

CHEMICAL CONTROL OF RODENTS IN ANIMAL FARMS (IZZAB) IN QATAR STATE

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Received : 25.01.18; **Accepted** : 22.03.18**ABSTRACT**

The aim of this study is to develop a control program for rodents in animal farms (Izzab) in Qatar. The preliminary baseline survey for rodent-infested Izzab revealed that 1506 Izzab out of 1814 was infested (83%). The overall percentage reduction in the rodent-infested Izzab after 6 months of the control programme was 77%. Towards the end of the control programme, a special strategy was adopted to control rodents in 327 Izzab in which rodents' activity was still observed. A 75% reduction was attained in these Izzab at the end of the control programme. The overall reduction in the infested Izzab was 94% at the end of the control programme.

The most predominant rodent species found in Izzab is the Norway rat *Rattus norvegicus*, making burrows inside and outside Izzab buildings. Fewer incidences were noted for the House mouse *Mus musculus* associated with Izzab buildings.

It is recommended that bait consumption and rodents' activity are to be monitored regularly so as to locate the farms that are still having problems and to detect any new foci or outbreaks. Implementing of Integrated Pest Management (IPM) technique is also highly recommended.

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KEY WORDS : Infection, Qatar, Rodents

Introduction**Rodents are exceptionally successful and widely distributed in urban and rural areas in Qatar.**

Maintaining animal farms (Izzab) is a popular activity encouraged by Qatar government. Many of these farms are grouped together to form a complex. This farming activity created a very attractive environment for rodents because of the continuous availability of food, water, shelter and less disturbance as compared to urban environment.

Accordingly, these farms are heavily infested by rodents. Such a situation, if left unchecked, can cause considerable economic loss and health hazard to animals and man.

Rats and mice play a significant role in public health, chiefly due to their role as carriers or reservoirs for microorganisms associated with infections and diseases that can be transmitted to humans. These diseases include plague, salmonellosis, leptospirosis, murine typhus, rickettsial pox, lymphocytic choriomeningitis, rat-bite fever, hanta virus haemorrhagic pulmonary syndrome, haemorrhagic fever, Venezuelan equine encephalitis (*Alphavirus*), powassan encephalitis (*Flavivirus*), rabies, Rocky Mountain spotted fever and tularemia as well as parasitism such as trichinosis, eosinophilic meningitis, taeniasis, cryptosporidia¹² and *Trypanosoma lewisi*⁹. Transmission of these infections to humans occur by indirect contact. Some are transmitted through contact with infected rodent urine or faeces, others through fleas and lice, and still others

through mosquito bites¹¹. Rural wild brown rats on farm serve as vectors of zoonotic and many other diseases and may represent a serious risk to the health of human and domestic animals³. Rats are found to be infected with a number of zoonotic parasites including *cryptosporidium*, *pasturella*, *listeria*, *yersinia* and Hantavirus, and represent a potential risk to the health of humans and domestic animals.

Salmonella in faecal pellets of wild brown rats (*Rattus norvegicus*) in the west Midlands is sufficient to present a potential risk to public health⁶.

The brown rats (*Rattus norvegicus*) from Doha, Qatar have been reported to be infested by *Hymenolopis diminuta*¹.

The ministry of Municipality and Urban Planning (MMUP) knowing the consequences of such problem organized a regular rodent control programme in these farms.

Since basic studies on rodent in Qatar State are still lacking and to date, no any study on the control measures against rodents have been published. This study was conducted with the aim of developing some rodent control strategies including the use of anticoagulants in a form of grains, wax blocks and tracking powder.

