Manaaki Whenua
Landcare Research

Pen testing the kill efficacy of four predator traps, 2021/22

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Pen testing the kill efficacy of four predator traps, 2021/22

Contract Report: LC4182

Grant Morriss

Manaaki Whenua – Landcare Research

Reviewed by:	*Approved for release by:*
Graham Hickling Senior Researcher Manaaki Whenua – Landcare Research	Chris Jones Portfolio Leader – Wildlife Management & Conservation Ecology Manaaki Whenua – Landcare Research

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Summary

Project and client

- Manaaki Whenua – Landcare Research, Lincoln, was contracted by the Department of Conservation (DOC), through DOC's Tools to Market programme, to assess the killing performance of four predator kill traps. The work was undertaken between December 2021 and August 2022.

Objective

- To test the killing performance of selected kill traps against possums, Norway rats, and ship rats, using the National Animal Welfare Advisory Committee (NAWAC) trap-testing guideline.

Methods

- DOC provided traps sourced from various manufacturers. The traps and species tested were:
  - SA3 possum
  - Ka Mate ship rat
  - Ka Mate Norway rat
  - BT200 Norway rat
  - DOC150 ship rat.
- Wild-caught possums and rats were penned individually and trialled in a free-approach test. Traps were set as per manufacturers' instructions.
- Once an animal was struck by the trap, the time to loss of palpebral (blinking) reflex was measured to determine whether the trap had rendered the captured animal irreversibly unconscious within 3 minutes. For the trap to pass the NAWAC trap-testing guidelines, 10 of 10 animals need to be rendered irreversibly unconscious within 3 minutes.
- Animals that were trapped but remained conscious for longer than 3 minutes were euthanised, and, for all captures, the trap jaw-strike location was identified and recorded.
- This work was carried out with the approval of the Manaaki Whenua – Landcare Research Animal Ethics Committee (AEC 21/11/04).

Results

- The SA3 trap successfully killed the first possum tested but failed with the second when this individual was struck anterior to the eyes, pulled itself out of the trap, and remained conscious beyond 3 minutes. The possum was euthanised and testing ceased.
- The Ka Mate trap successfully killed the first six ship rats tested, with all sustaining skull fractures. The seventh rat was hit longitudinally on the head and was

incapacitated, but remained conscious beyond 3 minutes and was euthanised. Testing ceased.

- Two Norway rats were killed successfully with the Ka Mate trap before the third was struck anterior to the eyes and remained conscious. The third rat was euthanised and testing ceased.
- The BT200 successfully killed seven Norway rats, either with compression of the body and/or skull fractures. The eighth rat was struck in the head with a glancing blow by the first kill bar but remained mobile and conscious for more than 3 minutes. This rat was euthanised and testing ceased.
- Nine ship rats were killed successfully with the DOC150 trap, with all sustaining skull fractures. Another three rats triggered the trap but escaped uninjured, so, because no welfare compromise had occurred with these individuals, testing continued. The 13th ship rat tested was caught by the front left foot and remained conscious beyond 3 minutes. Testing ceased.

Conclusions

- All four trap designs tested failed to pass the NAWAC trap-testing criterion.
- The SA3 trap could be modified to protect the external setting wire to reduce the chance of a possum triggering the trap prematurely if it approaches the trap from the side or above. Alternatively, setting the unmodified trap above a leaning board may guide possums into the trap more centrally and reduce the risk of premature set-off.
- The Ka Mate trap may only need a minor change to pass the NAWAC trap-testing criterion. Both rats that failed were struck in the head and would probably have been successfully killed if a few millimetres further into the trap. Adapting the trigger so that the bait is c. 5 mm further into the trap or extending the kill bar by 5 mm could meet the NAWAC trap-testing criterion if the modified trap is resubmitted for testing.
- Both the BT200 and DOC150 traps have already passed the NAWAC trap-testing criterion with ship rats and Norway rats, respectively. Though both trap types failed during the testing reported here, the number of successful kills indicates minor refinement could be all that is needed to optimise killing efficacy. Reducing the size of the plate could improve the consistency of successful capture outcomes by ensuring the rat is more centralised within the trap before it fires.

