

## **Guidelines on Rodent Prevention and Control in Market Building**

### **Rodent Problem in Market**

Market is a place highly susceptible to rodent infestation due to the presence of large amount of food sources, harbouraging places and commuting routes for rodents. Improper storage of food and goods, poor handling of food debris, extensive accumulation of articles and long-term existence of structural defects such as voids and holes, which are commonly seen in market buildings, are accountable for the rodent problems in such setting.

### **Rodent Prevention and Control**

2. Generally, rodent control methods can be classified into fundamental control and supplementary control. Fundamental control includes elimination of food and harbourages for rodent as well as implementation of rodent-proofing and rodent preventive measures, while supplementary control refers to direct control methods such as trapping and poisonous baiting.

#### **Fundamental Control**

##### *Elimination of Food, Harbourage and Passage*

3. Constant attention should be given to the availability of food and harbourages for rodents, which are the two most important factors that lead to rodent infestations. Rodents are omnivorous and they consume human's food as well as food residues / remnants. Particular attention should be paid to the storage and disposal of anything which could be taken by rodents as food. Food for human consumption should be kept in metal or glass containers with well-fitted covers; fresh produce and stored products (e.g. grains) should be stored in rodent-proof stores or rooms, etc. Besides, disposal of all putrescible waste (garbage) in a proper and hygienic way is of paramount importance; they should be dumped in metal or plastic bins / receptacles with well-fitted covers but not littered around in order to cut the food sources for rodents.

4. In market / market building, there are numerous places that can shelter rodents. For example, rodents could harbourage at any concealed areas in the market, voids between structures / articles, space / areas unattended by humans for a considerable period, etc. We can make use of different methods (e.g. sealing, filling) to remove these places so as to eliminate the harbourages for rodents.

5. When dealing with rodent problem, it should always be remembered that 'Prevention is better than cure'. If the environmental sanitation is maintained at a high standard, harbouraging places for rodents are eliminated and their passages are blocked, rodent infestation can always be prevented to a large extent.

### *Rodent-proofing*

6. Rodent-proofing of market / market building is another important aspect to prevent rodent infestation. It should be applied whenever it is possible and practicable to do so, particularly for places where large quantities of food are kept.

7. There are many ways by which rats and mice may enter a market / market building, and a very thorough search is necessary to locate all possible means of rodent entry. In general, openings greater than 6 mm should be sealed or screened to block rodent (including rats and mice) movement. The principles / specifications / examples of rodent proofing are provided below for reference:

- (a) 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.) after rodent disinfestation.
- (b) Broken or missing gratings should be replaced, and the apertures between bars of metal grating should not be greater than 6 mm.
- (c) Ventilation grids and other similar openings may be proofed either with 24 gauge expanded metal with 6 mm mesh, or with 22 standard wire gauge (SWG) galvanised steel woven wire cloth with 6 mm mesh.
- (d) Space beneath doorways resulted from worn steps should be repaired or renewed. Wooden doors have to be protected at the bottom by fitting a 20 gauge galvanised steel 'kicking-plate' of at least 300 mm high on the outside, with a maximum door clearance of 6 mm. A similar metal plate should be fixed to the door frame to form a continuous band of metal.
- (e) Openings and passing for pipes, wires and ducts through walls, etc. should be completely sealed.
- (f) Voids or 'dead' spaces in buildings may be inevitable and may in fact be purposely built to house some basic facilities (e.g. pipes, electrical conduits and air-conditioning ducts above suspended ceiling). Nevertheless, these voids should be made inaccessible to rodents and the materials and decorative finishing used should be resistant to gnawing by rodents. There should be no voids between the sides, backs and bottoms of built-in furniture and the adjacent walls

or floors. There should be no voids greater than 6 mm in width behind wooden skirting. Voids among battens installed behind panel should be kept to a minimum and be made inaccessible to rodents, and the materials used should be resistant to rodent gnawing.

- (g) Places such as food preparation areas and food stores should NOT have false ceilings. Although there may be concern that the overhanging pipes and ducts will be exposed in the lack of false ceiling causing undesirable outlook of the places, it is important to understand that the warmth of a food preparation area and the scent of food will attract rodents, and that a false ceiling will provide them with an ideal harbourage and nesting place. These areas / rooms should strictly leave no access, even the very small one, to rodents.
- (h) Vertical pipes could be used by rats to reach entry points or harbouraging places. A rat would find it difficult / unable to climb (by wedging itself) between a pipe and a wall / vertical surface or between adjacent pipes if the distance between the two supporting structures is at least 100 mm apart. Alternatively, they could be installed with a circular / inverted funnel shaped rat guard made of 20 gauge galvanised steel sheet, projecting about 230 mm from the vertical pipe and with diameter of at least 550 mm (assuming diameter of the pipe is less than 90 mm); the gap between the rat guard and the pipe should not be greater than 6 mm. Make sure there is no projection or any other structure nearby to serve as foot step for rodents to jump over the rat guard.

