

OBSERVATIONS ON SOCIAL ORGANIZATION OF SPRINGBOK, *ANTIDORCAS MARSUPIALIS*, IN THE BONTBOK NATIONAL PARK, SWELLENDAM

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ABSTRACT

The study area of 2 786 ha contained over 200 springbok. The data were gathered during 78 separate day visits over four years. The most important social groups were (1) nursery herds of females and young; (2) harem herds similar to (1) but containing one adult male; (3) bachelor herds of males; and (4) solitary males. Other groupings, e.g. mixed adults of both sexes, were very uncommon. About twice as many adult females were to be found in harem herds as in nursery herds. The mean size of female herds (1 and 2 above) was between seven and nine animals (range 2-40) and of bachelor herds about five animals (range 2-14). Rutting and lambing tended to be seasonal. The lambing peak appeared to be about mid-September, though lambs were seen in every month September-April. It is suggested that lambing is correlated with the onset of Spring rains. Courtship activity seemed to be most intense during February-April. The adult sex ratio was about 85 males : 100 females.

INTRODUCTION

The second Bontebok National Park, where this study was conducted, was proclaimed at its present site 6,4 km south of Swellendam in March 1961 (Van der Merwe 1968). Springbok, *Antidorcas marsupialis*, were introduced in 1964 (De Graaff & Penzhorn 1976) and have thrived there despite the fact that the South Western Cape zone is outside their natural range (Ansell 1968), though Bateman (1961) quotes one somewhat dubious source suggesting that springbok may originally have been present. The springbok in this zone have the most southerly distribution of the species. In 1974 the number in the study area was over 200. A part-time study of springbok behaviour was started in March 1972, though some observations were made in the period January 1969 - April 1970.

The springbok belongs to the tribe Antilopini. Both sexes carry horns, though the female's are far more slender and shorter than those of the male. The springbok in the study area belong to the small race *A.m. marsupialis*. The average weight of 15 adult males immobilized for marking purposes was 32,0 kg, with a range of 28,6 - 37,3 kg. According to Ansell (1968) there are two larger races, *A.m. hofmeyri*, which occurs in the southern part of South West Africa and Botswana, and *A.m. angolensis*, which occurs in the northern part of South West Africa and Angola.

STUDY AREA

The study area was about 2 786 ha in extent, and falls into the winter rainfall region. However, according to Grobler & Marais (1967) the local rainfall figures show that Swellendam receives rain throughout the year with a spring maximum. The annual average for the Park is 544 mm.

Besides springbok, the only other large mammals present in significant numbers were ca. 250 bontebok, *Damaliscus d. dorcas*, and ca. 200 vaal ribbok, *Pelea capreolus*. There were no large mammalian predators, but silver jackals, *Vulpes chama*, and aardwolves, *Proteles cristatus*, were present in small numbers.

The vegetation of the area has for centuries past been influenced by the activities of man. In the park it is mainly low shrubs varying in height from about 30 cm on the flats to 70 cm on the moister parts of the ridges. These can be divided into a number of communities but the most important in terms of area are communities of renosterbos, *Elytropappus rhinocerotis*, on the sandy soil of the flats where stones are mostly absent, and *Leucadendron* communities on the ridges and gravel terraces (Grobler & Marais 1967). In the latter the soil is sandy and characterized by the presence of great quantities of stones varying from pebble size to small boulders. On the flats, apart from dominant renosterbos, other shrubs present are *Aspalathus spinosa*, *Montinia caryophyllacea*, *Eroeda imbricata*, *Berkheya armata* and *Corymbium scabrum*. The most important grasses here are *Eragrostis curvula*, *Themeda triandra* and *Ehrharta longiflora*. The *Leucadendron* communities are dominated by *L. adscendens* and *Pelargonium ovale*. On the banks of the Breede River thickets of *Acacia karroo* are an important source of shade and cover.