Recommendations

- DOC should consider which of the traps tested here are suitable for further investigation, taking into consideration likely uptake and utility, then liaise with trap manufacturers to see if they are willing to modify traps and resubmit them for NAWAC testing.
- DOC should continue to test the killing efficacy of new trap models. Traps that are used to target pest species other than those listed by Predator Free 2050 could be included to increase the tools available for multi-species pest control.

1 Introduction

Manaaki Whenua – Landcare Research, Lincoln, was contracted by the Department of Conservation (DOC), through DOC's Tools to Market programme, to assess the killing performance of four predator kill traps. The work was undertaken between December 2021 and August 2022 and was the first year of a 3-year contract.

2 Background

In 2000 the National Animal Welfare Advisory Committee (NAWAC) approved 'NAWAC guideline 09: Assessing the welfare performance of restraining and kill traps' to guide the testing of animal traps in New Zealand. Since then, many traps used for capturing vertebrate pests in New Zealand have been assessed against the guideline's performance criteria.

Predator Free 2050 (PF2050) is a coordinated nationwide programme with the goal of eradicating mustelids (stoats, ferrets, and weasels), rats, and possums from mainland New Zealand by 2050. There has been a groundswell of support for PF2050 across the country, with many groups initiating pest control operations.

DOC's trap welfare best practice guidance (DOC 2021) makes the following recommendations:

i Traps that have met the current NAWAC guideline tests should be used in preference to those that have not (either untested or failed).

ii Staff should apply this consideration to traps used in DOC operations including collaborative operations with other agencies or community groups.

iii Approving managers should apply the same preference when considering applications by other agencies, community groups, or individuals to use traps on public conservation land. To facilitate this a best practice guide was created: *PF2050 – A Practical Guide to Trapping*.[1]

The DOC Tools to Market programme was created to invest in the development of new predator control tools and technology to support Predator Free 2050. This programme is being used to fund the testing of up to five different types of trap each year for 3 years from 2021. Selected traps will be tested against the NAWAC guidelines to increase the number of commercially available NAWAC-tested predator traps in the marketplace. Compliance with NAWAC will assure the Predator Free 2050 community, and the public in general, that the traps are killing the targeted species as humanely as possible. The 2021/22 test results reported here are for the first five trap tests (four different trap types) tested within the Tools to Market programme.

[1] https://www.doc.govt.nz/globalassets/documents/conservation/threats-and-impacts/pf2050/pf2050-trapping-guide.pdf (accessed 2 August 2022).

3 Objective

- To test the killing performance of selected kill traps against possums, Norway rats, and ship rats using the NAWAC trap-testing guideline.[2]

4 Methods

DOC provided traps that were sourced directly from various manufacturers (Table 1). The different trap types were tested on species nominated by DOC (Table 1), with traps set as per the manufacturers' instructions and outlined in the following test descriptions.

Table 1. Manufacturer, trap type, and species tested

Manufacturer	Trap type	Species tested
Steve Allan	SA3	Possum
Ka Mate Traps Ltd	Ka Mate	Ship rat; Norway rat
National Springs and Wire Products NZ Ltd	BT200	Norway rat
CMI Springs	DOC150	Ship rat

4.1 Test 1. SA3 trap on possums

Possums were acclimatised to captivity in outdoor pens for at least 1 month before being transferred to observation pens for the trap testing. Possums were penned individually, and the trap was tested in a free-approach test. In each observation pen one trap was set 75 cm above the ground on a vertical post (Figure 1). The trap was baited with flour lure (50:50 mix of flour and sugar, flavoured with five-spice powder) on the floor of the trap and on the post leading up to the trap. The trap set was pre-fed for 4 nights with the trap left unset and baited as above, and the lure was replenished daily.

When a possum was struck by the trap, the time to loss of palpebral (blinking) reflex was measured to determine whether the trap rendered the captured animal irreversibly unconscious within 3 minutes. For the trap to pass the NAWAC trap-testing guideline (2019), 10 of 10 possums needed to be rendered irreversibly unconscious within 3 minutes. Once irreversible unconsciousness was identified, a stethoscope was used to determine cessation of heartbeat.

