

Virtual fencing facilitates rest-based grazing in an extensive cattle system.



CASE STUDY



Wintinna Station

Virtual Fencing



Jake and Frankie Fennell with their children.

Who: Jake and Francesca Fennell (owners, Wintinna Station, pictured above), Megan Willis - Senior Research Officer, SARDI, and Andrea Tschirner - Regional Agriculture Landcare Facilitator, Landscapes SA Arid Lands.

Where: Wintinna Station, Far North, South Australia

When: April - October 2023

Wintinna Station, owned by Jake and Frankie Fennell, is a 3,812km² cattle station located in the Far North of South Australia, approximately 2 hours North of Coober Pedy. Wintinna is made up of two main landscapes, mulga sandhills on the Western side and crab hole/breakaway country on the Eastern side. Jake and Frankie

have owned Wintinna Station since 2015 and have made significant improvements despite some challenging climatic conditions. Wintinna Station could be considered a leading and innovative pastoral property in South Australia with regard to implementing regenerative grazing practices, utilising low stress stock handling, and making use of various AgTech solutions to solve a range of issues on farm.

Jake and Frankie have observed the benefits of rest-based grazing on their property and how rested country facilitates more pasture growth and recovery after smaller rainfall events. This is of particular interest to them when considering the mulga country on the Western side of their property. This country has the capacity to carry more stock and support their breeding operation, especially if managed for optimal pasture growth and recovery. Given the costs associated with building physical fences over such a large area, alternative methods of controlling livestock location are attractive to Jake and Frankie.

“If we were to fence the place up how we’d like it we would need 24 paddocks for the rotation.

That’s about 1,100kms [of fencing]. So, with clearing and everything it would be \$5 million plus to fence”, says Jake.

Virtual fencing has been a solution in their minds for some time but given the current legislation preventing its use, they had not previously had the opportunity to utilise this tool.

Jake and Frankie hosted a trial at Wintinna to support the SARDI-led Virtual Fencing for Livestock project. The aim of this trial was to determine if virtual fencing could be used to facilitate rest-based grazing of cattle in an extensive production system. One hundred heifers were mustered, virtual fencing technology was sourced, and the trial was set up in mid-April 2023.

What is virtual fencing?

Virtual fencing is an AgTech solution that allows remote management of livestock grazing. Virtual fencing uses GPS enabled boundaries to control the location of livestock. The location of these boundaries is communicated via a collar worn by each animal. When the animal approaches the virtual boundary an audio tone will be delivered via the collar. If the animal does not continue forward, there will be no further signals applied. If the animal continues forward a mild pulse is applied. Within a short period of exposure to the virtual fencing the animals learn to modify their behaviour in response to the audio signal to avoid receiving a pulse. As a result, animals stay within the virtual boundaries and grazing location can be managed.

How was virtual fencing implemented on Wintinna Station?

Animals must undergo training to the virtual fencing system before it can be implemented in a large area. At Wintinna this occurred in a 1.5km² (150ha) holding paddock. The virtual fence was activated along the physical fence line for three days in order for them to learn what the collars signals meant. For four days following this the cattle were excluded from approximately one third of the training paddock. At the end of this four days the cattle had shown that they had adequately learned to respond to the virtual fence (Fig. 1.).



Fig. 1. The two virtual fence configurations implemented during the 7-day training period preceding trial commencement. Areas of blue and green shading represent a heat map of the GPS locations of the cattle during this time.

Following the training period, the heifers were moved to 'Dead Finish Paddock', a 45km² (4,500ha) area comprising of uplands, open gently sloping plains with shrubby drainage lines. The heifers were excluded from a strip along the northern boundary of the paddock for four weeks. This simple boundary design was activated to assess how well the cattle responded to the virtual fence in such a large area. The heifers responded well to the virtual fence with a GPS heat map indicating only minor breaches of the virtual fence along a prominent drainage line (Fig. 2.). This heat map also highlights the distribution of cattle throughout the inclusion area, with some favouring of drainage lines where water and forage are abundant.