### Supplementary Control

#### *Trapping*

8. Trapping is one of the common methods for controlling rodents. It is the preferred method when the use of rodenticides is considered undesirable, e.g. poisoned rodents dying in inaccessible areas would cause bad odour. Break-back / snap traps are used to instantly kill rats and mice, whereas wire cage traps are used to capture live rodents. Wire cage traps should be baited and set on the first day that they are laid. In general, wire cage traps found in the local market are designed for trapping rats, but not mice.

9. Only when encountering heavy rodent infestation where other rodent control methods have been exhausted without giving satisfactory results may glue traps be considered as a tool to supplement the rodent control programme. It is important to observe that glue traps 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 glue trap in a lockable, tamper-resistant rodent station or dedicated rodent glue trap tunnel for complete protection against non-target animals. Frequent inspections should be arranged to each glue trap laid and any trapped rodent should be collected and killed in a humane manner, and their carcass be properly handled / disposed of as soon as possible. To follow international recommendation, at least one inspection should be made every 12 hours. Glue traps should be set at night after the closure of the market and retrieved before the market open in the following morning. The use of glue traps should be suspended as soon as the situation of rodent infestation is alleviated.

10. Rats and mice feel safe by moving close to vertical surfaces such as wall, rather than across open areas. Traps should therefore be placed at right angle to the vertical surface against which rodents are known or suspected to run. When snap traps are used, they should extend from a vertical surface at a right angle, with the trigger end facing 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. Similarly, when cage traps are used, they should also be placed at right angle with the opening of the trap facing the vertical surface. If they are set parallel to the vertical surface, they should be set back-to-back **in pair** (with opening facing the two ends) (Fig 2). The position for traps should be carefully chosen; they should remain in the same position throughout the trapping period and should be set firmly on ground whenever possible. Traps for catching mice are suggested to be placed about 1 m apart while traps for rats be placed about 3 to 5 m apart. The distances could be adjusted according to the actual environment as well as rodent infestation and activities.



Fig 1: Setting a snap trap at right angle to the vertical surface



Fig 2: Setting traps parallel to the vertical surface

11. If a non-target animal is captured and it is injured or suspected to be injured, contact Society for the Prevention of Cruelty to Animals (SPCA) at their emergency hotline 2711 1000 for assistance.

12. Thorough survey is needed to ascertain the locations of rodent harbourages and disposal routes. Base on the result of the survey, as many traps as possible and reasonable should be laid. **It is suggested that at least six traps should be laid for one or two rodents.**

13. Rats consume a great variety of food but they are very sensitive to the freshness of food, thus fresh baits should be used as far as possible and baits that have dried out or spoiled should be replaced immediately by fresh ones. Using mixed baits in traps can, to a certain extent, minimise the impacts of environmental factors, human practices, or variations in rodent behaviour on the efficiency of traps. As food preference of rodents varies from time to time and from place to place, food baits that work in a location at a particular time point may not have the same attractiveness to rodents in other location(s) or in the same location at other time points. Therefore, trials on different food baits should be conducted at the beginning of each trapping operation at individual location to find out the best combination of food baits. Based on previous test results, bread with peanut butter, barbeque pork (char siu) and sweet corn could be good baits for rodent trapping. Other appropriate food baits could also be included whenever applicable.

14. 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 prolonged period. For a trapping programme, traps should be laid for at least five consecutive days.

### *Poisonous Baiting*

15. The most commonly used rodenticides are anticoagulant rodenticides, which can be broadly classified into multiple-dose and single-dose rodenticides. Anticoagulant rodenticides would not induce bait shyness of rodents.

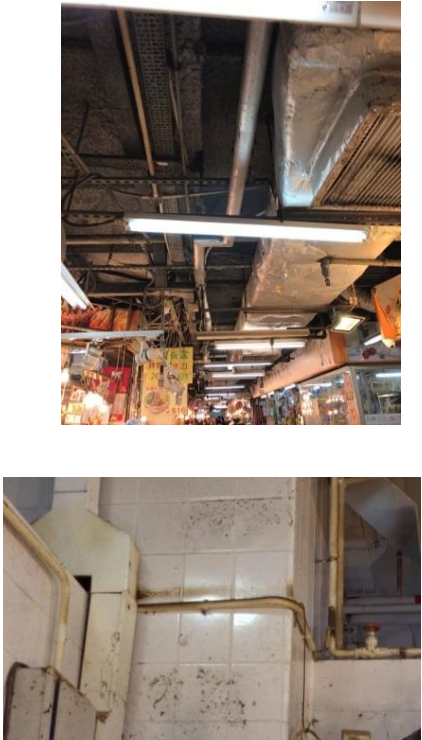
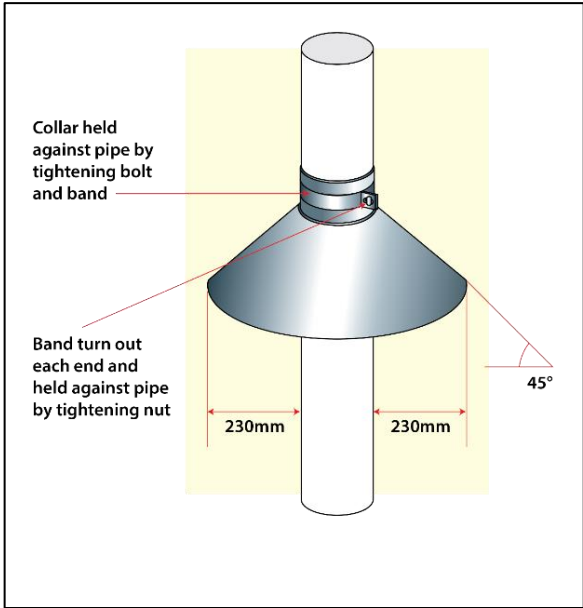