[2] National Animal Welfare Advisory Committee (NAWAC) 2019. Guideline 09: Assessing the welfare performance of restraining and kill traps 2019. https://www.mpi.govt.nz/dmsdocument/8521-nawac-guideline-09-assessing-the-welfare-performance-of-restraining-and-kill-traps (accessed 2 August 2022).

Figure 1. Unset SA3 kill trap attached to a post 75 cm above the ground. The trap was baited with flour lure (50:50 mix of flour and sugar flavoured with five-spice) on the floor of the trap and on the post leading up to the trap.

4.2 Test 2. Ka Mate trap on ship rats

Wild-caught rats were acclimatised to captivity in cages before being transferred to test arenas (L 2.5 m, H 1.0 m, W 0.8 m) for the trap testing. Rats were confined individually in each arena and tested in a free-approach test during the evening. In each arena a trap in a vertically set tunnel was screwed into a plywood backing board and into the side of the arena, with the base of the tunnel 10 cm above the ground (Figure 2). The trap was baited with round, flat-sided pellets provided by the manufacturer, which were made from RS5 prefeed bait with additional sugar and cinnamon lure. The traps were pre-fed for 3 to 11 nights with the trap set but cable-tied open, and pellets placed under the trigger and trap and beside the kill bar cover plate. A section of flax stem containing cinnamon lure was also included as an additional lure under the trap (Figure 2). Rats were provided with standard feed pellets (ProLab RHM 1800 LabDiet, PMI Nutrition International, MO, USA), which were placed in the arena, and water was available *ad libitum*.

When the traps were set for lethal testing they were only baited with a pellet under the trigger and the cable tie was removed. When a rat was struck, it was assessed according to the method described in test 1.

Figure 2. Ka Mate trap and vertically set tunnel (shown open) as deployed for tests 2 & 3. The trap is shown as it was configured for pre-feeding. A cable tie prevented the trap firing and bait was placed under the trap and trigger, and beside the kill-bar cover plate. A cinnamon-lured flax stem was also included as an additional lure beneath the trap. During pre-feeding and testing the hinged tunnel front was closed; rats accessed the trap through the two triangular entry holes at the base of the tunnel. Standard feed pellets are shown in the sawdust to the left of the trap. A Protecta EVO Ambush Bait Station (in background) was provided as a secondary nest box.

4.3 Test 3. Ka Mate trap on Norway rats

Wild-caught Norway rats were acclimatised, housed, and tested as described for ship rats in test 2 (Figure 2), except there were 5 nights of pre-feeding before lethal testing commenced.

4.4 Test 4. BT200 trap on Norway rats

The BT200 traps as supplied required calibration of the spring-off weight of the trap treadles. This was adjusted to 100 g using the methods described for the DOC200 trap in the Predator Free 2050 *Practical Guide to Trapping*. In addition, each trap was set and fired 10 times using a substitute target prior to animal testing, as per the preparation of traps recommended in the NAWAC guideline.

Wild-caught Norway rats were acclimatised and housed as described for tests 2 & 3. As in tests 2 & 3, rats were confined individually in each arena and tested in a free-approach test. In each arena a trap was screwed into and set in a single-set wooden tunnel (manufactured to DOC design specifications by Haines Pallets, Lower Hutt; Figure 3). The trap was baited with bacon fat smeared on standard rodent feed pellets, which were placed beyond the trap in the tunnel. The rats were pre-fed for 2 to 7 nights with the trap unset before lethal testing commenced.

Figure 3. Unset BT200 kill trap in a Haines Pallets single-entrance wooden tunnel. The lid has been unscrewed and opened to view the trap from above. The trap was firmly screwed to the tunnel base. Standard rodent feed pellets smeared with bacon fat were placed to the left of the trap.

