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Physiological responses of blesbok, eland and red hartebeest to different capture methods

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In this study intra-species physiological responses to different capturing techniques were compared. Statistically significant differences for lactate and osmolality concentrations were shown to exist between blesbok captured by herding into a boma and manually restrained, and blesbok captured by netting. There does not seem to be any advantage in allowing blesbok to rest in the boma before they are captured. Capture methods as described are stressful, with the netting procedure resulting in the highest mean values in blesbok and eland for haematocrit, glucose, lactate, osmolality and total catecholamines.

Die intra-spesie fisiologiese reaksies as gevolg van verskillende vangtegnieke is vergelyk. Statisties betekenisvolle verskille is gevind tussen blesbokgroepe wat met die hand gevang en 'n groep wat met 'n net gevang is, vir laktaat- en osmolaliteitwaardes. 'n Rusperiode na aanjaging maar voor hantering het geen voordeel ingehou vir blesbokke nie aangesien geen verskille in hulle waardes in vergelyking met dié van bokke wat nie gerus het nie, gevind kon word nie. Vangtegnieke soos beskryf, lei tot spanning, en die hoogste gemiddelde waardes vir hematokrit, glukose, laktaat, osmolaliteit en totale katesjolamiene, is gemeet in blesbokke en elande wat met 'n net gevang is.

Keywords: Antelope, blood composition, capture, immobilization, stress

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Introduction

A paucity of information exists concerning physiological responses of wild animals caught in nets and by other methods in South Africa. Gericke, Hofmeyr & Louw (1978) showed that springbok *Antidorcas marsupialis* captured in drop nets had elevated cardiac rates, respiration rates, rectal temperatures and haematocrits. In addition, increased concentrations of plasma glucose, lactate, sodium, potassium, creatine kinase and lactate dehydrogenase and a decreased blood pH were measured. They concluded that netting caused exhaustion of the animals which resulted in anaerobic metabolism and metabolic acidosis. It was suggested that the sympathetic response of the alarm reaction was responsible for capture myopathy. An evaluation of capture techniques for wild impala *Aepyceros melampus* showed a mortality of 30% for animals confined in a crush, 0,4% for those caught in nets, 22% for those restrained with tranquilization and 7,5% for those restrained without tranquilization (Murray, Lewis & Coetzee 1981).

Three methods currently used by the National Parks Board during capture operations of large numbers of wild antelope are: (i) catching animals in a narrow area built in a boma (crush) after they had been herded into the boma, (ii) herding them into nets or (iii) darting them with immobilization agents or sedatives from the air. In this study, aspects of the physiological responses of blesbok, *Damaliscus dorcas phillipsi*, eland *Taurotragus oryx* and red hartebeest *Alcelaphus buselaphus* immediately after capture by one of these methods were measured and compared.

Materials and Methods

Animals were herded by helicopter during early morning with the exception of eland (Group D) which was done throughout the day. Animals were either caught at the Mountain Zebra National Park or the Golden Gate National Park. Blood samples were obtained from the jugular vein of adult animals of both sexes.

Blesbok at Golden Gate National Park

Group A: These animals were herded for 10 to 20 min covering distances of between 1 and 4 km. Once in the boma animals were immediately chased into the crush and caught by hand. Blood was drawn from 21 animals.

Group B: A large group was herded for approximately 28 min covering a distance of about 6 km. These animals were allowed to rest in the boma for approximately 1 h before being chased into the crush and caught by hand, where blood was obtained from 12 animals.

Blesbok at Mountain Zebra National Park

Group C: These animals were herded for 10 to 22 min covering 2 to 4 km. They were allowed to set their own pace until the last 250 m,

whereafter they were driven into nets and caught hy hand. Blood samples were taken from 11 animals.

Eland at Mountain Zebra National Park

Group D: These animals were darted with 8 mg etorphine (M99, Reckitt) and 100 mg xylazine HCl (Rompun, Bayer) from a helicopter without being herded. Once immobilized blood samples were obtained from 8 animals.

Group E: A group of animals was herded for about 20 min covering approximately 3 km and immediately chased into suspended nets. Blood samples were drawn from 6 manually restrained animals as soon as possible.

Red hartebeest at Mountain Zebra National Park

Group F: These animals were herded for 8 min covering approximately 2 km by means of a helicopter and people on horseback. Slow movement was allowed with occasional stopping for the first 5 min. The animals were chased into nets for the last 3 min (approximately 1 km). Blood samples were drawn from 4 animals.

