FERAL DEER AGGREGATOR

FINAL REPORT FOR PROJECT P01-T-001

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Cover image: Feral Deer aggregator. Credit Department of Primary Industries and Regions South Australia.
FERAL DEER AGGREGATOR

FINAL PROJECT REPORT FOR P0-T-001

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EXECUTIVE SUMMARY

Existing tools to control feral deer are limited to shooting from the air, shooting from the ground, trapping, or fencing them out. The Deer Aggregator project aimed to provide landholders and conservation managers with a cost-effective tool to aggregate feral deer to better facilitate control options. A deer-specific feed structure would reduce feed and time required to replace feed consumed by non-target species and potentially provide a tool to dispense toxic bait (pending future registration of a bait) while excluding non-target animals.

In 2018, the Department of Primary Industries and Regions South Australia (PIRSA) in partnership with the Centre for Invasive Species Solutions (CISS) and Department for Environment and Water (DEW) commenced the Deer Aggregator project. The project aimed to design a deer-specific feeder that excluded non-target native species. The design of the Deer Aggregator was based on an ungulate-specific feed structure developed by New South Wales National Parks and Wildlife Service (NPWS) (Hunt et al. 2014). The original feed structure was highly target-specific, with feral goats freely able to access feed, while non-target native species were excluded. However, the feeder was less accessible to fallow deer (*Dama dama*) and red deer (*Cervus elaphus*).

The design of the Deer Aggregator exploits the difference in foot morphology of deer, macropods and emus. Over the course of the Deer Aggregator project, several prototypes were developed, tested and modified with each iteration improving the performance and durability of the device. The final prototype underwent extensive field trials in South Australia at a rural and peri-urban site with free ranging fallow and red deer.

This project has successfully developed a model for a deer-specific feeder which can be used to attract deer to specific locations for shooting or trapping or to assist with monitoring. By excluding non-target native animals including macropods, possums and birds, loss of feed and site disturbance is reduced. This cost-effective tool is easy to construct, transport and maintain in the field, making it a practical tool for a range of stakeholders. The Deer Aggregator may be useful in areas where deer numbers are low or the ability to shoot deer is limited, such as in peri-urban areas.
INTRODUCTION

CONTEXT: INCREASING FERAL DEER NUMBERS AND IMPACTS

The growing numbers and distribution of feral deer is having an increasing impact on farming and the environment. If left uncontrolled, the economic cost of feral deer is expected to rise into the billions in the next 30 years (BDO EconSearch 2022). Control of feral deer in Australia is limited to shooting, which in many places is ineffective as a single method to reduce the spread and impact of increasing populations. To combat the current and future impact of feral deer, there is a need to develop new control tools and to improve the effectiveness of existing tools and strategies.

PROJECT OBJECTIVES: A DEER-SPECIFIC FEEDER

Feral deer are highly cryptic, difficult to locate and adaptive to harassment by hunting. Attracting feral deer to specific locations using feed and lures can assist control and monitoring efforts. The Deer Aggregator project aimed to provide landholders and conservation managers with a cost-effective tool to aggregate feral deer by developing a deer-specific feeder that would attract deer but exclude non-target animals. A deer-specific feeder would reduce feed uptake by non-target species, and may assist in the safe delivery of toxic baits developed in the future.
METHODS

THE DESIGN PROCESS BUILT ON PREVIOUS NATIONAL PARKS AND WILDLIFE WORK

The concept and design of the Deer Aggregator was based on several ungulate-specific feed structures developed by the NSW NPWS (Hunt et al. 2014; R Hunt personal communication 2018). These structures exploit differences in the size and shape of the feet of the main non-target species (kangaroos and wallabies) and ungulates (goats and deer), so that the native species cannot access the feed. The previous feed structures developed in NSW were shown to be successful for feral goats but less successful with deer. The Deer Aggregator project sought to refine the design of one of the NSW feeders to work more effectively for deer.

In developing the Deer Aggregator, we followed the engineering design process:

- identify the need
- research the problem and possible solutions
- identify clear criteria and constraints
- imagine possible solutions
- design possible solutions
- create prototypes
- test and improve design.

The key criteria for designing the Deer Aggregator were that:

- fallow and red deer would readily feed from the device
- non-target species would be readily excluded
- the device would be easy to transport and construct in the field
- the device would be robust and affordable.

PROTOTYPE MANUFACTURING AND FIELD-TESTING

After we tested deer interactions with various components such as feed outlets (Figure 1) and mesh footplates, several prototypes of a deer feeder were constructed and tested on fallow and red deer in the field. Based on interactions with non-target species and deer (recorded using trail cameras), the design was improved and a final prototype manufactured in a short production run (Figure 2). This version was then tested in the field at several sites over 17 months (October 2020 – February 2022). Over this period, the prototype was further refined to exclude non-target species.
In total, 26 Deer Aggregators were tested at four field sites in South Australia. Additional Deer Aggregators were sent to sites in Tasmania (2), Queensland (3), and New South Wales (3) for stakeholder feedback and preliminary information about other species’ interactions with the devices.

