IMPROVING THE OUTCOMES OF USING CANID PEST EJECTORS TO MANAGE WILD DOGS IN PERI-URBAN ENVIRONMENTS

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ABSTRACT

The use of lethal control techniques to mitigate the impacts of wild dogs (*Canis familiaris*), particularly in urban environments, can be complex and is often influenced by a variety of external factors. However, wild dog control is sometimes necessary for the prevention of, or in response to, negative impacts to livestock, native wildlife, pets, and people. Canid pest ejectors (CPEs) were registered for use in Australia in 2016 and are available for the control of peri-urban wild dogs, using either PAPP or 1080 toxin, where regulations permit. To understand and improve deployment strategies, we assessed wild dog, fox, and non-target species interactions with CPEs in peri-urban regions. Using modelling techniques, we determined when and how often GPS-tracked wild dogs would have encountered CPEs when deployed at varying densities. Then, field trials were conducted with CPEs deployed continuously for twelve months across five sites on the Sunshine Coast or Gympie regions. Interactions and activations of CPEs were monitored with camera traps. Finally, a CPE capsule toxin degradation trial was conducted to determine if 1080 and PAPP capsules remained sufficiently toxic when not activated and continually deployed over a two-year period. This paper will provide a brief overview of the results of these trials, including assessments of target and non-target species interactions with CPEs, and discuss recommended deployment strategies for their optimal and safe use.

Keywords: Wild dog, control, canid pest ejector, management.

INTRODUCTION

Peri-urban landscapes are rapidly developing in many countries worldwide, including Australia. In these regions, where the urban environment gradually transitions into bush or farmland, human-wildlife conflict can occur, but traditional pest management methods are not always possible, are difficult for landowners to implement, or they need refining. The impacts of pest animals in these unique landscapes require better tools to manage natural resources, animal and plant production, and risks to human and animal health.

Wild dogs commonly live in peri-urban regions in Australia. Their well-known impacts include preying on threatened native fauna (Gentle *et al.* 2019), domestic livestock and companion animal attacks (Gentle *et al.* 2017), and the potential risk to public health through pathogen transmission (Harriott *et al.* 2019).

Interventions by pest managers typically aim to mitigate these negative impacts by using a variety of control tools in the landscape to count, catch, kill, or otherwise manage wild dogs. However, in peri-urban regions, where wild dog management is spatially and temporally constrained by human and domestic animal activity, control is limited to carefully selected, small parcels of land and are more likely to target a specific group or an individual wild dog, rather than manage broad scale populations (McNeill *et al.* 2016). This usually excludes the ability for traditional baiting, and as a result, trapping is heavily relied upon. Trapping requires significant operator skill, requires daily checking, and is often outside the capabilities and desires for peri-urban residents (Please *et al.* 2018).

Canid Pest Ejectors (CPEs) require less frequent monitoring than trapping and could offer efficiency improvements for managing the impacts of wild dogs in these environs. However, information to assist with their effective deployment and use is required. This includes understanding how both wild dogs (as the target species) and other wildlife (as the non-target species) encounter and interact with CPEs in the peri-urban environment. It is also important to understand the longevity of CPE lures and capsules in the environment. Collectively, this information will help to provide guidelines for best practice deployment and maintenance of the devices.

MATERIALS AND METHODS

Device density and placement

Data from eleven GPS collared wild dogs in peri-urban north-eastern Australia were used to quantify and compare encounters with three different densities (spacings of every 200 m, 500 m, or intersections only) of modelled ejector locations placed in each respective animal's home-range. Survival analyses was used to determine the effect of the different deployment techniques and spacing on wild dog encounters with CPEs. We also accounted for sex and seasonal factors in the modelled interactions. To compare the three deployment strategies and to help understand how wild dogs might encounter CPEs in their environment, we tested the time taken to first CPE encounter per dog, the percentage of CPEs visited and percentage of days that a dog encountered a CPE. See Harriott *et al.* (2021) for detailed methods.

Device encounter and interaction by species

1080 or PAPP CPEs were deployed on five separate peri-urban properties within the Sunshine Coast or Gympie region at the highest permitted density (determined by toxin regulations and council risk assessment). Camera traps were used to monitor wild dog presence on properties, and additional camera traps were placed directly on CPEs to record interactions with the control tool. Wild dogs were individually identified by two independent researchers, using both the footage from monitoring and CPE camera traps. Non-target species encounters and interactions with CPEs were also recorded.

CPE capsule degradation

Four capsule treatments (1080 field, 1080 storage, PAPP field, PAPP storage) were deployed and regularly sampled over a 2-year period at a peri-urban south-east Queensland site (Nambour). CPE capsules were sampled over time and tested for toxin content/concentration as measures of degradation. PAPP and 1080 content assays were completed in a National Association of Testing Authorities (NATA)-accredited laboratory.

