Body measurements, carcase and organ mass of mammals from the Etosha National Park

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CONTENTS

ABSTRACT

The measurements and mass of zebra *Equus burchelli antiquorum*, springbok *Antidorcas marsupialis*, gemsbok *Oryx gazella* and wildebeest *Connochaetus taurinus*, as well as the mass of certain organs and the hides from these animals are recorded. These animals were shot to feed cheetah *Acinonyx jubatus* which were being introduced to the Etosha National Park. The mass of the animals and certain organs are compared with similar data from elsewhere in Africa.

1 INTRODUCTION

During the period of January to April 1970, a number of ungulates were shot to feed captive cheetah which were being introduced to the Etosha National Park. Those animals were zebra *Equus burchelli antiquorum*, springbok *Antidorcas marsupialis*, gemsbok *Oryx gazella* and wildebeest *Connochaetus taurinus*. The animals were measured, their mass determined and dressed and the mass of their organs determined. The mass of some of the cheetah *Acinonyx jubatus* were determined and measured upon arrival in the Park. Mass and measurements of animals destroyed for other purposes have also been included. This paper provides mass and measurements to partially fill a gap which exists in the literature on published mass and measurements. Due to certain practical considerations the accepted dressing methods could not be followed.

2 METHODS

Depending on the mass of meat required to feed the cheetah, one to three animals were shot per day and usually before 09h00. Neck shots were preferred as blood loss was minimal. The carcases were transported to the temporary abbattoir where they were measured and their mass determined with a suspended spring balance. Thereafter each carcase was skinned to behind the head and down to the fetlocks. During the slaughtering process, the heart, lungs, liver, spleen and kidneys were removed and their mass determined provided they were undamaged. In each case the mass of the organ itself was determined after all attached arteries, veins, membranes and surrounding fat had been removed, in order to obtain uniformity in mass determination procedures. In all cases the hearts were opened and drained of blood.

The mass of springbok were determined from a smaller spring scale while all organs had their mass determined on a pan scale. The mass of the skins weights were determined by subtracting the mass of the skinned carcase from the unskinned carcase. The mass given below are from adult animals as determined by an examination of the dentition and age determinations, based on dentition, were carried out on zebras and springbok according

to the methods prescribed by Klingel (1965) and Rautenbach (1971) respectively.

In cases of pregnant animals the mass of the gravid uterus was deducted from the animal's total mass.

Measurements taken were those as prescribed by Roberts (1951) with heartgirth as an additional measurement and is therefore directly comparable to some of the measurements given by Sachs (1967).

The original measurements were in British Standard Units: for this paper those have been converted to the Metric system.

3 RESULTS AND DISCUSSION

3.1 Springbok

The results are shown in tables 1, 2, 3 and figure 1. In the case of the springbok, an attempt was made to collect large individuals only and this has resulted in a certain amount of bias in favour of large adults. However, this was done with the purpose of ascertaining maximum mass for this subspecies as it is claimed to be the largest of the species (Roberts, 1951). Numerous persons, especially hunters (A. Port, P. Brand. pers. comm.) have questioned the validity of this. There is no doubt that *A.m. angolensis* is larger than *A.m. marsupialis* from places such as the Transvaal and Northern Cape (Table 3) but it does appear, from the few collected by J. Hofmeyr (pers. comm.) that those *A.m. hofmeyri* from the southern half of South West Africa are heavier than *A.m. angolensis*. Considering the fact that the mass given by J. Hofmeyr represents total body mass less blood (these springbok were bled) then an increase of 11,5% (males) is remarkable. Unfortunately the mass of the one female, as supplied by J. Hofmeyr, includes the foetus.

According to T. Lichtenstein (pers. comm.) springbok in southern South West Africa lamb twice a year and on his farm (Lochkolk) juveniles of all ages can be seen, presumably a result of the exceptional rains of 1973—1974. This differs from the springbok in Etosha where there is only one main lambing season: December to February.

Should the indication that springbok from the southern SWA are the heaviest be confirmed at a later date when more data is available, further investigation will probably show that an environmental factor is responsible. P. Brand (pers. comm.) has indicated that springbok collected from this area carry much fat whereas those from the Etosha National Park had very little fat deposits.

