

## FOOD CONSUMPTION AND PREFERENCE OF THE ROOF RAT, *Rattus rattus* (Linnaeus).

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### ABSTRACT

Food consumption and preference of the roof rat, *Rattus rattus*, were investigated. Two groups of foods were used: the first included wheat, barley and maize; the second included peanut, date and squash. Daily rate of consumption of wheat, barley, maize, peanut, date and squash was 77.16, 86.33, 96.06, 70.19, 88.74 and 326.51 g/kg body weight /day when introduced individually (no-choice feeding test). Further, foods were introduced to rats in double-choice and triple choice feeding experiments. In double-choice feeding experiment, wheat was more preferable than barley (65%:35%), barley was more preferable than maize (60.47%:39.53%), and maize was less preferable than wheat (69.23%:30.77%), also, squash was more preferable than peanut (61%:39%), peanut was more preferable than date (53.63%:47.37%) and date was less preferable than squash (43.08%:56.92%). In triple-choice feeding test, preferences of foods could be arranged in descending order as follow: wheat, barley and maize (49.11%:26.45%:24.44%) – in the first group, and squash, peanut and finally date (77.5%:13.32%:9.18%) – in the second group. When wheat was tested against peanut in a double choice feeding test, the first was found to be more preferable (65.96%:34.04%).

### INTRODUCTION

It is impossible to say which particular food is preferred by individual rats or even whole population; thus there is no such thing as universally acceptable bait (Meehan, 1984). Rowe (1973) made a similar comment about mice. These facts have been confirmed by studies of consumption of food by wild rats (Clark, 1982). Rodents can eat most foodstuff, but studies have found that they prefer particular foods to others. Boiled rice has been recommended for *Rattus rattus* and *R. exulans* in Burma (Harrison & Woodville, 1950). Arafa *et al.* (1975) found that available cereals and bruised maize were the most preferable food to *Rattus norvegicus* and *Acomys cahirinus*, bruised sorghum to *Arvicanthes niloticus*, sound maize to *Rattus rattus alexandrinus* and broad bean to *Rattus rattus forugivorous*. Wheat and paddy rice were preferred by *Acomys cahirinus* (Omar 1977). Yabe (1979) found that roof rat, *Rattus rattus* principally ate fruit and seeds. Crushed wheat was the preferable food by *Arvicanthes niloticus* to many cereals (El-Deeb *et al.* 1985 & Youssef, 1986).

### MATERIALS AND METHODS

#### Animals:

Rats (*Rattus rattus*), were trapped from Khaled Ibn Elwaleed village, Badr district, Behiera governorate, using wire box traps (spring door type). Animals were transported to the laboratory in a cloth bag then weighed and individually caged in metal cages. Food and fresh water were introduced *ad lib* for two weeks before starting the experiments.

**Tested foods:**

The tested foods were divided into two groups: the first included: wheat, barley and corn, and the second included: peanut, date and squash.

**Experiments:**

Ten mature animals were used for each experiment. Along ten days, known amount (50g) of food was offered to animals individually every day and weighed the day after to determine the daily food consumption. To examine food preference. Three experiments were carried out as follows:

- 1- No choice feeding experiment: every type of food of each group was introduced lonely to estimate the daily consumption of food as g/kg body weight/day.
- 2- double choice feeding experiment: introducing each group of foods in pairs.
- 3- Triple choice feeding experiment: introducing all foods of each group at the same time.

Wheat from the first group and peanut from the second group were chosen and were tested against each other to determine the most preferable food.

**Calculation:**

Food preference percentage was calculated as follows:

$$\text{Food preference \%} = \frac{\text{Amount consumed of the food}}{\text{Total consumption of foods}} \times 100$$

group foods) in the no-choice feeding test. As regarding to the double-choice feeding test (table 2), wheat was more preferable than barley (65%:35%), and it also was more preferable than maize (69.23%:30.77%). These results were emphasized by the triple-choice feeding test (table 3), as the preference of wheat, barley and maize could be arranged in descending order as follows: wheat (49.1%) followed by barley (26.45%) followed by maize (24.45%). These results may be attributed to the hardness or the texture of the food.

**Table (1): Daily food consumption by the roof rat, *R. rattus* in a no-choice feeding test.**

Consumed amount	Gp1			Gp2		
	Wheat	Barley	Maize	Peanut	Date	Squash
g/rat/day	10.22 ± 2.61	11.32 ± 0.9	12.67 ± 1.34	7.01 ± 1.06	12.42 ± 1.41	34.97 ± 3.31
g/kg bw/day	77.16 ± 17.45	86.33 ± 4.53	96.06 ± 11.27	70.19 ± 18.75	88.74 ± 17.97	326.51 ± 55.6

± sd

T2

Concerning the second group, squash was the most consumed food (34.96%) during the no-choice feeding test (table 1). In the double-choice feeding test (table 2), squash was more preferable than peanut (61%:39%), and it was more preferable than date (56.92%:43.08%), also, peanut was more preferable than date (52.63%:47.37%) when they tested against each other. As to the second group in the triple-choice feeding test (table 3), squash was the most preferable food (77.5%) followed by peanut (13.32%) followed by date (9.18%).such results may be due to food water content or hardness.

