Bull. zool. Surv. India, 6 (1-3) : 21-26. 1984

STUDIES ON THE FOOD PREFERENCE AND CONSUMPTION OF *RATTUS RATTUS* (LINNAEUS) [RODENTIA : MURIDAE] IN CAPTIVITY

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ABSTRACT

The order of preference and the rate of consumption of five most common food grains of West Bengal were investigated in *Rattus rattus* (Linnaeus) under controlled condition in special type of cage. Two food grains were provided at a time until all the possible combination (a total of ten) had been given. A simple preferential order for rice was observed in all the four dyadic trials. However, from the amount of consumption of other food grains, it is obvious that this species prefers a varied diet, rather than consuming a single food grain to the exclusion of others. No significant difference was observed in the quantity of day and night feeding. Average daily consumption is about 9.85 gm. It has been estimated that 61 individuals of adult *Rattus rattus* can consume food equivalent to that necessary for one Indian.

INTRODUCTION

The knowledge about the food preference and rate of consumption of pest species of rodents is a long felt need. Rodents are versatile in feeding behaviour and choice of food, but they are not uniformly so. For the effective control measure and to determine the extent of damage, detailed studies on the feeding of rodents are needed in different parts of the country growing different types of crops and herbs, as the normal food of rodents depend on their immediate environments. Variety, seasonal changes of diet, food preference and rate of consumption in different species of rodents have been studied in different parts of our country, but except for the reports of Spillett (1968), Parrack and Thomas (1970) and Chakraborty (1977), no qualitative and quantitative information have been collected on the food habits of rodents occurring in West Bengal. Spillett (1968) made detailed study on the food preference, consumption and calorie intake of *Bandicota bengalensis* (Gray) in captivity with five most common food grains of West Bengal, viz., wheat (*Tricticum aestivam*), rice (*Oryza sativa*), lentil (*Ervem lens*), black gram (*Phaseolus radiatus*) and green gram (*Phaseolus aureus*). In the present paper similar study was made on the *Rattus rattus* (Linnaeus). It is mainly a house rat and occurs in good number in West Bengal. However, its population is gradually decreasing in the city areas due to highly growing population of *B. bengalensis* (Spillett 1968, Seal and Banerji 1969).

METHOD

For the experiment, rats (*R. rattus*) were regularly collected from groceries near Behala Tram Depot (Calcutta-34) in wonder trap (Trap designed for multiple catch). They were

