

Rodent Problems in Markets

Introduction

Improper handling of food debris, accumulation of articles, improper storage of goods and structural defects such as cracks and holes contribute to rodent problems in market buildings. Besides, structures such as false ceilings also provide good harbourages for rodents, particularly in areas where food are handily available.

Rodent Prevention and Control Measures

2. Generally, rodent control measures can be classified into fundamental measures and supplementary measures. Fundamental measures include elimination of food and harbourage, rodent-proofing and rodent prevention while supplementary measures include trapping and poisonous baiting.

A. Fundamental Measures

Food and Harbourage

3. Whenever the problem of domestic (commensal) rats or mice is considered, it should always be remembered that 'Prevention is better than Cure'. If the general standard of environmental sanitation is maintained at a high level and rodent harbourage is either eliminated or kept to a minimum, such will always prove the greatest value in preventing infestation. Particular attention should be paid to the storage and disposal of anything which could be taken by rodents as food. Rodents are omnivorous and will consume any substance as their food that could be in the form of food for human consumption and food residues. Food for human consumption should be kept in metal or glass containers, with well-fitted covers; grains and other food should be stored in rodent-proof stores or godowns, etc. Correct disposal of all putrescible waste (garbage) is of the greatest importance, and far too frequently such refuse is left lying about or is not deposited in metal or plastic dust-bins or receptacles with well-fitted covers.

4. In many premises, particularly markets, there are numerous harbourages to support infestation and it is frequently found that at least some, if not all, of these harbourages can be eliminated. Rodents build their harbourages at concealed areas of buildings, voids between structures, space/area unattended by humans for a considerable period of time, etc.

5. Constant attention should be given to the above two factors, namely food and harbourages which are the most important in the prevention of rodent infestations. Sealing/filling up any space that could be accessed by rodents and tidying up all areas of premises would eliminate harbourages for rodents whereas proper storage and disposal of putrescible waste would help eliminate food sources for rodents.

Rodent-proofing

6. Rodent-proofing of buildings, or parts of buildings, is another important method of prevention which should be applied whenever it is possible and practicable to do so. This is particularly important for places where quantities of food are kept.

7. There are many ways by which rats and mice may enter buildings, and a very thorough search is necessary to locate all possible means of entry. Rat-holes and other small openings can be blocked by filling or covering them with appropriate materials (e.g. fine concrete, cement mortar, 20 gauge metal sheet or barbed wire balls etc.). Broken or missing gratings should be replaced. Ventilation grids and other similar openings may be proofed externally either with 24-gauge expanded metal with 6 mm (1/4 in.) mesh, or with galvanized steel woven wire cloth of 22 S.W.G. with about seven meshes to the inch (25.4 mm); these materials will exclude both rats and mice. Space beneath doorways resulted from worn steps should be repaired or renewed. Wooden doors may have to be protected at the bottom by fitting a 20-gauge metal 'kicking-plate' of at least 300 mm high on the outside. This should have a maximum clearance of 6 mm (1/4 in). A similar plate should be fixed to the door frames to form a continuous band of metal.

Rodent Proofing Principles

8. A few examples to demonstrate the fundamental principles to be applied for the prevention of rodent infestation are listed below:

- (a) Openings and passing for pipes, wires, and ducts through walls should be completely sealed, etc.
- (b) Voids or 'dead' spaces are sometimes inevitable and in some parts of a building (e.g. the space above a suspended ceiling) may in fact have been designed as a void with the intention of using it for plumbing, electrical conduits, or air-conditioning ducts. Nevertheless, these voids should be made inaccessible to vermin and the materials and decorative finishes used

should be resistant to gnawing by rodents. There should be no voids between the sides, backs, or bottoms of built-in furniture and the adjacent walls or floors. There should be no voids greater than 6 mm (1/4in) wide behind wooden skirting. Voids caused by fixing battens behind panel should be kept to a minimum and the voids made inaccessible to vermin; the materials used should be resistant to gnawing.

