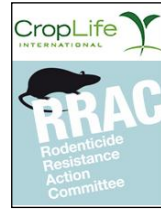


Field Trial to Evaluate the Efficacy of Rodenticide Baits for the Control of Rats (*Rattus norvegicus*)

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1. Introduction

Field trials are to be conducted under natural conditions, on a site where rats live and, as a precondition, where they are accustomed to feeding on several types of foodstuffs. The bait competes with these foodstuffs for the period of the trial.

The aim of field trials with rodenticides is to measure the efficacy of the treatments in terms of change in size of the target population. The most reliable method is the census evaluation, which will be explained below.

The approach of the CENSUS EVALUATION is measuring efficacy by at least two indirect estimates of the population size, both before and after the treatment. One common census method is to record the consumption of un-poisoned food. The ratio of the daily food consumption, before and after the treatment, is an expression of the efficacy of the treatment. Another method frequently employed is the use of tracking patches.

The protocol of field trials based on the census food consumption consists of four consecutive periods:

1. Preparation
2. Pre-treatment census
3. Treatment
4. Post-treatment census

This protocol is intended to comply with the requirements of the European Commission with respect to testing the efficacy of rodenticides.¹ It is also closely aligned to previously published protocols issued by the European and Mediterranean Plant Protection Organization which have been widely adopted by researchers studying the efficacy of rodenticides.²

¹ European Commission (2009). Technical notes for guidance on product evaluation. Appendices to chapter 7. Product Type 14. Efficacy evaluation of rodenticidal biocidal products. Endorsed at the 32nd meeting of representatives of Members States Competent Authorities for the implementation of Directive 98/8/EC concerning the placing of biocidal products on the market (18-20 February 2009). European Commission, Brussels. 22pp.

² EPPO (1998). Efficacy evaluation of rodenticides. Field tests against synanthropic rodents (*Mus musculus*, *Rattus norvegicus*, *R. rattus*). European and Mediterranean Plant Protection Organization. Paris. P/114(2). 12 pp.

2. Trial Course

2.1 Preparation

In general, a site for a field trial should be a small rather than a large area with a medium rat infestation, which is possible to control with 10 - 30 bait points during a period of three to four weeks. Make sure that no rat control has been conducted during the last (at least 3) months. It should be easy to gain access to the places where the rats run and take food, in order to set the bait points there. It is difficult to estimate the effectiveness of a rodenticide bait at a site when the neighbouring areas are heavily infested, because rats will invade from these areas into the experimental area.

After a careful investigation of the probable trial site, bait points have to be established. The use of bait stations, made of plastic or steel, usually causes a reluctant approach of the rats, and therefore results in a delayed trial schedule. Whenever possible, baiting points should be established in hidden places, and bait stations should be used only if there is no alternative. Generally, wooden bait stations, as large as possible, are preferred. Mark every bait point with its number, e. g. using chalk. Use un-poisoned food (e.g. locally available food, wheat, oats), ca. 200g in a dish offered per bait point, to attract the rats, and to habituate them in case bait stations are used. An inspection of the trial site some days later reveals where rats are active. Only during this period, bait points can be moved in order to make them suitable for the local situation.

Every bait point should be numbered, marked on a site map, and registered in the data sheet. Note the complete address of the trial site, its location, structure, food which rats are used to eating, and any changes observed during the trial period.

Always work with the agreement of those who own the site and keep them informed about the progress of the treatment. It may be useful to provide site owners and workers with maps showing the positions of baiting points. They should also be provided with instructions about what to do if bait points are disturbed and if non-target animals gain access to baits.

Procedure of Preparation:

Inspection of study site by experienced operator.

- Proceed on foot and cover all areas of the site and examine for signs of rodent activity. Take sufficient time for a careful investigation.
- Look behind potential covers where possible, such as piles, rubbish, sheets etc. Use gloves and torch! Investigate the upper level, such as feed and hay stores under the roof.
- Examine all areas of the site with particular attention to hedgerows, ground-covering vegetation, and watercourses.
- Look for signs of rodent activity such as droppings, smear marks, footprints, runs, rodent damage, burrows and places where rodents are feeding.

Produce a sketch map, indicating the principal site structures and areas of rat activity.

- Make draft copy of each building and other structures (e.g. piles, rubbish, stored materials) on paper. Note location and use of buildings. Mark potential ways of immigration of rats onto the site.

- Divide trial site into 2 – 5 areas, depending on size, location and distribution of the infested area, e. g. on a livestock farm.
- Areas could be given a score of rat activity in the range 0 (no activity) to 3 (high activity).

It may be recommended to set some feeding places in order to get an impression of rat activity. In particular when bait stations shall be used, it is recommended to place them approximately two weeks before the trial starts. Often some weeks are required to get the rats entering bait stations.

2.2 Pre-Treatment Census

Two independent census methods are recommended: Consumption of census food and tracking patches. A further option is the use of electronic activity detection systems and automatic cameras.

2.2.1 Census feeding

Put 200g census food (e. g. un-poisoned wheat, rolled oats) in every bait point. Weigh the remaining food every day, and replace the eaten food. In bait points which are emptied within 24 hours by the rats double the amount of census food. Persist with census baiting until daily consumption has levelled off, or at least for four consecutive days. The total consumption of the last day of this period is the value used to calculate the treatment effect in relation to the post-treatment census. It is also possible to use the sum or the average consumption of two or three days.