3.2. Zebra

It is of interest to note that a mass difference of 11,3% exists between male *E. burchelli* from SWA and Hluhluwe Natal, and this difference can probably also be ascribed to differences in habitat. It also appears that no significant mass differenc exists between *E. burchelli*, from South West Afric and those from Central Africa although the mas given for those from Serengeti appear to be extreme ly low when compared with those from the Luangw Valley. (Note: Hitchins, Sachs and authors cited b von le Chevallerie and Robinette omitted to nam the subspecies involved. Three subspecies occur i Zambia *E.b. böhmi*, *E.b. selousi* and *E.b. anti quorum*, according to Sidney (1965) and from th localities given in Table 3 it would appear that mos of them are *E.b. böhmi* and those from Natal woul be *E.b. antiquorum*.

3.3 Wildebeest

Wildebeest from the various localities (Table 3) d not differ significantly in mass (range for males 201,1—245 kg) excepting for *C. taurinus* from th S.A. Lombard Game Reserve, Transvaal. The las mentioned were introduced into this area.

3.4 Gemsbok

No reliable references could be traced, underscorin the paucity of information which exists in this field However, the oryx has a discontinious distributio in Africa with *O.g. gazella* occupying the arid Soutl West and the others i.e. *O.g. beisa*, *O.g. gallarium O.g. annectens* and *O.g. callotis* distributed ove central and northern Africa from Tanzania to th Red Sea coast (Ansell, 1971). All members of th species appear to favour arid regions and make mass comparisons interesting. *O.g. beisa* and *O.g callotis* appear to have the same mean mass wit *O.g. gazella* somewhat heavier (10—12%).

3.5 Cheetah

Lamprey (1964), citing Meinertzhagen, gives mas for cheetah from an unspecified locality. These mass are considerably heavier than those fro SWA. However, the cheetah from SWA were in a rather poor condition but even if they had been in good condition it is questionable if they would have come close to the mean cited by Lamprey.

3.6 Organ mass

The comparative differences which exist between the organ mass of the species are shown in figure 1. Most of these differences are insignificant. The small spleen mass of the springbok is probably due to a more severe catecholamine reaction at the time of death than a species reaction. Hofmeyr, Louw and du Preez (1973) have shown that sufficiently alarmed and stressed zebra elicit autonomically controlled reflex reactions which are typically brought about by the catecholamines and it is suspected that in springbok the same reactions are elicited even when shot.

4 CONCLUSION

There appears to be significant variation in mass of the animals discussed, especially intra-specific, which again supports the separation of the species. However, this could be more a case of environmental factors contributing to mass differences, as shown by *A.m. hofmeyri* from southern South West Africa and those from the Transvaal and Northern Cape. Zebra also show differences but the wildebeest appear to adhere to a common mean mass. There also appears to be a significant difference in mean mass between the southern and northern subspecies of *Oryx gazella*. From the little information available on cheetah it would also appear that large mass fluctuations could be expected between different populations.

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Table 1. Mean values and ranges (in parenthesis) of bodymass and body measurements according to sex, of animals from the Etosha National Park.

		Mass		Body measurements (cm)						
Species	Sex	No.	kg	No.	Head and body	Tail	Hind foot	Heart girth	Shoulder height	Ear
Zebra	m	30	307,3	29	223,0	46,3	53,1	145,1	138,9	16,1
	obs. range		(261—362)		(209,6—246,4)	(31,8—52,1)	(45,7—57,8)	(137,2—163,8)	(132,1—149,9)	(14,6—17,9)
	f	16	289,6	17	220,9	46,7	52,3	146,4	136,7	16,5
	obs. range		(236—358)		(203,2—240,7)	(40,6—53,3)	(48,3—55,9)	(129,5—156,2)	(127,0—152,4)	(15,2—17,2)
	m + f	46	301,2		222,2	46,5	52,8	145,5	138,1	16,3
Gemsbok	m	7	194,1	7	187,7	49,2	51,9	151,7	136,0	20,2
	obs. range		(170—222)		(175,3—204,5)	(41,9—57,2)	(50,2—53,3)	(142,2—160,0)	(130,2—139,7)	(19,1—21,6)
	f	4	197,3	4	186,1	51,8	52,0	153,4	134,0	20,2
	obs. range		(179—213)		(177,8—194,3)	(48,9—54,6)	(51,5—52,1)	(149,9—158,8)	(132,1—139,7)	(19,1—21,6)
	m + f		195,3		187,1	50,1	51,9	152,3	135,3	20,2
Springbok	m	18	40,8	19	126,5	28,1	41,3	83,7	88,9	17,8
	obs. range		(34,7—46,5)		(119,4—138,4)	(22,9—33,0)	(36,8—43,2)	(76,2—95,3)	(82,6—95,3)	(15,9—19,1)
	f	2	30,9	2	123,9	24,5	39,4	75,0	79,8	16,6
	obs. range		(29,9—31,8)		(123,2—124,5)	(22,9—26,0)	(39,4—39,4)	(76,9—82,6)	(76,9—82,6)	(15,9—17,2)
	m + f		39,8		126,3	27,7	41,1	82,9	88,0	17,6
Wildebeest	m	15	221,3	17	194,7	59,6	52,0	158,5	143,3	19,1
	obs. range		(177—254)		(185,4—207,0)	(55,9—64,8)	(49,5—57,8)	(152,4—170,2)	(132,1—148,6)	(17,2—21,0)
	f	0	—	0	—	—	—	—	—	—
Cheetah	m	8	44,1	10	130,8	71,6	30,1	70,1	85,7	7,7
	obs. range		(38,6—57,6)		(126,4—141,0)	(68,0—81,3)	(27,9—31,8)	(66,0—78,7)	(78,7—96,5)	(7,0—8,3)
	f	8	35,9	10	124,8	68,3	28,3	63,0	80,8	7,4
	obs. range		(29,5—44,5)		(117,5—134,6)	(62,2—76,2)	(27,3—30,5)	(54,6—69,9)	(73,7—87,6)	(7,0—7,6)
	m + f		40,0		127,8	70,0	29,2	66,6	83,3	7,5

