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Blood Biochemical Profile in Ostrich from Northeast Mexico

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Abstract: In Mexico, there is currently an increase in breeding ostriches, which has led to new research about parasitic, nutritional and other kind of diseases in this animal. However, information about blood biochemical profile of ostrich in this country is non existent, whereas in countries such as USA and Israel there are reference values about blood chemistry. In this study, blood samples were obtained from 107 ostriches with no disease symptoms. Blood plasma content of glucose, urea, non-proteic nitrogen (BUM), Total protein, albumin, globulins, total bilirubin (BT), alanine aminotransferase (ALT), aspartate aminotranferase (AST), Creatinine Kinase (CK), Alkaline Phosphatase (ALP), phosphorous and calcium, were determined. Results were as follows: glucose, 145 mg dL^{-1}; urea, 9 mg dL^{-1}; BUM, 4.2 mg dL^{-1}; total protein, 3.28 g dL^{-1}; albumin, 1.63 g dL^{-1}; globulins, 2.08 g dL^{-1}; BT, 8.71 μml L^{-1}, ALT, 175.86 U mL^{-1}, AST, 69.72 U mL^{-1}, Ck, 4.707 U L^{-1}, ALP, 422.5 U L^{-1}, phosphorus, 10.29 mg dL^{-1} and calcium, 12 mg dL^{-1}.

Key words: Ostrich, biochemical profile, reference values, enzymes, Mexico

INTRODUCTION

Ostrich exploitation is widely distributed and includes countries such as Southafrica, Namibia, Israel, Australia, USA, Canada, France, Spain, United Kingdom, Netherlands, Belgium, Germany, Italy and Ukraine. This is due to the fact that ostrich is well adapted to different climates and geographical zones. As a way of non-traditional animal breeding system, ostrich production is not new, but it has developed into a fast growing industry and good source of income. These birds have excellent reproduction rates until they are 40 years old and their yearly meat and leather production is five-fold over cattle. They need little land (a maximum of 60 animals ha^{-1}) and have better food conversion than other meat-producing animals. Furthermore, ostrich generate sub products with high commercial value and well appreciated, such as feather and fertile and non-fertile eggs (Bonorino, 1990; Mushi *et al*., 1998).

The ostrich industry began in Mexico in 1991 and by the year 2000 there were about 700 breeders. New-born and young ostriches are often affected by diseases that attack different body organs and systems. Knowledge of biochemical values of blood components is important for the diagnosis and treatment of diseases. Partial information about biochemical blood values in adult ostrich exist in the scientific study (Van Heerden *et al*., 1985; Levy *et al*., 1989; Verstappen *et al*., 2002).

On the other hand, blood values are also important in understanding physiology and adaptation of species to the environment, as well as an aid to clinical studies, giving information to confirm diagnosis, to follow evolution and degree of importance of pathological processes. In both cases, the interpretation of the results depends of the degree of deviation of a given blood value with regard to the normal. That is why there are necessary reference values for each species, in order to compare the observed parameters found in particular animals. Few available information exists about normal blood values for most Ratids (Sarasqueta, 1997).

Objective of this research was to determine selected biochemical values in serum of clinically healthy ostriches in order to establish normal values of blood parameters, which will allow determination of health status of <1 year old ostriches.

MATERIALS AND METHODS

The animals were located in a farm of the state of Tamaulipas, with semi-arid conditions typical of Northeast

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Mexico. Blood samples were obtained by venopunction of braquial wing vein from 107 ostriches of 165 days of age. Sera was separated within 2 h of blood extraction, refrigerated at 5°C and processed within 12 h. Dry-biochemistry analyzer (Vet-Test 8008, IDEXX) was used for blood values determination. This method has the advantage that results are not affected by hemolyzed, lypemic or icteric samples.

Serum contentration of glucose, urea, non-proteic nitrogen (BUM), Total protein, albumin, globulins, total bilirubin (BT), alanine aminotransferase (ALT), aspartate aminotranferase (AST), Creatinine Kinase (CK), alkaline fosfatase (ALP), phosphorous and calcium, were determined. After the determination of distributive normality of the data parametric, statistics analysis of arithmetic mean and standard deviation was performed.

RESULTS AND DISCUSSION

Mean concentration of blood plasma components are shown in Table 1. Results were as follows: glucose, 145 mg dL^{-1}; urea, 9 mg dL^{-1}; BUM, 4.2 mg dL^{-1}; total protein, 3.28 g dL^{-1}; albumin, 1.63 g dL^{-1}; globulins, 2.08 g dL^{-1}; B.T. 8.71 mml L^{-1}, ALT, 175.86 U mL^{-1}, AST, 69.72 U mL^{-1}, Ck, 4.707 U L^{-1}, ALP, 422.5 U L^{-1}, phosphorus, 10.29 mg dL^{-1} and calcium, 12 mg dL^{-1}.

