

BLOOD SERUM BIOCHEMICAL VALUES OF NEONATAL ANTELOPES OF THE SUBFAMILIES REDUNCINAE AND HIPPOTRAGINAE

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Abstract

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Values of 17 blood serum biochemical indicators obtained in 1- to 4-day old antelopes of 10 species of the Subfamilies *Reduncinae* and *Hippotraginae* kept in the Zoological Garden at Dvůr Králové are reported. Interspecies differences in the values were more pronounced in the *Hippotraginae* than in the *Reduncinae*. The values recorded for the neonatal antelopes were compared with the published data on adult animals of the same species kept in the Zoological Garden at Dvůr Králové.

Antelopes, neonates, captivity, blood serum, biochemistry.

Blood serum biochemical values of captive antelopes have received little attention to date. The present study reports the values obtained in neonatal antelopes of 10 species of the subfamilies *Reduncinae* and *Hippotraginae*, namely, mountain reedbucks (*Redunca fulvorufula*), Lady Grey's waterbucks (*Kobus megaceros*), lechwe waterbucks (*Kobus leche*), defassa waterbucks (*Kobus ellipsiprymnus defassa*), common waterbucks (*Kobus ellipsiprymnus ellipsiprymnus*), roan antelopes (*Hippotragus equinus*), sable antelopes (*Hippotragus niger*), addax (*Addax nasomaculatus*), scimitar-horned oryx (*Oryx dammah*), gemsboks (*Oryx gazella gazella*) in the Zoological Garden at Dvůr Králové during the period 1982 to 1990.

Materials and Methods

Blood samples were withdrawn from the vena jugularis of manually restrained clinically healthy 1- to 4-day old antelopes on the occasion of preventive measures throughout the year. Included in the study were only those neonates that developed no disease during the following 14 days. Basic information on animals of the individual species are presented in Table 1. The blood samples were collected into glass test-tubes and allowed to stand at room temperature. The samples were forwarded to the laboratory for processing within 60 minutes of collection. The blood serum biochemical values were determined with methods used routinely in clinical practice (Pospišil et al. 1987).

Means (\bar{x}) and standard deviations (S.D.) were computed from the values obtained for each species regardless of sex. The significance of the differences between the species was analysed using Student's t-test separately for each subfamily.

Table 1

Animals examined - basic data

	n	Collection period		Age	n	Body mass of animals when blood-sampled kg	
		M/F	Month	Year			Days
A	Mountain reedbuck	5/6	6-8	86-90	1-4	12	2.5- 4.0
B	Lady Grey's waterbuck	10/11	1-11	82-90	1-4	20	5.5- 7.5
C	Lechwe waterbuck	23/23	1-12	86-89	1-4	42	6.0-10.0
D	Defassa waterbuck	13/7	1-12	86-89	1-4	17	10.0-15.0
E	Common waterbuck	2/4	11-8	87-88	1-3	6	11.0-16.0
F	Roan antelope	15/22	3-9	85-89	1-3	25	14.0-23.0
G	Sable antelope	11/8	1-7	85-89	1-3	11	13.0-20.0
H	Addax	15/9	2-5	85-89	1-3	24	6.0- 8.0
I	Scimitar-horned oryx	12/6	3-7	85-89	1-3	18	9.5-11.0
J	Gemsbok	13/18	12-5	85-89	1-4	31	11.5-16.0