**FINAL ASSESSMENT AT A RURAL AND A PERI-URBAN SITE IN SA**

Following final adjustments to the structure and electronic door-operating program settings, trials were conducted at two sites (south-east SA and a peri-urban site in the Adelaide Hills) between July 2021 and February 2022. Data from 20 Deer Aggregators was used to assess the Deer Aggregator’s effectiveness to attract and feed feral deer while excluding non-target native animals. Details of the final prototype, methods of assessment and results are outlined in a manuscript submitted to the journal *Wildlife Research* (CSIRO Publishing) (Appendix 1).
RESULTS

KEY ACHIEVEMENTS

- The Deer Aggregator project developed a new cost-effective tool that will provide people with better opportunities to manage feral deer.

- Feral fallow and red deer were attracted to the Deer Aggregators and successfully accessed feed, particularly in summer months. Deer visited the Deer Aggregators during the night when feed was accessible (Figure 3) and during the day (Figure 4) when closed (to exclude birds), and frequently returned on consecutive days and nights.

- The Deer Aggregator effectively excluded non-target native animals. Macropods and emus were excluded when the differences in their foot size and shape triggered the feeder door to close after they depressed the footplate (Figure 5). Brushtail possums were excluded by triggering the base or triggering the possum bar sensor. Spikes on the face of the feeder also helped to exclude possums. Birds were excluded by closing the feeder during daylight hours.

- The cost of materials for each Deer Aggregator was AUD$800 and each was largely constructed from readily available parts. The structures are easy to transport and construct in the field by one person. The low cost of production and ease of use would mean landholders could purchase several Deer Aggregators (if made commercially available) and shift them to different locations. Alternatively, program managers, groups of land managers or conservation workers could pool funds to buy several and share/move them around.

- CAD technical drawings for the Deer Aggregator construction and assembly were produced and a draft user manual developed to assist future commercialisation of the deer-specific feeder.

Figure 3. Fallow deer feeding from an open Deer Aggregator. The mesh size of the footplate enables deer to step through the mesh holes, and not activate the feeder to close (south-east South Australia).
RECOMMENDATIONS ABOUT LOCATIONS FOR USE

The Deer Aggregator can be used within the home range of feral deer to attract them to specific locations to assist aerial or ground shooting, or can be used in large-scale traps. Monitored Deer Aggregators using trail cameras could assist people in the timing and spatial focus of their control efforts, particularly where deer numbers are low and movement seasonal. When used for either of these approaches, a deer-specific feeder would reduce the need to frequently replace feed consumed by non-target species – reducing site disturbance, feed costs and time.
Several Deer Aggregators may be required at a given location to improve habituation or feed uptake by deer. Deer aggregators in this study were mostly in forested areas where deer stayed during the day. Placing feeders in feeding areas such as paddocks may improve visitation, but livestock would have to be removed to prevent them feeding from the Deer Aggregator.

PROJECT IMPLICATIONS: DEVICE, DELIVERY, DIRECTIONS

This project has successfully developed a model for a deer-specific feeder which can be used to attract deer to specific locations for shooting or trapping or to assist with monitoring. By excluding non-target animals including native macropods, possums and birds, loss of feed and site disturbance is reduced. This cost-effective tool is easy to construct, transport and maintain in the field, making it a practical tool for a range of stakeholders. The Deer Aggregator may be useful in areas where deer numbers are low or the ability to shoot deer is limited, such as in peri-urban areas.

Deer-specific feeders such as the Deer Aggregator could also be used to trial the delivery of any future toxic baits.

The information gained through the Deer Aggregator Project will assist in developing field operating procedures for the Deer Aggregator and other ungulate-specific feeders.

END-USER ENGAGEMENT AT WORKSHOPS AND FIELD DAYS

When we demonstrated and discussed the Deer Aggregator at 20 workshops and field days (attended by 650+ stakeholders), we received feedback on the Deer Aggregator and increased community awareness of the impacts of feral deer, control options and management strategies. The National Deer Coordinator, through numerous workshops, has also assisted in bringing the tool to the attention of land managers across Australia.

End-user groups consulted during the development of the device included:

- primary producers and local agricultural groups
- peak bodies (Meat and Livestock Australia, Australian Wool Innovation, Grains Research and Development Corporation, state farming bodies, Livestock SA)
- local governments in jurisdictions where local governments have a role in feral deer management
- state agencies with feral-deer management responsibilities
- Landscape Boards SA.

A workshop with deer-management personnel from New Zealand Department of Conservation (DOC) provided opportunity to exchange practical experiences about attracting deer (using lures and different feed types) and discussing effectiveness and limitations of control measures for NZ’s rapidly increasing deer populations. The workshop emphasised the need to develop new control tools and to improve the effectiveness of existing tools and techniques.

NEXT STEPS TOWARDS COMMERCIALISATION

The Deer Aggregator project has delivered a prototype that has been field-tested and can be carried through to commercialisation to enable greater uptake and application of the tool. The next steps to progress commercialisation of the Deer Aggregator (in a future project) are to:

- refine the current design to reduce loss and spillage by rodents, and improve durability of several components
- trial the existing Deer Aggregator at sites occupied by chital, rusa, sambar and hog deer to validate use by other deer species and functionality under wider environmental conditions
(such as alpine and heavier rainfall areas). Data from trials could be used to modify and improve the existing prototype, if required, to capture a broader market and refine guidelines

- conduct market research and identify potential distribution strategies to inform a commercialisation strategy and pathway
- seek agreement with a manufacturing company to commercialise and promote the aggregator.
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OVERALL PROJECT TEAM

(This list also includes those that are no longer with the project.)

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REFERENCES