- (c) Places such as food-preparation areas, and food stores should NOT have false ceilings. However much one dislikes the appearance of the mass of piping which must often be left exposed if there is no false ceilings, it is important to remember that the warmth of a food-preparation area and scent of food will attract rats, and that a false ceiling provides an ideal harbourage and nesting place for rats. A real case of infestation due to this specific cause, and which proved most difficult to eradicate, was found in the food-preparation area of a local building not more than four years old. These rooms should therefore leave no access, even the very small one, to rodent.
- (d) Vertical pipes may be used by rats to reach entry points or harbourage places. A rat would find it difficult to climb (by wedging itself) between a pipe and a wall/vertical surface or between adjacent pipes, if the space between these structures is too big. Vertical pipes should, therefore, be spaced at least 100 mm apart, and be at least 100 mm from wall/vertical surface. Circular rat guard made of 20 gauge metal sheet and diameter of at least 550 mm should be deployed if necessary. The gap between the rat guard and the pipe should not be larger than 6 mm. The rat guard should be installed in height of at least 100 cm above ground or the nearest object that cannot be reached by rodent. Besides, there should be no shortcut or any other structure nearby letting the rodent by-pass the rat guard easily.

B. Supplementary Measures

Trapping

9. Trapping is one of the control methods for controlling of rodents. Traps are the preferred method of capturing rodents in situations where the use of rodenticides is considered undesirable, e.g. where poisoned rodents dying in inaccessible areas could cause unwanted odour problems or where rodents are specifically required for disease or other biological studies. Break-back traps are used to instantly kill rats and mice; to capture live rodents, wire cage traps/Multiple-catch traps are used. Wire cage

traps/Multiple-catch traps for rats and mice should be baited and set on the first day that they are laid. In general, wire cage traps found in the local markets are not designed for trapping mice. The size of the cage/multiple-catch traps must be smaller than 331 mm in length, 181 mm in width or 156 mm in height.

10. Only when countering heavy rodent infestation where other rodent control methods have been exhausted without satisfactory results, sticky traps/glue traps may be considered as a tool to supplement the rodent control programme. They should not be set outdoor or in areas with possible activities of other non-target animals, e.g. birds, cats and reptiles, etc. Consideration may be given to enclosing the sticky trap/glue trap in a lockable, temper-resistant rodent station or dedicated rodent sticky trap/glue trap tunnel for complete protection against non-target animals. Frequent inspections should be arranged to each sticky trap/glue trap laid and any trapped rodent shall be handled of immediately in a humane manner. The carcass should be properly handled as soon as possible. The use of sticky traps/glue traps should be suspended as soon as the situation of rodent infestation is alleviated. When sticky traps/glue traps are used, the frequency of inspection should be increased. Internationally recommended inspection interval range from hourly to every 12-hour. (added in June 2023)

11. Rats and mice feel safe by moving close to vertical surfaces such as wall, rather than across open areas. Break-back traps should therefore be placed at right angle to the vertical surface against which rodents are known or suspected to run. Traps should extend from a vertical surface at a right angle, with the trigger end nearly touching the vertical surface (Fig 1). If traps are set parallel to the vertical surface, set them in pairs, with the triggers situated to intercept rodents coming from either direction (Fig 2). When cage traps are used, they should also be placed similarly at right angles with the open of the trap facing the vertical surface. Whenever possible, setting rat cages firmly on ground. The position for traps should be carefully chosen, and traps should remain in the same position throughout each trapping period. **For best results, traps should be placed 2-3 m apart for mice and 3 to 5 m apart for rats.**



Fig 1 Method of laying break-back trap



Fig 2 Method of setting traps parallel to the vertical surface

12. If the captured non-target animal is or suspected to be injured, contact Society for the Prevention of Cruelty to Animals (SPCA) at their emergency hotline 2711 1000 for assistance. (added in June 2023)

13. A very common cause of unsuccessful trapping is the laying of insufficient number of traps. For the best results, a thorough survey is needed to ascertain the locations of rodent harbourages and movement. Based on the result of the survey, as many traps as possible and reasonably are to be laid. **It is suggested that at least six traps should be laid for one or two rodents.**

14. Rats are omnivorous, consuming a great variety of food but are very sensitive to the freshness of food. Fresh baits should be used as far as possible. Mixed baits, in a certain extent, can minimize the impacts of environmental factors, human practices or variations in rodent behavior on the efficiency of traps during the rodent trapping programmes. As food preference of rodents varies from time to time and place to place, it is necessary to find out the best combination of food baits for a particular location with rodent infestation. A combination of food baits could be selected from three or four different food baits to be placed inside the cage traps for the first few days of the trapping programme and be observed for their attractiveness to rodents (base on the trapping result). Once the more attractive food baits under such circumstances were found, the most and the second most attractive food baits could be used together for the subsequent trapping periods in that particular areas. However, the list of food baits preferred in a location does not guarantee similar attractiveness to rodents in another location. Trials on different food baits should be conducted in any trapping operation at individual location to find out the preferred combination of food baits. Based on previous field test results, bread with peanut butter, barbequed pork (char siu) and sweet corn could be good choices for rodent trapping. Other appropriate food baits could also be included whenever applicable.

