

# POSSUM CONTROL – HAND BROADCAST 1080 PELLET OR CARROT BAITS (with optional [deer repellent](#))

## (CONTROLLED SUBSTANCES LICENCE REQUIRED)

This document summarises research findings that underpin the key technical aspects of hand-laying 1080 baits for possum (and rat) control. This and the broader context of possum control and monitoring are reviewed in greater detail elsewhere [1].

### **Timing of operations**

- Possum feeding behaviour and body condition change throughout the year: this generally does not appear to affect the proportion of populations that eat bait [2] but the sudden appearance of ephemeral foods such as nikau flowers and hinau fruit can cause a rapid change in possum diet [3] and, though not yet verified, this may reduce possums' encounter with and consumption of baits.
- Possums are more susceptible to 1080 at lower temperatures, and kill rates tend to be higher for operations carried out on colder nights, often exceeding 90% kills on nights colder than 9° C [4]
- The traditional season of winter-early spring is therefore probably the more assured period for effective aerial 1080 operations. Furthermore, if rodents are being targeted, bait acceptance is highest in winter [5]. Local weather conditions, logistical constraints, and other factors may necessitate the operation being done at other times of the year.

### **Bait**

- Most operations use cereal-based pellet baits, though chopped carrot bait is occasionally used [6].
- Two pellet bait formulations are currently available: RS5, and No. 7 (Animal Control Products, Wanganui). Baits are cylindrical and available in three sizes: 10, 16, and 20 mm diameter with corresponding approximate mean weights of 2, 6 and 12 g.
- Carrots should be Royal Chantenay variety: this is highly palatable to possums [7]. Carrots must be washed and free of foreign objects. Carrot bait of optimal size is made using a machine in which the cutting grid has a 28-mm mesh, and small particles are then removed using a screening drum with holes measuring 18 - 22mm diameter[8]. Reliance carrot cutters are known to consistently produce good bait [9].
- 1080 is incorporated in pellets, or applied to the surface of carrot bait in the cutting machine, at 1.5 g/kg i.e. 0.15% wt:wt. Lower 1080 concentrations reduce possum kills and cause bait-shyness [10,11].
- Cinnamon oil is used to primarily to mask 1080 [12] but it also improves detection of baits by possums and enhances bait palatability [13]. At a concentration of 0.3% wt/wt, it is expected to remain effective in baits stored for up to 12 months [14]. Higher concentrations (> 0.5%) reduce the palatability of baits [7].

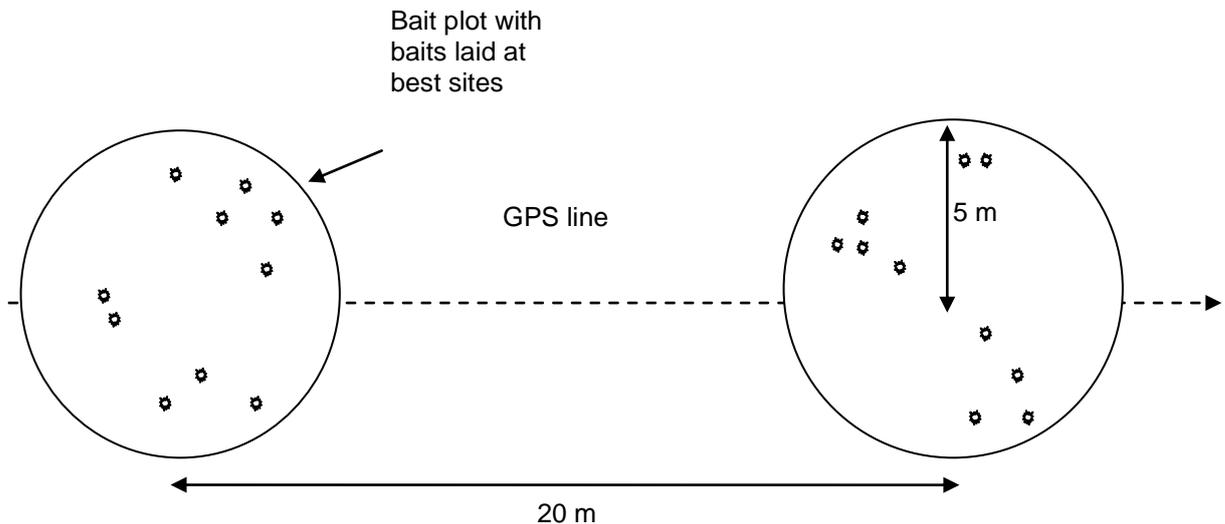
- Baits need to be hard enough to resist fragmentation during transport, handling and aerial distribution. Fragments increase the risk of sub-lethal poisoning of possums [15] and increase the hazard posed to small non-target animals [8,16]. However, palatability of baits declines with increasing hardness [7]. To avoid these problems, specifications have been developed for both maximum and minimum bait hardness, and practical methods designed for pest managers to check bait hardness [17].
- Green dye is included in bait as a bird-deterrent. Together with improved bait quality (i.e. greatly reduced fragmentation), this has reduced the risk to most bird species studied [18,19]. Risk assessment procedures [20] have been developed, and deterrent bait additives are being developed for some species that may be put at risk during 1080 operations, such as kea [21].
- Where it is necessary to protect deer, baits should be used that contain Epro Deer Repellent (EDR). EDR is effective in deterring deer from eating baits but does not deter possums [22]. Prefeed baits should also be treated with the repellent. Cinnamon is generally used at a reduced concentration of 0.075% when deer repellent is applied to baits: operational experience indicates that it may reduce the effectiveness of the deer repellent if used at higher concentrations (K. Stafford, pers.comm.) but this has yet to be experimentally verified.
- Generally, RS5 bait is used where a shorter exposure period is required (e.g. where livestock have been temporarily shifted) and where there is little chance of rain ruining the bait on the first night. 16 mm RS5 baits begin to disintegrate after 5 mm of rain, and about 40% of the 1080 leaches out of the baits with 10mm of rain [23].
- In wet forest and where a longer exposure period is sought, the No.7 bait is generally preferred as it is more water resistant [23]. 1080 begins to leach out rapidly after the first 10 mm rain [23]. This will increase the chances of possums being sub-lethally poisoned and becoming bait-shy thus jeopardising future control attempts [11]. Wet weather also reduces possum activity on the forest floor [2,24,25].
- Carrot bait is considerably more rain-resistant: almost all the 1080 was retained following 200 mm of rain [23].
- Bait must be stored in a suitable building (i.e. secure, dry, well ventilated, with a concrete floor) with no direct sunlight on stored bait. Shrink wrap around pallets should be removed to prevent the bait sweating.
- Correctly stored baits will remain adequately toxic and palatable for 12 months [14].