16. Multiple-dose anticoagulant rodenticides are effective against all species of local commensal rodents. The active ingredient of the rodenticide (Dustable Powder at concentration of 0.75%) should be added to and well mixed with other bait bases (uncooked rice, oil and sugar) to form a rodenticide bait mixture with concentration of 0.0375% before use.






17. Single-dose anticoagulant rodenticides are also effective against all rodent pests. They are formulated into different ready-to-use forms, such as scrap bait, block bait, etc. In general, scrap baits are more acceptable to rodents than block baits as the high wax content of the latter render them less palatable to rodents. The poisonous baits are to be evenly distributed in the target area according to the application rate as stated on the product labels. Poisonous baits should be pushed into rat burrows, thrown to places not readily accessible to humans and domestic animals, placed in protected positions and other infested places (e.g. junk accumulation points). It is not advisable to hang the poisonous baits at more than 5 cm above ground. It takes a few days for the poisonous baits to effect and most of the poisoned rodents will die within two weeks after ingesting a lethal dose of poisonous baits.

18. Anticoagulant rodenticides are toxic to humans; they should be handled with great care. Information stated on the product label should be strictly followed to ensure effectiveness and safety. Adequate verbal and written warnings must be given to members of the public, local residents and relevant parties to avoid any accidental poisoning.






Food and Environmental Hygiene Department  
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**Table 1 Problems Commonly Observed in Markets and Suggested Improvement Works**

Item	Problems	Suggested improvement works
1	<p>Piping / ducting provides free runway for rodent at ceiling and between ceiling and floor areas.</p> 	<ul style="list-style-type: none"> <li>● Install rat guard made with rodent-proof material at vertical pipe leading to ceilings or at external wall of building.</li> </ul>  <ul style="list-style-type: none"> <li>● Wrap pipes / ducts with barbed wire at intervals to block rodent dispersal.</li> </ul>
2	<p>False ceilings provide rodents with concealed runways and harbourages.</p> 	<ul style="list-style-type: none"> <li>● Avoid installing false ceilings in markets.</li> </ul>

Item	Problems	Suggested improvement works
3	<p>Vertical pillars facilitate rodent commuting between ceiling and floor areas.</p> 	<ul style="list-style-type: none"> <li>● A clear zone of at least 1 m high should be maintained between the ceiling and the nearest articles around the pillar.</li> <li>● Rat guards should be installed on pipes / ducts (refer to Item 1).</li> </ul>
4	<p>Rodent could pass through threshold clearance greater than 6 mm.</p> 	<ul style="list-style-type: none"> <li>● Install 20 gauge galvanised metal kicking plate of 300 mm high on outside of a door with threshold clearance of not greater than 6 mm.</li> </ul> 
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"> <li>● Install 24 gauge expanded galvanised steel or 22 SWG galvanised steel woven wire cloth with mesh size not bigger than 6 mm at louvers.</li> <li>● Threshold clearance should not be greater than 6 mm.</li> </ul> 



Item	Problems	Suggested improvement works
6	<p>Passings of ducts / pipes through wall provide free runways for rodents from room to room or stall to stall.</p> 	<ul style="list-style-type: none"> <li>● Block up all holes or voids by galvanised wire nettings / balls especially those passings between rooms or between floors.</li> <li>● Seal all cable trunks properly on both ends with galvanised wire nettings / balls or any other rodent proofing materials.</li> </ul>
7	<p>Surface channels provide concealed runway for rodent dispersal.</p> 	<ul style="list-style-type: none"> <li>● Install wire meshes of apertures not greater than 6 mm at the surface channel to prevent access of rodents.</li> </ul> 
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"> <li>● A clear zone of at least 1 m vertical distance should be maintained between the lowest ceiling pipes / ducts and the nearest articles below them to prevent rodents from jumping between the ceiling pipes / ducts and nearby articles.</li> </ul>

Item	Problems	Suggested improvement works
9	<p>Service rooms could become habourages of rodents and provide them with access to markets for food.</p> 	<ul style="list-style-type: none"> <li>● Install 24 gauge expanded galvanised steel or 22 SWG galvanised steel woven wire cloth with mesh size not bigger than 6 mm.</li> </ul>
10	<p>Drain openings could be accessed by rodents.</p> 	<ul style="list-style-type: none"> <li>● Install 24 gauge expanded galvanised steel or 22 SWG galvanised steel woven wire cloth with mesh size not bigger than 6 mm underneath the gratings.</li> <li>● Use gratings with gaps not greater than 6 mm.</li> </ul> 