n = No. animals examined

M = male

F = female

Table 2

Biochemical values of neonates of the Reduncinae and Hippotraginae

		Mountain reedbuck	Lady Grey's waterbuck	Lechwe waterbuck	Defassa waterbuck	Common waterbuck
		A	B	C	D	E
Total protein (g/l)	\bar{x}	53.5	53.1	53.1	53.7	51.6
	SD	6.3	5.0	9.5	9.6	3.8
	Range	45-65	43-61	39-80	36-74	45-57
Glucose (mmol/l)	\bar{x}	6.52	7.56	7.00	7.08	6.86
	SD	1.59	1.43	1.85	1.20	1.19
	Range	4.3-8.4	3.5-9.5	2.6-10.2	5.2-8.7	5.1-8.6
Creatinine (umol/l)	\bar{x}	141.7	100.8	150.0	154.1	171.3
	SD	22.9	19.9	47.3	37.6	36.1
	Range	108-171	66-147	91-268	108-227	120-221
Urea (mmol/l)	\bar{x}	5.27	5.52	6.20	5.47	6.08
	SD	1.46	1.43	2.24	1.61	1.73
	Range	3.6-7.6	3.0-8.4	1.3-10.6	2.8-9.0	4.0-8.1
Triglycerides (mmol/l)	\bar{x}					
	SD					
	Range					
Cholesterol (mmol/l)	\bar{x}	1.66	2.11	2.12	1.82	1.58
	SD	0.36	0.58	0.48	0.75	0.24
	Range	1.2-2.3	1.5-3.4	1.6-3.4	0.9-3.3	1.3-2.0
AP (ukat/l)	\bar{x}	7.612	6.663	7.050	3.181	2.920
	SD	3.370	2.393	3.115	0.792	0.635
	Range	2.86-12.67	3.71-10.8	1.67-13.80	2.21-5.29	2.25-3.90
AST (ukat/l)	\bar{x}	0.556	0.533	0.600	0.827	0.653
	SD	0.111	0.121	0.205	0.253	0.167
	Range	0.40-0.72	0.31-0.75	0.28-1.30	0.45-1.30	0.52-0.97
ALT (ukat/l)	\bar{x}	0.087	0.278	0.287	0.186	0.125
	SD	0.058	0.120	0.140	0.129	0.059
	Range	0.02-0.19	0.10-0.55	0.08-0.92	0.02-0.53	0.03-0.20
Magnesium (mmol/l)	\bar{x}	0.959	0.944	0.900	1.018	1.065
	SD	0.118	0.098	0.169	0.121	0.110
	Range	0.77-1.12	0.77-1.10	0.46-1.30	0.77-1.24	0.94-1.20
Calcium (mmol/l)	\bar{x}	2.897	2.736	2.770	3.000	2.981
	SD	0.339	0.346	0.558	0.363	0.224
	Range	2.20-3.44	2.15-3.58	1.29-3.69	2.09-3.43	2.71-3.37
Phosphorus (mmol/l)	\bar{x}	2.825	2.737	2.880	2.748	2.635
	SD	0.517	0.630	0.696	0.648	0.329
	Range	2.16-3.92	2.10-4.67	1.70-4.54	1.81-4.36	2.23-3.20
Chlorides (mmol/l)	\bar{x}	106.0	104.9	101.0	100.9	105.1
	SD	5.6	8.0	8.5	7.9	7.0
	Range	95-114	94-120	70-117	86-116	98-116
Sodium (mmol/l)	\bar{x}	137.0	146.2	144.0	145.0	145.3
	SD	14.8	10.8	13.4	14.0	10.0
	Range	111-156	124-167	110-170	120-165	133-158
Potassium (mmol/l)	\bar{x}	5.164	4.919	4.870	5.185	4.966
	SD	0.610	0.775	0.674	0.855	0.765
	Range	4.21-6.26	4.00-6.71	3.17-6.47	3.25-6.37	3.92-5.85
Copper (umol/l)	\bar{x}	12.86	8.96	15.29	7.00	5.87
	SD	7.83	3.69	6.75	4.16	1.17
	Range	7.9-21.9	4.1-16.8	5.6-29.3	3.5-11.6	4.5-6.9
Zinc (umol/l)	\bar{x}	30.10	29.94	33.45	24.83	27.77
	SD	2.42	6.88	6.25	5.81	8.35
	Range	27.4-32.1	21.6-39.0	22.8-42.5	18.8-30.4	15.8-33.7
Iron (umol/l)	\bar{x}	19.50	19.30	22.86	16.96	19.75
	SD	4.72	10.88	9.66	1.41	6.87
	Range	16.1-24.9	9.3-38.4	9.4-50.9	15.7-18.5	14.0-29.3

Results and Discussion

Blood serum biochemical values for the individual species of each subfamily are presented in Table 2.

Statistical differences between the values for the individual species within each subfamily are presented in Table 3.