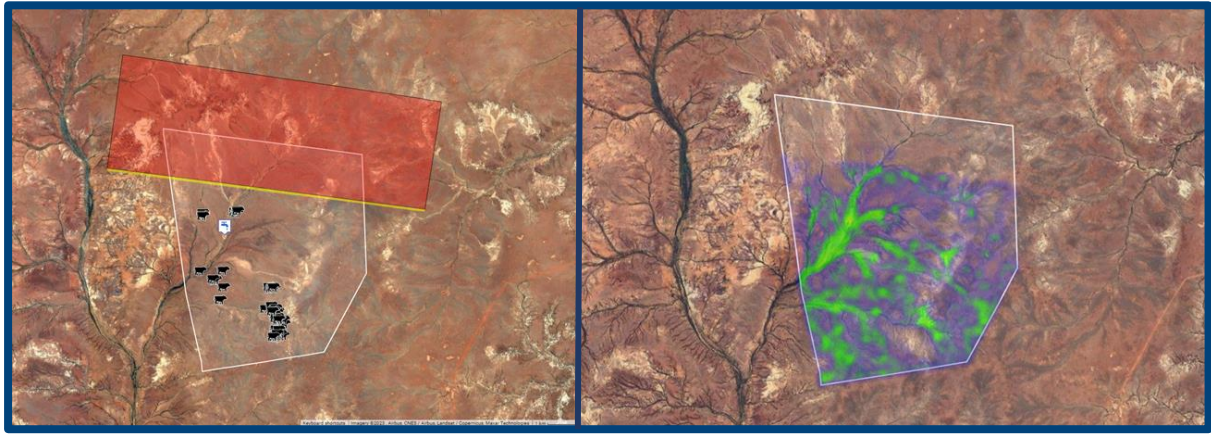


Fig. 2. The first virtual fence activated in Dead Finish excluding cattle from an area along the Northern boundary. Including a GPS heat map indicating the distribution of cattle throughout the paddock during the four-week period. The white and blue tap icon indicates a dam. Following this, a new inclusion zone was implemented to rest the eastern side of Dead Finish in addition to the northern boundary. This was done by containing the cattle in the Southwestern third of the paddock where the dam and a creek system are located. This section of the paddock is also considered to be more productive due to capture of moisture by the landscape to grow more forage. Thus, excluding cattle from the Eastern, lower producing area of the paddock would promote pasture regeneration and optimised utilisation. The cattle were contained in this area for nine weeks with excellent containment observed (Fig. 3.) During this time a significant rainfall event occurred that caused breaches of the virtual fence. Wintinna received approximately 35mm of rain overnight which caused dispersal of some cattle into the exclusion zone. By the next morning, all cattle had returned to the inclusion zone unassisted.