Table 2. Mean mass of wet hides (kg).

Species	No. of hides	Mean mass	% of mean body mass
Zebra	35	22,4	7,4%
Gemsbok	10	16,0	8,2%
Springbok	20	2,2	5,5%
Wildebeest	12	19,5	8,8%

Table 3. Comparison of live body mass of various species from different localities.

Species	Sex	No.	Mass (kg)	Range (kg)	Locality and Author
Springbok	m	18	40,8	34,7 – 46,5	
	f	2	30,9	29,9 – 31,8	E.N.P. (S.W.A.) – Present study
	m		42,0	33 – 50	
	f		37	31 – 45	S.W.A. – Skinner *et. al.* (1971)
	m	4	45,5		Lochkolk, Keetmanshoop Dist. S.W.A. –
	f	1	44,0		Hofmeyr
	m		36	29 – 42	R.S.A. Unknown locality – Skinner *et al.*
	f		30	24 – 32	(1971)
	m	5	35,8	32,7 – 38,6	Lombard Game Reserve, Transvaal – Van Zyl
	f	7	30,7	25,0 – 33,6	(1968)
	m	35	35,4		Lombard Game Reserve, Transvaal – von le
	f	12	28,0		Chevallerie *et al.* (1970)
	m	6	27,8		Lombard Game Reserve, Transvaal – von le
	f	25	25,5		Chevallerie *et al.* (1970)
	m	193	31,3		
	f	34	28,1		Kimberley – Liversidge (pers. comm.)
Zebra	m	8	327,3		Fort Jameson Plateau from von le Chevallerie
	f	7	322,3		(1970)
	m	2	312,4		Fort Jameson Plateau from von le Chevallerie
	f	3	275,1		(1970)
	m	10	275,9	240 –320	
	f	7	280,4	314	Hluhluwe, Zululand – Hitchins (1968)
	m	0			Nakabima South Province – from Robinette
	f	1	281,0		(1963)
	m	13	247,8	220,4 – 284,0	
	f	8	219,1	175,5 – 241,5	Serengeti, Tanzania – Sachs (1967)
	m	2	283,0		
	f	1	260,0		Tarangire Game Reserve – Lamprey (1964)
	m	5	315,1		Fort Jameson Plateau from von le Chevallerie
	f	0			(1970)
	m	30	307,3	261 –362	
	f	16	289,6	236 –358	Etosha National Park SWA – Present study
Wildebeest	m	2	238,2		Luangwa Valley – from von le Chevallerie
	f	2	220,9		(1970)
	m	33	238,6	177,8 – 293,9	
	f	22	190,0	141,5 – 216,8	Hluhluwe Game Reserve – Hitchins (1966)
	m	10	243,3		
	f	10	192,0		East Africa – Ledger (1968)
	m	98	236,7	178 –294	
	f	95	190,0	142 –252	Hluhluwe Game Reserve – Hitchins (1968)
	m	40	201,1	171,0 – 242,0	
	f	11	163,0	140,8 – 185,8	Serengeti, Tanzania – Sachs (1967)