In the *Reduncinae* only minimal differences were found between the values for the related species lechwe waterbuck and Lady Grey's waterbuck, creatinine and copper values being lower in Lady Grey's waterbucks. No differences in the values were found between two subspecies, namely, between defassa waterbucks and common waterbucks. Lower ALT values were recorded for mountain reedbucks, lower creatinine values for Lady Grey's waterbucks; higher cholesterol and ALT values were found in Lady Grey's waterbucks and lechwe waterbucks. A higher AST level was found in defassa waterbucks and

Table 2
(Continued)

Roan antelope	Sable antelope	Addax	Scimitar-horned oryx	Gemsbok
F	G	H	I	J
66.0	63.5	50.6	61.5	57.6
9.6	11.6	7.7	10.0	10.8
51-82	41-81	39-66	41-77	40-77
7.21	7.01	8.20	8.62	8.25
1.26	1.00	1.45	1.23	1.36
4.0-10.4	4.8-9.7	4.6-10.8	6.5-10.5	5.5-11.1
198.9	185.8	112.3	138.0	130.7
39.9	48.2	20.0	27.2	20.7
130-295	127-296	89-161	102-196	103-184
6.30	6.23	3.83	5.41	4.18
2.12	1.68	1.81	1.14	1.59
2.5-10.8	3.3-8.7	1.9-8.9	3.7-7.8	1.8-8.0
1.703	1.396	3.237	2.922	2.190
0.692	0.627	0.839	0.408	0.762
0.44-2.69	0.46-2.21	0.20-3.87	2.43-3.47	1.24-3.18
1.69	1.54	1.74	2.04	1.42
0.47	0.51	0.53	0.59	0.48
0.5-2.7	0.8-2.3	0.8-2.7	1.3-3.6	0.5-2.4
5.756	7.346	4.738	6.780	3.446
2.042	3.124	1.389	2.272	1.721
1.30-10.3	2.12-13.5	2.22-7.37	3.22-10.7	1.40-7.43
0.475	0.481	0.419	0.512	0.438
0.141	0.105	0.130	0.156	0.143
0.17-0.94	0.31-0.74	0.21-0.73	0.19-0.79	0.21-0.71
0.109	0.161	0.132	0.147	0.102
0.055	0.080	0.074	0.082	0.079
0.01-0.22	0.04-0.27	0.01-0.28	0.01-0.26	0.01-0.28
0.900	0.971	0.917	0.900	0.939
0.108	0.130	0.074	0.095	0.092
0.55-1.06	0.78-1.30	0.76-1.04	0.76-1.03	0.74-1.10
2.803	2.775	2.943	2.734	2.869
0.413	0.410	0.459	0.334	0.386
1.95-3.52	2.28-3.63	2.18-3.73	2.17-3.48	2.02-3.93
3.038	2.695	2.713	2.918	2.513
0.576	0.327	0.487	0.407	0.347
1.72-3.96	1.90-3.11	1.84-3.80	2.18-3.54	1.79-3.19
97.8	100.6	107.4	105.0	105.1
8.3	9.0	5.7	7.9	6.2
83-117	84-113	94-118	86-118	86-113
138.7	138.5	139.4	144.2	138.5
11.5	9.1	6.7	8.8	11.4
115-160	124-151	127-152	130-159	110-155
4.287	4.704	4.751	4.643	4.595
0.451	0.659	0.784	0.733	0.713
3.08-5.38	3.24-5.75	3.14-6.01	3.37-5.90	3.11-5.93
12.00	11.05	13.68	10.64	10.76
4.82	3.34	4.54	2.43	4.29
4.2-22.6	7.5-16.9	8.0-23.1	7.1-13.5	5.6-18.6
30.28	29.74	27.67	39.08	30.19
11.93	11.21	12.18	19.68	21.22
17.9-58.2	14.6-54.3	12.1-51.3	18.9-66.1	8.8-84.6
26.94	17.31	13.56	22.88	18.87
12.11	10.21	5.77	9.03	8.78
6.3-45.7	4.7-37.8	9.4-27.0	13.4-40.7	9.0-32.7

lower alkaline phosphatase levels were recorded for defassa waterbucks and common waterbucks.

In the *Hippotraginae* a degree of similarity in the values depending on the relatedness of the species was also apparent. This applied to roan antelopes and sable antelopes within the group of desert antelopes and to addax, scimitar-horned oryx and gemsboks. However, the interspecies differences in the *Hippotraginae* were greater than in the *Reduncinae*. Thus roan antelopes showed higher urea, creatinine, phosphorus and iron levels and lower glucose, triglyceride, chloride and potassium levels. Sable antelopes showed higher urea, creatinine, alkaline phosphatase and ALT levels and lower glucose and triglyceride levels. Addax exhibited lower total protein, urea, creatinine and iron levels, whereas scimitar-horned oryx showed a higher cholesterol level and gemsboks, a lower alkaline phosphatase level.

