Use Of The Vetscan® Classic In Falcons.

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Summary

Blood chemistry reference values obtained with an in-house clinical analyzer (Vetscan® Classic; Abaxis®) from 44 healthy adult female pure gyrfalcons *(Falco rusticolus)* and gyr-hybrids are presented.

Introduction

Reference plasma chemistry values for several species of raptors have been published (Samour and D'Aloia 1996, Lumeij *et al* 1998, Samour 2000, Pollock *et al* 2005). Reference values have to be establish under similar conditions and they maybe affected by age and sex, season of sampling (Gelarch 1979 cited by Lierz 2003), time of feeding (Lumeij and Remple 1991), stress and/ food source (Kraft 1998 cited by Lierz 2003), and diagnostic tools used before sampling (Lierz *et al* 1998).

Hunting falcons are valuable birds, and this fact makes necessary the use of accurate diagnostic techniques (Lierz 2003). Blood chemistry assays and their interpretation have been incorporated as important aids of diagnosis of disease in veterinary medicine (Harr 2002). These analyses are difficult to evaluate without reference values of clinically normal individuals and the knowledge of the variation of biochemistry parameters in response to different pathological conditions (Samour and D'Aloia 1996).

In-house clinical analyzers such as the VetScan® eliminate the difficulties of conventional laboratory analyzers. Plasma chemistry reference values for an exotic species have been established using the VetScan® analyzer (Mayer *et al* 2005). Advantages of the VetScan® analyzer include compactness, feasibility of operation by nonlaboratory personnel, use of heparinized whole blood, small amount of sample required, performance of simultaneous assays of different parameters, short time required to obtain the results and no necessity of storage and transport of the samples.

The main aim of this study was to obtain reference values for biochemistry for healthy hunting falcons using a commercial biochemical in-house analyzer.

Materials and Methods

Seventeen healthy adult female pure gyrfalcons *(Falco rusticolus)* and 27 gyr-hybrids were used in this study. Blood samples were obtained and analyzed at the Al Wasl Veterinary Clinic (Dubai, UAE) as part of routine health checks performed between September 2004 and March 2005.

Health checks included physical examination, endoscopic examination of the caudal thoracic airsacs, haematology, biochemistry, radiography and parasitological examination. Blood samples (1.5 to 2 ml) were collected from the cutaneous ulnar vein while birds were under anaesthesia and 1 ml was placed in commercial lithium-heparin collection tubes for biochemical analysis. Anaesthesia was induced using a face mask and open circuit with 5% isoflurane (Forane; Abbott Ltd) and 1l/min oxygen and maintained with 3% isoflurane.

Biochemical analysis was performed using the avian-reptilian rotor on the VetScan® Classic Analyzer (Abaxis®) with 100µl of heparinized blood according to the manufacture's specifications within one hour of sample collection. The avian-reptilian rotor provides results for aspartate aminotransferase (AST), creatinine kinase (CK), glucose (GLU), total protein (TP), albumin (ALB), globuline (GLOB), uric acid (UA), blood urea nitrogen (BUN), phosphorous (PHOS), calcium (CA), potassium (K) and sodium (NA). The statistical analysis was performed using the commercial package SPSS 12.0 (SPSS Inc,). Kolmogorov-Smornov and Shapiro-Wilk test were used to evaluate the distribution of the data. Significance testing was set at 0.05. Parametric test were used to evaluate parameters following a Gaussian distribution, and Mann-Whitney in the rest.

Results

Normal distribution was followed by GLU, TP, ALB, GLOB, UA, CA and NA. AST, CK, BUN, PHOS and K did not follow a normal distribution. No significant difference ($p<0.05$) was found between gyrfalcons and their hybrids for AST, CK, GLU, TP, ALB, GLOB, UA, BUN, PHOS, CA, K. Significant difference was found for NA. Mean, median, standard deviation, minimum and maximum, 2.5% and 75.5% percentiles and 95% confidence intervals are summarized in table 1. Reference values given by Lierz (2003) and Samour (2000) are compared with those obtained in table 2.

Table 1: Plasma Biochemistries For Pure Gyrfalcons (*Falco Rusticolus*) And Gyr-hybrids.

