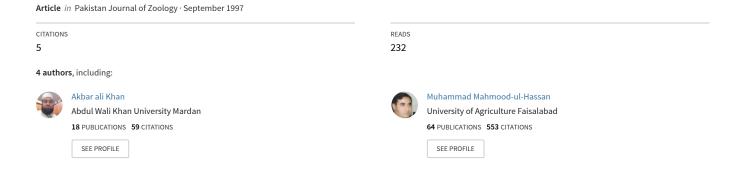# Some demographic characteristics of the house mouse (Mus musculus bactrianus) in villages of central Punjab (Pakistan)

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Some Demographic Characteristics of the House Mouse (*Mus musculus bactrianus*) in Villages of Central Punjab (Pakistan)

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Abstract.- The overall trap success of house mouse (*Mus musculus bactrianus*) living in the villages of central Punjab was 4.30%. Reproductively active male mice were recorded in all the seasonal samples with an average of 87.50%. Female mice, too, bred throughout the year averaging a prevalence of pregnancy of 42.86% and a litter size of 5.10±1.35 (2-7). Mean litter size increased with the increase in body weight and head and body length classes of the mice. There was no effect of season on the size of litter. The ratios of the two sexes approximated 1:1. On the average 21.83% of the mice in the sample were immature. Seasonal variations in the proportions of young mice did not vary significantly.

Key words: Abundance, population structure, trap success, house mouse.

INTRODUCTION

In Pakistan, the house mouse (*Mus musculus bactrianus*) affects both indoor and outdoor habitats. In indoor situation, it occurs in crowded cities, small towns and villages. Outdoors, it affects almost all the agricultural crops, however, it does not occur in the non-crop areas as widely as it does in the croplands. In the former it is largely confined to the edges bordering the croplands (Hussain *et al.*, 1975). Segments of the mouse populations living in the fields have been studied by Rana and Beg (1976), Ambreen (1989) and Khan and Beg (1990). The segment of the mouse population inhabiting rural areas in Pakistan has not yet been studied. The present study provides some demographic information on *Mus musculus bactrianus* living in the villages of central Punjab (Pakistan).

MATERIALS AND METHODS

The present study on the house mouse was carried out from June, 1994 through May, 1995. During this period, 12 randomly selected villages all located within 70 km of Faisalabad city, were sampled for the house mouse. From these 12 villages, a total of 63 village houses, 16 village shops and 8 flour mills were randomly selected and sampled. In addition to these 3 structures, 26 farms located in the fields at varying distances from the villages were also sampled.

The trapping was carried out by using wooden McGill mouse traps (10x4.5cm). In all structures, 450 traps were set each night. Percent trap success was used as an index of abundance. The traps were baited with "roti" (bread).

The captured animals were weighed and then their standard body measurements were taken. Each specimen was autopsied and the reproductive data were recorded. The points on body weight (BW), and head and body length (HBL) spectra, at which 50% of house mice showed several sexual maturity criteria (such as visible tubules in cauda epididymis or perforate vagina) were determined by plotting the proportion showing the character in each BW and HBL classes on arithmatic-probability paper and fitting a line to the data points by eye (Davis, 1964). Animals attaining or exceeding these values in BW or in HBL were considered as adult; all others were classified as immature.

RESULTS

Abundance

The trap success ranged from 2% in autumn to 6.52% in summer. During winter and spring seasons the trap success was 4.37% and 4.30%, respectively. The annual average was 4.30% (Table I).

Reproduction

It was found that male house mice attained sexual maturity at 9.4g BW and at 50 mm HBL,

Season	Male			Females		
	% Trap success	No. Adult	% Rep. active (n)	No. Adult	% pregnant (n)	Litter size Mean±SD (Range)
Autumn	2.00	18	83 (15)	07	71 (05)	4.8±2.17 (2-7)
Winter	4.37	22	91 (20)	24	25 (06)	5.0±1.27 (4-7)
Spring	4.30	20	95 (19)	48	48 (12)	5.2±0.82 (4-6)
Summer	6.52	28	82 (23)	35	46 (16)	5.2±1.52 (2-7)
Total	4.30	88	88 (82)	91	43 (39)	5.1±1.35 (2-7)

Table II.- Body weight (g) and body length (mm) related variations in the prevalence of pregnancy and litter size in female *Mus musculus*.

BW classes	Body weight (BW)			HBL classes	Body length (HBL)		
	No. Adult	% pregnant (n)	Litter size Mean±SD (Range)		No. Adult	% pregnant (n)	Litter size Mean±SD (Range)
6 - 10	9	33.3 (3)	4.3±0.58 (4-5)	61-71	8	62.5 (5)	4.6±1.67 (2-6)
11 - 15	39	38.2 (15)	4.6±1.40 (2-6)	71-80	36	41.7 (15)	4.8±1.37 (4-6)
16 - 20	35	42.9 (15)	5.6±1.30 (2-7)	81-90	35	40.0 (14)	5.4±1.28 (3-7)
> 21	8	75.0 (6)	5.5±1.23 (4-6)	> 91	14	35.7 (5)	5.6±1.14 (4-7)
Total	91	42.9 (39)	5.1±1.35 (2-7)	Total	93	41.9 (39)	5.1±1.35 (2-7)

Table III.- Proportions of female *M. musculus* and immatures in the seasonal samples.

