Estimating the Economic Losses Caused by the Climbing Rat *Rattus rattus frugivorous* in the Poultry Production Farm

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ABSTRACT

Poultry feed losses caused by the white-bellied climbing rat, *Rattus rattus frugivorous,* were estimated in a poultry farm in northwest Cairo, Egypt. The results showed that the rats feed consumption in the hen's production hangars was 16.446, 15.694, 7.632 and 3.395 kg in hangars A, B, C and D for three days, respectively. The amounts of poultry feed monthly lost that caused by climbing rats in the poultry farm were equal to 164.46, 156.94, 76.32 and 33.95 kg, for hangars A, B, C, and D respectively. These amounts of feed coasted about 1151.22, 1098.58, 534.24 and 237.65 Egyptian pounds (LE)/month for hangars A, B, C, and D respectively from the feed offered to the layer chickens.

Keywords: Rodents; losses; feed; damage.

INTRODUCTION

Rodents are the most abundant and diversified order of living mammals in the world. Since the Middle Ages, it has been known that rodents contribute to human disease, as black rats are associated with the transmission of plague. It is well known that more than 24 different infectious agents are directly or indirectly transmitted by rodents to humans Saber (2017), Moreno-Salas *et al.* (2019), Mohtasebi *et al.* (2020), Khalel (2021) and Mangombi *et al.* (2021).

Rodent population studies have played a major role in advancing the understanding of population dynamics. In order to know the benefits of control, a sound understanding of the relationship between the abundance of pest animals and the damage they cause is required. This relationship can then be used to assess Economic Injury Levels (EILs.) and to establish appropriate management goals Saber (2017), Tijjania *et al.* (2020) and Soafy (2021).

The main objective of this work was, to estimate the losses caused by the white-bellied climbing rats in one of the poultry production farms.

MATERIALS AND METHODS

This study was conducted at one of the poultry farms in North West Cairo, Egypt, in order to evaluate and estimate the feed damage and losses caused by rodents. This farm consisted of three locations and each location contained four hangars. Then 20 hanging bait stations were placed in each hangar at a distance of 10m between each other.

Daily feed consumption of the White-bellied climbing rat *R. rattus frugivorous* was recorded of the feed provided in the 20 suspended bait stations for three successive days at a constant level per day of 700 gm from poultry feed, which is equivalent to providing 14 kg feed/ hangar /day. The remaining poultry feed in each suspended bait station was re-weighed, then completed to 700 gm daily during the experimental time. The percentage of feed damage and amount of losses were calculated as described by Buckle (1994).

RESULTS AND DISCUSSION

The results in Table (1) indicated that the estimated losses of poultry feed caused by the White-bellied climbing rat *R. rattus frugivorous* in the poultry farm. The results showed that the rats feed consumption in the hen's production hangars was 16.446, 15.694, 7.632, and 3.395 kg in hangars A, B, C and D during three days, respectively. The results also displayed that the change in rat's daily feed consumption was 7.138, 5.830 and 3.478 kg in the hangar (A) during days 1, 2, and 3 respectively. While the daily feed consumption change in the hangar (B) was 5.560, 5.560 and 4.574 kg through three days (day 1, 2 and 3), respectively. Whereas the feed consumption of the rats in the hangar (C) was 9.09, 4.323 and 2.400 kg over three days, respectively. Furthermore, the daily feed intake for the rats in hangar D was 0.511, 0.958 and 1.921 respectively through the three days.

These results clearly indicated that the rats feed consumption was higher in hangars A, B, and C compared to hangar D. This may be due to that hangars A, B and C were older than the hangar D which could these hangars have default points in their structure which facilitated the rats to go easily inside these hangars and caused loses or damage of poultry feed by building nests and breeding in large numbers more than hangar D.

The results in Table (2) offered the lowest and highest values of daily consumption during three days in the hangar, A, B, C, and D. The lowest and highest values of daily feed intake in the hangar (A) were 130 and 658 gm on day1, 132 and 420 gm on day 2 and 83 and 315 gm on day3 respectively, while in the hangar (B) were 4 and 680 gm on day1, 92 and 345 gm on day 2, and 78 and 365 gm on day3, respectively. However, in the hangar (C) the daily feed intake by the rats was 30 and 210 gm on day1, 48 and 275 gm on day 2, and 48 and 240 gm on day3, respectively, and were 23 and 83 gm on day1, 27 and 104 gm on day2, and 48 and 142 gm on day3, respectively in the hangar (D).

These results proved that the amounts of poultry feed monthly lost that caused by climbing rat *R. rattus frugivorous* in the poultry farm were equal to 164.46, 156.94, 76.32 and 33.95 kg feed, for hangars A, B, C, and D respectively. These amounts of feed coasted the farm owner about 1151.22, 1098.58, 534.24 and 237.65 Egyptian pounds (LE)/month for hangars A, B, C, and D respectively from the feed offered to the layer chickens in this farm (Table 1).

Finally, the actual values of the losses caused by rats vary by crop, variety, year, geographical location, pest species involved, length and method of storage and climate (Gratz, 1990).

These results are partially agree with Belmain and Shafali (2008) found that about 5-10% of stored grain was lost to rodents over each 3-month storage period (each household losing ˜200kg/year). Also WFP, (2009) reported that maize harvest was also severely damaged with about 43% of households reporting yields of less than 50% of expected production. These losses are a major livelihood shock for rural households who rely on their own production as a source of food and income.

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Table 1: Daily feed intake by climbing rat *R. rattus frugivorous* (gm) in poultry production hangars during three consecutive days.

