the blood, which in turn reflects changes in the protein metabolism of the whole organism. The Black-necked pheasants or Southern Caucasus pheasants (*Phasianus col. colchicus*), Gray partridge (*Perdix perdix*) and Chukar partridge (*Alectoris chukar*) are birds from the order Galliformes, family Phasianidae and native to Europe and Asia. They have been widely introduced as game birds and are one of

the world's most hunted birds [1,2]. Although it is well known that plasma biochemistry is important for medical diagnosis of disease in several bird species, limited information is available for pheasants, partridges [3,4] and chukars [5]. There are studies have reported the values of biochemical parameters in pheasants [6,7], and the knowledge of plasma chemistry parameters in pheasants, partridges and chukars still remains incomplete [8]. Therefore, accurate and useful biochemical analyses are needed. In general, blood examination is performed for several reasons as a screening procedure to assess general health [9]. Because the clinical signs of illness in birds are frequently subtle, clinical chemistry is necessary to evaluate cellular damage [10]. Plasma biochemical

and haematological parameters were examined in 4-week-old to 12-week-old game birds. Healthy, uninfected pheasants and partridges had similar levels of total protein, albumin, osmolality, Na⁺, Cl⁻, K⁺, Mg²⁺ and glucose. Triglyceride, globulin and Ca²⁺ were significantly higher and PO₄³⁻ was lower in the partridges.

Pheasants carrying a light to moderate infection with Spironucleus had significantly lower total protein, albumin, osmolality, Na⁺, Cl⁻, Ca²⁺ and PO₄³⁻. In severely affected pheasants, the osmolality, Na⁺ and Cl⁻ fell further. Triglyceride and glucose were significantly lower than in healthy birds, and Mg²⁺ was higher. Similar data were obtained from infected partridges. Red cell parameters rose significantly in pheasants severely affected by spironucleosis, and the percent of heterophils was significantly higher and lymphocytes and basophils lower in their blood smears [11]. The effects of sex and dietary composition were investigated in 48 male and 48 female 16-week old chukar partridges. Sixteen starter and 16 grower diets were arranged in a 4 x 4 factorial design with 4 concentration of crude protein (CP) and 4 concentration of metabolizable energy (ME). Blood samples were collected at 16 weeks of age and analysed for total protein, triglycerides, uric acid, total cholesterol, glucose, calcium, phosphorus, sodium, potassium and chlorine. There were no significant effects of sex on the measured parameters. Serum total protein was highest in partridges fed on a diet containing 200/175 g CP/kg (starter grower). Serum cholesterol concentrations of partridge fed the diet with 240/200 or 280/225 g CP/kg were significantly higher than that for partridge fed diets containing a lower gCP/kg. Serum total protein and glucose levels significantly decreased as dietary energy level was increased. Serum triglycerides and calcium were highest in partridge fed on the diets containing 13.39/13.81 and 11.71/12.55 ME MJ/kg, respectively.

Serum phosphorus and chloride levels were highest in partridges given the diet containing 10.88/11.92 ME MJ/kg. There were significant interactions between the effects of CP and ME on serum triglycerides, sodium and potassium levels. The results of this study suggested that dietary CP, and especially ME concentration, significantly affect blood parameters in chukar partridge [12]. Blood samples were collected from 36 (12 by species; 6 male and 6 female) captive, adult, clinically healthy Black-necked pheasants or Southern Caucasus pheasants (*Phasianus colchicus*), Gray partridge (*Perdix perdix*) and Chukar partridge (*Alectoris chukar*) for plasma biochemical analyses. The investigated parameters were Total protein, Albumin, Total bilirubin and Glucose. Significant differences ($P < 0.05$) among both sexes were found in concentrations of total bilirubin and Glucose in Gray partridges; and Total protein in Chukar. In female Gray and Chukar partridges, the Total protein values were higher than in male

ones, but in pheasants it was the opposite. The trend for Albumin and Total bilirubin values in the three game birds were inverted, with higher values observed in male than female birds. Biochemical blood parameters are important in determining the physiological status and health status of farm animals and poultry. It is known that the biochemical parameters of blood in birds change with age [13-15]. Based on the foregoing, the aim of the research was to study the dynamics of total protein in the blood serum of partridges in connection with a change in weight and being on the same mode of feeding and maintenance.

Material and Research Methods

The studies were carried out on partridges, which were bred in the (incubator) vivarium of the Institute of Zoology of ANAS. All partridges were bred in the (incubator) vivarium of the Institute of Zoology of ANAS. During the period of the experiments, the chickens were kept in the vivarium of the Institute of Zoology of ANAS (20 heads per group). All chicks were placed in cages in the vivarium, where they were kept until 2 weeks of age. For the experiments, 5 chickens were taken from each group. The studies were carried out in 2 replicates. Blood was taken from the jugular vein during decapitation slaughter. Sodium citrate solution was added to each tube, then the blood was centrifuged for 15 minutes at 1500 rpm, serum was separated, followed by determination of total protein by the Lowry method [16]. Statistical processing of the obtained results and the reliability of differences were assessed by Student's t-test [17]. Differences were considered statistically significant at $P < 0.05$.