Methods**Baseline survey for rat infestation in Izzab:**

There are 8 Izzab complexes in Qatar State (Shahaniyah, Alkhoraib, Abunakhlaha, Aljomulaha,



Fig. 1 : One of the animal farms



Fig. 2 : A wooden box bait station in a farm

TABLE-1: Percentages reduction in rat-infested Izzab after six months of rodent control (June – December 2009)

Municipality	Area	Total number of Izzab	Total infested Izzab at June 2009	Total infested Izzab at Dec. 2009	% Reduction
Rayyan	Shahaniyah	184	153	68	56%
	Alkhoraib	382	317	60	81%
	Abunakhlaha	351	291	34	84%
	Aljomuliaha	44	37	12	68%
Alkhor & Zakherra	Umselal	231	192	31	84%
	Semaismaha	323	268	66	75%
Alwakaraha	Alwakaraha	269	223	68	70%
Alshamal	Alshamal	30	25	10	60%
Total	-	1814	1506	349	77%

Umselal, Semaismaha, Alwakaraha, and Alshamal) distributed through 4 municipalities (Al-Rayyan, Alkhor & Zakherra, Alwakaraha, and Alshamal) with total of 1814 Izzab (Table 1).

Before the starting of control programme, a through baseline survey was conducted in May 2009 in all Izzab to determine the number of rat- infested Izzab.