METHODS

The data were gathered during 78 separate day visits to the Bontebok Park between 4.3.72 and 7.3.76. Data from the period January 1969 - April 1970 have also been included. All observations were made from a motor vehicle with the aid of binoculars.

RESULTS

Fourteen censuses were conducted at different seasons between 5.12.72 and 24.9.74 by driving round the whole park and classifying by age and sex all groups of springbok encountered. Springbok are easy to sex in the field even when young, due to the conspicuous penis sheath and thicker horns of the male. Animals were classified into the following age groups:

1. Lambs (no horns visible). Males in the range 0 - about 5 weeks and females 0 - about 12 weeks (Rautenbach 1971).
2. Juvenile males and females. Horns visible and shorter than ears.

3. Yearling males and females. In males horns longer than ears; scrotum small. Females classified on large body size though horns usually shorter than ears. Age from about 10,5 months upwards (Rautenbach 1971).

4. Adult males and females.

During each census, a mean number of 137 springbok (range 57-204) were classified into groups. Table 1 is an analysis of the censuses conducted during the rutting and lambing seasons and illustrates the overall herd structure. The most important social groups were:

1. Nursery herds consisting of adult females and young of both sexes.
2. Harem herds. Similar to nursery herds but containing one adult male.
3. Bachelor herds of males from the age of about 10,5 months upwards.
4. Solitary males, presumed to be territorial.
5. Other groups (e.g. mixed adult males and females). Very uncommon but included, since Bigalke (1970, 1972) reported them as common.

It is clear from Table 1 that harem herds make up by far the largest segment of the population (nearly 48% of the sample), whereas nursery herds comprise only 20% of the sample. This shows that the majority of the females were accompanied by adult males. Analysis of the adult females showed that out of 197 females classified in Table 1, 132 (67%) were in harem herds and only 65 (33%) in nursery herds.

Bachelor herds of adult and subadult (yearling) males were conspicuous throughout the study period. These herds were characterized by their small mean size of about 5 animals per herd (range 2-14). Young males tend to leave the nursery herds and join the bachelors when

TABLE 1
Springbok herd structure. Seasonal changes in rut and lambing season

Herd type	Feb. - Mar. 1973 (rut)					Sept. 1973 + 1974 (lambing)				
	No. animals	% of sample	No. adult ♀♀	No. herds	Ave. animals per herd	No. animals	% of sample	No. adult ♀♀	No. herds	Ave. animals per herd
Harem herds (one adult ♂)	190	57	92	20	9,5	93	36,0	40	15	6,2
Nursery herds (No adult ♂)	21	6,3	12	6	3,5	99	38,4	53	15	6,6
Bachelor herds	74	22,2	—	16	4,6	34	13,2	—	7	4,9
Solitary males	39	11,7	—	39	1	25	9,7	—	25	1
Others	9	2,7	0	—	—	7	2,7	0	—	—
Total	333					258				

about 10 months old. Analysis of all the pooled census data showed that only 19 males classed as yearlings were found with female herds, whereas there were at least 46 yearling females in the same herds. (This is probably an underestimate since females are far more difficult to age accurately). The remainder of the yearling males had evidently joined bachelor herds, since 91 out of 350 bachelor sightings (26%) were classed as yearlings.

Bigalke (1970, 1972) studied the social organization of springbok in Etosha Game Park, Kalahari Gemsbok Park and the Kimberley area. All these regions are semi-arid, with low, erratic summer rainfall. Bigalke recorded large, mixed herds of all ages and both sexes which tended to congregate wherever there was green pasture during the summer months. Aggregations up to 2 000 strong were recorded at Etosha and Kimberley. During the winter months these large herds dispersed and groups were smaller. The most common social unit was found to be mixed herds of adults and juveniles of both sexes, besides bachelor herds and solitary males. Only during the rut did harem herds, containing one adult male plus adult females and young, become numerous.