Species	Sex	No.	Mass (kg)	Range (kg)	Locality and Author
	m	1	211,1		Ngomo, Southern Province from Robinette (1963)
	f	0			
	m	7	147,1		Lombard Game Reserve — from von le Chevallerie (1970)
	f	0			
	m	14	245,2		Locality unknown — from von le Chevallerie (1970)
	f	1	266,9		
	m	15	221,3	177 —254	Etosha National Park, S.W.A. — Present study
Cheetah	m	4	60,8		Locality unknown from Lamprey (1964)
	f	1	63,1		
	m	8	44,1	38,6— 57,6	Etosha National Park, S.W.A. — Present study
	f	8	35,9	29,5— 44,5	
Gemsbok	m	7	194,1	170,0—222,0	Etosha National Park, S.W.A. — Present study
	f	4	197,3	179,0—213,0	
	m	10	173,0		East Africa — Ledger (1963)
	f	4	149,7		
	m	10	176,4		East Africa — Ledger (1968)
	f	10	161,7		
	m	2	173,7		Kenya — from von le Chevallerie (1970)
	f	0			

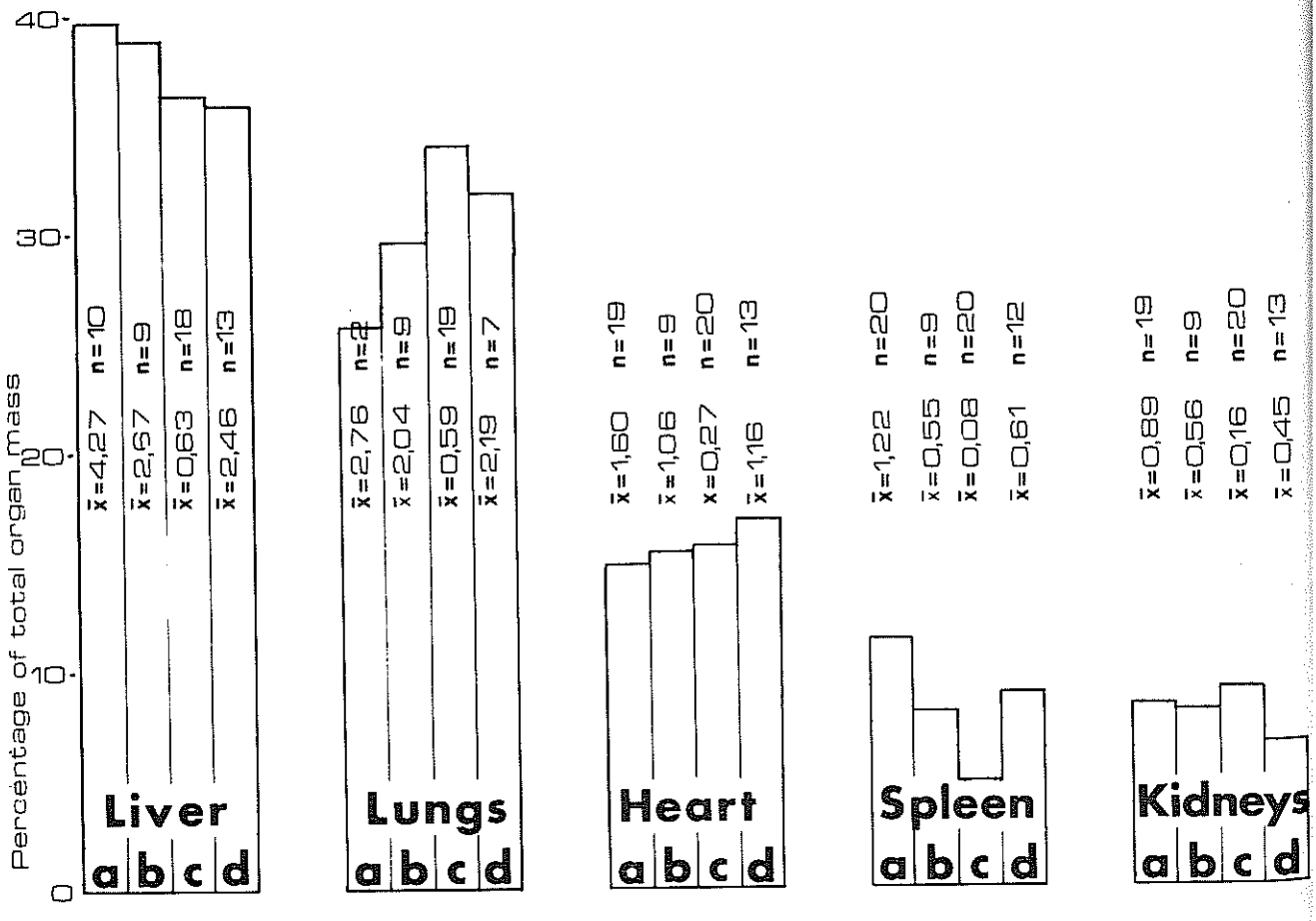

Figure 1. Comparative organ masses.
(a = zebra, b = gemsbok, c = springbok, d = wildebeest)

