Effectiveness of the Victor snapback trap for killing stoats

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Effectiveness of the Victor snapback trap for killing stoats

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ABSTRACT

The Animal Welfare Act 1999 enables traps that are considered unacceptably inhumane to be prohibited. This provision has resulted in an increased awareness of how well kill traps actually kill the intended target species. As part of an ongoing trap-testing programme, Landcare Research tested the killing performance of Fenn traps and showed that they were ineffective at killing stoats (*Mustela erminea*), with most captured stoats still conscious after 5 minutes. Because Fenn traps are used extensively for trapping stoats in New Zealand it is desirable that a humane alternative is found. A potential alternative is the Victor snapback trap. Although these traps are designed for capturing rats, they have been successfully tested for capturing and killing short-tailed weasels (*Mustela erminea*) in Canada. These traps were tested on captive wild-caught stoats, using a plastic shroud to direct and align the stoat at the front of the trap. To pass the test the trap had to render at least 13 of 15 stoats irreversibly unconscious within 3 minutes. Seven stoats were rendered unconscious rapidly (i.e. <30 seconds). However, three were either not struck across the head or managed to escape because the low clamping force exerted by the trap was not sufficient to securely hold a conscious animal. Because three captures failed to result in the stoats being rendered unconscious within 3 minutes, the trap failed the test. A humane alternative to the Fenn trap is still required.

Keywords: animal welfare, control, humaneness, New Zealand, rats, stoats, weasels, traps

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1. Introduction

To protect some endangered species, DOC needs to control predators, such as stoats. The Fenn trap, both Mk IV and Mk VI models, has been used for trapping stoats in New Zealand since the 1970s (King 1994). Recent changes in animal welfare legislation include a provision for the prohibition of traps that are considered inhumane, and there is an increasing awareness of the need to know how well kill traps actually kill the intended target species. As part of an ongoing trap-testing programme, Landcare Research tested the killing performance of Fenn traps and showed that they were ineffective with most captured stoats still conscious after 5 min. (unpublished data). Acceptable traps need to be able to consistently render target animals unconscious within 3 min. (Warburton 1995). Consequently, DOC was made aware of the trap's poor performance and the need to find a more humane alternative.

A potential alternative to the Fenn trap was the Victor snapback trap. These traps, although designed for capturing rats, have been tested successfully for capturing and killing short-tailed weasels (*Mustela erminea*) in Canada (Canadian Trapper 1999). Although the short-tailed weasel is the same species as the stoat, it is generally smaller (females 28–85 g, males 70–206 g; Fagerstone 1987). In comparison female stoats in New Zealand weigh on average 200 g and males 300–350 g (King 1990). This project was carried out to determine if the Victor snapback trap was effective at killing stoats in New Zealand.

The time to loss of brainstem reflex is measured to assess whether a kill-trap system is acceptable in terms of its ability to kill quickly. The system includes the trap, any boxes or covers used, and the way the trap is set. The International Organisation for Standardisation (ISO) developed a draft standard for testing traps (Jotham & Phillips 1994; Warburton 1995) and this has now been developed as a National Animal Welfare Advisory Committee (NAWAC) draft guideline for testing traps. For kill traps to be acceptable either 10 of 10 or 13 of 15 target animals must be rendered irreversibly unconscious within 3 min. of capture. Consciousness is determined by using the palpebral (blinking) reflex, which stops when the animal has lost consciousness (Rowsell et al. 1981).

2. Objectives

To evaluate the welfare performance of the Victor professional rat trap, by:

- Measuring the mechanical parameters of the Victor snapback trap
- Using pen trials to determine how well the trap (with selected trap set) captures and kills stoats

3. Methods

3.1 MECHANICAL TESTS

Three mechanical parameters were measured: impact momentum (kg m/s), clamping force (newtons), and kinetic energy (joules).

To determine the impact momentum and kinetic energy of the traps we used an accelerometer to determine the velocity of the strike at impact. The accelerometer weighed 8 g and was rated from 0 to 200 *G* with overload potential to 2000 *G*, and was attached to the impact bar by sandwiching it between two small metal plates. An oscilloscope was used to capture the voltage output versus time. Five traps were tested with each being tested five times. These results were then averaged to obtain a single mean trace of velocity. To determine impact momentum we measured the mass of the striking bar and multiplied this mass by the velocity. To determine the kinetic energy, we used the velocity together with the mass of the striking bar and the length of the bar contacting the animals. The overall effect of the additional weight of the accelerometer was corrected for before calculating the impact momentum and kinetic energy.