Up to now, biochemical data regarding neonatal antelopes of the two subfamilies have been scarce. Compared with the values reported for neonatal scimitar-horned oryx by Bush

Table 3

Statistical significance of differences (in %) in the values between the species of the *Reduncinae* and *Hippotraginae*

	<i>Reduncinae</i>										<i>Hippotraginae</i>									
	A:B	A:C	A:D	A:E	B:C	B:D	B:E	C:D	C:E	D:E	F:G	F:H	F:I	F:J	G:H	G:I	G:J	H:I	H:J	I:J
Total protein	-	-	-	-	-	-	-	-	-	-	-	1	-	5	1	-	-	1	5	-
Glucose	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	-	-	-
Creatinine	1	-	-	-	1	1	1	-	-	-	-	1	1	1	1	1	1	1	1	-
Urea	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	1	1	-	1
Triglycerides	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-
Cholesterol	1	1	-	-	-	-	1	-	1	-	-	-	5	5	-	5	-	-	5	1
AP	-	-	1	1	-	1	1	1	1	-	5	-	-	1	1	1	1	5	5	1
AST	-	-	1	-	-	1	-	5	-	-	-	-	-	-	-	-	-	5	-	-
ALT	1	1	5	-	-	1	1	1	1	-	1	-	-	-	-	-	1	-	-	-
Magnesium	-	-	-	-	-	-	5	5	5	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	-	-	-	-	-	-	-	-	-	-	5	5	-	1	-	-	-	-	-	1
Chlorides	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-
Sodium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	-	-	-	-	-	-	-	-	1	1	5	5	-	-	-	-	-	-
Copper	-	-	-	-	5	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-
Zinc	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	-	-	-	-	-	-	-	-	-	-	5	1	-	5	-	-	-	5	-	-

et al. (1983), the equally old scimitar-horned oryx antelopes in our study showed lower alkaline phosphatase, AST, ALT, and potassium levels and higher glucose, urea and phosphorus levels. These differences may be regarded as due to different husbandry and feeding practices.

Comparison with the values found previously in adult antelopes kept in the Zoological Garden at Dvůr Králové (Váhala et al. 1989a, 1989b, 1991) revealed a similar to equal trend in the development of the biochemical values in all the species under study. Neonatal antelopes exhibited higher alkaline phosphatase, calcium and phosphorus levels and lower total protein, creatinine, ALT and iron levels. Except the addax species they also showed lower glucose levels and, except lechwe waterbucks, lower cholesterol levels. These findings are in keeping with the variations with age in lechwe waterbucks as reported in a previous study (Váhala and Kaše 1993).

Základní biochemické hodnoty krevního séra novorozенých mláďat antilop podčeledí *Reduncinae* a *Hippotraginae*

V práci uvádíme hodnoty 17 biochemických ukazatelů krevního séra 10 druhů antilop podčeledi *Reduncinae* a *Hippotraginae* ve věku 1 až 4 dny, narozených v Zoo Dvůr Králové.

U podčeledi *Hippotraginae* byly zjištěny výraznější mezidruhové rozdíly jednotlivých hodnot, než mezi druhy podčeledi *Reduncinae*. Hodnoty neonatálních jedinců jsme porovnali s literárními údaji u dospělých zvířat chovaných v zoo Dvůr Králové.

Основные биохимические величины кровяной сыворотки новорожденных детенышей антилопы подсемейств *Reduncinae* и *Hippotraginae*

В работе приведены величины 17 биохимических показателей кровяной сыворотки 10 видов антилоп подсемейств *Reduncinae* и *Hippotraginae* в возрасте 1-4 сутки, рожденных в зоопарке Двур-Кралове.

У подсемейства *Hippotraginae* были выявлены более выразительные межвидовые расхождения отдельных величин по сравнению с видами подсемейства *Reduncinae*. Величины новорожденных особей сопоставляли с литературными данными взрослых животных, содержаемых в зоопарке Двур-Кралове.

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