

# Some notes on Lichtenstein's hartebeest, *Alcelaphus lichtensteini* (Peters)

V.R. Booth

Mammal Research Institute, University of Pretoria, Pretoria

---

Data on herd structure, sex ratios, density, territorial behaviour and reproduction of Lichtenstein's hartebeest (*Alcelaphus lichtensteini*) have been extracted from the literature. These data are discussed in the light of field observations made on a small population in south-eastern Zimbabwe.

*S. Afr. J. Zool.* 1985, 20: 57 – 60

Gegewens oor die kuddestruktuur, geslagsverhoudings, digtheid, territoriale gedrag, en voortplanting van Lichtenstein se hartbees (*Alcelaphus lichtensteini*) is uit die literatuur verkry. Hierdie gegewens tesame met persoonlike waarnemings op 'n klein bevolking van die spesie in suidoos-Zimbabwe word weergegee.

*S.-Afr. Tydskr. Dierk.* 1985, 20: 57 – 60

Some aspects of the ecology and social behaviour of Lichtenstein's hartebeest, *Alcelaphus lichtensteini* (Peters, 1852) have been discussed by Mitchell (1965), Dowsett (1966) and Wilson (1966) while Mentis (1972) summarized some of the life history features.

Information concerning the general ecology and social behaviour of this species have been extracted from the literature and collated. A summary of these data, together with personal observations made while investigating the habitat preferences of Lichtenstein's hartebeest in south-eastern Zimbabwe, are presented.

## Methods

Information on herd structure, sex ratios, densities, territoriality, reproduction and body measurements was obtained from published reports, unpublished reports and communications with persons who had a working knowledge of this species. In addition, field observations were made on a small population of hartebeest, in which individual animals could be recognized, in the south-eastern lowveld of Zimbabwe.

## Results and discussion

### Herd structure

Lichtenstein's hartebeest rarely occurs in groups larger than 10 individuals and groups containing more than 20 individuals seldom occur. Rodgers (pers. comm.) comments that 89% of all herds observed in southern Tanzania consisted of between one and ten animals while only 10% contained more animals, the largest recorded being 22 individuals.

From Zambia there is a record of 65 individuals (17 males, 36 females and 12 juveniles) seen together in August on the Tondwa Plains. The observer may, however, inadvertently have grouped all the individuals seen on the Plain together into a single herd. The same observer also recorded 31, 26 and 20 individuals in single herds for this area (Northern Rhodesia Game Department, unpublished, undated). Generally, the mean group size varied from 8,2 in Zambia's Kafue National Park to 2,9 in eastern Zambia (Table 1).

In Mozambique a record of 29 individuals (of which 50% were bulls) was recorded from Kangatole in the Contada area during capture operations in 1972 (Zimbabwe Department of National Parks and Wildlife Management, unpublished, undated). Otherwise several herds averaging eight in number were observed. Tinley (1977) states that two peaks, one of six individuals and one of 12, were observed in the mean group size of hartebeest in the Gorongosa National Park, while larger concentrations (72 individuals in one herd) were recorded in October.

V.R. Booth

Present address: Department of National Parks and Wildlife Management, Private Bag 5926, Victoria Falls, Zimbabwe

Received 3 August 1984; accepted 6 November 1984

**Table 1** Summary of mean herd size, sex ratios and density of Lichtenstein's hartebeest, *Alcelaphus lichtensteini* in central and southern Africa

