

POSSUM CONTROL - AERIAL APPLICATION OF 1080 CEREAL PELLETS OR CARROT BAIT (with optional [deer repellent](#))

(CONTROLLED SUBSTANCES LICENCE REQUIRED)

Conduct of aerial 1080 control operations is a complex technical task that is preceded by a lengthy period of consultation with affected parties and application for permits from a number of agencies. Current best practice advice is available elsewhere with respect to the [management](#) and [conduct](#) of aerial 1080 operations.

This document summarises research findings that underpin the key technical aspects of aerial 1080 poisoning of possums. 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 hinu fruit can cause a rapid change in possum diet [3]. An abundance of tawa fruit was also considered to be the most likely reason for poor bait acceptance in trials of different baiting strategies [4].
- 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 [5]
- 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 [6]. 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 [7].
- 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 [8]. Carrots must be washed and free of foreign objects. Carrot bait is optimally 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[9]. Reliance carrot cutters are known to consistently produce good bait [10].
- 1080 is incorporated in pellets, or applied to the surface of carrot bait, at 1.5 g/kg i.e. 0.15% wt:wt. Lower 1080 concentrations reduce possum kills and cause bait-shyness [11,12].

- Cinnamon oil is used to primarily to mask 1080 [13] but it also improves detection of baits by possums and enhances bait palatability [14]. At a concentration of 0.3% wt/wt, it is expected to remain effective in baits stored for up to 12 months [15]. Higher concentrations (> 0.5%) reduce the palatability of baits [8].
- 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 [16] and increase the hazard posed to small non-target animals [9,17]. However, palatability of baits declines with increasing hardness [8]. 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 [18].
- 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 [19,20]. Risk assessment procedures [21] 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 [22].
- 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 [23]. 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 [24].
- In wet forest and where a longer exposure period is sought, the No.7 bait is generally preferred as it is more water resistant [24]. 1080 begins to leach out rapidly after the first 10 mm rain [24]. This will increase the chances of possums being sub-lethally poisoned and becoming bait-shy thus jeopardising future control attempts [12]. Wet weather also reduces possum activity on the forest floor [2,25,26].
- Carrot bait is considerably more rain-resistant: almost all the 1080 was retained following 200 mm of rain [24].
- 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 [15].

Bait application

- Pre-feeding with non-toxic baits, generally at a rate of 2 kg/ha, increases the average possum kill [4,27,28]. It increases the likelihood that possums will subsequently discover toxic baits [29], reduces wariness (neophobia) of possums to toxic bait and increases the kill [4,30,31], and 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 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 [11,34], and is especially important when low sowing rates create a sparse distribution of baits on the ground [35].

- While traditionally, total bait coverage using conventional bait sowing buckets was required to achieve high possum kills [36], recent research suggests that more restricted distribution of baits in clusters or strips along flight paths up to 150 m apart may be equally as effective while granting the advantages of reduced cost and environmental hazard [35,37,38].
- With improvements in bait quality and bait application methods, application rates have declined dramatically since the 1970s when cereal pellet baits were used typically at a rate of 20 kg/ha [39]. Now, toxic bait is normally applied at a rate of 2 kg/ha [1]
- 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 [40].
- 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 [41].

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