We determined the static clamping force using a spring balance.

3.2 PEN TESTS

Acclimatised stoats were placed in outside pens at Landcare Research's animal facility. Traps were set on poles approximately 25 cm above ground. The traps were fitted with plastic covers (funnels) to ensure animals entered the trap from below to maximise the probability of a successful strike (Fig. 1). This set was selected to minimise risk to kiwi, after discussion with Peter Shaw (DOC, Opotiki).

The trigger system was slightly modified three times in an attempt to obtain a consistent strike location. The first trigger used was the base of the commercially supplied yellow plastic triggers to which we attached a safety pin so that, when set, it positioned the meat bait 50–55 mm in from where the striking bar closed (Fig. 2). The second trigger was the factory-fitted metal tab with meat bait tied on. This trigger enabled the bait to be set nearer to

Figure 1. Victor professional snapback trap with plastic cover.

Figure 2. Trap with plastic trigger base and safety pin attached.

the striking bar because the first trigger resulted in one animal being struck too far behind the head.

The third trigger (Fig. 3) was the metal tab, modified by fixing a safety pin to the front, again to hold the bait closer to the striking bar. The meat bait was attached to the pin, and when the trap was set, this positioned the bait 30–35 mm in from where the striking bar closed.

Each test animal was observed from inside an observation hut and when they triggered the trap the observer got to the trap as quickly as possible to monitor the palpebral reflex by blowing on and touching the corner of the eye. The time to loss of palpebral reflex and cessation of the heartbeat were recorded, as well as the strike location of the trap on the animal. Captures were monitored and recorded on video.

A sample size of 15 stoats was selected, which required at least 13 of these animals to be rendered unconscious within 3 min. for the trap to pass the test. Additionally, even if one or two captures failed to result in a stoat being rendered unconscious within 3 min., these captures had to result in the stoats being rendered unconscious within 5 min. (NAWAC draft guidelines). If escaped animals survived, they were considered to have exceeded the 5-min. time frame to loss of consciousness and therefore had to be counted as a failed capture (NAWAC draft guidelines).

Because the trigger modifications were minor, and failures resulted even from correctly struck animals, all test animals were grouped into the one sample. Once three failures were obtained, the test was stopped because it was not possible to get 13 successful kills from 15 animals.

The work was carried out with approval from the Landcare Research Animal Ethics Committee.

Figure 3. Trap with metal tab trigger and safety pin attached.

4. Results

4.1 MECHANICAL TESTS

Even with very high striking-bar velocities (i.e. 25 m/s), the Victor snapback traps had a very low impact momentum (0.24 kg m/s) (Table 1). This was a result of the light-weight striking arm. Equally, the trap's clamping force was very low (c. 8–10 newtons) and could not hold a struggling stoat. In comparison clamping forces of most other kill traps are in excess of 80 newtons. The trap did, however, manage to kill some stoats very rapidly and this was because of the relatively high kinetic energy being applied to a small contact area across the skull.

TABLE 1. RESULTS OF MECHANICAL TESTS OF VICTOR SNAPBACK.

	STRIKING BAR DISPLACEMENT FROM CLOSED POSITION	
	10 mm	20 mm
Static clamp (newton)	8.2	10.2
Impact momentum (kg m/s)	0.245	0.242
Kinetic energy (J)	3.16	3.08
Velocity at impact (m/s)	25.80	25.48

4.2 PEN TESTS

All stoats tested were adult males and ranged in weight from 229 g to 450 g. The first stoat that was not killed was struck on the shoulder as a result of having to push its head too far into the trap before triggering it (Table 2).

TABLE 2. OUTCOMES OF TESTS OF VICTOR SNAPBACK TRAPS SET USING A SAFETY PIN ATTACHED TO THE BASE OF THE PLASTIC TRIGGER.