Location and reference	Herd size	Sex ratio	Density km <sup>2</sup>
Tanzania			
Eastern Selous G.R. — Rodgers (1977)	5,40	1 : 3,7	3,5
Western Selous G.R. — Rodgers (pers. comm.)	4,65	—	2,0
Rungwa G.R. — Rodgers (pers. comm.)	5,70	—	0,5
Biharamulo G.R. — Rodgers (pers. comm.)	6,17	—	0,5
Mozambique			
Kangantole — Dept. Nat. Parks Zimbabwe*	8,00	—	—
Gorongosa — Tinley (1977)	6 & 12	—	0,2
Zambia			
Eastern Zambia — Wilson (1966)	2,90	1 : 3,0	—
Kafue N.P. — Northern Rhodesia Game Dept.*	6,20	1 : 2,1	—
Kafue National Park — Dowsett (1966)	8,20	1 : 2,5	0,2
Kafue N.P. (bachelor herd) — Mitchell (undated)	3,80	—	—
Kafue N.P. (breeding herd) — Mitchell (undated)	5,90	—	—
Zimbabwe			
Lone Star Ranch, Zimbabwe — present study	3,00	1 : 1,4	0,3
Gona re Zhou National Park — present study	5,30	1 : 2,6	0,3

\*Unpublished, undated.

In Zimbabwe the largest herd consisted of 16 individuals (four bulls, nine cows, two sub-adult cows and one sub-adult bull) which was recorded in September (Booth 1980). The mean herd size in the study area was three whilst in the Gona re Zhou National Park it was 5,3 (Table 1).

The occurrence of large herds appears to be unusual for this species, unlike the red hartebeest *Alcelaphus buselaphus caama* which forms spectacular aggregations (Smithers 1971). The majority of large congregations of Lichtenstein's hartebeest have been recorded in August/September. The reason for this is not clear although it is possible that the territorial system breaks down at the time the calves are born and these larger than normal aggregations are a result of local migrations, possibly as an anti-predator device which affords protection to the calves. These larger aggregations are made possible by the abundance of food during this time of the year.

For the remainder of the year, the mean group size and sex ratio remain fairly constant, consisting of a territorial bull and 5–6 cows. Sub-adult cows usually remain in close association with the parent group but are invariably expelled from, or leave the parent group after 15–18 months. Young males, however, are expelled after 10–12 months (Mitchell undated; Dowsett 1966; present study). Adult cows may transfer from one group to another for a brief period before returning to their original group (Dowsett 1966; present study). It is not known what prompts such behaviour, although this activity was more noticeable in August and may be responsible for

initiating the grouping of the hartebeest into the larger than normal aggregations in August/September.

Bachelor males were usually found alone and rarely concentrated in herds (Dowsett 1966; Wilson 1966; Rodgers 1977). Mean group size for bachelor herds was 3,8 (Mitchell undated) and 2,9 (Wilson 1966) in the Kafue National Park and eastern Zambia respectively. In Zimbabwe, however, only one bachelor herd of three individuals, which soon disbanded, was recorded and all other males seen during an 18-month period were solitary. Groups of bachelor bulls seemingly do not establish territories while solitary bulls will exclude other bulls (Dowsett 1966; present study). Seventeen per cent of all hartebeest seen in the Selous Game Reserve and in southern Tanzania during a 14-month period were solitary males (Stobart 1970; Rodgers, pers. comm.). In the Kafue National Park (Zambia) 11 out of 54 reports were of female herds without attendant males.

#### Sex ratio and density

The sex ratio as recorded in various regions has been summarized in Table 1. The overall mean is 1 : 2,37 with the highest recorded in the eastern Selous Game Reserve, Tanzania (Stobart 1970). Density of Lichtenstein's hartebeest varies from 3,5/km<sup>2</sup> in the Selous Game Reserve to 0,2/km<sup>2</sup> in the Kafue National Park. Density figures for south-eastern Zimbabwe are approximate as only that portion of the area over which the hartebeest were distributed was considered.

#### Territoriality

Lichtenstein's hartebeest are territorial and there is no apparent overlap between territories, which are occupied by the same herd throughout the year and for several years in succession (Dowsett 1966). However, there is little evidence available on the manner in which Lichtenstein's hartebeest demarcate territories.

The rutting period extends from mid-October to early January in Zambia (Dowsett 1966) while in Zimbabwe this period was later. Bachelor bulls challenge harem males provoking fierce fighting often to the point of exhaustion, in an attempt to take over a harem of females (Dowsett 1966).