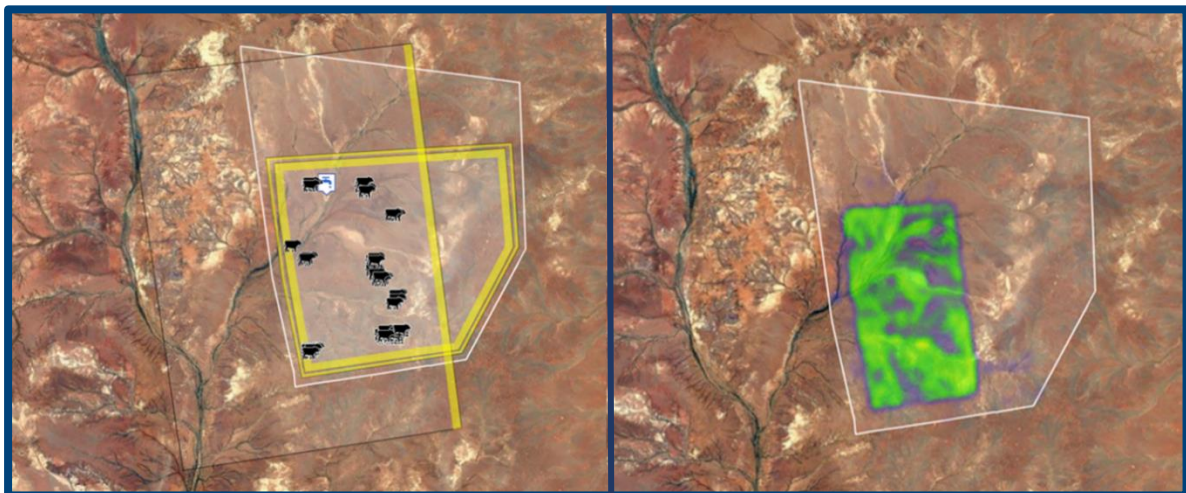


Fig. 3. A virtual fence configuration designed to contain the cattle in the Southwestern third of Dead Finish. Including a GPS heat map showing the level of containment achieved. After nine weeks the cattle had put on significant condition, so the fit of their collars needed to be assessed and adjusted in the yards. Addressing the collar fittings required mustering. Traditionally mustering in Dead Finish would require at least four to five hours with two motorbikes and an aircraft, and despite all this effort there would likely still be cattle left behind. Jake and Frankie used the virtual fencing to create a capture lane in the paddock to contain the cattle about 24 hours prior to mustering. The virtual capture lane allowed Jake and a station hand to muster using two motorbikes in three hours. No aircraft required! This was also the first muster to bring in 100% of animals in Jake and Frankie's eight-year history at Wintinna Station.

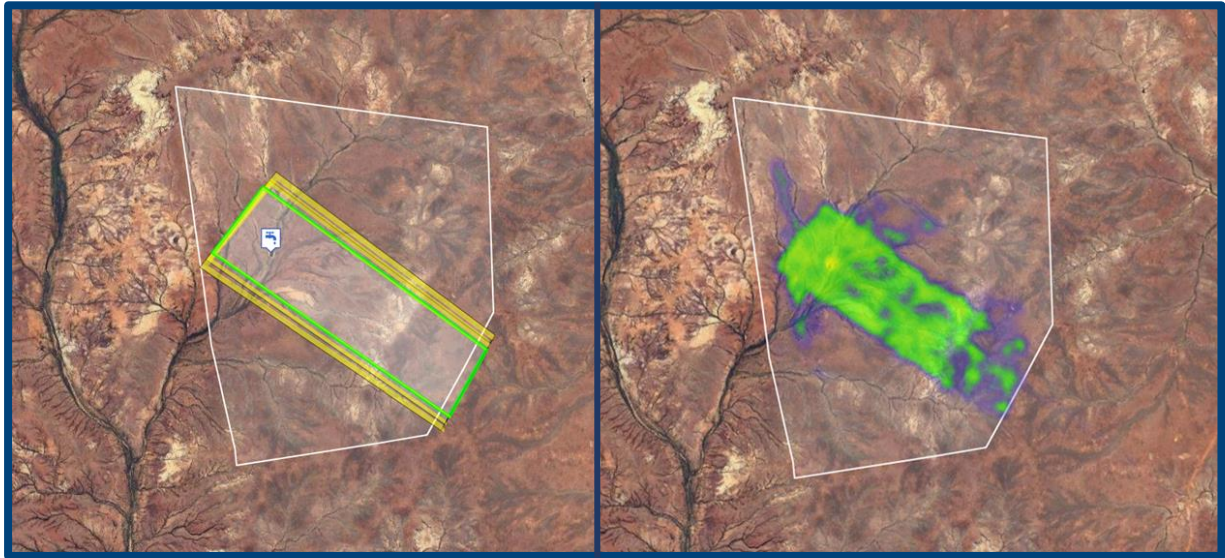


Fig. 4. The capture lane used to aid in mustering the cattle in Dead Finish. Including a GPS heat map showing the locations of the cattle during the 24-hour period. Some activity outside of the capture lane is likely due to animals making their way into the lane rather than moving out of it.

Once all the collars were checked and adjusted, the cattle were moved back into Dead Finish and a new virtual fence was activated. Jake and Frankie decided to allow full access to the paddock again after having the eastern side rested for nine weeks. To facilitate this, a virtual fence was activated just inside the physical boundary of the paddock (Fig. 5.). The GPS heat map in Fig. 5. demonstrates how the cattle began to utilise the entire paddock when they returned. This indicates that the cattle had learned to respond to the virtual fencing signals rather than make geographical associations within the paddock.

