

Focus

# Retrofit electric fencing to protect sheep from wild dogs in Australia

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## Wild dogs and sheep farming

It is believed that the dingo was introduced to Australia approximately 3,500 years ago and its origins can be traced back to Asian domesticated dogs [1]. Crossbreeding with modern domestic dogs has occurred throughout the country and the degree of hybridisation relates to length of European settlement and exposure of dingo populations to modern breeds [2].

In New South Wales (NSW), a state on the east coast of mainland Australia (Fig. 1), the term ‘wild dog’ refers to all free-living dogs: dingoes, feral<sup>1</sup> domestic dogs and their hybrid descendants, all of which are currently considered to be *Canis familiaris*. Wild dogs are predominantly golden or yellow but can be white, black, black and tan, brown, brindle or any combination of these (Fig. 2). Adult wild dogs range from 11 to 25 kg for males and seven to 22 kg for females.

Impacts on the Australian economy from production losses due to predation on livestock, disease transmission in livestock and the national costs associated with control are estimated to range between A\$64 million and A\$111

million annually [3]. There are also associated impacts on the mental health of livestock producers and the social and economic viability of rural communities [4]. At the time of writing, there was no compensation scheme for livestock killed by wild dogs in Australia.

Wild dogs prey on a wide variety of native fauna including kangaroos and are considered a known or potential risk to at least 14 endangered or vulnerable native mammal, reptile and bird species listed under the Environment Protection and Biodiversity Conservation Act 1999. Predation and attacks on wildlife by wild dogs can have serious impacts on native wildlife species, particularly those such as koalas that are also under threat from other key processes [5].

While each state and territory of Australia has its own specific legislation regarding wild dogs, the general intent is the same, i.e. that the land occupier is responsible for controlling them. In NSW, the Biosecurity Act 2015 places a legislative responsibility on the occupier of all lands in the state to take measures to prevent, minimise or eliminate the risks associated with



<sup>1</sup> The term ‘feral’ is used to describe animals that have been through the process of domestication but have returned to a wild state.