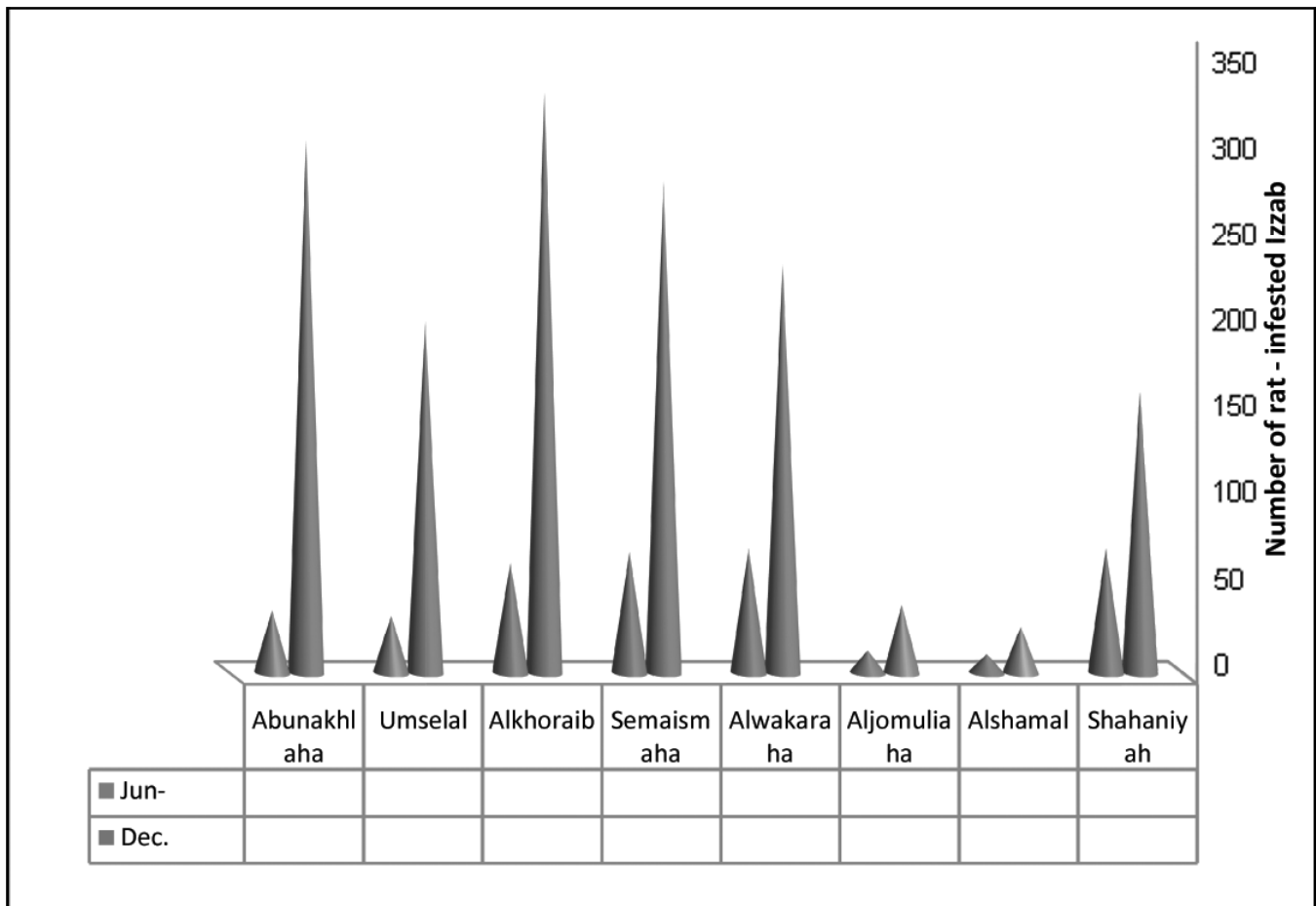


Fig. 3 : Reduction in number of rat - infested Izzab after 6 months of rodent control (June - Dec. 2009)

TABLE- 2: The percentage reduction in the number of rat- infested Izzab after 5 months of Rodenticides treatment (January – May 2010)

Izab Complex Name	Number of infested (Izabs) before Treatment (Dec. 2009)	1st Treatment (Jan. 2010)	% Red	2nd Treatment (Feb. 2010)	% Red	3rd Treatment (March 2010)	% Red	4th Treatment (April 2010)	% Red	5th Treatment (May 2010)	% Red
Wakara	68	55	19%	40	41%	26	59%	23	66%	18	74%
Shahanyia	68	54	21%	38	44%	27	60%	24	65%	21	69%
Abunakhla	34	15	56%	12	65%	9	74%	10	71%	9	74%
Alkhuraib	60	33	45%	29	52%	19	60%	15	75%	15	75%
Semsemah	66	45	32%	26	61%	24	64%	21	68%	16	76%
Umselal	31	14	55%	11	65%	7	77%	4	87%	4	87%
TOTAL	327	216	34%	156	52%	112	66%	97	70%	83	75%

Procedure:

Every Izzba was provided with 6 wooden box bait stations (55cm x 35cm x15 cm) which contain pure barley

seeds as bait for rats and left for 72 hours for bait uptake. Then, a thorough inspection for rat signs of infestation was performed at every Izzba. Those rat signs of infestation