Table (3) showed that wheat was tested vs peanut in double choice test (wheat represented the most preferable food from the first group, while peanut was selected from the second group as a preferable and applicable food), and the first was more preferable (65.96%:34.04%).

**Table (3): Daily food consumption and preference by the roof rat, *R. rattus* in a triple-choice feeding test.**

Consumed amount	Gp1				Gp2			
	Wheat	Barley	Maize	Total	Peanut	Date	Squash	Total
g/rat/day	6.34 ± 4.1	3.41 ± 1.74	3.15 ± 3.52	12.9 ± 3.49	2.79 ± 1.48	1.93 ± 1.15	16.25 ± 2.76	20.97 ± 6.92
g/kg bw/day	43.85 ± 27.94	23.61 ± 12.77	21.83 ± 24.71	89.29 ± 24.11	13.77 ± 7.8	19.98 ± 11.36	116.24 ± 19.89	150 ± 49.62
Preference (%)	49.1	26.45	24.45	100	13.32	9.18	77.5	100

±sd

The present study recommended that wheat is the most appropriate food to the rodenticidal baiting in crop fields against *R. rattus* rats.

These results are similar to those obtained by Ansari *et al.* (2005), they stated that wheat grains were more preferred for consumption compared to maize and barley grains.

## REFERENCES

- Ansari, S. A.; M. A. Rustamani; A. W. Kakar; A. A. Khooharo; Dars Fozia; H. B. Baloch; (2005) Grain losses caused by house rat *Rattus rattus* L. and its control. *Pakistan Journal of Zoology*, 37 (1) 33-38
- Arafa, M. S.; N. T. Naser; A. M. Salit and M. S. Khalil (1975). A comparative study of slow and quick-acting rodenticides in a confined area in Egypt. *International pest control*. p. 17 – 18.
- Asran, A.A. (1993) Bait preference and palatability of the house mouse, *Mus musculus* L. under laboratory conditions. *Egyptian Journal of Agricultural Research* 71(4): 907–913.
- Barnett, S.A.; M.M. Spencer (1953) Experiments on the food preferences of wild rats (*Rattus norvegicus* Berkenhout). *Journal of Hygiene, Cambridge* 51: 16–34.
- Bhardwaj, D.; J.A. Khan (1979) Effect of texture of food on bait-shy behaviour in wild rats (*Rattus rattus*) I. *Applied Animal Ethology* 5: 361–367.

- Brooks, J.E.; A.M. Bowerman (1973) Preferences of wild Norway rats for grains, seeds and legumes. Pest Control 41: 13–39.
- Clark, D.A. (1982) Foraging behavior of a vertebrate omnivore (*Rattus rattus*): meal structure, sampling, and diet breadth. Ecology 63: 763–772.
- El-Deeb, H. I., A. A. Asran; G. Kuehnert; and M. A. El Halfawy (1985) Bait preference and bait consumption of the Nile rat. *Arvicanthis niloticus*. Zagazig. Jour. Agric. Res. 12(1): 545 – 552.
- Harrison, J.L. and H.C. Woodville (1950) Notes on the feeding habits of house-rats in Rangoon, Burma. Annals of Applied Biology 37: 296–304.
- Meehan, A.P. (1984) Rats and mice: their biology and control. Rentokil, East Grinstead, Sussex, UK.
- Omar, M. T. (1977). Studies of rodents attacking stores and food staff factories in Cairo. Ph. D. Thesis, Fac. Agric., Al-Azhar Univ. pp. 150.
- Rowe, F.P. (1973) Aspects of mouse behaviour related to control. Mammal Review 3: 58–63.
- Yabe, T. 1979: The relation of food habits to the ecological distributions of the Norway rat (*Rattus norvegicus*) and the roof rat (*R. rattus*). Japanese Journal of Ecology 29: 235.
- Youssef, H. M.: M. (1986) Comparative studies on the rodents control. M. Sc. Thesis Fac. Agric. Alex. Univ. pp. 127.