4.5 Test 5. DOC150 on ship rats

The DOC150 traps required adjustment of the trigger arm so that they could be set, and calibration of the spring-off weight of the trap treadles, which was adjusted to 90–100 g. The traps were set and fired 10 times each using a substitute target prior to animal testing. One trap was excluded from testing because it had a defective plate, which would not lift to engage the sear and could not be set.

Each trap was set within a single-set plastic tunnel with Perspex baffles (manufactured by CMI Springs, Auckland; Figure 4). The trap was firmly attached to the tunnel base with bolts and baited with either Nutella® or smooth peanut butter smeared on standard rodent feed pellets that were placed in the bait receptacle beyond the trap in the tunnel. A

small additional amount of the paste bait was applied on the tunnel floor between the entrance baffles to encourage entry by rats. The rats were pre-fed for 2 to 19 nights with the trap unset before lethal testing commenced. Five rats that did not enter the trap boxes during the pre-feed period were removed from testing and replaced with other rats.

Figure 4. Unset DOC150 traps in CMI plastic tunnels. The tunnel on the right has external damage (chewing) on the lower plastic lip and the rear Perspex baffle caused by a ship rat during the pre-feeding period. Standard rodent feed pellets smeared with either Nutella® or smooth peanut butter were placed in the bait receptacle.

Any rats that survived were euthanised by cervical dislocation. This work was carried out with the approval of the Manaaki Whenua - Landcare Research Animal Ethics Committee (AEC 21/11/04).

5 Results

5.1 Test 1. SA3 trap on possums

The SA3 trap successfully killed the first possum tested (Figure 5) but failed with the second. The second individual was struck anterior to the eyes, pulled itself out of the trap, and remained conscious beyond 3 minutes (Table 1). The second possum had climbed the post and accessed the trap from the side. This angle of approach may have caused

premature firing of the trap, either when the possum knocked the external trigger wire with one of its paws, or because its head was angled sub-optimally when it pushed the internal trigger on the post side of the trap.

Figure 5. Possum successfully killed in SA3 trap.

5.2 Test 2. Ka Mate trap on ship rats

The Ka Mate trap successfully killed the first six ship rats tested, with all sustaining skull fractures (see Appendix 1). All six were irreversibly unconscious when first assessed. The seventh rat was hit longitudinally on the head and was incapacitated, but remained conscious past 3 minutes and was euthanised (Table 2).

5.3 Test 3. Ka Mate trap on Norway rats

Two Norway rats were killed successfully with the Ka Mate trap before the third was struck anterior to the eyes; that rat was incapacitated but remained conscious (Table 3; Appendix 1), so it was euthanised and testing ceased.

5.4 Test 4. BT200 trap on Norway rats

The BT200 successfully killed seven Norway rats, either with compression of the body and/or skull fractures. The eighth rat was struck in the head with a glancing blow by the first kill bar but remained conscious and mobile. This rat was euthanised after remaining conscious beyond 3 minutes (Table 4; Appendix 2). Testing ceased.

5.5 Test 5. DOC150 on ship rats

Nine ship rats were killed successfully with the DOC150 trap, with all sustaining skull fractures. Another three rats triggered the trap but escaped uninjured, so, because no welfare compromise had occurred with these individuals, testing continued. The 13th ship rat tested was caught by the front left foot and remained conscious beyond 3 minutes (Table 5; Appendix 3). Testing ceased.

Table 2. Outcome of test using the SA3 kill trap for capturing possums

Test date	Weight (kg)	Sex	Time to loss of palpebral reflex	Time to heart stop	Strike location	Notes
22/03/2022	3.10	F	2 m 1 s	4 m 18 s	Kill bar behind angle of the jaw.	Full occlusion of airway leading to irreversible unconsciousness.
22/03/2022	3.10	F	-	-	Kill bar strike anterior to the eyes.	Pulled out of trap after c. 10 s; vocalised when caught; possum approached trap from around side of post; possibility that its paw pushed on the setting wire on the outside of the trap, causing it to fire prematurely, or its head was angled sub-optimally in the trap entrance as the trap fired.