The present results are in marked contrast to those of Bigalke, but the small size of the study population should be kept in mind. Only one mixed herd of adult males and females was found out of 239 herds analysed (excluding solitary males). Furthermore, the herds in the Bontebok Park were relatively small. The mean size of nursery and harem herds lay between seven and nine animals and the largest herd seen was 40 animals, whereas the smallest mean herd size for mixed herds in the Etosha Park was 18,7 (Bigalke 1970). Similarly, the present bachelor herds were far smaller than those recorded by Bigalke (1972).

Seasonal changes: rutting and lambing

Rutting and lambing tend to be seasonal at Swellendam. Mating was seen three times in all on 28.2.69, 2.3.70 and 20.2.73. Rutting and courtship activity appeared to be most intense during February, March and April, but was also seen at the beginning of June and in September and November. July seemed to be the low point in courtship activity. Table 1 indicates that there was no marked change in social structure between the rut and the lambing season. There was, however, a higher proportion of nursery herds (lacking adult males) and a slightly reduced number of solitary males in the September (lambing) sample, indicating a reduction in territorial behaviour. Nevertheless, territorial males were seen courting females and defending their territories during the lambing season.

The most important lambing month appeared to be September, since a crop of new lambs was recorded in September 1972, 1973 and 1974. In 1969 a new-born lamb was seen as early as 26 August and since on 2.9.73 a crop of at least 14 new lambs was seen, it would appear that lambing probably starts at the end of August. In 1975 a crop of 16 new lambs was seen on 30 August and it appeared that lambing had started at the end of July. Assuming gestation to be less than six months (171 days: Shortridge 1934; 24 weeks: Van Zyl & Skinner 1970), one would expect the main rutting season to be mid-February to end of March.

Table 2 shows the number of lambs seen (classified as lambs if no horns visible) during

various censuses throughout the study period. Significant numbers of lambs were seen in every month from September through April, though crops of new-born lambs were seen only in August and September. However, four new lambs were seen on 6.3.76. Female lambs are difficult to age and this may introduce an error. Nevertheless, it seems that the lambing season may be rather prolonged and not very concentrated. If so, the rut would be similarly extended and one might expect to see courtship activity over a large part of the year. Unfortunately it was not possible to visit the study area sufficiently often to record an accurate birth peak. The findings of a rather extended lambing season with a marked peak in Spring, agree broadly with those published elsewhere (Skinner & van Zyl 1970; Skinner *et al.* 1971; Skinner *et al.* 1974).

Bigalke (1970) records that the lambing peak in the Etosha Game Park (the most northerly of his study areas), occurred in about mid-January, whereas in the Kimberley area he gives the "mean peak lambing date" as mid-October. Kimberley is approximately 10° latitude further south than Etosha. In the Bontebok Park, which is about 5,5° latitude further south than Kimberley, the peak is about mid-September.

All these findings suggest that the peak springbok lambing period is correlated more or less with the onset of summer rains in all the habitats described. In the S.A. Lombard Reserve, most rain falls in the months October through March (Skinner *et al.* 1974). In the Etosha Game Park, Berry (1972) reports that most rain falls in the months December

TABLE 2
Numbers of lambs (no horns visible) seen during censuses

Date	Sample size	No. lambs seen	% of sample
5.12.72	77	16	20,8
7.12.72	199	39	19,6
17. 2.73	133	29	21,8
24. 3.73	152	14	9,2
6. 4.73	180	10+	5,6
20. 4.73	125	9	7,2
31. 5.73	119	1	0,8
3. 7.73	86	0	0
2. 9.73	115	14 (new-born)	12,2
4.12.73	137	22	16,1
27. 4.74	147	9	6,1
29. 4.74	69	0	0
23. 9.74	52	17 (new-born)	32,7
24. 9.74	111	17 (new-born)	15,3
30. 8.75	35-40	16 (new-born)	40-46

through April, with a peak in February. In the Kimberley area, 30% of the annual rainfall occurs in the period October through December, and 48% in January through March (Thorntwaite Associates Laboratory 1962), while at Swellendam the greatest proportion of the annual rainfall (31%) falls in Spring (September through November) (Grobler & Marais 1967).

