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PRODUCTIVITY OF MOUNTAIN REEDBUCK *REDUNCA FULVORUFULA* (AFZELIUS, 1815) AT THE MOUNTAIN ZEBRA NATIONAL PARK

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Abstract – Eighty two adult mountain reedbuck *Redunca fulvorufula* were collected during four seasons, autumn, winter, spring and summer at the Mountain Zebra National Park mainly during 1975 and 1976. Body mass and carcass characteristics varied little with season, body mass varying from 24,0–35,5 kg for all buck shot and dressing percentage always exeeded 50. According to KFI animals were all in fair to good condition. Sixty four percent of all ewes were pregnant and 38,5% lactating. Females and males bred throughout the year but there was a peak in births during mid-summer. The species is highly productive, well adapted to the niche it occupies and lends itself to exploitation for meat production.

Introduction

Mountain reedbuck *Redunca fulvorufula fulvorufula* recommend themselves in several ways for improving productivity from farmland. Their venison is palatable and free of parasites; they graze rough terrain frequently marginal for domestic livestock; their social structure ensures an even distribution of the population over available habitat; and they have a high reproductive potential (Irby 1975, 1976). The purpose of the present study was to ascertain the potential of mountain reedbuck for improving productivity of mountainous areas in the Karoo.

Methods

Mountain reedbuck prefer the steep slopes and plateaux of the mountains in the Mountain Zebra National Park, (MZNP), Republic of South Africa where they are usually to be found and where all the individuals in the present study were shot at random, 10 per visit, with a 0,22 hornet

rifle. Forty three mature ewes, 11 subadult ewes, 39 mature rams and 27 subadult rams were obtained in this way during visits in March (autumn), June (winter), September (spring) and December (summer), mainly in 1975 and 1976 but there was some supplementation in 1978. Of the immature individuals shot there were insufficient numbers in the different age classes to make a reliable study of growth. However, some observations were made on their reproductive potential.

After being shot the buck were taken immediately to a slaughtering area where they were weighed and dressed. They were left to hang and the dressed carcass was weighed after 3–4 h but this period varied greatly. In order to assess body condition, the kidney fat index (KFI), being the mass of kidney fat divided by the mass of the kidneys (Riney 1960), was recorded for each carcass. Carcass length and buttock circumference were also measured.

Blood was collected with individual plastic disposable syringes from the heart and transferred to heparinised glass tubes. Plasma was separated by centrifugation and plasma testosterone from 15 rams estimated as described by Millar & Kewley (1976).

The reproductive tracts were dissected out, foetuses weighed, measured and the site of ovulation and implantation noted. In the males, testes and epididymides were weighed and then as with the ovaries, fixed in Bouins fluid and, after routine paraffin embedding, sectioned at 5 μm. Ovarian development and spermatogenesis were noted. Seminiferous tubule diameter was measured by taking the mean of 25 tubules measured in cross-section.

Foetuses were weighed and measured and then using a birthweight of 3 100 g and gestation period of eight months (from Irby 1976), conception dates were determined using the Huggett & Widdas (1951) formula.

Results

Body masses of adult rams ranged from 24,0–35,5 kg and those of adult ewes from 24,5–33,8 kg. Mean differences in body mass and carcass mass between the four seasons during which the buck were cropped varied only slightly and no seasonal differences could be detected (Table 1). Nor was there any seasonal difference in dressing percentage although males dressed out consistently higher than females. This may have been related to reproductive tract contents or differences in stomach fill but, as the carcasses were not chilled for 24 h before weighing, these differences must be regarded with caution.

Kidney fat index did show some seasonal variation for both sexes being highest in winter. In ewes it was lowest during the seasons when most were probably at their peak of lactation.

There was no relationship between the mean testicular and epididymal weights or seminiferous tubule diameters and climatic variables and the data suggest no seasonality peak in male reproductive activity. The

Mean body mass, carcass characteristics and reproductive parameters ± S D for mature female and male mountain reedbuck in four seasons at the Mountain Zebra National Park