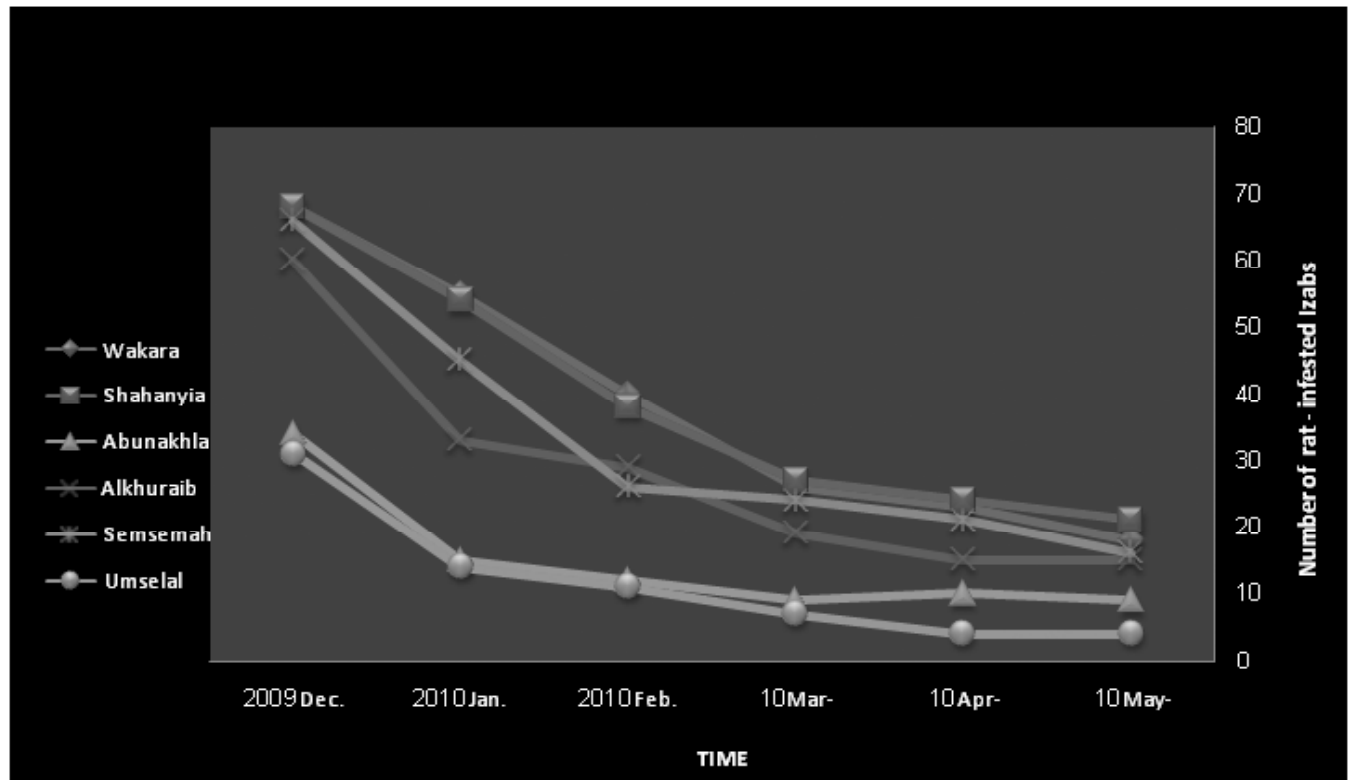


Fig. 4 : The effect of Rodenticides application for 5 months on rat - infested Izzab in Qatar State (Jan. - May 2010)

TABLE-3: Percentages reduction in rat-infested Izzab after eleven months of rodent control (June 2009 - May 2010)

Municipality	Area	Total number of Izzab	Total infested Izzab at June 2009	Total infested Izzab at Dec. 2009	% Reduction
Rayyan	Shahaniyah	184	153	21	86%
	Alkhoraib	382	317	15	95%
	Abunakhlaha	351	291	9	97%
Alkhor & Zakherra	Umselal	231	192	4	98%
	Semaismaha	323	268	16	94%
Alwakaraha	Alwakaraha	269	223	18	92%
Total	-	1740	1444	83	94%

are: presence of active rat burrows, rat droppings, rat footprints, rat sighting, and rat – bait consumption. The presence of any of those signs in any Izzba has rated it as a rat - infested. Results are shown on Table (1).

Control methods:

Study area and duration

The study was carried out in all the 8 Izzab in Qatar state from May 2009 to May 2010 .Izzab were similar in area.

Wooden bait stations:

A wooden boxes .Bait was placed in the centre of the bait station.

Bait stations placement:

Six wooden bait stations, each with 100 grams of

the grains treated with an anticoagulant were placed at every rat- infested Izzba in locations where rat infestation were highly observed, e.g. inside grains store, near to active burrows, near to water sources, along rat pathways and any other convenient locations.

Phase one (June to December 2009):

The 1506 rat-infested Izzab (as indicated by the baseline survey, Table 1) were provided by 6 wooden box bait stations each. A total of 10,884 bait stations were placed in locations as previously mentioned. 100 grams was placed in the centre of each bait station. The chemical used was Rodmour (Grains), manufactured by (I.N.D.I.A.) company, Italy with active ingredient being Difencoum. The baits were checked regularly for replacing new ones, if consumed, or changing if noticed to