Table 2. Outcome of test using the Ka Mate kill trap for capturing ship rats

Test date	Weight (g)	Sex	Time to loss of palpebral reflex	Time to heart stop	Strike location	Notes
5/04/2022	195.3	M	<33 s	3 min 9 s	1st kill bar across ear on side of head.	Fractured skull.
5/04/2022	195.3	M	<37 s	3 min 13 s	1st kill bar across skull between eyes.	Pulled out of trap with reflexive movement after c. 1 m; fractured skull; right eye protruding due to impact.
8/04/2022	186.1	M	<26 s	2 min 17 s	1st kill bar across side of head between ear and eye.	Fractured skull.
11/04/2022	175.5	M	<23 s	9 min 54 s	2nd kill bar across side of head between ear and eye.	Remained irreversibly unconscious but breathing until 8 min 39 s resulting in prolonged heart stop; fractured skull.
12/04/2022	146.0	F	<20 s	3 min 29 s	1st kill bar across side of head between ear and eye.	Fractured skull.
12/04/2022	130.2	F	<21 s	3 min 28 s	1st kill bar lateral strike across skull between eyes and ears.	Not held by trap; plucked whiskers under 1st kill bar; fractured skull.
19/04/2022	179.0	M	-	-	1st kill bar longitudinal strike along right edge of head.	Not held by trap; remained conscious but incapacitated; right eye damaged by impact; extensive bruising under skin on right side of head.

Table 3. Outcome of test using the Ka Mate kill trap for capturing Norway rats

Test date	Weight (g)	Sex	Time to loss of palpebral reflex	Time to heart stop	Strike location	Notes
1/05/2022	293.6	M	<30 s*	4 min 43 s	Dorsal strike between eyes and ears.	Rat ended up inverted held by nose following reflexive movement after the strike; initial breaths but soon ceased.
1/05/2022	229.7	F	<37 s	3 min 13 s	1st kill bar across side of head in line with ear; 2nd kill bar across muzzle.	Fractured skull.
1/05/2022	251.6	F	-	-	Anterior to eyes.	Not held by trap; remained conscious but incapacitated; nasal cavity crushed in front of eyes.

* Rat inverted but held in trap so eyes could not be accessed to assess irreversible unconsciousness. No other indicators of consciousness observed (i.e. conscious movement or vocalisation).

Table 4. Outcome of test using the BT200 kill trap for capturing Norway rats

Test date	Weight (g)	Sex	Time to loss of palpebral reflex	Time to heart stop	Strike location	Notes
30/05/2022	258.1	M	<24 s	<3 min	1st bar abdomen; 2nd bar abdomen; 3rd bar back of chest; 4th bar back of skull; 5th bar across eyes; 6th bar across muzzle.	Compression of body and skull fracture; no signs of life detected.
30/05/2022	249.7	M	<19 s	<3 min	1st bar back of skull; 2nd bar between eyes and ears; 3rd bar across muzzle.	Major skull fracture.
30/05/2022	176.1	M	<21 s	<3 min	1st bar back of skull; 2nd bar across eyes; 3rd bar across nose.	Major skull fracture.
1/06/2022	234.5	F	<21 s	<3 min	1st bar back of chest; 2nd bar chest; 3rd bar neck/back of skull; 4th bar in front of eyes.	Compression of body.
1/06/2022	241.0	M	<18 s	5 min 27 s	1–3 bars abdomen; 4th bar neck; 5th bar between ears and eyes; 6th bar across muzzle.	Compression of body and skull fracture.
1/06/2022	284.5	M	<21 s	4 min 22 s	1st bar between ears and eyes; 2nd bar across muzzle.	Major skull fracture.
3/06/2022	184.3	F	<26 s	<3 min	1st bar across hips; 2–3 bars abdomen; 4th bar chest; 5th bar shoulder; 6th bar between ears and eyes.	Compression of body and skull fracture.
3/06/2022	270.9	M	-	-	Glancing blow to head by 1st bar.	Not held by trap and retreated to nest box; left eye protruding but remained conscious and mobile; euthanised at 5 minutes.