Females	*March Range*	*June Range*	*September Range*	*December Range*
Number	9	12	11	11
Body mass (kg)	29,1±3,1(24,5–33,8)	28,8±2,9(14,5–32,5)	29,4±2,2(26,5–33,3)	27,1±1,4(25,5–29,0)
Carcass mass (kg)	15,2±1,3(13,5–17,0)	14,6±1,3(12,3–16,2)	14,3±1,4(13,0–15,7)	13,9±0,5(12,9–14,7)
Dressing %	52,4±2,7(50,0–57,1)	50,6±2,9(45,6–54,9)	50,6±1,6(48,9–52,6)	52,2±3,5(47,4–58,7)
Kidney fat index	9,6(1,4–16,5)	60,5(10,3–150,5)	26,1(7,2–57,4)	9,9(3,4–24,3)
Carcass length (cm)	61,5±4,8(52,5–69,0)	61,9±2,1(59,0–65,0)	64,2±3,2(59,5–68,5)	62,3±1,5(40,5–65,0)
Buttock circumference (cm)	44,9±3,0(38,5–48,0)	47,1±2,9(42,6–52,2)	45,9±2,4(41,9–48,7)	44,3±1,8(42,0–47,4)
Pregnant %	22,2	91,7*	100,0	45,5
Lactating %	44,4	41,7	14,3	45,5
Metacarpal length (cm)	20,0	19,6	20,0	19,0
All ewes	64,1% pregnant	38,5% Lactating	12,8% pregnant and lactating	

Males†	*March Range*	*June Range*	*September Range*	*December Range*
Number	10	9	10	10
Body mass (kg)	31,0±2,6(27,5–35,5)	29,8±3,4(24,0–34,3)	29,8±2,9(26,4–35,0)	30,3±2,8(27,0–33,6)
Carcass mass (kg)	16,8±1,3(14,8–19,0)	16,6±2,1(13,5–19,5)	16,5±2,1(13,5–20,5)	17,5±1,6(15,8–19,2)
Dressing %	54,2±2,4(51,1–58,6)	54,2±3,1(49,1–57,3)	55,5±2,8(50,5–58,6)	57,5±1,2(56,3–59,8)
KFI	14,2(8,5–17,2)	21,3(6,5–69,1)	17,3(4,4–66,9)	19,4(8,1–44,1)
Carcass length (cm)	63,4±5,4(59,0–75,0)	63,1±2,4(60,3–65,5)	63,5±2,1(59,8–66,0)	64,5±3,3(60,5–69,0)
Buttock circumference (cm)	47,6±3,0(44,0–51,5)	46,7±1,7(44,2–49,5)	44,9±1,9(42,5–48,0)	46,4±1,4(44,3–48,4)
Testes mass (g)	31,3±10,7(20,6–53,0)	30,7±3,6(27,1–39,4)	30,5±5,2(21,3–37,5)	34,9±5,2(25,0–42,0)
Seminiferous tubule diameter (μm)	189,3±27,3(147–334)	179±14,5(166–206)	191±22,7(163–225)	194±9,5(178–203)
Epididymes mass (g)	5,9±2,1(4,0–10,0)	6,2±2,9(3,5–13,0)	3,9±0,8(2,4–5,0)	4,2±0,8(3,0–5,5)
Metacarpal length (cm)	20,0	19,9	19,9	20,0

*4 of 5 in June with embryos.

†Testosterone levels varied from 0,9 ng/ml blood plasma in an old ram in June to 14,1 ng/ml blood plasma in a ram in prime condition in June and mean level for mature rams in mid-year was 7,6 ng/ml (n = 5) cf 1,6 ng/ml (n = 5) for other times. From a live mass of 13,5 kg testosterone levels above 1,0 ng/ml plasma were being secreted.