RESULTS

Device density and placement

CPE survivability (or the probability of encounter) was significantly different between seasons for individual wild dogs, and between male and females. CPEs placed within female home-ranges were found to have significantly less survivorship than those in male home-ranges. Ejectors spaced at closer intervals (200 m) had a greater percentage of days with wild dog encounters. Placing CPEs at road or track intersections provided the highest probability of wild dog encounter, with the average ejector at this location being 1.5 times more likely to be encountered than those at the alternative spacings (200 m and 500 m).

Device encounter and interaction

Data were collected for a total of 14,303 trap nights in the 12-month period, with 165 CPE activations – 65 of those CPEs contained PAPP and the remaining 97 contained 1080. Wild dogs and foxes accounted for a total of 15.2% (n = 25) of total CPE activations. A high number of CPE activations (*n* = 63; 38.2%) were caused by Australian bush turkeys (*Alectura lathami*); however, encounter and interaction rates for turkeys were higher than any other species. We individually identified 82 wild dogs across five sites. Of the wild dogs that could be identified, most (77%) encountered a CPE. Of those that encountered a CPE, most (71%) interacted with them but only 18% went on to activate the device. Overall, 10% of individually identified wild dogs detected on the properties activated a CPE. It took, on average, 5.6 days for a CPE to be activated by any species. Activations by wild dogs usually happened within the first five days after the lure was refreshed (average 4.75, range 0–15). However, turkeys were also quick to activate them within an average of 3.9 days (range 0–20). Reassuringly, the data suggest that CPEs are relatively target-specific to canids, with lower rates of interaction and activation by non-target species (~25.4% interactions, ~1.4% activations).

CPE capsule degradation

The dose (mg) for 1080 and PAPP capsules at deployment were 6.23 mg (*SD* = 0.17) and 988.7 mg (*SD* = 6.1), respectively, consistent with their respective nominal dose at manufacture of 6 mg (1080) and 1,000 mg (PAPP). There was little evidence of degradation or leakage of PAPP following 12 months of deployment, with field and stored capsules (pooled) sampled at 52 weeks containing an average of 985.43 mg (*SD* = 10.42, *n* = 6). For 1080, there also appears to be minimal degradation in capsules following deployment over 52 weeks in the store (mean = 5.68 mg, *SD* = 0.35) and field treatments (mean = 5.65 mg, *SD* = 0.53).
Similarly, after 104 weeks of deployment, there was little evidence of degradation or leakage of either PAPP or 1080. At week 84, one 1080 capsule recorded 1.88mg/capsule which was the only occasion where a drastic reduction in toxin content was recorded.

DISCUSSION

Our results show that achieving the most appropriate CPE placement depends on whether managers want maximum interactions or maximum efficiency, which are important considerations in the short- or long-term deployment of CPEs for managing wild dogs. These findings assist us to develop guidelines for the optimal and efficient placement of CPEs to ensure their safe and effective use in peri-urban environments. They also have additional relevance for other applications of device placement to survey or manage mobile species in peri-urban areas. Our field-based monitoring of CPE activity further supports that there is likely little benefit to be gained by increasing the currently used 20 CPE per 100 ha maximum. Peri-urban wild dogs can locate and become interested in interacting with CPEs. However, there is clear scope to increase the activation rates by wild dogs following interactions with CPEs. It is possible this could be achieved by refining lure types; however, individual preferences of wild dogs may limit our ability to achieve this. There is potential for testing clustered deployments of CPEs, where multiple lure types can be offered.

For non-target species, the risk of ingestion of any toxin, and especially a lethal dose, after accidental CPE activation is extremely low. This is due to the given the species' relative tolerance to 1080, body size, the design of the CPEs and the activation behaviour from those non-target species (or a combination of these factors). Collectively, the data suggest that CPEs in peri-urban areas are a useful and canid-specific tool to target some, but not all, wild dogs. This continues to demonstrate that a single control tool is insufficient for 'total' wild dog control, and the use of multiple control tools will be required to target individuals (and subpopulations of multiple individuals). Domestic dogs remain susceptible to CPEs and should be muzzled or excluded from the area all when CPEs are active in the environment.

Degradation testing of capsules provides reassurance that PAPP and 1080 capsules remain viable for extended periods of time when deployed in an environment similar to our field trial. Capsules can be confidently re-used if they were not activated during a control program, regardless of powder discoloration or clumping, as we detected in some PAPP capsules. It also provides supporting data for guidelines to direct withholding periods for domestic dogs, where capsules or CPEs are lost or cannot be retrieved after a CPE program is complete. It is possible under different climatic conditions that toxin degradation in capsules may occur, however, this needs to be tested.

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