Hangar (A)					Hangar (B)					Hangar (C)					Hangar (D)				
Hanging bait stations	1st day	2nd day	3rd day	Total	Hanging bait stations	1st day	2nd day	3rd day	Total	Hanging bait stations	1st day	2nd day	3rd day	Total	Hanging bait stations	1st day	2nd day	3rd day	Total
1	280	403	230	913	1	0	97	172	269	1	0	43	131	174	1	50	0	48	98
2	263	320	243	826	2	210	278	263	751	2	0	104	104	208	2	48	73	112	233
3	658	132	113	903	3	270	193	240	703	3	42	127	92	261	3	30	45	76	151
4	398	210	195	803	4	215	164	193	572	4	210	275	197	682	4	0	0	63	63
5	511	280	83	874	5	290	243	268	801	5	100	93	114	307	5	0	53	118	171
6	378	420	140	938	6	315	277	194	786	6	45	123	240	408	6	0	0	75	75
7	512	271	92	875	7	470	192	213	875	7	36	97	165	298	7	72	63	46	181
8	365	294	310	969	8	248	253	145	646	8	98	53	93	244	8	0	48	98	146
9	242	347	248	837	9	317	279	365	961	9	60	142	82	284	9	0	29	125	154
10	318	415	102	835	10	228	345	293	866	10	42	57	174	273	10	0	0	97	97
11	203	275	315	793	11	297	182	337	816	11	0	92	72	164	11	35	97	108	240
12	540	310	85	935	12	680	274	95	1049	12	0	73	123	196	12	83	85	34	202
13	228	385	245	858	13	477	148	271	896	13	0	98	146	244	13	46	104	190	340
14	430	391	186	1007	14	130	269	341	740	14	27	109	95	231	14	0	27	100	127
15	372	366	153	891	15	215	260	315	790	15	65	78	153	296	15	23	45	142	210
16	280	235	163	678	16	530	308	78	916	16	98	137	146	381	16	0	52	66	118
17	501	367	94	962	17	511	174	191	876	17	56	0	47	103	17	47	97	75	219
18	349	214	178	741	18	97	182	234	513	18	0	48	115	163	18	0	62	113	175
19	180	0	210	390	19	56	113	196	365	19	0	118	63	181	19	32	0	142	174
20	130	195	93	418	20	4	92	170	266	20	30	92	48	170	20	45	78	93	216
total	7138	5830	3478	16446[a]	total	5560	5560	4574	15694[b]	total	909	4323	2400	7632[c]	total	511	958	1921	3390[cd]
Feed cost/LE	142.760	116.600	69.560	328920		111.200	111.200	91.480	313.880		18.180	86.460	48.000	152.640		10.220	19.160	38.420	67.800

Table 2: Total daily feed intake (FI), minimum and maximum feed intake in A, B, C and D hangars and percentage of feed lost by climbing rat *R. rattus frugivorous*.

minimum and maximum feed intake from poultry feed in each hanger										% total feed losses			feed intake from poultry feed in each hanger		
Hangars	Total FI in 1st day	Min.	Max.	Total FI in 2nd day	Min.	Max.	Total FI in 3rd day	Min.	Max.	1st day	2nd day	3rd day	Mean ± Stander. Error	Min.	Max.
A	7138	130	658	5830a	132	420	3478	83	315	51	42	25	822.30± 36.52	83	658
B	5560	4	680	5560b	92	345	4574	78	365	39.7	40	33	722.85±49.67	4	680
C	909	30	210	4323c	48	275	2400	48	240	6.49	31	17	263.40±27.78	30	275
D	511	23	83	958cd	27	104	1921	48	142	3.65	6.8	14	169.50±14.67	23	142

تقدير الخسائر الاقتصادية الناجمة عن الجرذ المتسلق ذو البطن البيضاء في أحد مزارع إنتاج الدواجن

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الملخص العربي

أجريت هذه الدراسة في إحدى مزارع الإنتاج الداجني في منطقة شمال غرب القاهرة بجمهورية مصر العربية، وذلك بغرض تقييم وتقدير الأضرار والخسائر الإقتصادية التي يسببها الجرذ المتسلق بتغذيته على الأعلاف المقدمة لتلك الطيور. تتكون هذه المزرعة من ثلاثة مواقع ويحتوي كل موقع على أربع عنابر. تم وضع 20 محطة طُعم معلق في كل حظيرة على مسافة 10 أمتار بين بعضها البعض. تم تسجيل الاستهلاك اليومي للجرذ المتسلق أبيض البطن *Rattus rattus frugivorous* من علف الدواجن المقدم في 20 محطة طعوم معلقة المسافة بين كل محطة 10 أمتار لمدة ثلاثة أيام متتالية عند مستوي يومي للعلف ثابت 700جم/محطة/يوم بما يعادل 14كجم/عنبر/ يوم. أوضحت النتائج أن استهلاك الجرذان من العلف خلال ثلاثة أيام في عنابر أ – ب - جـ - ود كانت 16.446-15.694-7.632-3.395 كجم على التوالي. كما أظهرت النتائج أن تكلفة الخسائر كانت 237.65-534.24-1098.58-1151.22 جنية مصري/شهر في عنابر أ ، ب ، جـ ، دعلي التوالي. ويعزي ارتفاع الخسارة في العنابر أ- ب - ج لقدم تربية الدواجن بها مما سهل للجرذان التوطن وبناء العشوش والتكاثر بأعداد كبيرة.

الكلمات الاسترشادية: القوارض, الخسائر, الضرر, التغذية.