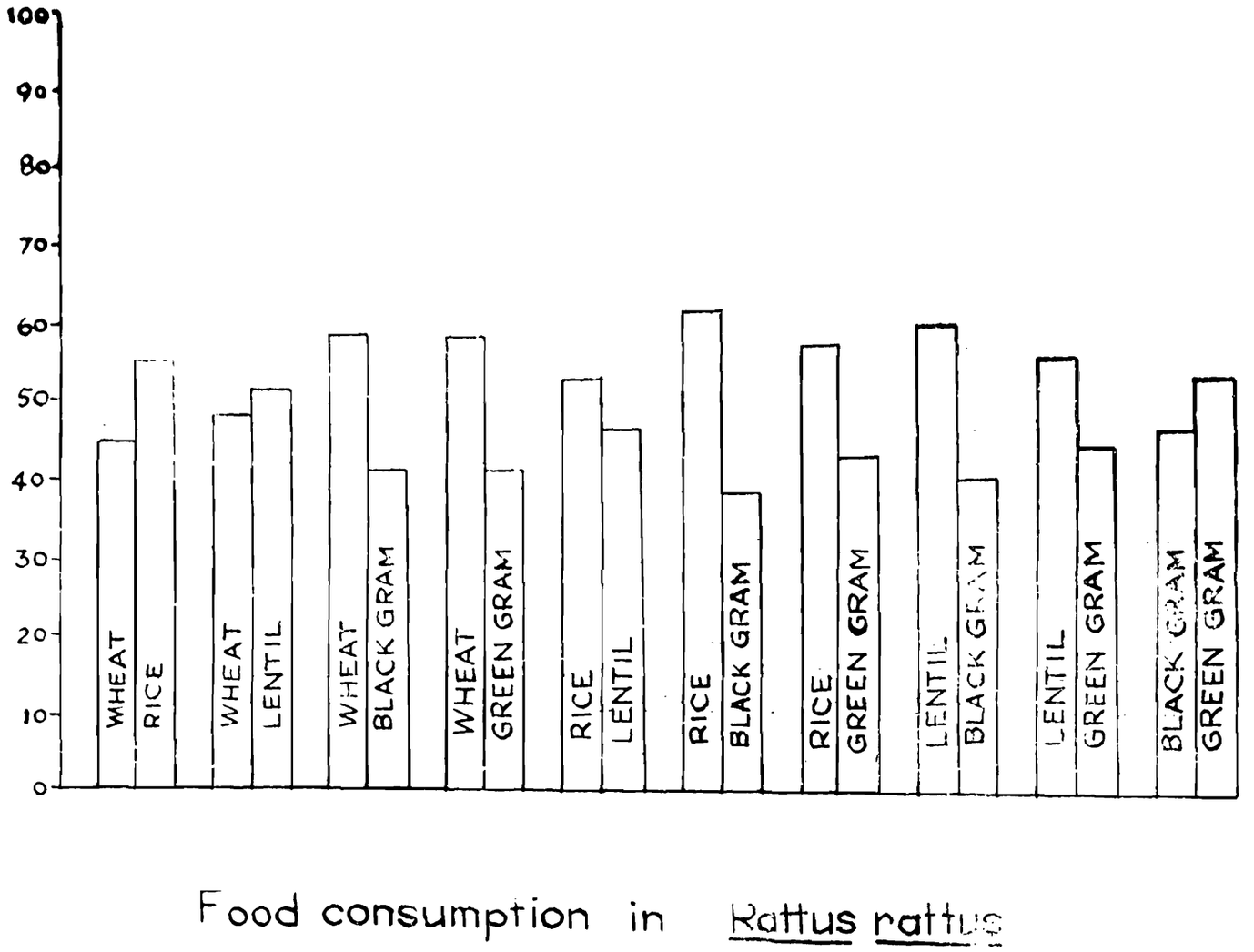

Fig. 1. Graphic representation of percentage of consumption for each of five food grain when presented two at a time to four individually caged *R. rattus* during 5-day study period.

reared in special type of wire cages. Each cage is about 100 cm. × 55 cm. × 50 cm. in size with three equal compartments. Partitions between the compartment are removable (Plate III). There is also a removable metallic tray at the base of the cage for the collection of faeces and spilled food grains. The adults were maintained in the cages for two days with water and all the food grains used for the experiment for acclimatization. Experiment was conducted only with these acclimatized rats. Food grains used by Spillett (1968) are the most common crops of West Bengal, and a good stock of them are maintained in the ration shops, groceries and houses. Hence the same five food grains, viz., rice (*Oryza sativa*), wheat (*Tricticum aestivam*), lentil (*Ervem lens*), black gram (*Phaseolus radiatus*) and green gram (*Phaseolus aureus*) were selected for the present study. Calorie values of these grains were given by Parpia *et al.* (1964). In natural condition rats are rarely restricted to single food type, thus two food grains were provided at a time until all the possible combination (a total of ten) had been given. Only a single rat was kept in each cage and the food and water trays were kept in the first compartment. The rat was forced to move into third compartment of the cage at 07.00 hour and 19.00 hour with

TABLE 1. Consumption rates (gramme and calories), defaecation rates and weights for four individually caged adult *R. rattus* when presented five food grains two at a time during five days study period.

Total rat hours	Food grains	Calories/ gramme	Gramme consumed	Calories consumed	Faeces No.	Faeces Weight in gramme (air dried)	Total weight of rats in gramme Start	Finish	Difference	Mean	Calories consumed/X gramme of rat.
480	Wheat	3.46	93	321.78	900	35.2	675.3	683.6	+ 8.3	679.45	1.06
	Rice	3.48	114	396.72							
480	Wheat	3.46	102	352.92	879	35	639.4	651.8	+12.4	645.6	1.13
	Lentil	3.43	109	373.87							
480	Wheat	3.46	115	397. 9	1021	48.6	708.5	721.3	+12.8	714.9	0.95
	Black gram	3.47	81	281.07							
480	Wheat	3.46	113	390.98	998	37.8	592.8	610.4	+17.6	601.6	1.12
	Green gram	3.51	80	280. 8							
480	Rice	3.48	110	382. 8	896	38.2	721.2	716.4	- 4.8	718.8	0.99
	Lentil	3.43	96	329.28							
480	Rice	3.48	119	414.12	1005	47.4	635.7	637.8	+ 2.1	636 75	1.05
	Black gram	3.47	74	256.78							
480	Rice	3.48	109	379. 2	709	30.8	624.7	621.6	- 3.1	623.15	1.06
	Green gram	3.51	81	284.31							
480	Lentil	3.43	116	397.88	881	31.7	587.6	601.2	+13.6	594.4	1.12
	Black gram	3.47	78	270.66							
480	Lentil	3.43	108	370.44	967	37.5	649.2	647	- 2.2	648.1	1.03
	Green gram	3.51	85	298.35							
480	Black gram	3.47	87	301.89	951	37.3	703.4	689.3	-14.1	696.2	0.93
	Green gram	3.51	99	347.49							
Total 4800		69.40	1969	6829.36	9207	379.5	6537.8	6580.4	42.60	6558.95	10.44
Mean 480		3.47	393.8	1365.87	1841.4	75.9	653.78	658.04	4.26	655.89	1.04

the help of movable partition to collect all the food grains and pellets from the cage as well as from the tray. This permitted both the food consumption and defaecation rates to be recorded on the day versus night basis. Faecal pellets were counted and air dried before weighing them. The rats were weighed to the nearest 0.1 gm. before and at the end of each trial.