Sex and age ratios

Table 3 contains a sex and age ratio analysis of the ten most complete censuses conducted during the study period. It is apparent that there is considerable variability in the ratios obtained from the individual censuses. This is attributable to the fact that all censuses were incomplete due to the difficult nature of the terrain and the consequent failure to count all the animals. The mean of the results from the individual censuses gave an adult ratio of 85 males : 100 females. This is a figure far closer to parity than that obtained by Bigalke (1970) who saw very low percentages of adult males in populations in the Etosha and Kalahari

TABLE 3
Springbok population composition: sex and age ratios in the Bontebok Park (only the ten most complete censuses tabulated)

Date	Census Total	Adult ♂♂	Adult ♀♀	♂♂ :100 ♀♀	Non-Adults	Non-Adults :100 ♀♀
7.12.72	203	34	84	40,4	85	101,2
17. 2.73	154	56	48	116,6	50	104,2
24. 3.73	170	55	56	98,2	59	105,4
6. 4.73	197	58	66	87,8	73	110,6
20. 4.73	145	55	44	125,0	46	104,5
31. 5.73	129	39	40	97,5	50	125,0
2. 9.73	115	25	48	52,0	53	110,4
4.12.73	152	44	40	110,0	68	170,0
27. 4.74	151	33	69	47,8	49	71,0
24. 9.74	125	34	45	75,5	46	102,2
Mean				85,1		110,4
S.E.				9,5		7,9
Feb-Mar 1973 (Rut)	333	114	104	109,6	115	110,6
Sept. '73 & '74 (Lambing)	258	62	95	65,3	101	106,3

Parks. Figures of from 43-57 males : 100 females can be derived from his Table 6. Nevertheless, the present figures differ significantly from a 50 : 50 ratio ($\text{Chi}^2 = 13,5$; $p < 0,001$). Some of this discrepancy is very likely an artifact due to females being much more difficult to age accurately in the field. Some subadult females were probably classed as adult, thus artificially swelling the numbers of adult females.

Skinner *et al.* (1971) believe that the adult sex ratio is even, on the evidence of 1 633 adults caught in the S.A. Lombard Reserve. In contrast, in the Mountain Zebra National Park, Penzhorn (1974) found a predominance of 130 males : 100 females in a sample of 620 springbok.

Table 3 also shows the number and proportion of juveniles classified during individual censuses. For this purpose all non-adult animals are classed as juveniles. The mean ratio of 110 juveniles per 100 females is considerably higher than that reported by Bigalke (1970) for the Etosha and Kalahari Parks, (45-64 juveniles per 100 females). This could partly be the result of a better survival rate of young at Swellendam due to the lack of predators.

DISCUSSION

These results differ from those of Bigalke (1970, 1972), who found great variability in the size and composition of springbok herds in his study areas, and that mixed herds of adults and juveniles of both sexes and all age classes predominated. The Swellendam population showed the basic social structure characteristic of territorial species such as Thomson's and Grant's gazelles. Herd sizes for these gazelles are generally rather small (Estes 1967), and comparable with those found here for springbok. Estes gives average nursery herd sizes of 23 animals for *G. thomsonii* and 16 for *G. granti* and average bachelor herd sizes of 13 for *G. thomsonii* and 10 for *G. granti*. The small size of springbok herds in the Bontebok National Park may be a special case due to the small size of the population and the availability of year-round grazing. Nevertheless, it seems clear that springbok herd structure is very variable, which may be one factor permitting it to adapt to a wide variety of habitats and climatic regimes. It is usually associated with semi-arid environments where seasonal migrations are necessary, but is evidently able to adapt to regions of permanent grazing.

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