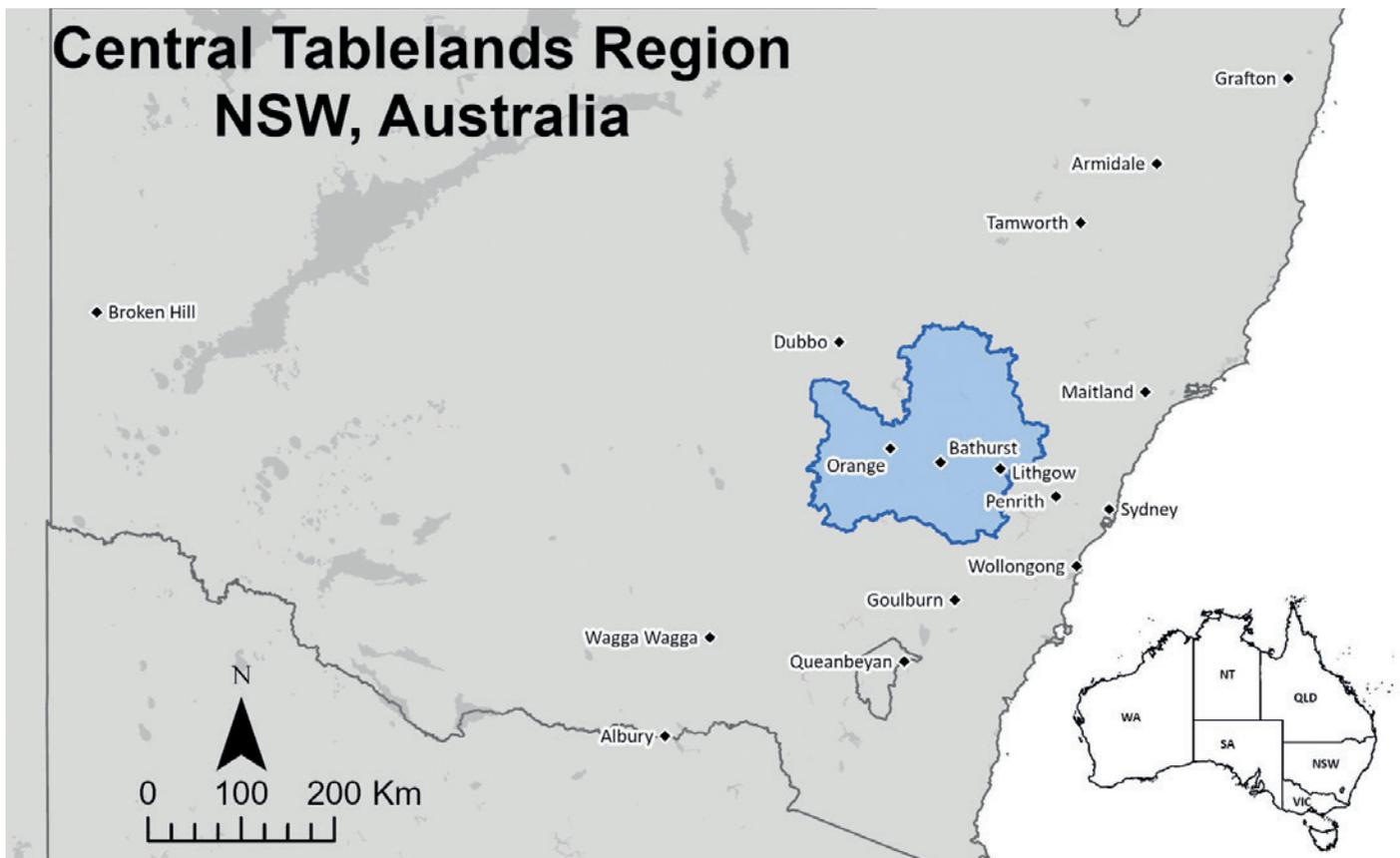


Fig. 1. Location of Central Tablelands, NSW, Australia (Source: Local Land Services).

wild dogs as far as is reasonably practicable. This obliges the occupier of lands, private or public, to take all practical measures, including by lethal means, to minimise the risk of any negative impacts of wild dogs on their land or neighbouring lands.

Poison baiting, leg-hold trapping, opportunistic shooting and exclusion fencing have been used as the primary means of killing or excluding wild dogs in Australia since European settlement<sup>2</sup>, with mixed results. The most common form of lethal control for wild dogs is the use of meat baits injected with sodium fluoroacetate, better known as 1080 (pronounced “ten eighty”). This poison is produced as an odourless, tasteless white powder that is diluted with water to concentrations specific for the species being targeted, which include feral pigs, foxes and rabbits. For wild dog control, it is injected into fresh, dried or pro-

cessed meat baits. The supply and use of 1080 is highly regulated in Australia. It is a restricted chemical product and can only be supplied to persons who are authorised to use it under state or territory laws.

As in other parts of the world, the demographic of rural NSW has been changing for many years, with a drift of people away from agriculture into cities. At the same time, there has been an increase in rural land being subdivided and sold for ‘hobby farm’ use and recreational purposes.



Fig. 2. A typical wild dog at Box Hill sheep farm, NSW (Photo: M&J Healey).

<sup>2</sup> The use of livestock guardian animals such as donkeys, dogs and alpacas is a much more recent trend as, unlike in Europe and elsewhere, there is no long-term historical connection with them in Australia. The extensive grazing situations that most livestock farms operate in the Central Tablelands of NSW, where livestock are left in paddocks for long periods of time with limited human contact, mean that many farmers have concluded that the work involved in sourcing, training and bonding guardian animals is not a good investment of their time.