Result

Of the five food grains presented two at a time to individually caged rat, a simple preferential order was observed for rice in all four dyadic trials ; lentil in three out of four ; wheat in two out of four ; greengram in one out of four and black gram was not favoured in any trials. The rate of consumption is presented in Table 1, and percentage of consumption for each is graphed in Fig. 1. The average daily consumption of food by individual *R. rattus* comes to about 9.85 gm. which is nearly 1/17th of its body weight. Although there is a marked preferrence for rice over others, from the amount of consumption of other food grains it is

obvious that this species prefers a varied diet, rather than consuming single food grain to the exclusion of others. No significant difference was observed in the day and night feeding and particular food grain is preferred in the day as well as in the night. However, defaecation rate is little lower during the day time.

Weight losses occurred when the following combinations of foods were provided :— rice-lentil, rice-green gram, lentil-green gram, and black gram green gram. Weight was gained with all other six combinations of foods. It is interesting to note that presence of wheat in the food always increases the weight of the rat. The calorie consumed per mean gm. of rat varied within a very small range of 0.93-1.13 with a mean of 1.04 for the five days of study period. No significant difference of calorie intake was found with any particular combination of foods. Below are some calculations derived from the data given in Table 1.

Rat days : $\frac{4800}{24} = 200$

$\bar{x}$ gm. consumed/rat/day : $\frac{1969}{200} = 9.85$

$\bar{x}$ calories consumed/rat/day : $\frac{6829.36}{200}$

$= 34.15$ .....(A)

$\bar{x}$ number of faeces/rat/day : $\frac{9207}{200} = 46.06$

$\bar{x}$ weight (gm. air dried) of faeces/rat/day : $\frac{379.5}{200} = 1.9$

$\bar{x}$ gain (gm.)/rat/day : $\frac{42.6}{200} = 0.21$

$\bar{x}$ weight (gm.) of rat used : $\frac{6558.95}{40} =$

163.97.....(B)

$\bar{x}$ calories consumed/day/gm. of rat : $\frac{A}{B}$

$= 0.21$

Discussion

In the present study following preference was obtained : (i) rice, (ii) lentil, (iii) wheat, (iv) green gram, (v) black gram. Harrison and Woodville (1950) also reported marked preference for rice by *R. rattus*. Chitre and Deoras (quoted by Spillett, 196) reported the following preference of food grains for *R. rattus* in captivity : (i) wheat, (ii) barley, (iii) lentil, (iv) maize, (v) millet and (iv) rice. According to Majumdar *et al.* (1969) jower appeared to be the most preferred grain to *R. rattus*. Mukta Bai *et al.* (1978) found that under laboratory condition some rodents including *R. rattus* preferred a snail (*Ariophonta madraspatana*) in preference to whole wheat, ragi, jower, rice or groundnut. This is obvious that *R. rattus* shows different types of preference in different studies, but in all the experiments it consumes other grains or food in good quantities showing ultimate preference for a varied diet. In fact, members of the genus *Rattus* generally accept a wide spectrum of foods (Fall *et al.* 1971) and it appears that niche differences determine the extent of food preference in *R. rattus*. Thus, the suggestion of Fitzwater and Prakash (1966) that for trapping of rodents, a mixed bait or a choice of bait is better than reliance on a single type, holds good for this species.

Spillett (1968) found some differences in the day and night feeding of *B. bengalensis*, but the same was not observed in *R. rattus*. Actually in the shops and godowns, the latter species is found to be almost equally active in the day as well as in the night, while the former species is almost completely nocturnal in habit. The daily consumption of *R. rattus* in the present study comes to about 9.85 gm. which is much less than that found by Majumdar *et al.* (1969) in Mysore. However,

weight of the stomach contents of adult *R. rattus* collected from the shops goes up to 16 gm. This indicates that consumption in captivity is much less than in nature. As Kavanau (1967), Spillett (1968) and others have pointed out, the relatively sterile environment to which the captive animals are submitted, restricted movement, absence of disturbances and social stresses, tend to distort their behaviour and less consumption of food. Food consumption data derived from captive animals probably represent the minimum requirement of them.

From the above study it was derived that an adult *R. rattus* of body weight 163.97 gm. requires 34.15 calories daily. According to Parpia *et al.* (1964), the average Indian subsists upon approximately 2100 calories per day, which means 61 individuals of adult *R. rattus* can consume food equivalent to that necessary for one Indian in a day.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. B. K. Tikader, Director, Zoological Survey of India, for affording facilities for this study. Gratitude is expressed, to Dr. B. Biswas, Emeritus Scientist, for going through the manuscript and valuable suggestions. We are indebted to Dr. A. K. Mukherjee, Superintending Zoologist, Dr. V. C. Agrawal, Superintending Zoologist, Shri R. L. Chowdhury, Zoologist and Shri P. K. Das, Zoologist, who considerately asked several helpful questions. We wish to acknowledge the kind cooperation extended by the owners of the different groceries of Behala.

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