Season	Sample size	% Female (n)	% immature (n)
Autumn	27	29.6 (8)	7.4 (2)
Winter	59	50.9 (30)	22.0 (13)
Spring	56	55.4 (31)	19.6 (11)
Summer	87	52.9 (46)	27.6 (24)

whereas the female mice attained maturity at BW of 9.7 g and 67 mm HBL. Reproductively active males were recorded in all the four seasons of the year. Maximum (95%) breeding activity was recorded in the spring season and minimum (82%) in the summer season. During the autumn and winter seasons the proportion of reproductively active males was 83% and 91%, respectively (Table I). The average annual proportion of breeding males was 88%. Seasonal variations in the proportions of reproductively active males were not statistically significant.

Pregnant females were found in all the months of the year. Prevalence of pregnancy was the lowest in winter (25%) and the highest in autumn (71%); the yearly average being 43%. Neither seasonal variations nor those related with the BW and HBL of the females were statistically significant (Tables

size was recorded during the summer season (5.2±1.52; range=2-7) and the smallest during the autumn season (4.8±2.17; range=2-7). Season, BW, and HBL related variations in the mean litter size were not significant (Tables I-III). In the near term females the litter size averaged 4.0±1.68 (n=7).

Table IV.-   Rate of pregnancy and litter size in *M. musculus* populations from different localities and microhabitats.

Locations	No. of adult females	Percent pregnant	Embryos/ pregnant females	Authorities
Indoor studies				
Mississippi	765	46.8	4.8	Smith, 1954
South Carolina	19	21.0	5.7	Caldwell, 1964
England				
Ricks	1088	50.5	5.7	Southwick, 1958
Urban	433	21.9	5.2	Lourie, 1946
Flour depots	499	31.7	5.5	Laurie, 1946
Cold stores	524	26.5	6.4	Laurie, 1946
Ricks	468	40.6	5.8	Laurie, 1946
Pakistan				
Punjab, rural structure	91	42.9	5.1	Present study
Outdoor studies				
Pakistan				
Punjab, irrigated field	82	43.9	5.8	Rana & Beg, 1976
Central Punjab	37	54.0	7.6	Ambreen, 1989
Central Punjab	94	51.1	6.2	Khan & Beg, 1990

Population structure

The ratio of the two sexes approximated the theoretical 1:1. Recruitment of young mice in the population took place in all the seasons (Table III). The proportion of young mice was maximum in the summer (27.6%) and minimum in the autumn season (7.4%). On the average, 21.8% of the mice were immature. Seasonal variations in proportions of young mice were not significant.

DISCUSSION

Reproduction

Trap success of the mice in summer season was approximately three times greater than that of the autumn season. Perhaps the wheat grain brought indoors from the fields attracted the mice to the village houses from the fields. Overall average for trap success was 4.3%. Hussain *et al.* (1975) recorded 9.5% and 4.8% trap success of house mice in human dwellings. Trap success of house mice recorded by Ali (1990) and Khan (1990) in different structures of Faisalabad city was relatively low; 3.3% in residential houses, 0.1% in grain shops, 0.5% in groceries and 0.3% in sweet shops.

The female mice as already noted by Rana and Beg (1976), breed throughout the year in the central Punjab. However, the breeding activity was markedly reduced in the winter season. Most of the pregnancies in *M. musculus* were concentrated in early spring and mid-autumn. In indoor populations of the house mouse, prevalence of pregnancy has been found to vary from 21.0% to 50.5% (Smith, 1954; Caldwell, 1964; Southwick, 1958; Laurie, 1946) (Table IV). Prevalence of pregnancy in the mice of the present study was 42.9% which lies between those recorded for the South Carolina (Caldwell, 1964) and England (Southwick, 1958) mice populations. The proportion of pregnant females in the mice samples from the agricultural fields (see Rana and Beg, 1976; Ambreen, 1989; Khan and Beg, 1990) was generally greater than the one for the mice of the villages. The present estimate of 5.1±1.35 (SD) embryos per female is the smallest of all the litter sizes recorded for indoor mice populations; the only exception being the mice from Mississippi (Smith, 1954).

Population structure

The data of present study indicate that proportion of immature mice was relatively high in summer and winter samples. This could be related to high reproduction rates in spring and autumn. Abundant food supply could be another favourable

factor. Khan (1982) and Ambreen (1989) estimated that immature mice constituted 14.9% and 19.5% of annual samples which are relatively lower than that of the present estimate of 21.8%.

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