

Some observations on the reproductive biology of collared pika *Ochotona rufescens* Gray, 1842 from Ziarat Valley, Baluchistan, Pakistan

Mian M. SHAFI, Syed W. A. RIZVI, Amjad PERVEZ,
Rajab ALI and Syed Z. SHAH

Shafi M. M., Rizvi S. W. A., Pervez A., Ali R. and Shah S. Z. 1992. Some observations on the reproductive biology of collared pika *Ochotona rufescens* Gray, 1842 from Ziarat Valley, Baluchistan, Pakistan. Acta theriol. 37: 423 – 427.

Some reproductive parameters of collared pika *Ochotona rufescens* Gray, 1842 were studied during the winter from Ziarat Valley, Baluchistan. Out of 195 animals captured, 105 (53.8%) were males and 90 (46.2%) females. Males were bigger and heavier than non-pregnant females. Mean litter size according to embryo count was 3.6 ± 1.6 (range: 1 – 7 young/female), and by placental scars 4.48 ± 0.30 (range: 2 – 6 young/female). Mean HBL of primiparous females was less than multiparous females. The higher fecundity rate of pika helps to attain its pest status in apple orchards.

Vertebrate Pest Control Laboratory, Pakistan Agricultural Research Council, P.O. Box -8401, University Campus, Karachi-75270, Pakistan

Key words: *Ochotona rufescens*, reproductive biology, Pakistan

Introduction

The collared pika *Ochotona rufescens* Gray, 1842 also known as Afghan pika, mouse hare or reddish pika is distributed in Pakistan, Iran, Afghanistan and Uzbekistan (Roberts 1977). In Baluchistan province of Pakistan, the collared pikas are associated with the mountain steppe forest at elevation above 1200 m and even to 3600 m. It also inhabits the comparatively arid mountain slopes where steppe forests no longer exist, such as in the Chiltan and Bolan (Roberts 1977, Siddiqui 1961).

Pikas are herbivorous lagomorphs which in summer severely damage wheat, corn, potatoes and garden vegetables. During the winter when the natural vegetation is lacking, pikas gnaw/injure the trunks and branches of apple trees, thus reducing the fruit production. Shafi *et al.* (1989) reported that in 1986 pikas damaged an average of 21.6% (from 14.7 to 25.5%) of apple trees, and the yield losses of apples was estimated at 21.2 million rupees in a single crop season.

Except for some observations (by Roberts 1977, Puget and Gouarderes 1974), no detailed study on the reproductive biology of this species is available. The present paper aims to provide information on litter size, sex ratio and prevalence of pregnancy with reference to head and body length and body weight of pikas.

Materials and methods

Study area

The Ziarat district (30°20'N, 67°45'E) altitude 2,450 meters, is in the north-western sector of Baluchistan province. Precipitations occur mostly in winter months, from December to March, with a variable summer monsoon between June and July. In Ziarat, juniper *Juniperus macropoda* trees constitute a dry open forest. The soil is extremely rocky and farmers use stones to make fences and terraces which provide good nesting places for pikas. In addition, pikas make burrows under juniper trees and nest in rock slides of the valley.

Data collection

During the winter of 1986, pikas were captured in specially designed live traps of 61 × 17 × 16 cm, baited with apple fruit and brought to the laboratory. Individuals were sexed, weighed and measured. All measurements were taken in millimeters. Body weight was obtained by means of a Pesola spring scale with an accuracy of 0.1 g. Reproductive conditions, i.e. perforation of vaginal orifice, number of visible mammae, lactation, visible pregnancy, number and size of embryos and presence of placental scars were noted in all females.

Results and discussion

Body size and sex ratio

From the total of 195 pikas *Ochotona rufescens* captured, 105 (53.8%) were males and 90 (46.2%) females. Body length and weight distribution in both males and females is presented in Table 1. Males grew to a greater body weight and

Table 1. Head-body length (HBL) and body weight (Wt) distribution in *Ochotona rufescens* from Ziarat Valley, Baluchistan as well as differences between sexes.

HBL mm	Males n	Wt ± SD g	Non-pregnant females, n	Wt ± SD g	<i>p</i>
110 – 130	7	79.3 ± 9.3	5	64.0 ± 5.5	< 0.05
131 – 151	10	96.3 ± 18.9	6	81.7 ± 14.7	< 0.05
152 – 172	25	132.2 ± 20.3	9	118.9 ± 15.5	< 0.05
173 – 193	25	160.2 ± 29.0	8	145.0 ± 14.4	< 0.05
194 – 214	18	194.4 ± 31.5	15	183.4 ± 11.0	< 0.05
215 – 235	20	254.7 ± 32.2	5	235.0 ± 2.7	< 0.05
Total/Avg.	105	165.9 ± 59.6	48	145.1 ± 52.5	
Maximum Wt of male = 350 g			Maximum Wt of female = 240 g		
Mean HBL ± SD of male = 181.6 ± 28.5mm			Mean HBL ± SD of female = 177.3 ± 30.4 mm		

longer body length than females, the difference in body weight between sexes being significant in all body length classes ($t = 2.17$; $df = 151$; $p < 0.05$). According to Markham and Whicker (1973), the average body weight of adult males was bigger than adult females. They also reported that no changes in body weights of both sexes of pikas occur during the winter season. Our data are also in agreement with the above findings. There was a positive relationship between HBL (head and body length) and weight in males ($r = 0.89$; $p < 0.001$) and females (non-pregnant; $r = 0.95$; $p < 0.001$; pregnant; $r = 0.89$; $p < 0.001$).