There are numerous stereotyped behaviour patterns in the repertoire of the genus *Alcelaphus* that are directly associated with territorial defence (von Richter 1972). Amongst these, pawing and horning the earth are the most conspicuous. In Zimbabwe the most conspicuous body movements were the 'head-to-flank', in which the head is rubbed against the shoulder, and a 'head-flagging' movement in which the hartebeest shook its head up and down vigorously when alarmed (present study). These behaviour patterns were observed when the herd was disturbed. The male would walk towards the intruder and display the 'head-flagging' movement periodically while stamping the front feet, snorting, flicking the tail and wiping its shoulder with the side of the head before turning to flee. Females displayed similar behaviour but not as frequently.

Gosling (1974) comments that the main method adopted by Coke's hartebeest, *Alcelaphus buselaphus cokei*, for marking territories was using dung piles, as do red hartebeest (Kok 1975), but this was not unequivocally established in Zimbabwe during the present study. Dowsett (1966) states that both males and females horn the earth to demarcate territories. This activity was not observed in Zimbabwe nor were any hartebeest observed with soil clinging to their horns. However, an examination of a number of skulls ( $n = 14$ ) from both sexes collected in the Gona re Zhou National Park showed

that one horn was 150–200 mm shorter than the other, which may have been caused by horning activity.

Lichtenstein's hartebeest possess well-developed preorbital glands which consist of a bare invaginated orifice below the eye. That of a dead specimen exuded a whitish secretion on applying pressure but did not leave any noticeable odour. Dowsett (1966) comments that this sticky secretion leaves a dark smudge on each side of the hartebeest above the shoulder. These marks were not observed on all individuals throughout the year. In Zimbabwe individual hartebeest were first noticed to have these marks in August and all members of the herd, including a 6-month-old animal, displayed these marks by September. Ansell (in Dowsett 1966) recorded definite smudges on the side of a 2–3-month-old juvenile in October, indicating the early activity of these face glands.

Increased activity at the beginning of the rut suggests that the glands may play a role in reproductive behaviour. Wilson (1966) observed a territorial bull rubbing its preorbital gland on the hindquarters of a female just prior to mounting. In Zimbabwe the hartebeest were not observed physically marking vegetation or the ground. It is suggested here that the territory of the hartebeest is passively marked by means of these glands. It is possible that the secretions of the preorbital glands are deposited onto the thick, tall grass stratum in which these animals prefer to feed in this area. Any foreign herd venturing into the feeding area would detect the presence of the resident group and thus avoid a confrontation.

Gosling (1974) stated that the role of the preorbital glands in Coke's hartebeest in territorial demarcation was not clear since the females and juveniles were observed marking at least as frequently as did the territorial males. On the other hand von Richter (1972) stated that Coke's hartebeest actively marked twigs, as well as the ground, by rubbing their preorbital glands on the ground during horning sessions, while Kok (1975) believed that the preorbital gland fulfils a similar function in the red hartebeest. Backhouse (1959) however, stated that in the related *Alcelaphus buselaphus lelwel*, the

preorbital gland was 'not well developed' and that the secretions played no part in demarcating territories.

The role of interdigital glands is equally obscure. The pedal glands are more developed on the front feet than on the hind feet and in general resemble those of the red hartebeest (Pocock 1910; Ansell 1966). That pawing the ground is a conspicuous behavioural trait in this group (Kok 1975) does suggest that the pedal glands are in some way associated with territorial demarcation. The herd bull (or a cow) usually stamps the front feet on the ground when disturbed. This action may serve to release secretions from the glands and, as it is usually this individual that is the first to flee, the secretions may be deposited during flight leaving a trail that other members of the herd could follow and thus maintain contact.

### Reproduction

The average gestation period for Lichtenstein's hartebeest has been recorded as 240 days (Kenneth & Ritchie 1953) and 237 days (Asdell 1964), which are supported by field observations on copulation and subsequent births of the first calves (Dowsett 1966; Wilson 1966).