WEIGHT (g)	SEX	STRIKE LOCATION	PALPEBRAL REFLEX* (min. : s)	HEART STOP (min. : s)	NOTES
303	Male	Skull, behind ears	0 : 39	3 : 40	Skull broken
367.7	Male	Neck	0 : 40	0 : 50	Vertebrae fractured
–	Male	Shoulder	–	–	Escape

* Note: Times to loss of palpebral reflex are often maximum figures as it took the observer about 30 s to reach and monitor a captured animal, and often the animal would have been rendered unconscious more quickly than this.

Using the metal trigger, two further stoats were killed successfully. A third animal was hit by the bar but not held, and so escaped. Because of the speed of the trap, even by replaying the video, the strike location could not be determined (Table 3).

TABLE 3. OUTCOMES OF VICTOR SNAPBACK TRAPS SET USING THE COMMERCIALLY SUPPLIED METAL TRIGGER.

WEIGHT (g)	SEX	STRIKE LOCATION	PALPEBRAL REFLEX (min. : s)	HEART STOP (min. : s)	NOTES
379.0	Male	Across skull	0 : 33	3 : 10	Fractured skull
450	Male	Rear of skull	0 : 35	3 : 16	
410	Male	?	–		Escape

With the further modification of the trigger three more stoats were successfully captured and killed, however a fourth animal escaped (Table 4). Although the first of these stoats was killed it still managed to pull free from the trap. The last stoat in this series was struck successfully on the head, escaped and recovered.

TABLE 4. OUTCOMES OF VICTOR SNAPBACK TRAPS SET WITH A SAFETY PIN ATTACHED TO THE METAL TRIGGER.

WEIGHT (g)	SEX	STRIKE LOCATION	PALPEBRAL REFLEX (min. : s)	HEART STOP (min. : s)	NOTES
229	Male	Skull, between ears and eyes	0 : 30	3 : 00	Pulled out of trap after about 2 s. Fractured skull
257	Male	Skull, between ears and eyes	0 : 45	3 : 05	Fractured skull
292	Male	Skull, just forward of ears	0 : 39	4 : 07	Fractured skull
410	Male	Head	–	–	Escape, animal stunned, but recovered after 3 min.

5. Conclusions

Although the Victor professional snapback trap had the capacity to kill stoats quickly, it was difficult to get the trap to do so consistently. To capture and kill successfully, kill traps must have sufficient impact momentum and clamping force (Warburton & Hall 1995). The relatively high proportion of escapes in these trials indicated that the trap had insufficient clamping force to hold the animals if they were not rendered unconscious quickly. The last stoat tested was struck on the head and knocked unconscious, but recovered, which indicates that the impact momentum of this trap is marginal for achieving a consistent kill. The mechanical tests showed that the trap had clamping forces and impact momentum well below those of many other kill traps used in New Zealand (Warburton & Hall 1995). These results therefore indicate that before any new traps are considered for pen testing they should at least have mechanical values that exceed those found for this trap. This will reduce the chance of test animals being subjected to trials using ineffective traps.

Additionally, the traps tested were brand new and, therefore, would have been performing at their best. With use the impact momentum will only decline, increasing the probability that captured stoats would not be killed quickly.

All the test trigger systems achieved cranial strikes. However, even though sample sizes are too small to be conclusive, the third trigger system tested appeared to give the most consistent strike location. It struck all four stoats (including the escaped animal) on the skull between the ears and the eyes. As expected the first trigger system, which held the bait further into the covered funnel, struck further back and would be more likely to result in neck strikes. Such a strike location is probably ineffective because most mustelids have a strong muscle system around the neck. For mink (*Mustela vison*) kill thresholds for impact momentum on their necks are higher than those for head strikes (Zelin et al. 1983).

The approval of the Victor professional snapback trap for use on Canadian stoats (short-tailed weasels), but failure in New Zealand, is most likely due to the considerably smaller size of the Canadian animals. The results of this trial and the Canadian approval suggest that a snapback trap with increased impact momentum and sufficient clamping force to hold the animal could effectively kill New Zealand stoats.

6. Recommendations

We make the following recommendations.

- The Victor professional snapback trap with current configurations should not be used to target stoats, or be considered as a potential replacement for Fenn traps.
- DOC should continue to seek a humane alternative trap to Fenn traps, which can be recommended for trapping stoats.

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