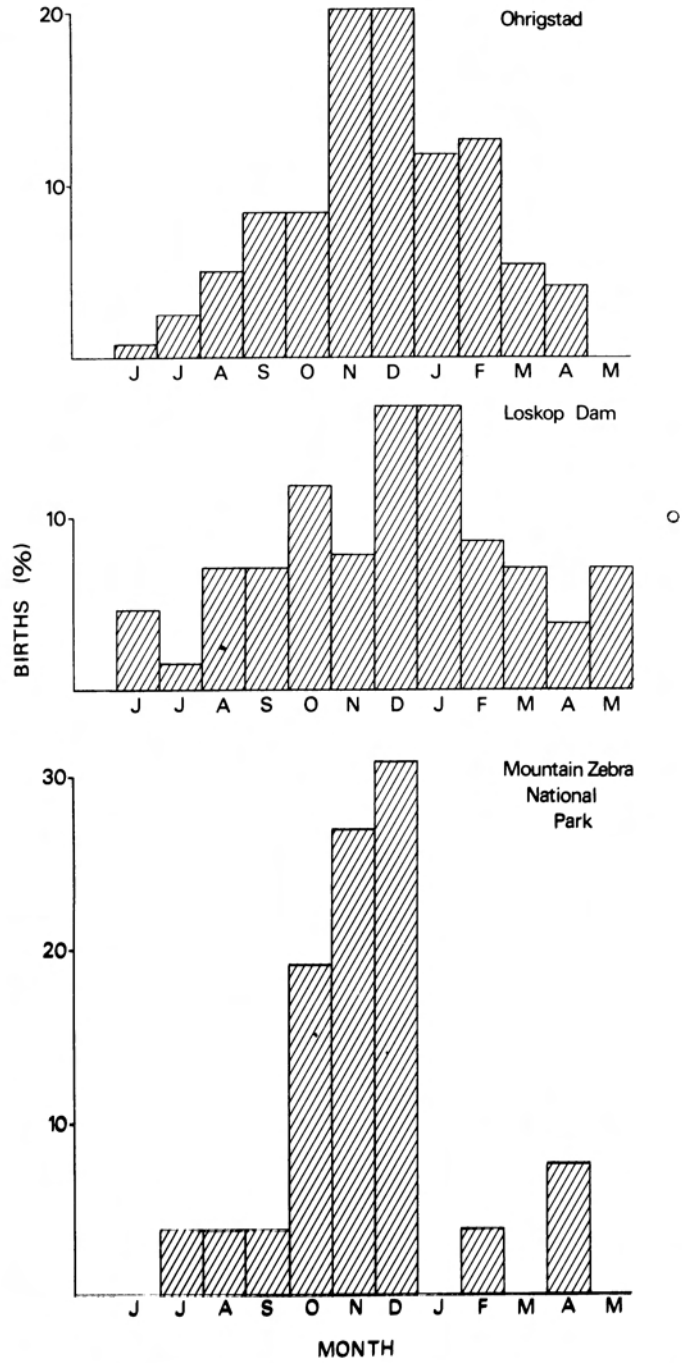

Fig. 1. Distribution of births of mountain reedbuck at Ohrigstad and Loskop Dam Nature Reserves from 1969–1972 (from Irby 1976) and at the Mountain Zebra National Park, birth dates being extrapolated from weights of 26 foetuses taken in 1975 and 1976.

plasma testosterone levels did indicate a peak in testicular endocrine function in winter for those individuals where androgens were assayed but this may have been related to body condition. Moreover, a serious deficiency was that the social status of the rams could not be determined. Testosterone levels in ram lambs fell within the range for adults from the age of about 5–6 months but the spermatogenic cycle was only complete in subadult rams when they reached an age of about 8–10 months, at which stage they had attained about 80% of adult body mass.

In all pregnant females implantation of the single embryo had taken place in the right uterine horn although 50% of ovulations occurred in the left ovary. Transmigration of fertilized ova to the right horn therefore occurred. It is apparent from the results (Table 1) that there is a seasonal pattern in pregnancy rate although there is no synchronized breeding pattern with foetuses of all sizes being found throughout the year. A breeding peak is confirmed when conception and birth dates are calculated for all foetuses obtained (Fig. 1), indicating a breeding peak in April/May and a birth peak in November/December. This was further substantiated by the remains of placental membranes in the right uterine horns of two ewes shot during December indicating they had just lambed. Nevertheless, ewes breed throughout the year.

Subadult ewes reach 80% of mature bodymass at about 7–8 months of age when ovarian development is such that breeding could possibly take place at this time. However, the small number of individuals in the sample preclude any definite conclusions in this regard.

Discussion

The results from the present study indicate that the mountain reedbuck is particularly well suited to the terrain it inhabits. For a grazer the lack of seasonal variation in body mass and carcass mass is particularly important because grasses usually undergo large seasonal variations in nutritive value particularly in regions such as the Karoo where a number of climatic variables show marked seasonal variation. Lack of seasonal change in carcass characteristics could indicate that the MZNP is understocked both with mountain reedbuck and with other competitive grazers. Being understocked the mountain reedbuck are able to select adequate nutritious forage to maintain satisfactory body mass throughout the year.