Females are sexually mature at an age of 16–18 months (Mitchell 1965; Wilson 1966). No more than two females in a group appeared to be on heat at the same time (Dowsett 1966) which results in synchronized births within herds (Rodgers, pers. comm; present study).

The calving period in Zambia was from June to September with a peak in July/August (Table 2). In the Luangwa Valley (Zambia) Ansell (1960) gives the peak calving period as October/November. Dowsett (1969), however, gives July/August as the calving period, with Rodgers (pers. comm.) suggesting mid-August to early December with a peak in September for southern Tanzania. In Zimbabwe all herds observed had calves at foot in September. Many of the hartebeest captured in Mozambique in August 1972 gave birth to or aborted their near full-term calves in the first week of September (Zimbabwe Department of National Parks and

**Table 2** Summary of the record of appearance of Lichtenstein's hartebeest calves less than four weeks old in various regions of central and southern Africa

Location and Reference	June	July	Aug	Sept	Oct	Nov	Dec
Zambia							
Kafue National Park — Mitchell (1965)	1	162	95	3	2	—	—
Eastern Zambia — Wilson (1966)	—	5	3	—	—	—	—
Southern Province*	—	30	8	—	11	—	—
Central Province*	1	10	13	—	1	—	—
North-western Province*	—	16	12	2	1	—	—
Western Province*	—	—	5	—	—	—	—
Northern Province*	—	7	14	—	—	—	—
Luangwa Valley*	—	—	—	—	1	4	—
Mozambique							
Gorongosa National Park — Tinley (1977)	—	—	x	xx	x	x	x
Zimbabwe							
South-eastern lowveld — present study	—	—	—	—	12	—	—
Gona re Zhou Nat. Park — present study	—	—	—	13	—	—	—
Totals	2	230	150	18	28	4	—

\*Northern Rhodesia Game Department, unpublished, undated.

Wildlife Management, unpublished, undated). This is confirmed by Tinley (1977) who gives the peak calving period as September for Mozambique.

### Body mass

Published and unpublished information on body masses of fetuses and adults is presented in Tables 3a and 3b.

**Table 3a** Foetal body masses (kg) of Lichtenstein's hartebeest, *Alcelaphus lichtensteini* as recorded in central and southern Africa

Country (reference)	Date	Mass	Sex
Zambia (Wilson 1966)	10/1	0,005	–
	21/2	0,005	–
	21/2	0,04	f
	24/4	1,80	f
	30/4	1,80	m
	30/4	1,80	f
	15/5	0,68	f
	8/7	13,60	f
	15/7	11,79	f
Tanzania (Rodgers, pers. comm.)	24/4	0,70	–
	14/7	1,60	–
	22/8	7,70	–
	17/9	3,70	–
Zimbabwe (Booth 1980)	6/9	9,00	f
	6/9	7,00	m
	10/9	10,00	m
	11/9	10,00	f
	12/9	9,00	f
	14/9	10,00	f
	16/9	11,00	f
	16/9	10,00	m
8/11	13,00	f	

**Table 3b** Adult body masses (kg) of Lichtenstein's hartebeest as recorded in central and southern Africa (average mass given in parenthesis)

Country (reference)	Male	Female
Zambia & Malawi (Wilson 1968)	149,23 – 199,12 (168,73)	152,00 – 189,00 (173,72)
Tanzania (Rodgers, pers. comm.)	165,00 – 203,00 (179,10)	131,00 – 153,80 (144,80)
Zimbabwe (present study)	No data	125,00 – 177,00

### Conclusion

A review of published and unpublished information indicates that the mean herd size and sex ratio of Lichtenstein's hartebeest vary little throughout its range. However, observations on territorial behaviour suggest that this species does not conform to the patterns displayed by other members of the alcelaphine tribe and this aspect warrants further investigation. Two distinct breeding peaks have been recorded,

July/August in Zambia and September in Tanzania, Mozambique and Zimbabwe.