Table 5. Outcome of a test using the DOC150 kill trap for capturing ship rats

Test date	Weight (g)	Sex	Time to loss of palpebral reflex	Time to heart stop	Strike location	Notes
14/06/2022	127.5	M	<14 s	<3 min	1st bar abdomen; 2nd bar abdomen; 3rd bar back of chest; 4th bar back of skull; 5th bar in front of eyes; 6th bar tip of nose.	Full body compression and skull fracture.
16/06/2022	144.0	M	-	-	Nil – complete miss.	
19/06/2022	126.1	M	-	-	Nil – complete miss.	
26/06/2022	101.7	F	<25 s	<3 min	1st bar abdomen; 2nd bar abdomen; 3rd bar chest; 4th bar skull; leading edge of kill bars longitudinally along body.	Full body compression and skull fracture.
26/06/2022	143.4	M	<18 s	<3 min	1st bar rear of chest; 2nd bar chest; 3rd bar back of skull; 4th bar tip of nose.	Chest compression and skull fracture.
28/06/2022	142.0	M	<16 s	<3 min	1st bar chest; 2nd bar neck; 3rd bar across eyes.	Chest compression and skull fracture.
3/07/2022	158.5	M	<19 s	4 min 12 s	1st bar chest; 2nd bar neck; 3rd bar across eyes.	Chest compression and skull fracture.
3/07/2022	237.0	M	-	-	Nil – complete miss.	
8/07/2022	168.5	M	<23 s	<3 min	1st bar shoulder; 2nd bar across ears; 3rd bar across tip of nose	Chest compression and skull fracture.
15/07/2022	176.8	M	<29 s	<3 min	1st bar abdomen; 2nd bar abdomen; 3rd bar back of chest; 4th bar back of skull; 5th bar across eyes.	Full body compression and skull fracture.
15/07/2022	122.0	F	<14 s	<3 min	1st bar abdomen; 2nd bar abdomen; 3rd bar back of chest; 4th bar back of skull; 5th bar across eyes.	Full body compression and skull fracture.
19/07/2022	185.8	M	<20 s	4 min 32 s	1st bar abdomen; 2nd bar abdomen; 3rd bar back of chest; 4th bar shoulder; 5th bar across ears; 6th bar across eyes.	Full body compression and skull fracture.
19/07/2022	121.7	F	-	-	1st bar front left paw.	Paw crushed; euthanised at 5 minutes.

6 Conclusions

All four trap designs tested failed to pass the NAWAC trap-testing criterion. Minor changes to the trap designs, as outlined below, could result in traps passing the criterion if they were modified and retested.

6.1 SA3 trap modification

The SA3 trap could be modified to shield the external setting wire to reduce the chance of a possum triggering the trap prematurely if it approaches the trap from the side or above. Alternatively, setting the unmodified trap above a leaning board may direct possums into the trap more centrally and reduce the risk of premature set-off. This setting method has already been assessed on possums and passed the NAWAC trap-testing criterion with the larger SA2 Kat trap, which has the same design (Morriss 2018).

6.2 Ka Mate trap modification

The Ka Mate trap may only need a slight change to pass the NAWAC trap-testing criterion. Both rats that failed to be killed quickly were struck in the head and were likely to have been successfully killed if they were a few millimetres further into the trap when struck. The reverse trigger design of the Ka Mate trap means rats pull out the bait and are struck on the way out. Having the trap set vertically also means that gravity increases the distance rats move out of the trap before being struck. It is possible that rats would not get as far out if the trap was set in a horizontal tunnel and therefore would be lethally struck more consistently. Overall, targeting was quite consistent, so if the manufacturer wishes to continue using traps in vertically set tunnels, modifying the trigger so that baits are c. 5 mm further in, or alternatively, extending the kill bar by c. 5 mm, could result in consistent kills.

6.3 BT200 trap modification

The BT200 has already passed the NAWAC trap-testing criterion with ship rats (Morriss 2022). Though the trap failed the Norway rat testing reported here, the number of successful kills indicates minor refinement could be all that is needed to optimise killing efficacy. Reducing the size of the plate could improve the consistency of successful capture outcomes, with rats more centralised in the trap before it fires. All the traps had been calibrated prior to the test starting using the method described in the Predator Free 2050 *Practical Guide to Trapping*. As was found in previous testing (Morriss 2022), it is critical that the manufacturer calibrate the traps more accurately in controlled factory conditions before sale. Failure to do so could be detrimental to sales, with users unhappy with the quality of the product.