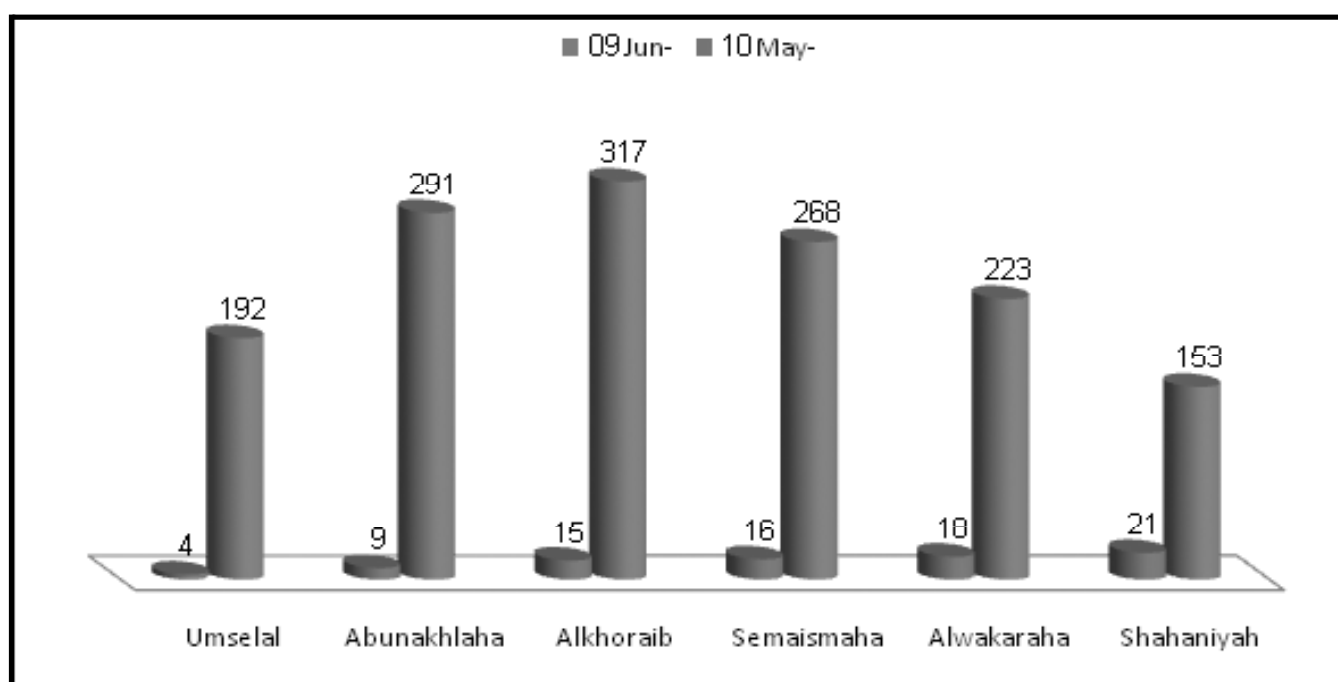


Fig. 5 : Reduction in number of rat- infested Izzab after 11 months of rodent control (June 2009 - May 2010)



Fig. 6 : Norway rat *Rattus norvegicus*

contaminate with dust and other environmental conditions.

Phase two (January to May 2010):

At the end of phase one, it was noticed that about 327 Izzab were still having some degrees of rat infestation. It was also noticed that although, baited with fresh baits, yet the bait consumption was very weak despite the fact that many signs of rat infestations have been clearly observed.

Thus, it was decided that more bait stations should be added to those Izzab (2 to 4 at each Izzba according to the degree of infestation), introducing the bait in formulation other than grains (Wax blocks) , manufactured by Frunol Delicia GmbH, Germany, with active ingredient being Brodifacoum 0.005 %. Results are presented in Table (1) and Fig (1).

Results

The preliminary baseline survey for rodent- infested Izzab revealed that 1506 Izzab out of 1814 were infested (83 %) Table (1).

The percentage reduction in the rodent-infested Izzab after 6 months of the control programme (June to December 2009) was 77% (Table 1 and Fig1).