Many of these newly created properties are not occupied full-time and they are often owned by people whose values and beliefs are vastly different to those of the remaining large-scale, full-time agricultural producers in the area. Differences of opinion on the role of wild dogs in the environment and the use of poison baits and trapping to control them has caused high levels of frustration within small communities that are impacted by wild dog attacks [6]. The focus of this article is to look at the effectiveness of adding electric fencing to existing fences on farms in the Central Tablelands region of NSW as a non-lethal option to reduce the number of attacks by wild dogs on sheep.

## Study area and farm characteristics

The Central Tablelands region covers an area of approximately 31,365 km<sup>2</sup> in NSW (Fig. 1). It includes the major towns of Bathurst, Blayney, Cowra, Lithgow, Molong, Mudgee, Oberon and Orange. Agriculturally, the region is highly diverse, with evenly spread summer and winter rainfall supporting productive cropping systems. Sheep grazing is the most significant land use (Fig. 3), followed by irrigated farming, broad acre crops and horticultural enterprises including areas of fruit and vegetable growing and viticulture. The region produced 10% of NSW's wool and sheep meat production in 2019–2020 to the value of A\$79 million and A\$142 million, respectively [7].

The potential of electric fencing to reduce livestock losses to predators was investigated at two sheep farming operations that were heavily impacted by wild dog attacks over a period of several years. Rockleigh farm at Ilford, owned by Colin and Eva Mahy, covers 370 hectares and



Fig. 3. Typical Central Tablelands grazing land (Photo: Paul Gibb).

runs 1,300 Merino ewes (Fig. 4). Box Hill farm at Turon-dale, owned by Malcolm and Jodie Healey, covers 1,500 hectares and runs 3,000 Merino ewes (Fig. 2). The main source of income at both these farms is wool production, with meat lamb production as a secondary part of the business. The sheep are run on an extensive basis, living in the paddock year-round with lambing at Box Hill taking place in spring while Rockleigh has split lambing, with half the ewes lambing in autumn and the other half in spring. Pastures vary from native grasses to improved pastures such as forage cereals, ryegrass and legumes.

Internal subdivision fences and property boundary fences are usually constructed of steel posts, plain wire and netting with a total height of approximately 1.2 m. While this type of fence keeps sheep where they are meant to be, external pressure from wildlife, normal deterioration over time and weather events such as storms create weak points in the fence that a variety of animals, including wild dogs, use to gain entrance to sheep paddocks. Such fencing, in combination with lethal control measures (including trapping, poisoning, and shooting), was the only means of wild dog control carried out at Box Hill and Rockleigh prior to the retrofitting of electric fencing (see below).

Wild dog attacks increased dramatically on both properties in 2017–2018. At Rockleigh, 31 ewes were killed in 2018. Based on saleyard and individual farmer financial records at the time, the replacement cost for these sheep was A\$300 per head totalling A\$9,300. This does not include lost wool sales of approximately A\$80 per head and lost lamb sales. Lamb marking percentages at Box Hill fell from 95% in 2016 to 32% in 2018.



Fig. 4. Merino ewe lambs at Rockleigh farm (Photo: Paul Gibb).

## Retrofit electric fence design

In early May 2019, as a result of increasing wild dog attacks in the region, Central Tablelands Local Land Services hosted a group of sheep producers on a tour of properties approximately six hours' drive away to inspect a variety of electric fencing styles being trialled for wild dog control. Based on discussions held with farmers in the trial area and having viewed the types of fencing in use, it was apparent that Gallagher Westonfence electric fencing was proving to be very effective at excluding wild dogs as well as foxes, feral pigs and deer. It consists of a sloping<sup>3</sup> fence attached to an existing fence line and constructed using 81-cm high-density polyethylene posts with five predrilled holes in each post. These are attached



Fig. 5. Close-up of fence detail at Rockleigh sheep farm (Photo: Paul Gibb).

approximately 60 cm above the bottom of the existing fence posts, with the lower end of the dropper sitting on top of the surrounding ground surface approximately 50 cm outside the base of the existing fence (Figs. 5 and 6). The poly droppers are placed approximately six metres apart along the length of the fence, creating a sloping electrified barrier to any approaching animals (Fig. 5).

