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Hematological and Serum Chemistry Values for Arabian Oryx (*Oryx leucoryx*)

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ABSTRACT: Blood samples obtained from 73 captive Arabian oryx (*Oryx leucoryx*) were analyzed for hematology and serum chemistry values. Compared with other data from this animal RBC, WBC, bilirubin and ASAT values are lower, but glucose, urea and uric acid values are higher.

Key words: Arabian oryx, hematology, biochemistry, Hippotraginae, *Oryx leucoryx*.

The Arabian oryx (*Oryx leucoryx*) is thought to have disappeared in the wild during the 1970's due to habitat degradation and overhunting. Its natural range covered the whole of the interior of the Arabian peninsula and extended into Syria (Stanley Price, 1989). The "World Herd" was created in 1963 to save the species from extinction, and was established in the United States from animals of various origins. That was the starting point of other projects in Arabian countries; oryx were released in the wild in Jordan in 1978 and in Oman in 1982. Saudi Arabia begun an important project of captive breeding of this species in 1986 at the National Wildlife Research Center (NWRC) (21°17′N to 40°40′E) near Taif, Saudi Arabia with animals originating from the King Khaled farm (25°03′N to 46°45′E) near Riyadh. Today the NWRC herd consists of 95 animals and on 1 March 1990, 17 oryx of American and Jordanian origins were released in the Mahazat As Said Reserve (21°59′ to 22°31′N, 40°27′ to 42°12′E).

A very serious outbreak of tuberculosis in the NWRC herd in 1986 led to a dramatic TB eradication campaign with serological tests performed twice a year on most of the animals. This opportunity was used to collect blood for hematological and biochemical analyses.

As with other wild animals, Arabian oryx manifests few clinical signs of disease. This fact reinforces the usefulness of additional investigation such as hematological and biochemical analyses as an aid to identify and treat sick animals. In this field little has been done on oryx species apart from the work of Bush et al. (1983) (on Scimitar-horned oryx, *oryx tao*) and the one of Rhodes reported by Kitchen (1986). Normal hematological values are also given for *O. leucoryx* by R. A. Kock and C. M. Hawkey (1988). Moreover the establishment of reference values for the Arabian oryx would be the first step in understanding and elucidating the physiological adaptations of this species to the very arid conditions of its natural habitat.

The NWRC is at an altitude of 1,500 m, in a semidesert type habitat of *Acacia* sp. and *Lycium shawii*. It has an annual rainfall of <100 mm of water, and temperate temperatures (winter: mean maximum = 22 C, mean minimum = 8 C and summer: mean maximum = 35 C, mean minimum = 23 C).

The 95 oryx of the NWRC are kept in enclosures from 300 m² to 25 ha. They receive water and dry alfalfa ad libitum, fresh alfalfa (1 kg per adult), and 60 g pellets daily (composition: barley 65%, corn 18%, soya cattle-cake 15%, meat flavor 2%).

The first oryx which arrived in the NWRC are called the "A generation" and are kept in treatment pens of 300 m² due to the past tuberculosis outbreak. The calves, called the "B generation," are removed at birth from their dams and are hand-reared to avoid any risk of contamination. Consequently they are tame and easy to manipulate and most of them are only tranquilized for blood sampling.

Between 22 April 1990 and 20 May 1990, 73 oryx were immobilized and blood sam-

TABLE 1. Hematological and blood chemistry values for *Oryx leucoryx* in NWRC, Saudi Arabia.

	Sample size	Mean (± confidence interval at 5%)	Variation interval for one individual
Hematology			
WBC (1,000/mm³)	63	3.48 ± 0.32	0.952–6.006
RBC (million/mm³)	63	7.29 ± 0.38	4.25–10.33
Hemoglobin (g/dl)	22	14.5 ± 1.48	7.54–21.46
Hematocrit (%)	50	41.5 ± 1.3	32.34–50.66
MCV (m³)	20	44.94 ± 5.5	20.36–69.52
MCH (pg)	20	14.62 ± 1.67	7.15–22.09
MCHC (%)	20	32.88 ± 1.54	26–39.76
Differential white cell count			
Neutrophils (%)	59	75.2 ± 2.44	56.5–93.91
(1,000/mm³)	59	2.68 ± 0.278	0.553–4.826
Lymphocytes (%)	59	20.56 ± 2.3	2.87–38.25
(1,000/mm³)	59	0.70 ± 0.094	0–1.432
Monocytes (%)	59	1.02 ± 0.29	0–3.25
(1,000/mm³)	59	0.036 ± 0.012	0–0.127
Eosinophils (%)	59	2.86 ± 0.65	0–7.87
(1,000/mm³)	59	0.108 ± 0.029	0–0.331
Basophils (%)	59	0.37 ± 0.2	0–1.91
(1,000/mm³)	59	0.013 ± 0.007	0–0.068
Chemistry			
Total protein (g/L)	73	68.01 ± 3	42.37–93.65
Glucose (g/L)	73	1.95 ± 0.15	0.64–3.25
Blood urea nitrogen (g/L)	73	0.51 ± 0.04	0.14–0.87
Creatine-kinase (u/L)	32	303.34 ± 72.52	0–713.59
Creatinine (mg/dl)	59	1.38 ± 0.06	0.92–1.83
Bilirubin (mg/L)	43	3.65 ± 0.54	0.11–1.83
Uric acid (mg/dl)	44	2.07 ± 0.41	0–4.82
ASAT (u/L)	69	47.65 ± 3.29	20.3–75