15. With both rats and mice, it is better to carry out repeated trapping programmes with a large number of traps laid for a few days, rather than distributing scattered traps over a wide area for a longer period. For a single trapping programme, traps should be laid for at least five consecutive nights.

Poisonous Baiting

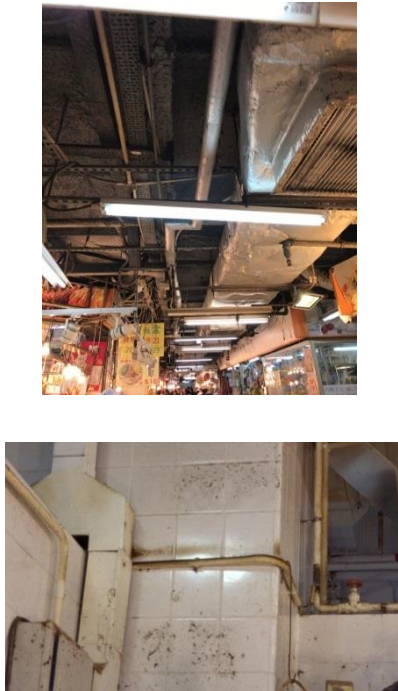
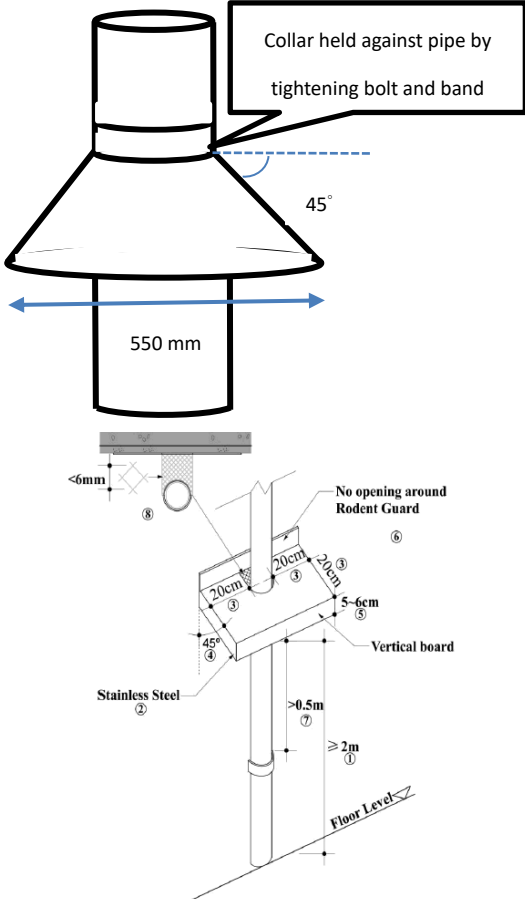
16. The most commonly used rodenticides are anti-coagulant but different kinds of rodenticides have different application methods. Information stated on the product label should be strictly followed to ensure effectiveness and safety. Generally speaking, there are two major kinds of anti-coagulants, the multiple-dose and single-dose.





17. Multiple-dose anticoagulants are effective against all species of local commensal rodents and it would not induce bait shyness of rodents. The master mix of rodenticide should be added to other bait base, such as rice, oil and sugar and the mixture should be mixed well.






18. Single-dose anti-coagulants are also cost-effective against all rodent pests. They are formulated into different ready-to-use form, such as pellets, wax blocks, etc. Generally speaking, pellets are more acceptable than wax block as the high wax content of the latter rendering it less palatable to rodents. The bait packs are to be evenly distributed in the target area according to the application rate as stated in the product labels. Bait pellets should be pushed into rat burrows, thrown into places not readily accessible to humans and domestic animals, placed in protected positions and other infested places such as junk accumulation points. It is not advisable to hang the poisoned bait over 10 cm above ground. It takes a few days for the bait to effect and most poisoned rodents will die within two weeks after baits were laid.