Westonfences are set up with alternating 'hot' (electrified) and 'cold' (non-electrified) wires. Usually, the bottom wire is non-electrified to reduce instances of electrical shorts from surrounding material such as soil and grass and possible impacts on non-target native animals including reptiles. The wires in the second and fourth holes from the bottom are electrified, the wire in the middle hole is non-electrified and the top, fifth hole is used

to fasten the post to the existing vertical fence. Typically, when a wild dog approaches a fence with the intention of getting to the other side, it will first try to push through the fence at or below snout level or, secondly, try to burrow under the fence. In the case of a Westonfence, it will typically make contact with either one of the two electric wires as it pushes its muzzle into the gaps between wires, resulting in an electric shock.

The effectiveness of this type of fence revolves around the use of high conductivity wire to carry the electricity and high voltage generated by either permanent mains power energisers or solar battery energisers with adequate stored joules of energy capacity (Fig. 7). Typical values for energiser output are 10,000 volts and 100 joules of stored energy. Also essential are proper site prepara-



Fig. 6. Retrofitted electric fencing at Rockleigh sheep farm (Photo: Paul Gibb).



Fig. 7. Solar powered energiser in a paddock at Box Hill sheep farm (Photo: Jodie Healey).

<sup>3</sup> There is also a vertical version if a completely new fence is to be constructed.

tion, careful construction – with special attention paid to the earthing system – and, most importantly, ongoing maintenance.

## Installation, outcomes, perspective

Due to high levels of interest generated by the educational tour and increasing wild dog attacks on livestock, in late 2019 Central Tablelands Local Land Services established an exclusion fencing grant whereby landholders, through an expression of interest process, were eligible to receive A\$1,800 per kilometre towards the cost of erecting an electric exclusion fence. This grant was fully subscribed with funding enabling 144 kilometres of electrified fencing to be constructed by a variety of sheep producers in the NSW Central Tablelands. Technical support was provided by Gallagher during construction and remains available to any landholder requiring it.

The owners of Rockleigh and Box Hill farms erected 10 km and 20 km, respectively, of the sloping-style Westonfence depicted in this article, attached to a variety of pre-existing fences typical of the area. Fence construction was carried out by the farmers themselves in 2020, including the installation of the recommended energisers and earthing system. Due to the combination of current fence energiser technology and high conductivity fencing wire, only one energiser was required on each farm to power the full length of electric fencing.

In the three years since the fences have been in place there has not been a single wild dog attack on either property even though continuous wild dog presence has been recorded on land surrounding both farms via camera traps along the fence lines and dog tracks found pacing parallel to the electric fences. In contrast, wild dog attacks on sheep have continued on farms with no electric fencing

adjacent to both Rockleigh and Box Hill, with reports of wild dog attacks on sheep made to Central Tablelands Local Land Services and associated wild dog control groups indicating that approximately 700 sheep have been killed in the time period since the fences were completed.

Discussions held with participants in this trial have indicated that, at current sheep and wool prices, the average payback period of money invested in electric fencing is approximately 3–4 years, with several farmers having put up additional fencing without any financial subsidy. Aside from financial savings achieved by reducing losses to predation, all participants in the grant scheme have indicated that the reduction in mental health impacts from dealing with wild dog attacks on their sheep was just as valuable to them. Moreover, the exclusion of wild dogs from participating farms has totally removed the need to lay poison baits and set traps on these properties while at the same time helping people remain as sheep producers in their respective local communities.

Nevertheless, the increased adoption of electric fencing for pest animal control has been hampered by the widely held belief that it requires complicated and ongoing maintenance to be effective, for which farmers do not have time. The counter-argument to this position is that all types of fencing require ongoing maintenance to be fit for purpose and that the technology associated with the new generation of fence energisers (i.e. fault indicator displays on energisers, fence status lights located in paddocks, ‘back to base’ fault alarm systems and text messages sent to the owner’s mobile phone to notify of problems) reduce the amount of unnecessary fence inspections compared to non-electric fences.

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