A 75% reduction was attained in these Izzab at the end of the phase one, when a special strategy was adopted to control rodent for another 5 months in 327 Izzab in which rodents activity was still observed (January to May 2010), Table (2) and Fig (2).

Overall reduction in the infested Izzab after 11 months was 94% at the end of the control programme (June 2009 to May 2010), Table (3) and Fig (3).

The most predominant rodent species in Izzab is Norway rat *Rattus norvegicus* making burrows inside Izzab and outside Izzab buildings (Fig.4). Fewer incidences were noticed for the House mouse *Mus musculus* associated with Izzab building (Fig.5).

Discussion

Rats and mice mostly live in animal farms and house sewerage pathways from where they can pick *E. coli* by eating contaminated feed, drinking water, wastes through poultry and cattle excreta and also from infected herbage. *E. coli* remained the most important bacteria that can be transmitted by rats and mice between different farms and buildings¹⁴.

It was revealed that *R. rattus* and *Mus musculus* might pose a potential risk in the zoonosis of *colibacillosis*, *salmonellosis* and infestation of *Hymenolepis nana*¹⁴.

Rodents in animal farms and agro-ecological surroundings can be infected with Salmonella and Campylobacter and transfer these pathogens to food animals or amplify the number of bacteria in the farm environment. A resident infected rodent population could lead to continuously returning infections in the animal farm environment¹⁰.

The results in Table (1) and Fig. (1) indicated that the reduction in the number of infested Izzab was significant. 77% reduction was achieved after 6 months baiting (June to December 2009). The fact that livestock farms usually provide abundant shelter for rodents to hide and rest in and they contain animal feed and water which are accessible to rodents makes rodent control a very difficult task. Therefore, the 77% reduction in infested farms is a satisfactory result in a situation where rat proofing is not available. Rat proofing in farm structures is the most effective means of rodent control in animal farms¹³. Rodent proofing is not possible and cannot be economically justified so rodents are to be kept at low levels through the use of other techniques include rodenticides bait stations². A worker⁷ also recommended the use of permanent bait stations in animal farms to control rodents. It was stated that for effective long-lasting management of pests in poultry farms the optimal strategy include efficient use of rodenticides (*i.e.* regular timing), knowledge of the habitat and distribution of the rodent species and regular control of the vegetation at the



Fig. 7 : House mouse *Mus musculus*

border⁵. He also suggested the continuous use of rodenticides throughout the season a method which has been more or less followed in this study.

A 75% reduction was obtained in farms in which rodents were still active after December 2009 through the adoption of alternative strategy (Table 2 & Fig 2). The reduction in the number of infested farms at this stage could be attributed to the increase in the number of baiting stations in these farms. The use of many baiting points is a technique developed⁴ and increasing the number of baiting points will optimize the possibility of rodents to locate and consume the bait. It will also guarantee that all the individuals in the rodent population will have a chance to consume the bait while in the case of using fewer baiting points the dominant individuals may monopolize the few baiting stations available. Another factor which may be contributed to the control of rodents at this stage is the use of the alternative formulation (wax blocks) after observing the low level of bait (grains) uptake by rodents. It was observed that the bait uptake was improved after applying wax blocks. Factors that determine

the uptake of rodenticides bait by rodents were summarized⁸ as follows: (1) fear of new objects (neophobia) (2) population structure of the target rodent population (3) bait palatability (4) habitat structure.

Conclusion

Izzab complexes are different from economically productive farms so they lack the attention, sanitation and proofing usually found in proper animal farms. This makes the habitat more attractive to rodents and makes their control very difficult. This study and other studies demonstrated that in this type of habitat the use of rodenticides bait stations through the season is an effective method.

It is recommended that bait consumption and rodents activity is to be monitored regularly so as to locate the farms that are still having problems and to detect any new foci or outbreaks.

Alternative bait formulations and using many baiting points are recommended in these farms.

Implementing of Integrated Pest Management (IPM) technique is also highly recommended.

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