On the other hand, stocking rate may be related to the social system of this species. Irby (1976), found that group size averaged 3,2 individuals in the Loskop Dam Nature Reserve, Transvaal, and Mason (1977) made similar observations in the Jack Scott Nature Reserve, Transvaal. Irby found males were territorial and four groups each occupied an area of about 15 ha indicating an operative carrying capacity of 5 ha per mountain reedbuck. No such results were obtained during the present study, but farmers report much larger aggregations of this species in the Karoo.

The period during which the present study was carried out may also

have been above average for climatic variables favourably affecting plant growth such as rainfall and ambient temperatures.

A sample of rumen contents was taken from nearly all the animals shot but the species composition was not determined, as a botanical key would have had to be worked out. Moreover, recent studies (Zimmermann 1978; Monro 1979) have indicated marked deficiencies in this approach. It would appear important that concomitant studies on grazing behaviour using tame mountain reedbuck be carried out. Irby's (1976) results, indicating that this species is a grazer in the areas where he studied them, have therefore been accepted as applying in the MZNP although, if they consume many dicotyledons, this would help explain how they maintain body mass throughout the year.

In contrast to the present results, in the Loskop Dam Nature Reserve, Irby (1975) found a highly significant relationship between month of collection and carcass mass. Animals collected during July to October are significantly lighter. This is a seasonal pattern one would expect for a seasonal grazer. Dressing percentage was also some 10% and 5% lower for males and females respectively at this time. However, the dressing percentages he obtained during November-June were of the order of 2–5% higher than those obtained during the present study.

Unfortunately Irby does not give KFI values and, as he included mesenteric fat with epinephric fat, this could not be calculated. Nevertheless, carcasses from mountain reedbuck at Loskop Dam Nature Reserve always contained some fat although the amount was halved from July – October. Kidney fat index has been found to be a reliable index of total body fat in impala (Monro & Skinner 1979.) Kidney fat index values found for mountain reedbuck always fall within the range for fair to good condition given by Monro & Skinner (1979). This is a further indication that carrying capacity for grazers during the period of the present study was not exceeded. The higher KFI values for June in both males and females indicated a build up of fat reserves for the more adverse conditions to be expected during the latter half of winter. In ewes higher KFI indices were also found in September probably as a result of building up reserves in late pregnancy in preparation for lactation.

As in several other ungulate species such as the impala (Hofmeyr & Skinner 1969) and springbok (Van Zyl & Skinner 1970), only one ovum is invariably shed and implantation is always in the right uterine horn.

The percentage of mature ewes pregnant, lactating and pregnant, and lactating namely 64,1, 38,5 and 12,8 are very similar to Irby's (1976) percentages for mature ewes at Loskop Dam Nature Reserve of 62,5, 33,3 and 12,5. Moreover, it can be seen from Fig. 1 that the pattern of births in different seasons is similar for Ohrigstad, Loskop Dam and the Mountain Zebra National Park. Irby's (1976) observations for Giant's Castle Game Reserve in Natal, although only covering eight months of the year, also show births occurring throughout the period with a peak from November – January.

This peak in births, when extrapolated back means there is a peak in

breeding activity around April/May which is confirmed by Irby's (1976) behavioural observations on males. The higher testosterone levels from rams shot in early June during the present study also fit this pattern. What is surprising is that the pattern of reproduction in such widely differing geographic areas, Loskop Dam, Giant's Castle and the MZNP is so similar. This indicates that the environmental cues to which the mountain reedbuck are responding are the same and the species has successfully evolved to fill this particular niche. This response is different from other grazers on the plain where a marked seasonal reproductive pattern determined by daylength has evolved (Skinner, van Zyl & Oates 1974).

The mountain reedbuck is a productive antelope which would appear to be well suited to exploitation and development for meat production in areas which are marginal for domestic livestock production. Sexual maturity occurs at a reasonably early age in both sexes which both breed throughout the year and reproduction therefore lends itself to manipulation through management. The optimum time for cropping in all areas where this species has been studied would appear to be mid-winter about a month after the peak breeding season.

More research is required on grazing behaviour using tame individuals and on territoriality and social behaviour to establish management policies regarding stocking and culling rates. Furthermore, the influence of culling subadults at specific ages from 6 months of age on the rate of reproduction of mature ewes, should be investigated. In addition, the amount of competition between mountain reedbuck and other grazing ungulates, particularly domestic sheep and cattle, should be established.

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