Glucose concentration was similar to the results obtained by Okotie-Eboh *et al.* (1992) and Jensen *et al.* (1992), but lower that the values reported by Levy *et al.* (1989). Therefore, the value of 158 mg dL^{-1} is considered hypoglycemic in adult animals, whereas this value is normal for the young.

Total protein values found in this study are in accordance with results reported in Africa (Palomeque *et al.*, 1991), Israel (Levy *et al.*, 1989), USA Albumin and globulin concentrations were similar to the results informed by Jensen *et al.* (1992). Calcium blood levels in this study were not different to the results of Jensen *et al.* (1992) and Okotie-Eboh *et al.* (1992), whereas the results informed in this study for phosphorous, urea and Bun were higher than the results of Palomeque *et al.* (1991) and Levy (1989).

With regard to the AST enzyme, the values were similar to the reported by Palomeque (1991) and Levy *et al.* (1989), but lower than the results of Okotie-Eboh *et al.* (1992). The ALT enzyme values found in this study were higher than the reported by Levy *et al.* (1989).

One possible explanation for the differences of the results informed in this study with the values found by other researchers is that in this study were analyzed 165 days old animals, whereas the other studies are based in animals with >1 year old.

Table 1: Blood chemistry values in ostrich

Parameters	Minimum	Maximum	Media
Glucose (mg dL^{-1})	90	230	145
Urea (mg dL^{-1})	5	13	9
BUN (mg mL^{-1})	2.33	6	4.2
Total protein (g dL^{-1})	2	5	3.28
Albumin (g dL^{-1})	1	3	1.63
Globulins g dL^{-1}	1.5	4	2.08
Total bilirubin (mml L^{-1})	3.7	19.4	8.71
ALT (u mL^{-1})	155	200	175.86
AST (u mL^{-1})	61	80	69.72
CK (U L^{-1})	3269	6145	4707
ALP (U L^{-1})	115	730	422.5
Phosphorus (mg dL^{-1})	6	18	10.29
Calcium (mg dL^{-1})	9	24	12

CONCLUSION

Values of glucose concentration in plasma were much lower than the values reported in the literature, but are in agreement with results found in animals with <7 months of age. Transaminase values were high and are in agreement with other authors. Values of phosphorous, urea and bun were much higher than the ones reported in the study. We suggest that this differences can be due to nutrition and environment.

REFERENCES

Bonorino, G.G., 1990. The history of a of 500 million years. The geological evolution of the Patagonia. Assoc. Sci. Today, 2 (7): 12-17. http://www.cienciahoy.org.ar/indice.htm.

Jensen, J.M., J.H. Johnson and S.T. Weiner, 1992 Husbandry and medical management of ostriches, emus and rheas Wildlife and Exotic Animal Teleconsultants College Station, TX (USA), pp: 23-30.

Levy, A., B. Perelman, T. Warner, M. Van Grevenbroek, C. Van Creveld and R. Yagil, 1989. Reference blood chemical values in ostriches. Am. J. Vet. Res., 50: 1548-1550. PMID: 2802331 .

Mushi, E.Z., M.G. Binta, R.G. Chabo, J.F. Isa and L. Modisa, 1998. Serum biochemical values of farmed ostrich (*Struthio camelus*) in Botswana Onderstepoort. J. Vet. Res., 65 (3): 189-193. PMID: 9809323.

Okotie-Eboh, G., C.A. Bailey, K.D. Hicks and L.F. Kubena, 1992. Referencie serum biochemical values for emus and ostriches Am. J. Vet. Res., 53 (10): 1765-1768. PMID: 1456516.

Palomeque, J., D. Pinto and G. Viscor, 1991. Hematologic and blood chemistry values of the Masai ostrich (*Struthio camelus*). J. Wildlife Dis., 27: 34-40. PMID: 2023325.

Sarasqueta, D.V., 1997. Baby of Nandus. 2nd Edn. In: Baby of Ostriches, Emus and Nandus. Royal (real) School of Aviculture. Barcelona, pp: 327-363. ISBN: 8492097833.

Van Heerden, J., J. Dauth, M.J.F. Jarvis, R.H. Keffen, J.E.F. Denny and M.J. Dreyer *et al*., 1985. Blood chemical and electrolyte concentrations in the ostrich (*Struthio camelus*). J. South Afr. Vet. Assoc., 56: 75-79. PMID: 4020817.

Verstappen, F.A., J.T. Lumeij and R.G. Bronneberg, 2002. Plasma chemistry reference values in ostriches. J. Wildlife Dis., 38 (1): 154-159. PMID: 11838206.