Group G: These animals were herded for 25 min covering about 3 to 5 km in the same manner as Group F. Blood samples were drawn from 4 animals.

Jugular blood samples were drawn into heparinized vacutainers. An aliquot was placed into a test tube containing 4 mmol/l glutathione. Haematocrits were determined. Samples were immediately centrifuged and the plasma separated from the cells. Plasma samples were frozen at –20°C until analysed for glucose, lactate, cortisol, total lipids, osmolality, total protein and total catecholamines by standard methods (Ganhao, Hattingh, Kay, Cornelius & Grobbelaar 1985).

Statistical analyses were done using a one-sided analysis of variance and significant differences were assessed using Student's *t* test.

Results

The results are shown in Figure 1 and Table 1. Statistically significant differences were found to exist between blesbok Groups A and C ($P < 0{,}01$), and B and C ($P < 0{,}025$) for lactate and for osmolality between Groups A and C ($P < 0{,}05$). Allowing blesbok to rest in the boma after herding before being manually caught (Group B) did not result in any significant decrease in the values of the variables measured compared with animals not given a rest (Group A). Immobilization and capture in nets resulted in similar values in eland (Groups D and E). An increase in herding times for red hartebeest also did not result in significant differences.

Discussion

Capture operations being used in South Africa by the

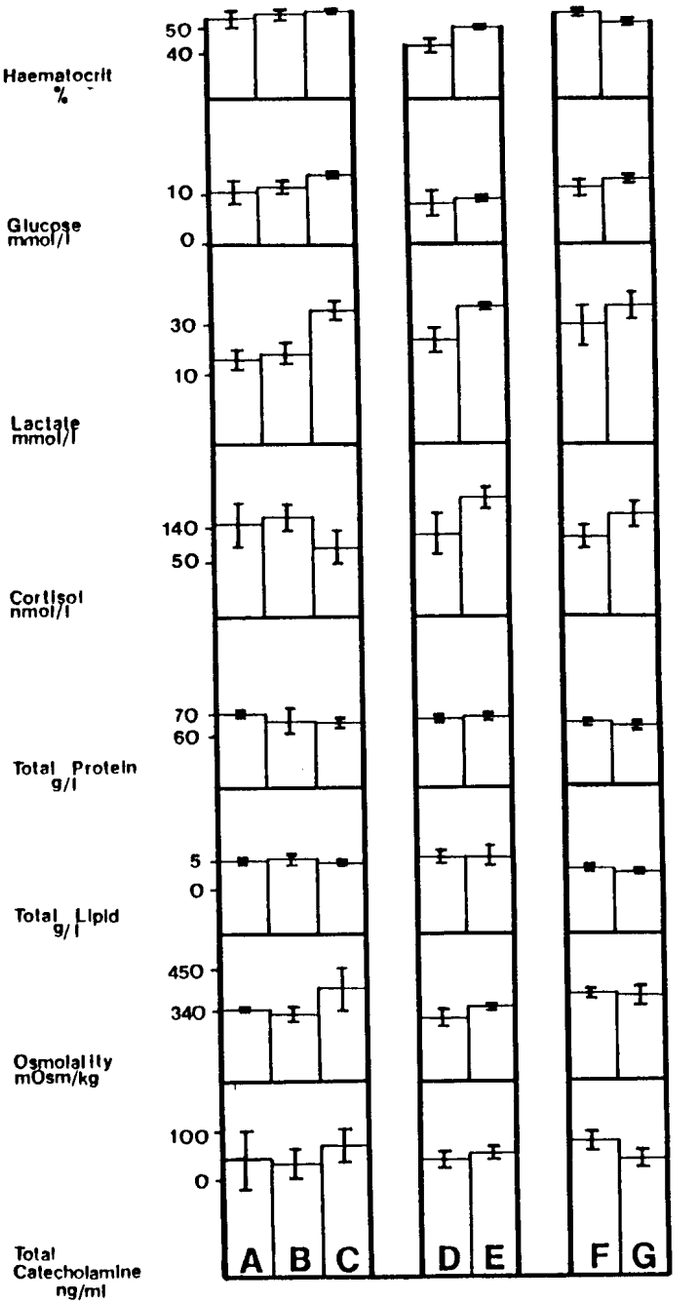

Figure 1 Response of antelope to capture. (See text for details and significant differences within groups.) A to G refer to the different groups of animals.