### **Bait application**

- The following method is based on research trials that showed it to be as cost-effective as aerial-1080 poisoning on flat, dissected terrain [26,27]. This was achieved by carrying out prefeeding aerially, then following GPS-logs of flight paths to hand lay 1080 baits. Pre-feeding with non-toxic baits increases the average possum kill [28-30]. Prior exposure to non-toxic bait (i) reduces possums' wariness (neophobia) to toxic bait [28,29], (ii) leads to possums revisiting the prefeed sites [31] increasing the likelihood that possums will subsequently discover toxic baits, and (iii) reduces the likelihood of bait-shyness occurring in possums that may survive [32,33].
- Where pellet baits are used, small 10 mm baits can be used for aerial prefeeding, giving the advantage of more baits on the ground and, hence, increased rate of encounter by possums. Subsequently, it is preferable to use 20 mm baits for toxic baiting. This ensures

that possums are always exposed to a lethal dose of 1080 [10,34], and is especially important when baits are distributed in clusters covering only a small proportion of the entire area [35].

- Aerially prefeed the site along GPS-defined flight paths 100 m apart using 10-mm cereal pellets or, if carrot is used, small baits produced by an appropriate cutting grid. This saves on cost (of bait and aerial sowing) while achieving the aims of prefeeding.
- Adjust sowing equipment to deliver the bait in a swath of 60 m and at a rate of 1.7 kg/100m of flight-path. This will produce an area-wide (i.e. over the entire area, not just the baited swaths) distribution of bait of 1 kg/ha.
- Using the same GPS-defined flight paths as used for aerial prefeeding, lay toxic baits at around 5-7 days after prefeed bait has all been removed (usually 2-3 days). Follow the lines and record baiting points at 20 m intervals as waypoints.
- At each baiting point, lay 10 toxic 12-g pellet baits or carrot baits (screened to remove chaff [8]). The 1080 baits are laid by placing them at ‘best’ sites (i.e. runs, open ground, or alongside bark bitten trees etc) within an approximate radius of 5 m at each baiting point:



- Toxic bait should be broadcast onto dry ground [36] and applied during a fine weather window of at least 3 nights. Wet weather reduces possum activity on the forest floor [24,25].

### **Sustaining control over the long term**

- Monitoring conservation outcomes is essential to judge effectiveness of the control programme. Control operations are useless unless outcomes are achieved.
- Pre- and post-operational monitoring is essential to determine the effectiveness of the operation. A comparison of pre- and post- data gives the most robust estimate of the kill result. Post- data cannot reliably be compared between operations.
- It is not advisable to use the same bait more frequently than once every 3 - 4 years. This time period can be reduced if good results were achieved during the previous operation,

and the current operation is preferred, and the lure is changed. Surviving possums are highly likely to be bait shy, making frequent repeated use of 1080 cereal ineffective [37].

- Pre-feeding, and using alternative bait types and lures can improve possum kills where 1080 bait shyness has been induced when using cereal bait [11].
- Reinvasion of possums into controlled areas can be reduced using, natural boundaries e.g. waterways and pasture, and treating buffer zones of at least 3km wide [38].

## Limitations

- Incorrect use of 1080 baits can cause bait shyness that probably lasts for the lifetime of individual possums and can be significant in a possum population for at least 3 years [39].
- Labour costs increase in difficult terrain and with size of area.
- Community views on 1080 can vary, effective consultation is required.
- This technique is incompatible with other conservation work that use dogs, e.g. goat hunting, threatened species and predator work.
- Toxic carcasses can wash out of operational area posing risks to dogs.
- Handlaying operations are highly weather dependant making the exact timing of the operation unpredictable.
- Incorrect use of 1080 cereal bait can cause bait shyness that probably lasts for the lifetime of individual possums and can render further 1080 operations ineffective for at least 3 years [39].
- Reinvasion of possums into controlled areas can be reduced using natural boundaries (e.g. waterways and pasture), or treating buffer zones of at least 3km width [38].

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