Plate 1. Determining the mass of the carcase.

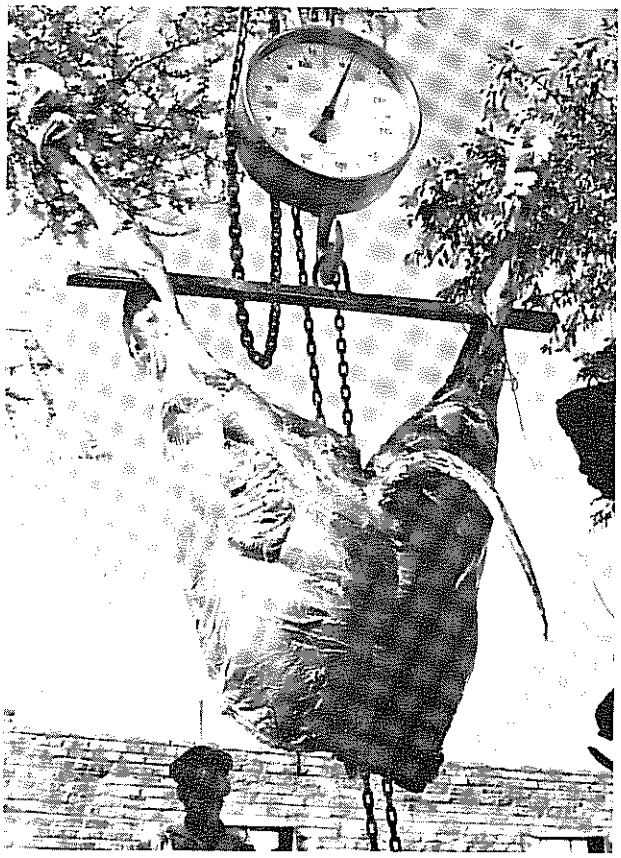

Plate 3. Determining the mass of the hind-quarters.

Plate 2. Removing the meat from the carcase.

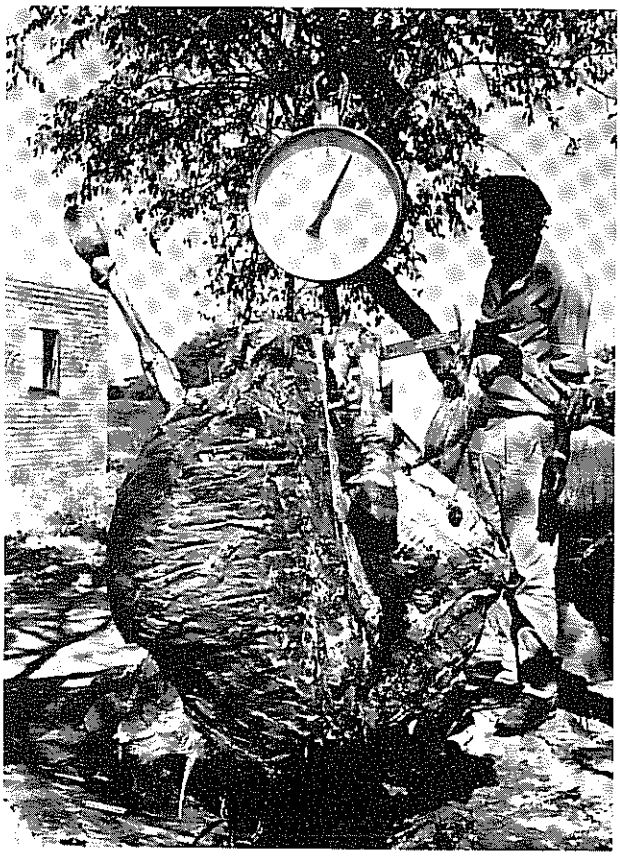

Plate 4. Determining the mass of the skeleton.