For discussion
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Advisory Council on Food and Environmental Hygiene

New Rodent Surveillance Programme of the Food and Environmental Hygiene Department

Purpose

This paper briefs members on the new rodent surveillance programme which makes use of thermal imaging cameras with artificial intelligence technology implemented by the Food and Environmental Hygiene Department (FEHD) in 2024.

Background

2. The purpose of rodent surveillance is to monitor rodent infestation within designated survey locations and assist the relevant departments in planning anti-rodent operations, as well as assessing the overall efficacy of rodent control work. Since 2000, the FEHD had been conducting the Rodent Infestation Survey (RIS) every six months by setting baits[1] in designated survey locations[2] across the territory to collect data on the ratio of baits gnawed by rodents for generating the Rodent Infestation Rate (RIR)[3].

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[1] Uncooked sweet potato cubes were selected as baits at that time after taking into consideration the fact that they can retain clear and identifiable gnawing marks, as well as the rodents' habitual grinding of teeth.

[2] The RIS covered 50 designated survey locations across the territory. Around 50 census baits would be placed in each designated survey location for three days. The FEHD would place census baits at rodent-infested areas or places likely to have rodent infestation problems, including streets and rear lanes, public housing estates, the vicinity of private residential buildings and construction sites, parks and open spaces, etc.

[3] The RIR refers to the ratio of the baits gnawed by rodents to the number of baits collected from the survey location concerned.

3. There are limitations with the aforementioned RIS. For instance, it only shows whether there are rodent activities in the survey locations during the survey period, but does not provide data to reflect the severity of rodent infestation. Moreover, hanging rodent baits near buildings for surveillance is more susceptible to human interference or other environmental factors, thereby lowering the accuracy of the survey.

4. The Government announced the formulation of a new surveillance index for rodent infestation in the 2022 Policy Address. In this connection, the FEHD has earlier collaborated with The University of Hong Kong to study the use of thermal imaging cameras with artificial intelligence technology for monitoring rodent activities, and such method was put on trial in Kowloon City, Sham Shui Po and Wan Chai districts in 2023. The trial findings indicate that the new method, compared with the traditional survey method using sweet potato baits, is more effective in reflecting the distribution and severity of rodent infestation in districts, for it has greater sensitivity and precision, with a more comprehensive coverage and a lower risk of interference by environmental factors.

Rodent Activity Survey

5. After examining the latest technology and analysing the trial findings, the FEHD has fully adopted thermal imaging cameras with artificial intelligence technology for conducting the Rodent Activity Survey (RAS) as a replacement for the original RIS from 2024 onwards. The RAS will be conducted in all 19 districts across the territory once every six months.

Selection of survey locations

6. The FEHD will take into account a basket of factors, including rodent-related complaint figures which have been confirmed upon investigation, number of live and dead rodents caught, inspection results and the views from local communities, etc., to identify about 300 locations with potential rodent problems in each district as the sample base. For each survey, based on factors such as geographical distribution and complaint figures, etc., approximately 100 locations will be selected from the sample base via stratified sampling for installation of thermal imaging cameras in order to effectively deploy resources

and ensure the representativeness of the sampled locations.

7. The survey will be conducted at night having regard to the habits of rodents. The thermal imaging camera will capture two thermal images[4] at every two-minute interval from 7:00 p.m. to 7:00 a.m. the following day for three consecutive nights, thereby capturing a total of approximately 216 000 images for each district. Artificial intelligence will then be used to help analyse the images and identify the presence of rodents. A thermal imaging camera set and a thermal image sample with a rodent detected are shown at **Annex**.

Rodent Absence Rate (RAR)

8. The FEHD will consolidate all thermal images captured by the thermal imaging cameras of an individual district and enumerate an RAR for that district. The RAR is calculated by the following formula:

$$\text{RAR} = \frac{\text{Number of thermal images with no rodents detected}}{\text{Total number of thermal images taken}} \times 100\%$$

9. For example, 100 locations are selected from "A district" for installation of thermal imaging cameras. Two thermal images are captured by each set of thermal imaging camera at two-minute intervals for twelve hours each day, for three consecutive nights, thereby capturing a total of 216 000 thermal images. Assuming that 185 000 thermal images have no rodents detected, an RAR of about 85.6% for this district is calculated based on this formula.

10. The RAS for the first half of 2024 has already commenced, with the results of the first five districts[5] announced. The surveys for the remaining 14 districts will commence in phases, and the findings will be progressively

[4] Each thermal imaging camera set has two lenses facing different directions.

[5] The RAR of the five districts are tabulated below –

District	Central and Western	Wan Chai	Eastern	Mong Kok	Sham Shui Po
RAR (%)	95.3	87.1	96.0	94.0	90.3

published and uploaded onto the website of the FEHD for public information. The FEHD plans to analyse, based on the data collected from each survey location, the density distribution of rodents. It will also consider classifying the RAR results into different levels for carrying out corresponding prevention and control measures.

11. The current phase of the RAS covers public areas, including streets and rear lanes, where rodent control services are provided by the FEHD. The Government is considering expanding the coverage of the survey to include locations under the purview of other departments, such as public housing estates, parks and recreation grounds, etc.

12. The FEHD will continue to make reference to the survey results, in addition to the observations from regular inspections and the views from local communities, to keep track of the situation and trend of rodent infestation in each district for adjustment of anti-rodent strategies and allocation of resources. It will implement targeted rodent prevention and control measures work as appropriate, including applying rodenticides and trapping devices, filling rat holes, and conducting joint operations with other relevant departments in areas with serious rodent infestation.

13. The FEHD will also continue to strengthen promotion and public education to encourage various sectors of the community to join hands in eliminating the three fundamental survival conditions of rodents – food, harbourage and passages – by eliminating their food sources and hiding places, as well as blocking their dispersal routes.

Advice Sought

14. Members are invited to note and give comments on this paper.

Environment and Ecology Bureau
Food and Environmental Hygiene Department
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Annex

Photo 1: Thermal imaging camera set installed at a survey location

Photo 2: Thermal image sample with a rodent detected