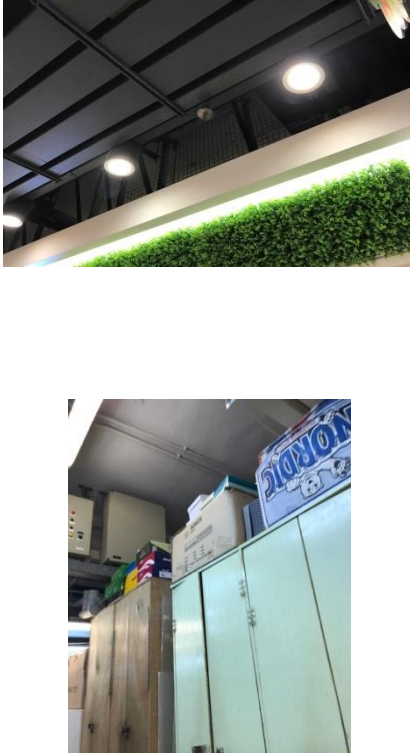

19. Anti-coagulants are also toxic to humans; they should be handled with great care. Adequate verbal and written warnings must be given to members of the public and local residents and relevant parties to avoid any accidental poisoning.



Problems Commonly Observed in Markets and Corresponding Measures

Item	Problems found	Possible improvement works
1	<p>Piping/ducting providing free runway for rodent at ceiling and between ceiling and floor areas.</p> 	<ul style="list-style-type: none"> ● Install rat guard with rodent proof material and size not smaller than 550mm, or extended for not less than 200mm from the vertical pipe leading to ceiling or on external wall of building  <ul style="list-style-type: none"> ● Wrap pipes/ducts with barbed wire at interval to discourage dispersal of rodents

Item	Problems found	Possible improvement works
2	<p>False ceilings provide rodents with concealed runway and harbourages.</p> 	<ul style="list-style-type: none"> ● Remove false ceilings in markets areas inside market complexes.
3	<p>Vertical pillar could facilitate rodent communication between ceiling and floor areas.</p> 	<ul style="list-style-type: none"> ● A clear zone of at least 1 m high should be maintained between the ceiling and the nearest articles surrounding the pillar. ● Rat guards should be installed on pipes/ducts.
4	<p>Rodent could access through door gap greater than 6 mm.</p> 	<p>Install 20 gauge metal kicking plate of 30 cm high from the bottom and fit to the ground leaving the door gap not greater than 6mm.</p> 

Item	Problems found	Possible improvement works
5	<p>Easy access of rodents through louvers on doors of refuse collection rooms, store rooms, service rooms, etc.</p> 	<ul style="list-style-type: none"> ● Install screen using 24-gauge expanded metal with 6mm mesh, or galvanized steel woven wire cloth of 22 S.W.G. with about seven meshes to the inch (25.4 mm) ● Threshold clearance should be lowered to less than 6 mm. 
6	<p>Passings of ducts/pipes through wall provides free runways for rodents between room to room or stall to stall.</p> 	<ul style="list-style-type: none"> ● Block up all holes or voids by galvanized wire-nettings / balls especially those passing from room to room or from floor to floor. ● Seal all trunks properly on both ends with galvanized wire-netting/balls or any other rodent proofing materials.
7	<p>Surface channels provided concealed runway for rodent dispersal. Food remnant accumulated inside also provides rodents with handy food sources.</p> 	<ul style="list-style-type: none"> ● Install wire meshes of apertures not less than 6 mm underneath the surface channel to prevent access of rodents. 

Item	Problems found	Possible improvement works
8	<p>Articles accumulated on top of stalls provide rodents with harbourages as well as easy access to ceiling areas for further dispersal.</p> 	<ul style="list-style-type: none"> ● A clear zone of at least 1 m vertical distance should be maintained between the lowest ceiling pipes/ducts and nearest articles to prevent rodents from jumping up and down the ceiling pipes/ducts and nearby articles.
9	<p>Service rooms near the markets could become habourages of rodents which allow easy access to the markets for food.</p> 	<ul style="list-style-type: none"> ● Install screen using 24-gauge expanded metal with 6mm mesh, or galvanized steel woven wire cloth of 22 S.W.G. with about seven meshes to the inch (25.4 mm)
10	<p>Drain openings could be accessed by rodents.</p>	<ul style="list-style-type: none"> ● Install screen using 24-gauge expanded metal with 6mm mesh, or galvanized steel woven wire cloth of 22 S.W.G. with about seven meshes to the inch (25.4 mm)

Item	Problems found	Possible improvement works
		<ul style="list-style-type: none"> <li data-bbox="837 264 1399 488">● Install wire meshes of apertures not less than 6 mm underneath the surface channels to prevent access of rodents or replace gratings of surface channel with gaps smaller than 6 mm. 

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