6.4 DOC150 trap modification

The DOC150 trap has already passed the NAWAC trap-testing criterion with Norway rats when used in a single entrance wooden tunnel.[3] Though the trap failed the ship-rat testing reported here, the number of successful kills indicates minor refinement could be all that is needed to optimise killing efficacy. Because the design of the DOC150 trap is very similar to the BT200, the same modification (i.e. reducing the size of the plate) could be used to improve the consistency of captures.

Ship rats were slow to enter the plastic tunnel used in the current test, with an average of 9 nights' exposure to the trap set before activating the trap, whereas Norway rats averaged 4 nights' exposure before activating the BT200 trap in a wooden tunnel. This could be a species difference and/or greater neophobia to newly made plastic boxes versus wooden tunnels. All plastic tunnels used for testing had rat-gnawing damage by the end of the trial, which suggests their field life could be limited when used in areas with high rat numbers.

The DOC150 traps required adjustment of the trigger arm so that they could be set, and calibration of the spring-off weight of the trap treadles. One trap could not be used because it had a defective plate, which would not lift to engage the sear and could not be set. As with the BT200 above, it is critical that the manufacturer calibrate the traps more accurately in controlled factory conditions before sale.

7 Recommendations

- DOC should consider which of the traps tested here are suitable for further investigation, taking into consideration likely uptake and utility, then liaise with trap manufacturers to see if they are willing to modify traps and resubmit them for NAWAC testing.
- DOC should continue to test the killing efficacy of new trap models. Traps that are used to target pest species other than those listed by Predator Free 2050 could be included in the testing programme to increase the tools available for multi-species pest control.

8 Acknowledgements

Thanks to DOC for providing traps and funding the pen testing. Thanks also to Animal Facility staff for animal husbandry, Graham Hickling and Chris Jones for review, Ray Prebble for editing, and Kate Boardman for final formatting of this report.

[3] Bionet trap testing summary table. https://www.bionet.nz/assets/Uploads/Trap-testing-summary-table-March-2022-2.pdf (accessed 8 August 2022).

9 References

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Morriss G 2018. Pen testing of the kill efficacy of the SA2 Kat trap when used for capturing possums. Manaaki Whenua – Landcare Research Contract Report LC3355 for Northland Regional Council.

Appendix 1 – Ship and Norway rats successfully killed by the Ka Mate trap during tests 2 & 3. One ship rat was struck and killed but not held by the trap

195.3 g male ship rat

195.3 g male ship rat

186.1 g male ship rat

175.5 g male ship rat

146.0 g female ship rat

130.2 g female ship rat

293.6 g male Norway rat

229.7. g female Norway rat

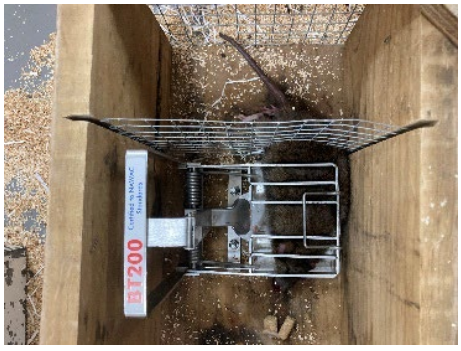
Appendix 2 – Norway rats caught by the BT200 trap during test 4, showing variation in kill bar strike location

258.1 g male

249.7 g male

176.1 g male

234.5 g female



241.0 g male

284.5 g male

184.3 g female

Appendix 3 – Ship rats caught by the DOC150 trap during test 5, showing variation in kill bar strike location

127.5 g male

101.7 g female

143.4 g male

142.0 g male

158.5 g male

168.5 g male

176.8 g male

122.0. g female

185.8 g male

121.7 g female (fail)