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Serum Biochemical Parameters in the Ring-Necked Pheasant (*Phasianus colchicus*) on Breeding Season

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Abstract: The influence of sex on serum biochemical parameters was investigated in adult (52 week-old) ring-necked pheasants on reproductive activity. Statistical comparisons were made for differences in values between male and female birds. Adult females had higher values for serum total protein and albumin. Significant variations were not observed in the analyses in relation to the sex of the birds for urea, uric acid, ratio urea/uric acid and globulins. This study also aimed to determine serum biochemical values for adult ring-necked pheasants.

Key words: Pheasant, *Phasianus colchicus*, breeding season, serum chemistry

Introduction

The ring-necked pheasant (*Phasianus colchicus* Linnaeus, 1758, *Galliformes*, *Phasianidae*) are birds of Asian origin and world-wide distributed. The commercial production of the ring-necked pheasants is extensively distributed in several countries around the world and some studies showed that this species can easily adapt to commercial management conditions, with good performance in terms of meat production and as game or ornamental birds (Manetti, 1991; Oliveira and Rossi, 2000).

The biochemical examination of the blood is among the methods which may contribute to the detection of some changes in health status and can be a useful aid for diagnosis diseases in birds. The knowledge of biochemical parameters in the ring-necked pheasant still remains incomplete.

Our report presents data on serum biochemical values of the ring-necked pheasant, with emphasis on the blood proteinogram (total serum protein, albumin and globulins) and renal function (urea, uric acid and the ratio urea/uric acid) of adult ring-necked pheasants presenting the effect of sex on serum blood values.

Materials and Methods

Ring-necked pheasants (*Phasianus colchicus*) were allocated in experimental floor-pen housed, receiving water and feed *ad libitum*. The feed was formulated with corn and soybean according with NRC (1994) recommendations. The adult animals were 52 week-old, during the breeding season, allocated in families with one male and four female.

Blood samples were collected from the ulnar superficial vein from 40 adult birds (10 male and 30 female).

Aliquots of each blood sample were transferred immediately to a 10-ml plain glass tube containing no anticoagulant for serum chemistry analyses. The serum chemistry parameters (uric acid, urea, serum total protein and albumin) were determined with an automated chemistry analyzer. The globulin value was determined by difference between serum total protein and albumin. The ratio of serum urea and uric acid was calculated: serum urea concentration (mmol/L) \times 1000/serum uric acid concentration (μ mol/L) (Lumeij, 2000). The control of the chemical analysis was made using Qualitrol-N.

The dates were analyzed by ANOVA and those with statistical differences were submitted to the Tukey's test at 0.05% using Statview® (version 5.0).

Results and Discussion

Serum chemistry values for adult ring-necked pheasants are shown in Table 1. There were no statistical differences in the serum chemistry values (uric acid, urea, ratio urea/uric acid) between male and female adult ring-necked pheasants. Schmidt *et al.* (2007a, 2007b) reported similar results for uric acid concentration in juvenile ring-necked pheasants. There is no information available on serum urea values for the ring-necked pheasants to compare with our results.

In birds, creatinine has limited diagnostic value (Lumeij, 1997). This test parameter is very insensitive and is a relatively poor diagnostic test in birds (Hochleithner, 1994). Creatine is mostly excreted in urine before it is converted to creatinine. Uric acid and urea values can be assessed in birds, but normal physiological and species variations have to be considered (Lumeij,

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Table 1: Serum chemistry values for adult pheasants (52 week-old) for both sexes. (Mean±SD)

Parameters	Male	Female
Uric acid (µmol/L)	358.04±150.6 ^a	334.5±131.5 ^a
Urea (mmol/L)	1.36±0.3 ^a	1.38±0.63 ^a
Ratio urea/uric acid	4.29±1.86 ^a	4.97±3.4 ^a
Serum total protein (g/dL)	4.54±0.94 ^a	5.09±0.6 ^b
Albumin (g/dL)	2.64±0.52 ^a	2.96±0.29 ^b
Globulins (g/dL)	1.9±0.51 ^a	2.13±0.46 ^a

Different letters in the same line are significantly different (p<0.05)

1997). Pathologic increases in uric acid can only be detected if 70% or more of kidney function is lost making this parameter useless for early detection. Urea can be used to detect dehydration but not to confirm renal dysfunction. Thus, the ratio of serum urea and uric acid can be used to differentiate prerenal and renal causes of azotemia (Lumeij, 2000). According to Lierz (2003) normal ratios must be established for each bird species. Lumeij (1997) reported values for the ratio of plasma urea and uric acid in ostriches, pigeons, peregrine falcon and some psittacine species. Among these species, ostriches and pigeons had lower values than male and female ring-necked pheasants.

There were no significant differences in the globulin values among males and females. The globulin values were similar to those reported for 5 week-old ring-necked pheasants (Schmidt *et al.*, 2007a) and for 88 and 102 day-old ring-necked pheasants (Schmidt *et al.*, 2007b).

Significant differences in serum total protein and albumin were found among males and females. It is well known that blood proteins in birds depend on age and sex and that they may also vary due to season (Fudge, 2000). According to Thrall (2004), hyperproteinemia in most birds is indicated by plasma total protein concentrations of greater than 4.5 g/dL. We found that the mean values for serum total protein and albumin obtained in this study for females were higher than males, indicating that the egg production may affect the concentration of total serum protein and albumin. Hens and female adult ring-necked pheasants demonstrated a marked increase in plasma total protein concentration just before egg production (Schmidt *et al.*, 2007a; Thrall, 2004). This hyperproteinemia is associated with an increase in vitellogenin and lipoproteins which is induced by estrogens because they are necessary for yolk production (Lumeij, 1997; Thrall, 2004).

Conclusions: We found that serum total protein and albumin differed significantly in accordance to sex due to egg production. The clinical chemistry results of urea,

uric acid and the serum ratio urea/uric acid obtained in this study can be considered baseline information on healthy adult ring-necked pheasants, thereby providing disease investigators with a standard of comparison.

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