Research Results and Discussion

In experimental studies, equal feeding regimes and conditions of keeping (control) were applied. Experimental groups of partridges were divided into two groups: the first group of birds was kept only in vivarium conditions, and the second group was placed in aviaries after 2 weeks of development. We monitored changes in the total weight of birds, the total protein in the blood serum of birds and the state of their viability. After the birds were hatched, they were placed in cages (1st and 2nd groups), 5 heads each. Blood was taken from partridges according to the generally accepted technique by opening the jugular vein on days 1, 5, 10, 15, 20, 30, 60, 120. Blood was collected in test tubes, then tubes with blood were placed in a thermostat for 3 hours at a temperature of 37°C, then placed in a refrigerator for 12 hours at a temperature of 0°C. Subsequently, the serum was separated and to remove the remaining erythrocytes, they were centrifuged at 1500 rpm for 15-20 minutes. The total blood protein content was determined refractometrically. These changes in body weight and total blood protein of partridges are shown in (Table 1). After 13-31 days, some

partridges of 5 heads were placed in aviaries (groups 3 and 4), and some were left in cages in a vivarium. Feeders and drinkers were placed inside the cages and inside the enclosure. The partridges were fed with a different diet, heating the cells of the vivarium and simultaneously exposing the room to ultraviolet irradiation. It should be noted that at the same time, all partridges in the selected conditions of keeping in open-air cages received an identical diet.

The feed of partridges contained proteins containing amino acids and vitamins A, E, D3. When growing partridges from 1 to 60 days, three types of rations were used depending on age in the following sequence: 1-4 days - pre-start, 5-30 days - start and 30-60 days - growth. The first feed consisted of hard-boiled crushed eggs (80%) and compound feed (20%). Gradually, the number of eggs was reduced and the seven-day-old partridges received a dry feed mixture, the egg had already been completely excluded from the diet. Was used industrial compound feed, which was enriched with protein and vitamin supplements to bring the nutritional level of 100 g of dry feed to: vitamins A - 20,000 IU, D3 - 1250 IU, E - 50 mg. As the partridges grew, a change in the total blood protein in birds was noted in connection with their development. In the Table 1 presents quantitative data of total protein in the blood serum of partridges in connection with changes in body weight. As a result of the data obtained, the dynamics of the parameters of the total

protein of the blood serum of partridges was revealed during 3 months of postembryogenesis. The experimental data obtained show that, with age, the change in total blood serum protein is proportional to the increase in live weight of partridges. (Figure 1) shows the data on the total protein content in the blood serum of partridges, depending on the intensity of development and growth of the mass of birds. It should be noted that with a decrease in the intensity of growth, an increase in the total protein of the blood serum of partridges was noted. At the highest growth rate of birds, which was observed in the period from 7-13 days, respectively, the least amount of total protein in the blood serum was determined in partridges. In all likelihood, this is due to the high consumption of protein during this period of development of the chicks, during the period when the construction of body tissues is observed.

Table 1: Partridge mass change and total protein from day 1 to day 60 post-embryogenesis.

Age in days	Weight in grams	Total protein in%
1	17.5	2.46
7	19.2	2.35
13	40.5	2.50
22	67.5	2.80
31	117.8	3.10
60	275.3	3.65