Significant difference between the body weight of non-pregnant and pregnant females was observed ($t = 14.7$; $df = 88$; $p < 0.001$). The proportion of males to females in the sample was 1 : 0.8. This proportion differs significantly from 1:1 sex ratio ($\chi^2 = 15.1$; $p < 0.01$).

Table 2. Pregnancy, litter size and lactation by head and body length (HBL) of pregnant females.

HBL mm	Females n	Pregnant females n	Pregnant females %	Litter size $\bar{x} \pm SD$	Lactating females n	Lactating + pregnant females, n	Reproductively active females %
131 - 151	5	—	—	—	—	—	—
131 - 151	6	—	—	—	—	—	—
152 - 172	11	2	18.2	1.5 \pm 0.70	—	2	18.2
173 - 193	11	3	27.3	2.0 \pm 1.00	3	6	54.5
194 - 214	28	13	46.4	2.5 \pm 0.77	8	21	75.0
215 - 235	29	24	82.7	4.58 \pm 1.38	5	29	100.0
Total/Avg.	90	42	46.7	3.6 \pm 1.6	16	58	64.4

Mean HBL \pm SD = 192.7 \pm 29.8 mm; Mean Wt \pm SD = 270.0 \pm 24.9 g; Maximum Wt = 360 g; 50% pregnant at 215.2 mm; 50% reproductively active at 212.0 mm.

Table 3. Pregnancy and number of placental scars by head-body length (HBL).

HBL mm	Female examined n	Non-pregnant without scars	Pregnant without scars	Non-pregnant 1 set scars	Pregnant 1 set scars	Non-pregnant 2 set scars	Pregnant 2 set scars
110 - 130	5	5	—	—	—	—	—
131 - 151	6	6	—	—	—	—	—
152 - 172	11	9	2	—	—	—	—
173 - 193	11	5	3	3	—	—	—
194 - 214	28	8	12	7	1	—	—
215 - 235	29	—	15	4	8	1	1
Total	90	33	32	14	9	1	1

At HBL 212.0 mm 50% were either pregnant or had at least 1 set of scars; Mean HBL \pm SD of primiparous females was 205.7 \pm 16.0 mm ($n = 46$); Mean HBL \pm SD of multiparous females was 219.5 \pm 12.7 mm ($n = 11$).

Litter size

Mean litter size of 3.6 ± 1.6 (range 1 – 7 young/female) was recorded from an embryo count in 42 females collected during the winter season (Table 2). The placental scars were observed in 25 females. The mean litter size according to placental scar count was 4.48 ± 0.3 (range: 2 – 6 young/female). The litter size based on placental scars was greater than estimated from an embryo count which may be due to the fact that litter size in the summer was higher than in the winter (Smith 1974) and 95% of the litters were born in the summer season. According to Walker (1975), the litter size in *O. rufescens* varied from 2 to 6 young. Mean litter size of 3.6 was recorded by Severaid (1955) by embryo count in captivity. Puget (1973) observed a litter size of 5.5 young/litter, but litter size in pikas varies. First litters were frequently of 3 or 4 young, but later litters may reach 7, 8 or 9 and sometimes more. Litter size was observed to be higher with the increase in HBL of females. During the present study higher litter size was also observed with the increase of HBL of the females. However, reproductive fluctuations/breeding potential of pikas *Ochotona princeps* in South Western Alberta showed no change in response to environmental parameters in the winter (Millar 1974).

Prevalence of breeding activity

The prevalence of pregnancy was determined from visible embryos and by placental scars. A summary of the distribution of pregnant or lactating females is shown in Table 2. Out of 90 females autopsied, 42 (46.7%) were visibly pregnant. The first pregnant female was recorded in HBL of 152 – 172 mm with mean body weight of 150.0 g. According to Puget (1973), pikas of this class were 5 to 6 weeks old. Puget and Gouarderes (1974) suggest that the smallest pregnant female was not more than 5 weeks old and the largest 8 weeks old. Apparently wild pikas can acquire sexual maturity earlier than captive specimens. In Ziarat, a long breeding season (from ca. 15 March to 30 September) permits *O. rufescens* to produce as many as five litters per female per year (Fulk and Khokhar 1980), which is comparable to *O. hyperborea* and *O. princeps*. In September, an average 64.4% females were reproductively active, including lactating and pregnant. Reproductivity increases with the increase of HBL class.

Based on the present data, the point at which 50% of the females were pregnant occurred at HBL of 215.2 mm and the point at which 50% of the females were reproductively active (pregnant as well as lactating) occurred at HBL of 212.0 mm.

Observations on pregnancy and placental scars are presented in Table 3. The point at which 50% of the females had at least one set of placental scars or were pregnant was at HBL of 212.0 mm. The multiparous females were of greater HBL than primiparous ($t = 3.0$; $df = 55$; $p < 0.005$).

During better winter survival, damage to apple trees was recorded to be higher (Khan and Smythe 1980, Shafi *et al.* 1989). Moreover, the higher fecundity rate of *O. rufescens* apparently enables it to achieve pest status by increase in population density and thereby infesting previously empty areas.

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Received 1 June 1992, accepted 10 December 1992.