ples collected for hematological and biochemical analysis. At this time it was not possible to measure correctly the hemoglobin, so in November 1990 22 oryx were caught and hematological analysis were done on these animals. Results given in Table 1 for hemoglobin, MCV, MCH, and MCHC come from these animals. PCV and RBC data for these animals are not presented in Table 1. In April and May 1990, all the animals were darted except two. In November 1990, 18 animals were manually restrained and four anesthetized or tranquilized. Effects of capture on blood parameters will be analyzed when more data will be available.

Animals were darted with rifle or blowpipe (Telinject, GMBH Romerberg, Germany) depending on the distance from the animal. For anesthetized animals, blood was sampled between 14 and 109 min after the dart ($\bar{x}$ = 39′50″ ± 19′02″). Blood was collected from the jugular vein with an 18-gauge needle into 10-ml vacutainer tubes (ethyldiaminetetraacetic acid (EDTA) tubes for hematology and serum tubes for biochemistry). Samples were refrigerated until examined. Hematological analyses were performed within 24 hr; cell counts were manually done with a Malassez hemacytometer, haemoglobine concentration was determined with a Compur M 2000 CS spectrophotometer (Bayer Diagnostic+Electronic Gmbh, 8000 Munchen 70, Germany), pack cell volume on a microcentrifuge Compur M 1100 (Bayer Diagnostic+Electronic Gmbh) and smears were stained with Hemacolor reagents (Merck, Darmstadt, Germany).

The serum tubes were immediately low-

ered to 4 C until there were centrifuged (within 8 hr of collection) and then stored at −20 C until chemical analysis could be performed between 10 days to 1 mo later. Total protein, glucose, urea, creatine-kinase, creatinine, bilirubine, uric acid and ASAT were determined by using a spectrophotometer Compur M 2000 CS with RCM test 2000 reagents (Bayer Diagnostic+Electronic Gmbh). Principles of the tests were the following: Biuret method for total protein, dehydrogenase of glucose for glucose, UV enzymatic essay for urea, optimized method as recommended by "Deutsche Gesellschaft fur Klinische Chemie" for creatine-kinase, Jaffe method for creatinine, DPD method for total bilirubin, Uricase-PAP method for uric acid, optimized method as recommended by "Deutsche Gesellschaft fur Klinische Chemie" for ASAT.

Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) were calculated according to conventional formula. For the total sample we calculated the mean, the standard deviation (SD), the mean interval at 5% ($\bar{x} \pm 1.96\ SD/\sqrt{n}$) and the interval of variation for one individual in the population ($\bar{x} \pm 1.96\ SD$) for all the parameters studied (see Table 1).

Hematological and serum chemistry values for Arabian oryx at NWRC are given in Table 1. Compared with what is given for Arabian oryx by R. A. Kock and C. M. Hawkey (1988), a few remarks have to be made: the hemoglobin concentration for NWRC oryx is quite the same; 14.5 versus 16.52; the RBC found is lower, 7.29 million/mm^3 in our study versus 10.21. The WBC is much lower in our case than in the previous study (3,479 against 6,200). The hematocrit is quite the same; 41.5 in our study and 44.5 in the study of R. A. Kock and C. M. Hawkey (1988).

For the chemistry values we found similar levels for total proteins as the one given by Kitchen (1986), but we found higher levels for glucose (1.95 versus 1.38). We found higher levels for blood urea nitrogen (0.51 g/L versus 0.226 g/L), and uric acid (2.07 mg/dl versus 1.4 mg/dl). Bilirubin is lower (3.6 mg/L versus 5.7 mg/L) with ASAT (47.65 u/L versus 123 u/L). Interpretation of the differences found between our study and other investigations is difficult as samples conditions and methods of analysis are not given.

Our data, from environment close to native habitat, are the first published for this species. But further studies are needed to evaluate the effects of anesthesia, sex, season, age and reproductive status of the animal.

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