### Acknowledgements

I gratefully acknowledge the facilities provided by Mr R. Sparrow of Lone Star Ranch, Chiredzi, on whose property this study was conducted. Financial assistance was provided by the Conservation Trust of Zimbabwe and the South African Nature Foundation.

### References

- ANSELL, W.F.H. 1960. The breeding of some larger mammals in Northern Rhodesia. *Proc. Zool. Soc. Lond.* 134: 251 – 274.
- ANSELL, W.F.H. 1966. Addenda and corrigenda to 'Mammals of Northern Rhodesia'. No 3. *Puku* 4: 24 – 37.
- ASDELL, S.A. 1964. Patterns in mammalian reproduction. Constable, London.
- BACKHAUSE, D. 1959. A hartebeest herd in the Garombe Park. *Afr. Wildl.* 13: 197 – 200.
- BOOTH, V.R. 1980. A study on Lichtenstein's hartebeest, *Alcelaphus lichtensteini* (Peters 1852) and its habitat in south-eastern Rhodesia. M. Sc. Thesis, University of Pretoria.
- DOWSETT, R.J. 1966. Behaviour and population structure of hartebeest in the Kafue National Park. *Puku* 4: 147 – 154.
- DOWSETT, R.J. 1969. Luangwa Valley notes. *Puku* 5: 220 – 222.
- GOSLING, L.M. 1974. The social behaviour of Coke's hartebeest, *Alcelaphus buselaphus cokei*. *IUCN Publication New Series* 24(1): 488 – 511.
- KENNETH, J.H. & RITCHIE, G.R. 1953. Gestation periods, a table and bibliography. Tech. Comm. No.5, Commonw. Bur. Anim. Breed. Genet., Edinburgh.
- KOK, D.B. 1975. Behaviour and ecology of red hartebeest, (*Alcelaphus buselaphus caama*). Nature Conservation miscellaneous publication No.4, Orange Free State Provincial Administration, Bloemfontein.
- MENTIS, M.T. 1972. A review of some life history features of large herbivores of Africa. *Lammergeyer* 16: 1 – 89.
- MITCHELL, B.L. Undated. Natural history of hartebeest (*Alcelaphus lichtensteini*, Peters). Kafue National Park Wildl. Res. Rep., Zambia, Prog. Rep. No 7.
- MITCHELL, B.L. 1965. Breeding, growth and aging criteria of Lichtenstein's hartebeest. *Puku* 3: 97 – 104.
- POCOCK, R.I. 1910. On the specialised cutaneous glands of ruminants. *Proc. Zool. Soc. Lond.* June: 840 – 968.
- RODGERS, W.A. 1977. Seasonal changes in group size amongst five wild herbivore species. *E. Afr. Wildl. J.* 15: 175 – 190.
- SMITHERS, R.H.N. 1971. Mammals of Botswana. Trustees of the Museums and Monuments of Rhodesia. *Mus. Mem.* 4: 1 – 340. Salisbury, Rhodesia.
- STOBART, P.S. 1970. Ecology of wildebeest, hartebeest and impala in the eastern Selous Game Reserve, Tanzania. Mimeograph, Tanzania Game Division.
- TINLEY, K.L. 1977. Framework of the Gorongosa Ecosystem. D. Sc. thesis, University of Pretoria.
- VON RICHTER, W. 1972. Territorial behaviour of the black wildebeest, *Connochaetes gnou*. *Zool. Afr.* 7: 207 – 231.
- WILSON, V.J. 1966. Observations on Lichtenstein's hartebeest, *Alcelaphus lichtensteini*, over a three year period, and their response to various tsetse control measures in Eastern Zambia. *Arnoldia (Rhod.)* 2(15): 1 – 14.
- WILSON, V.J. 1968. Weights of some mammals from eastern Zambia. *Arnoldia (Rhod.)* 3(32): 1 – 19.