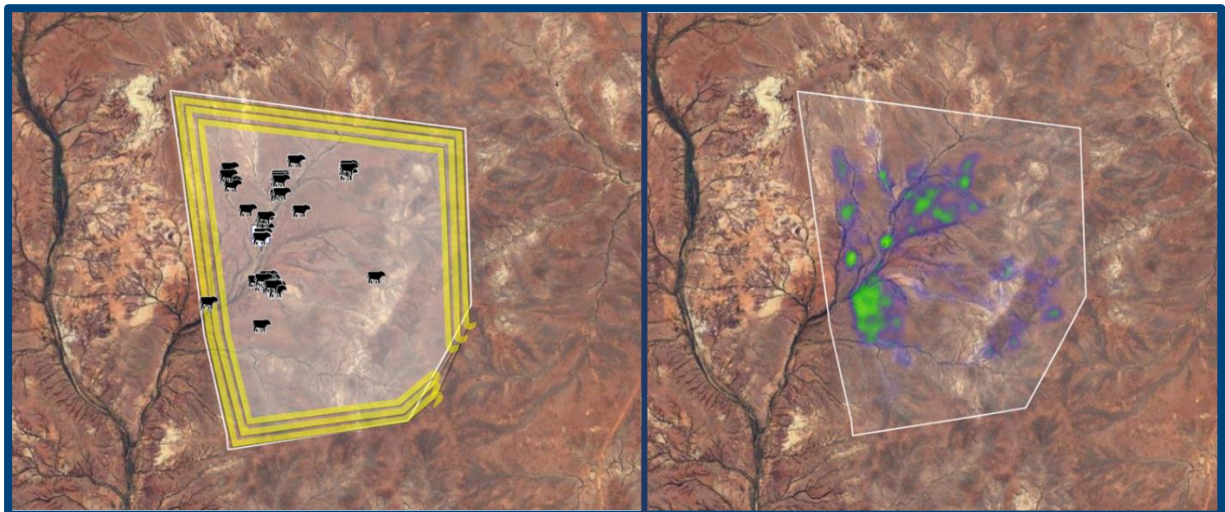


Fig. 5. A virtual fencing configuration allowing the cattle full access to Dead Finish, with a GPS heat map highlighting the distribution of the cattle in the paddock.

Approximately nine weeks later, in early October, the spring muster was taking place on Wintinna. In order to muster the trial heifers another capture lane (as displayed in Figure 4) was instated. Given that this muster was part of the whole of station muster, an aircraft and two motorbikes were utilised to bring the heifers in. This resulted in recovery of 97% of the mob in the main sweep of the paddock. The remaining animals were later accounted for.

Learning outcomes

The trial demonstrated that virtual fencing is highly effective when implementing rest-based grazing in an extensive cattle enterprise. Over the four-month period the cattle remained well contained within a number of virtual fencing configurations in Dead Finish. The GPS heat maps show that cattle were successfully excluded from more marginal areas within Dead Finish where Jake and Frankie wanted to promote pasture regeneration. Jake and Frankie aspire to implement a more intensive rest-based grazing system on the Western side of their property to increase carrying capacity and free up land on the Eastern side to act as a drought reserve. Their aim is to have 12 months of feed put aside at all times. Rest based grazing is essential in achieving this goal and virtual fencing may just be the best way to reach that.

Approximately one month into the trial Jake was out in Dead Finish and observed some cattle receiving signals from their collars. The cattle began to stir and were reluctant to block up calmly. This made Jake wonder how the cattle may behave when they were next handled in the yards. Jake and Frankie have invested a lot of time and effort into ensuring their cattle are quiet, so this was of concern. When the cattle were mustered and handled in the yards during and after the trial Jake was pleased with how calmly they moved to and through the yards. Observing no unfavourable changes in temperament or handleability of the cattle after exposure to virtual fencing cemented the benefit of this technology for implementation at Wintinna.

At Wintinna Station virtual fencing has had a positive impact on livestock and land management as a whole. The improved ability to manage cattle for rest-based grazing will have significant economic and sustainability benefits long-term if Jake and Frankie decide to implement virtual fencing into the future. Reducing mustering inputs is a major drawcard given this is a major expense within pastoral enterprises, especially for those who rely on contractors and aircraft. Demonstrating that these benefits can be achieved without having a negative impact on herd production parameters or temperament is a very positive finding that has the potential to change the way pastoral land is managed going forward.

“Moving from set-stocking to rest based grazing, is a powerful tool to improve long term land condition and maintain productivity. This technology has the potential to support pastoral land managers to effectively manage the condition of their country while improving herd productivity, it is so exciting to see where virtual fencing will take us.” - Andrea Tschirner

