The Goodnature® A24 automatic rat & stoat Kill Trap
Evaluation of Humaneness: 2011

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Purpose

This document reports on the field evaluation undertaken to assess the welfare performance of the Goodnature® A24 automatic rat/stoat kill trap's ability to kill rats according to the National Animal Welfare Advisory Committee (NAWAC) Guideline 09: *Assessing the welfare performance of restraining and kill traps*[1].

Background

Ship rats (*Rattus rattus* L.) were introduced to New Zealand accidentally in the second half of the 19th century, becoming widespread in the North Island by about 1860 and in the South Island about 30 years later (Atkinson, 1973). They are now found throughout North, South and Stewart Islands (Innes, 1990) and are known to occur on at least 47 offshore islands (Dowding, Murphy 1994). Rodents have had a major impact on New Zealand's biodiversity causing numerous extinctions over the past century and continue to threaten fauna and flora over much of New Zealand. The cost of controlling rats is high and generally involves the use of aerially applied 1080 or costly ground based operations using 1st and second generation anticoagulant poison. As tools such as toxins become less socially acceptable, the demand for other methods of control has increased.

The Goodnature® A24 automatic rat/stoat kill trap is designed to target all three species of rat, with a reduction in the labour costs associated with the need to re-set the traditional single-set traps. This is the first example of a self-resetting trap for rats that incorporates both a humane kill methodology with a practical field device.

To be considered humane as per the NAWAC standard, the trap was evaluated for its ability to render rats irreversibly unconscious within three minutes. The trap operates by driving a captured bolt onto the brain case of the rat with the objective of instantly crushing the skull causing spontaneous central nervous system suppression.

Objective

The objective of the evaluation was to determine whether the captured bolt technology of the trap effectively targets and kills rats within a naturally occurring weight range in a 'wild' environment, as per the NAWAC Guideline 09: Assessing the welfare performance of restraining and kill traps.[1]

[1] http://www.biosecurity.govt.nz/animal-welfare/nawac/policies/guideline09.htm

Methods

The Goodnature® A24 automatic rat/stoat kill trap is designed to humanely kill rats and stoats of all independent age classes and to reset itself at least 24 times. The device tested used a captured bolt approximately 20mm in diameter with a series of crenulations around the striking edge. Striking force of the captured bolt (not tested) is stated as 35 Kg.

Ship rats living within a lowland forest remnant in the Pauahatanui Stream catchment (41°05.50S 174°53.00E.) were attracted to baited sites over a period of days. One Goodnature® A24 automatic rat/stoat kill trap was then introduced to these baited sites.

To enable a rapid response to rat and trap activity, a camp was set up 5-10m away from the trap. Rat approaches to the trap were monitored by an audio proximity alarm beneath the trap and a second audio alarm that activated when the trap was triggered. When a rat triggered the proximity alarm the observer prepared for quick egress to the trap and timing of triggering to palprabel reflex. Additionally a "trail master" camera was used to record activity at the trap. Unfortunately the camera did not video a rat capture due to the inbuilt sensor failing to trigger when the rats body was stationary and partially obscured by the trap.

When the trap was triggered, the assessor rapidly approached the trap, and monitored the palpebral reflex of the animal and other vital signs, such as respiration and coordinated movement. The rat's weight and sex were also recorded.

Palpebral reflex was assessed by lightly touching the cornea of both eyes of the unconscious rat (Rowsell et al. 1981). Respiration was determined by visual observation of expansion and contraction of the rib cage. Other movements or emissions from the animal were also noted. All skulls were kept for further analysis, should they be required.

Results

All ten ship rats trapped were rendered irreversibly unconscious within three minutes with a mean time of 22.3 seconds (the range was 15 – 29 seconds). This time includes the lag between the trap triggering, and the ability of the assessor to travel to the trap and conduct the palpebral reflex test. In all cases eye reflex was absent on the first test conducted on the initial approach.

The weight of the tested ship rats ranged from 110 - 180 grams which correlates to an age class 3-6 (Miller and Miller 1995). The sex of the animals caught was weighted in favour of females with 6 female and 4 male rats killed as shown in Table 1.

Table 1. Time to loss of palpebral reflex and respiration in wild ship rats captured in the Goodnature® A24 automatic rat/stoat kill trap.

Weight (grams)	Length (mm)	Sex	Strike location	Palpebral reflex (negative)	Signs of respiration	Comments
130	160	Female	Entire cranium	16 Sec	Nil	Haemorrhage. Uncoordinated movement.
110	155	Female	Entire cranium	27 Sec	Nil	Haemorrhage. Uncoordinated movement.
150	165	Male	Entire cranium	27 Sec	Nil	Rat held in trap by bolt
110	160	Female	Entire cranium	21 Sec	Nil	Large haemorrhage
140	180	Male	Entire cranium	24 Sec	Nil	Rat held in trap by bolt. Large haemorrhage
160	170	Male	Entire cranium	17 Sec	Ongoing respiration for 20 Sec	Small haemorrhage.
180	180	Male	Entire cranium	15 Sec	Nil	Haemorrhage. Uncoordinated movement.
150	170	Female	Entire cranium	29 Sec	Nil	Rat held in trap by bolt. Difficulty removing animal
130	160	Female	Entire cranium	24 Sec	Nil	Rat held in trap by bolt. Small cranial haemorrhage. Uncoordinated movement.
170	175	Female	Entire cranium	23 Sec	Nil	Rat held in trap by bolt Large cranial haemorrhage. Uncoordinated movement.

Note: In all cases the animal presented with no palpebral reflex on first inspection. The times in table 1 are influenced by the time to access the animal after being struck by the trap.

Discussion

The Goodnature® A24 automatic rat/stoat kill trap easily meets the NAWAC guidelines for a humane kill trap. All animals were accessed and check for palpebrable reflex within 30 seconds and all animals remained irreversible unconscious till death shortly after.

I have little doubt, due to the major trauma inflicted on the captured rat skulls, that there was a spontaneous suppression of the central nervous system on being struck by the trap. Targeting of the killing bolt was excellent with the cranium of all rats killed completely involved by the killing bolts strike.

Many of the rats caught exhibited involuntary body movement immediately post capture that lasted up to 20 seconds. At no stage did these appear anything other than disorganised and involuntary spasms as a result of severe damage to the brain.

As this trial was confined to ship rat (*Rattus rattus*) age class 3-6 (>4 months old) I can not comment on the ability of the trap to target and kill the larger Norway rat (*Rattus norvegicus*) or the smaller kiore. However it appears likely, from the killing force applied and the good distribution of size and weights of ship rats, that little difficulty would be encountered in achieving a similar result on Norway (*R. norvegicus*) and the Pacific rat (*R. exulans*).

Conclusion

This field evaluation determined that the Goodnature® A24 automatic rat/stoat kill trap killed ship rats quickly and effectively, meeting the NAWAC kill trap testing guidelines. The trap consecutively killed 10 ship rats successfully ranging from 110- 180 grams body weight. In all cases palpebal reflex was absent on first approach to the struck animal at under 30 seconds.

References

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