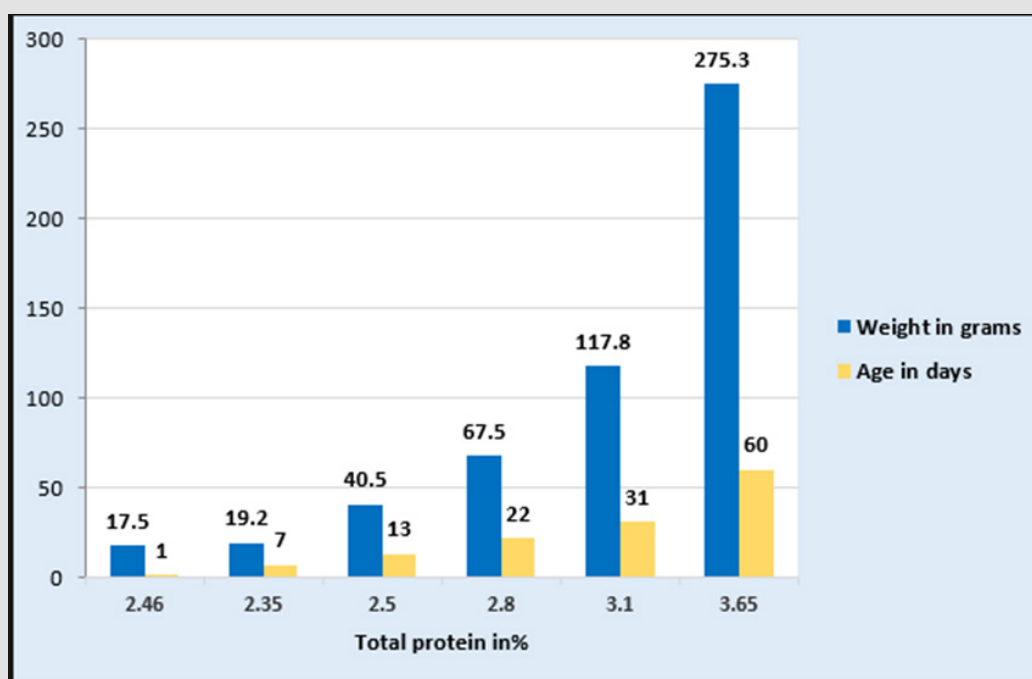


Figure 1: Diagram of the total protein of the blood serum of partridges depending on the intensity of development and growth of their mass.

Conclusion

- a. Experimentally revealed a change in the mass of partridge chicks from the moment of hatching to 3 months of age, occurring unevenly, which increased 15.7 times.
- b. It was revealed that the content of total protein in the blood serum of partridges is closely related to their growth and development.
- c. It was found that the more intensive development and increase in the growth of the mass of partridges corresponded to a lower content of total blood serum protein and vice versa.

References

1. Draycott R A, H Pock K, Carroll J P (2002) Sustainable management of a wild pheasant population in Austria. *Z Jagdwiss* 48: 346-353.
2. Kuzniacka J, Adamski M (2010) Growth rate of body weight and measurements in pheasants reared up to the 24th week of life. *Arch Tierz* 53(3): 360-367.
3. Rodriguez P, Tortosa FS, Millan J, Gortazar C (2004) Plasma chemistry reference values from captive red-legged partridges (*Alectoris rufa*). *Br Poult Sci* 45(4): 565-567.
4. Vitula F, Peckova L, Bandouchova H, Pohanka M, Novotny L, et al. (2011) *Mycoplasma gallisepticum* infection in the grey partridge *Perdix*: outbreak description, histopathology, biochemistry and antioxidant parameters. *Vet Res* 7: 34.
5. Farooq Z, Baboo I, Wajid M, Sadia H, Abrar M, et al. (2019) Hematological and Plasma biochemical reference values in Chukar Partridge (*Alectoris chukar*) under captive facilities. *Biol Pak* 65(II): 1-6
6. Schmidt EMS, Paulillo AC, Santin E, Locatelli-Dittrich R, Oliveira EG (2007) Hematological and serum chemistry values for the ring-necked pheasant (*Phasianus colchicus*): variation with sex and age. *Int J Poult Sci* 6(2): 137-139.
7. Hrabcaková P, Voslálková E, Bedánová I, Pištěková V, Chloupek J, et al. (2014) Haematological and Biochemical Parameters during the Laying Period in Common Pheasant Hens Housed in Enhanced Cages. *The Sci World J* 2014: 364602.
8. Suchy P, Strakova E, Kroupa L, Steinhäuser L, Herzig I (2010) Values of selected biochemical and mineral metabolism indicators in feathered game. *Acta Vet Brno* 79: 9-12.
9. Harrison G J, Lightfoot T L (2006) *Clinical Avian Medicine*. Volume 1 & 2, Spix Publishing, Florida, USA.
10. Nazifi S, Mosleh N, Ranjbar VR, Khordadmehr M (2011) Reference values of serum biochemical parameters in adult male and female ring-necked pheasants (*Phasianus colchicus*). *Comp Clin Path*.
11. Lloyd S, Gibson J S (2006) Haematology and biochemistry in healthy young pheasants and red-legged partridges and effects of spiro-nucleosis on these parameters. *Avian Pathology* 35(4): 335-340.
12. Ozek K, Bahtiyarca Y (2004) Effects of sex and protein and energy levels in the diet on the blood parameters of the chukar partridge (*Alectoris chukar*). *Br Poult Sci* 45(2): 290-293.
13. Cherkasova V V, Zelensky K S (2009) Hematological and biochemical parameters of the blood of broiler chickens in ontogenesis. *Bulletin of the Orenburg State Agrarian University* 4(24-1): 60-63.
14. Ponomarev V A, Eva Voslálková, Iveta Bedánová, Vladimíra Pištěková, Jan Chloupek, et al. (2014) Clinical and biochemical parameters of the blood of birds. *Ivanovo*, pp. 69-132.
15. Egorov I A, Grozina A A, Vertiprakhov V G (2018) Age-related changes in blood biochemical parameters in meat chickens (*Gallus gallus L*). *Agricultural biology* 53(4): 820-830.
16. Student (1908) The probable error of a mean. *Biometrika* 6(1): 1-25.
17. Lowry O H, Rosebrough N J, Farr A L, Randall R J (1951) Protein measurement with the Folin phenol reagent. *Journal of Biological Chemistry* 193(1): ss.265-275.

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