Virtual fencing technology for natural resource management

South Australia's first virtual fencing trial of cattle has demonstrated its potential to deliver significant environmental benefits through successfully protecting an area of Eucalyptus saplings along a watercourse from being grazed on a commercial farm.

Trial background

The trial was conducted by CSIRO within a 14-ha wire-fenced lucerne paddock on a beef grazing property at Eden Valley, SA.

The objective was to evaluate the pre-commercial eShepherd® virtual fencing system to exclude a group of cattle from an area of 0.5-2.5m tall river red gum saplings using a contoured (i.e. not straight) virtual fence line.

What is virtual fencing?

Technology that applies signals to control grazing livestock without using physical barriers.

The eShepherd® virtual fencing system currently being commercialised by Agersens uses a GPS-enabled solar powered neckband that trains cattle to respond to an audio cue as they approach the virtual fence line.

Twenty Santa Gertrudis heifers were each fitted with an eShepherd® pre-commercial neckband prototype for the trial period of 44 days. A virtual fence line was established within the trial paddock and was progressively shifted (on days 1, 4, 9 and 15) to prevent cattle from grazing the saplings in the exclusion zone (see paddock map). After day 15 the virtual fence line remained in its final contour pattern.

The eShepherd® pre-commercial neckband prototype fitted to cattle in the Eden Valley trial.

Animals received audio cues via the neckband to indicate the fence line, and a mild electrical pulse was administered if they continued moving forward following the audio cue.

Data from the neckband of each animal was collected to obtain: GPS locations, animal distance relative to the virtual fence line and number of delivered audio and electrical stimuli.

As an added check of the animals' grazing patterns, at the end of the trial, pasture quantity and quality was assessed and mapped across the grazing zones.

Trial results

The trial results demonstrated the cattle were able to rapidly learn the virtual fencing cues and respond primarily to the audio cue alone. The cattle were prevented from the grazing exclusion zone for 99.8% of the trial period (as measured by total animal hours). This included when the more complex contoured fence line was in place.

At the end of the trial, the pasture feed available in the grazing exclusion zone (0.59 t/ha) was double the quantity in the inclusion zone (0.31 t/ha). Likewise key measures of pasture quality; dry matter digestibility and crude protein, were significantly higher in the exclusion zone compared to the inclusion zone.

Importantly at the trial conclusion there was also no observed damage to the river red gum saplings located in the exclusion zone.
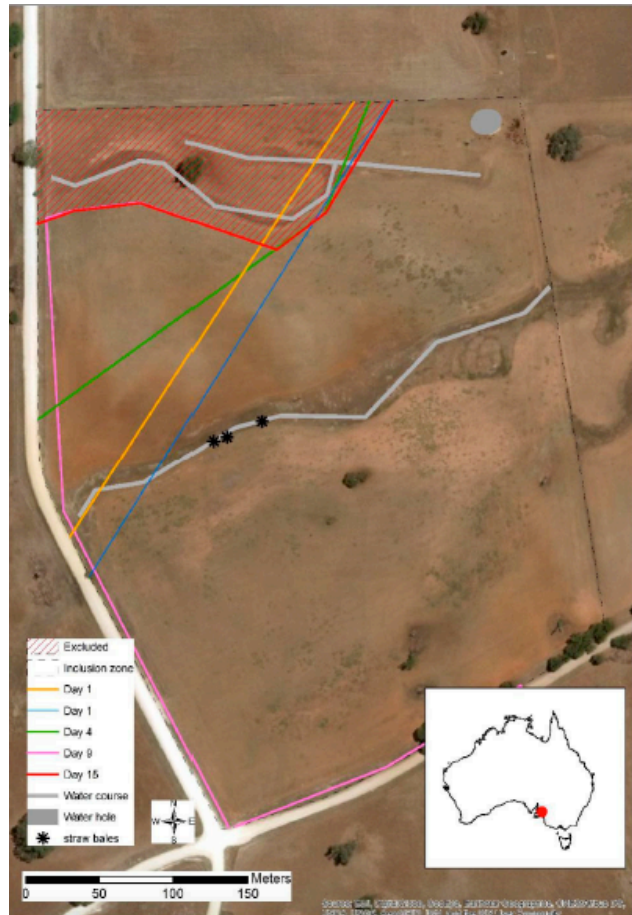
Eden Valley trial paddock showing the river red gum sapling area (excluded zone) and the progression of virtual fences that were set between days 1-15 of the trial.

Virtual fencing as a NRM tool

In this trial at Eden Valley, virtual fencing technology (using a pre-commercial neckband prototype) was shown to protect an environmental asset within a farm paddock from cattle grazing in the presence of a large pasture feed differential (across the virtual fence line). This result demonstrates the potential of virtual fencing technology to deliver additional NRM outcomes for graziers, including:

- Keeping animals out of other environmentally sensitive areas such as riparian zones, waterlogged or fragile soils
- Reduced overgrazing and erosion
- Improved maintenance of groundcover
- Improved weed control (through strategically timed and targeted grazing)