Note: Record all consumption amounts of single bait points on the data sheet. Data to be recorded are: Date; Number of the bait station; Weight of the remaining food; Weight of food in the station after replacement of eaten bait.

After finishing the pre-baiting census, empty the bait points, and do not remove bait stations.

The pre-treatment census allows the rodents to overcome their neophobic behaviour towards novel food, a process that would not occur during a standard treatment. In order to minimise this potential pre-baiting effect, the pre-treatment census food should be different from the treatment bait in appearance and taste. There should be a lag period between the end of the census and the start of the treatment of at least three days. A pre-baiting in order to get the rats overcoming their potential neophobic behaviour towards the bait shall be conducted if requested on the product label and use instructions, respectively, provided for the test product, using the recommended feedstuff.

2.2.2 Tracking patches

Perform pre-treatment assessment using tracking patches in parallel to census feeding. The tracking patch census, e.g. using silver sand patches, may be conducted concurrently with the census baiting.

- Note tracking patch number and location;

- Tracking patches must be at least 100mm x 200mm and of sufficient depth to ensure a flat surface.

- Tracking patches must be situated in positions different from bait points, although for practical reasons the two may have to be very close.
- Set tracking patches in a safe location, where rodent activity is suspected, and cover in such a manner as to deny access to non-target animals and to provide protection from weather, livestock and wild animals.
- Number tracking patches and mark their location on a copy of the sketch map.

Tracking Patch servicing procedure

On a daily basis:

Remove cover from tracking patch.

Examine the patch closely for signs of target animal activity.

Record the activity level, e.g. as follows:

0 = no tracks

1 = 1 – 5 footprints

2 = 5 footprints to 25% of the patch tracked

3 = 26% - 90% of the patch tracked

4 = 90% - 100% of the patch tracked

Re-coat the patch.

Replace the patch covering.

The definition of the activity levels may differ according to the standards established at the experimentalist. However, they must be defined in the trial documentation.

2.2.2 Electronic activity detection

Set the detectors and stations according to manual. The system may be used to record activities during the census periods and during the treatment.

2.3 Treatment

The treatment schedule and the quantities of bait applied should always follow the recommendations on the product label. Typically, put a minimum of 200g of the test bait, or the amount recommended for the test product, respectively, in every bait point. In case the label instructions deviate from this always follow the label instructions. According to the results of the pre-baiting census, there should be enough bait to ensure that all the bait will not be eaten within 24 hours. Weigh the remaining (non-eaten) bait at every control, and replace the eaten bait. In case all bait was eaten within the control interval, double the amount of bait. Record all data daily or at the control intervals fixed in the trial schedule (e. g. three times a week). In any case, follow the label of the test product and the instructions given for its application.

The bait take has to be measured at least three times a week until consumption declines, at least during the first week of the poison treatment. Record the data as listed above, and note any dead rats found and any other signs due to the treatment. When consumption has declined substantially, two records per week may be sufficient.

The standard treatment runs for three weeks. If it is suspected that the infestation was eliminated within a shorter period, the treatment may be finished earlier. In cases where rats accept the bait very reluctantly, and when an effective treatment seems to be more probable after an extended period, an extension by one or more weeks can be conducted.

After the treatment has been finished, remove all remaining bait. Bait stations have to remain in their places. A lag period between treatment and post-treatment census of 3 - 6 days is necessary because rats which have ingested a lethal dose of poison may survive the treatment for a few days.

2.4 Post-Treatment Census

Conduct the post-treatment census in an identical manner to the pre-treatment census. Typically place 200g census food (same food as during pre-treatment census) in the same places as during pre-treatment census and record consumption on at two to four successive days. Data to record are the same as above. If there is still consumption, investigate whether the target or other animals have taken the food (e. g. during rat trials look for mouse droppings). After the census is finished remove all remaining food and bait stations. The post-treatment tracking census or the use of electronic activity detectors should also be applied in the same way as in the pre-treatment census.

3. Parameters to be Summarised

- Details of the trial site, including alternative foodstuffs;
- Daily food consumption during census, specification of census food;
- Daily bait consumption;
- Daily number of bait points with takes;
- Number and location of rats observed or found dead;
- Possibilities and probability of invading rats during or after the treatment;
- Environmental changes within the trial site and in neighbouring areas;
- Effects on non-target animals.

4. General Instructions

- Use gloves when handling food, bait, bait containers etc.;
- After recording the data make sure that all data are noted;
- Follow the bait points in the same order every day;
- Set bait points only on well-protected places.
- Follow all hygiene and epidemic prevention recommendations, such as the use of disposable working wear on livestock farms, rubber boots, disinfection etc.

Material and equipment:

Census food, test bait, weighing scales, torch, food dishes, bait stations, gloves, data sheets, silver sand, long-handled spoons, and site map with bait points marked, chalk, scale.

Inform inhabitants and personnel, respectively, on the distribution of the bait points, the type of bait used, the details of antidote treatments, and other necessary precautions.