### معدل استهلاك الطعام لفأر الأسطح (*Rattus rattus* Linnaeus) والأطعمة المفضلة له.

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أجريت دراسة معملية بغرض تقدير المعدل اليومي Daily food consumption لاستهلاك فأر الأسطح *Rattus rattus* لمجموعتين من الأطعمة، وكذلك مدى تفضيله لكل منها. ضمت المجموعة الأولى: القمح والشعير والذرة، وضمت المجموعة الثانية: الفول السوداني والبلح والكوسة، وتلخصت نتائج الدراسة فيما يلي:

- 1- عند تقديم الأطعمة بصورة منفردة (no-choice feeding test) كان المعدل اليومي لاستهلاك فأر الأسطح لكل من القمح والشعير والذرة والفول السوداني والبلح والكوسة على الترتيب هو ٧٧,١٦ , ٨٦,٣٣ , ٩٦,٠٦ , ٧٠,١٩ , ٨٨,٧٤ , ٣٢٦,٥١ جم/كجم من وزن الجسم/يوم.
- 2- عند تقديم الأطعمة في صورة أزواج (double-choice feeding test), جاءت نسبة تفضيل القمح: الشعير ٦٥%:٣٥%، والشعير: الذرة ٤٧%:٦٠%:٣٩,٥٣%، وتفضيل الذرة: القمح ٣٠,٧٧%:٦٩,٢٣% وذلك بالنسبة لأطعمة المجموعة الأولى. بينما في أطعمة المجموعة الثانية جاءت نسبة تفضيل الكوسة: الفول السوداني ٦١%:٣٩%، والفول السوداني: البلح ٥٢,٦٣%:٤٧,٣٧% والبلح: الكوسة ٤٣,٠٨%:٥٦,٩٢%.
- 3- في حالة التقديم الثلاثي (triple-choice feeding test), كانت نسبة تفضيل القمح: الشعير: الذرة ٤٩,١١%:٢٦,٤٥%:٢٤,٤٥%، وبينما كانت نسبة تفضيل الكوسة: الفول السوداني: البلح ٧٧,٥%:١٣,٣٢%:٩,١٨%.
- 4- كان القمح أكثر أطعمة المجموعة الأولى تفضيلاً وكان الفول السوداني انسب أطعمة المجموعة الثانية لتطبيق الطعوم السامة، عند تقديمها معا جاءت نسبة تفضيل الأول: الثاني ٦٥,٩٦%:٣٤,٠٤%.

**Table (2): Daily food consumption and preference by the roof rat, *R. rattus* in a double-choice test.**

<b>Gp1</b>	<b>Wheat (W) vs barley (B)</b>			<b>Barley (B) vs maize (M)</b>			<b>Maize (M) vs wheat (W)</b>		
<b>Consumed amount</b>	<b>W</b>	<b>B</b>	<b>Total</b>	<b>B</b>	<b>M</b>	<b>Total</b>	<b>M</b>	<b>W</b>	<b>Total</b>
g/rat/day	9.43 ± 0.98	5.08 ± 1.5	14.5 ± 1.68	8.14 ± 3.63	5.32 ± 4.49	13.45 ± 2.09	3.38 ± 1.16	7.6 ± 2.21	10.98 ± 2.03
g/kg bw/day	60.09 ± 16.75	32.35 ± 8.57	92.44 ± 21.58	53.94 ± 27.29	35.25 ± 25.59	89.19 ± 17.26	21.86 ± 7.81	49.17 ± 14.8	71.03 ± 13.43
Preference(%)	65	35	100	60.47	39.53	100	30.77	69.23	100
<b>Gp2</b>	<b>Peanut (P) vs date (D)</b>			<b>Date (D) vs squash (S)</b>			<b>Squash (S) vs peanut (P)</b>		
<b>Consumed amount</b>	<b>P</b>	<b>D</b>	<b>Total</b>	<b>D</b>	<b>S</b>	<b>Total</b>	<b>S</b>	<b>P</b>	<b>Total</b>
g/rat/day	5.64 ± 0.72	5.07 ± 0.85	10.71 ± 0.96	12.12 ± 1.87	16.02 ± 4.24	28.14 ± 3.57	9.62 ± 3.9	6.15 ± 0.57	15.77 ± 4.09
g/kg bw/day	42.49 ± 9.6	38.24 ± 7.02	80.74 ± 14.27	90.67 ± 15.76	119.8 ± 36.11	210.46 ± 33.59	66.21 ± 27.98	42.34 ± 4.53	108.55 ± 29.89
Preference(%)	52.63	47.37	100	43.08	56.92	100	39	61	100
<b>Gp*</b>	<b>Wheat vs peanut</b>								
<b>Consumed Amount</b>	<b>W</b>	<b>P</b>	<b>total</b>						
g/rat/day	7.85 ± 0.73	4.05 ± 1.43	11.9 ± 1.5						
g/kg bw/day	58.74 ± 9.83	30.32 ± 11.7	89.05 ± 16.66						
Preference(%)	65.96	34.04	100						

\* Wheat represents the most preferable food from gp1 while peanut was selected from gp2 as a preferable and applicable food  
± sd