National Parks Board cannot be standardized. This is due to various difficulties such as mountainous terrain, animals differing in size, species populations of different densities, areas differing in size and vegetation, etc. Consequently, animals are herded for different time periods with or without rest periods using helicopters, vehicles or horsemen. Animals may either be herded into bomas with narrow catching areas (crushes) or into suspended nets or drop nets. They may also be captured by chemical immobilization.

In this study, intra-species physiological responses to different capture techniques were compared. Control data from resting animals could not be obtained, thus

Table 1 Results for the different variables measured on wild antelope: A to G refer to the different groups of animals (see text)

	A	B	C	D	E	F	G
Haematocrit (%)	52,9 ± 3,3	53,8 ± 4,0	54,3 ± 3,0	40,4 ± 5,1	48,5 ± 2,1	53,8 ± 2,5	50,3 ± 3,0
Glucose mmol/l	10,3 ± 3,2	11,3 ± 2,5	13,7 ± 1,9	7,9 ± 3,1	8,7 ± 2,2	11,5 ± 1,6	12,9 ± 1,2
Lactate mmol/l	13,1 ± 4,9	15,0 ± 5,3	32,3 ± 5,3	21,2 ± 5,9	34,3 ± 3,3	27,5 ± 8,2	34,5 ± 6,0
Cortisol nmol/l	136,1 ± 42,0	144,2 ± 35,6	87,6 ± 38,1	111,4 ± 48,0	185,5 ± 29,9	105,3 ± 32,4	152,0 ± 28,1
Total protein g/l	68,8 ± 3,0	68,2 ± 4,0	66,8 ± 1,5	66,5 ± 1,3	67,6 ± 0,9	65,9 ± 1,1	65,1 ± 2,0
Total lipid g/l	4,8 ± 1,0	5,3 ± 1,1	4,3 ± 0,9	6,3 ± 1,2	6,3 ± 2,1	3,0 ± 0,6	2,7 ± 0,1
Osmolality mOsm/kg	338 ± 9	336 ± 11	388 ± 33	329 ± 14	345 ± 8	378 ± 4	376 ± 11
Total catecholamine ng/ml	38,2 ± 54,7	29,5 ± 23,9	65,3 ± 33,7	37,9 ± 13,5	50,3 ± 14,3	72,5 ± 18,8	39,2 ± 13,2

quantitative changes can not be established. Values obtained in this study for the different variables are, however, all greater than those obtained from resting impala, a similar antelope. Since the concentrations of these variables provide an index of the physiological response to stressors (Hattingh 1988), it may be said that capture methods as studied here are stressful. Comparisons made within species showed few statistically significant differences at the 5% level caused by different capture methods. In certain instances this is probably because small numbers of animals were studied. These are pointed out below.

Red hartebeest showed no statistically significant differences between the group that was herded for 8 min and the one that was herded for 25 min. However, the mean lactate, glucose, and cortisol levels were greater whereas the haematocrit and total catecholamine levels were lower in the latter group. The lack of statistical significance indicates that the herding as done here had no effect on the measured responses of the animals, and that more intense exercise may result in significant differences compared with those resulting from less exercise. The practice of herding animals at their own pace for as short a time as possible to minimize the effect of stress from the catching procedure is to be recommended. Similar observations were made for blesbok groups herded for 10 min and 20 min, and the two groups were thus pooled (Group A).

Although blesbok were captured at two different locations (Groups A and B and Group C), using different methods, the haematocrit, total protein, total lipid and total catecholamine concentrations were similar. Allowing animals to rest after herding was not beneficial to them, since no statistically significant differences were found between the group with no rest (Group A) and the one with 1 h rest (Group B). Differences were, however, found between animals herded into a boma with a gangway (Groups A and B) and the ones herded into nets (Group C). Netting resulted in statistically significant raised values for both lactate and osmolality. A concomitant non-significant increase in glucose ($P < 0,1$) was also observed. These results show that netting as done in this study led to greater mean values for haematocrit, glucose, lactate, osmolality and total catecholamines than when the animals were caught by hand in a boma. Similar observations were made between netted and immobilized eland with the values for haematocrit, lactate, cortisol and osmolality increased in the former group, but not statistically significant ($P < 0,1$). These results indicate that the netting method of capture is probably the more 'stressful' procedure.

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