	N	Mean	Median	SD	Mín	Max	Percentiles % P2.5	P97.5	* 95% CI	
AST (U/l)	44	80.9	69.0	49.3	41.0	331.0	41.0	313.8		
CK (U/l)	44	576.7	469.0	417.3	287.0	3017.0	291.4	2775.5		
GLU (mg/dl)	44	318.8	317.0	16.6	289.0	360.0	289.4	358.8	313.8	323.9
TP (g/dl)	44	2.9	2.8	0.3	2.4	3.5	2.4	3.5	2.8	2.9
ALB (g/dl)	44	2.2	2.2	0.2	1.7	2.7	1.7	2.7	2.1	2.3
GLOB (g/dl)	44	0.6	0.6	0.3	0.1	1.5	0.1	1.5	0.5	0.7
UA (mg/dl)	44	6.0	5.4	2.8	1.6	12.3	1.6	12.3	5.1	6.8
BUN (mg/dl)	44	4.1	4.0	1.8	1.0	11.0	1.1	10.6		
PHOS (mg/dl)	44	3.1	3.4	1.0	0.4	5.0	0.5	5.0		
CA (mg/d/l)	43	8.6	8.6	0.3	8.1	9.3	8.1	9.3	8.5	8.7
K (mmol/l)	44	4.3	4.1	0.7	3.0	6.2	3.0	6.2		
NA Gyr (mmol/l)	17	148.8	149.0	3.2	143.0	154.0	138.0	155.0	144.3	147.7
NA Gyr-Hybrid (mmol/l)	27	146.0	145.0	4.2	138.0	155.0	143.0	154.0	147.2	150.5

*95% CI reported when parameter followed normal distribution

Table 2: Plasma chemistry reference values for gyrfalcons (*Falco rusticolus*) and gyr-hybrids compared with those provided by Lierz (2003) and Samour (2000).

Variable (SI)			Lierz (2003)		Samour (2000)
	Mean (SD)	P2.5-P97.5	Mean (SD)	P2.5-P97.5	Mean
AST (U/l)	80.9 (49.3)	41.0-313.8	149 (110)	44-471	97
UA (µmol/l)	356.9 (166.5)	95.2-731.6	370 (170)	80-690	828.5
Urea (mmol/l)	1.5 (0.6)	0.4-3.7	3.6 (2.2)	0-9.5	3.3
GLU (mmol/l)	17.7 (0.9)	16.1-19.9	20.4 (1.7)	17.4-23.9	17.7
TP (g/l)	29 (3)	24-35	25 (8.7)	4.5-46.2	28.9
ALB (g/l)	22 (2)	17-27	11.8 (1.7)	6.6-16.8	7.3
NA (mmol/l)	148.8 (3.2)	138.0-155.0	154 (12)	125-178	160
K (mmol/l)	4.3 (0.7)	3.0-6.2	3.1 (0.9)	1.9-4.9	1.99
CA (mmol/l)	2.1 (0.1)	2.0-2.3	2.3 (0.27)	1.98-3.48	2.4
PHOS (mmol/l)	3.1 (1.0)	0.5-5.0	1.52 (0.4)	0.45-2.89	1.2

Discussion

Female gyrfalcons (*Falco rusticolus*) and their hybrids are popular birds of prey used for falconry in the Middle East, and the demand of state of the art health care for these animals has increased over the last years. Biochemistry panels have been incorporated to basic investigations by veterinarians, and although some references have been published (Lierz 2003), there are not reported reference values in these species for the VetScan® analyzer. As biochemistry is only useful after a careful history and complete physical examination and should be evaluated in conjunction with complete haematology (Halliwell 1981), the birds included in our study went through a complete health check.

All animals included in this study were clinically normal adult females. Because it has been established that reference values may be affected by several factors (Lumeij and Remple 1991, Samour and D'Aloia 1996, Lierz *et al* 1998), conditions at the time of sampling were standardized as much as possible to avoid differences. Statistical significant difference ($p<0.05$) between pure breed and hybrids was only found in sodium concentrations, therefore reference values for the rest of parameters were calculated as a sole group.

The method used by the VetScan® (bromocresol green dye) for the calculation of albumin concentrations has been found not to be reliable in birds; the serum protein electrophoresis is the recommended method (Lumeij *et al* 1990). Even though the values obtained by this method do not allow a detailed interpretation, personal observations by the authors indicate that the increase in globulin levels (calculated from total protein and albumin concentrations) in absence of other abnormalities can suggest the presence of an underlying pathology in several cases and further investigations are recommended.

To the authors' knowledge this is the first report of reference values using the commercial in-house analyzer VetScan® in gyrfalcons and their hybrids. Although birds sampled under different conditions may have different results, the values obtained in our study can be use as base line for further investigations that represents better the whole population.

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