

VIRTUAL HERDING RESEARCH UPDATE

TECHNOTE 8: USE OF VIRTUAL HERDING TECHNOLOGY IN THE SHEEP INDUSTRY



Background

Farmers in the sheep/cropping systems in south east Australia have been strong supporters of virtual herding (VH) technology as they see tremendous advantages in situations where they need fences to contain sheep, but prefer minimal fences to make cropping easier. Until recently the majority of the work with virtual herding has been conducted with cattle. A small sheep project was conducted in 2014 at the University of New England to examine the behavioural response of sheep to a virtual fence established via an underground wire. The results of this initial study found that sheep, like cattle, exhibited a strong ability for associative learning between the audio and electrical cues in VH technology.

To date the commercial technology has been developed by Agersens Pty Ltd for cattle and any work in sheep so far has been basic R&D using manual neckbands with small numbers of animals. This technology requires people to deliver the cues manually and thus only 1-2 animals can be controlled by one person at any one time. Despite these limitations, considerable basic R&D work has been conducted with sheep recently to identify the cues required, and the application of the technology to improve pasture utilisation, herd sheep and exclude sheep from certain environmentally sensitive areas.

There will be continued development of the VH technology to enable its use commercially for the sheep industry in the longer term. It may take several years to develop a neckband or ear tag using VH technology that is effective in managing sheep.

Potential application of VH technology to the sheep industry

Although only experimental studies have been conducted during this Project, there are a large range of potential applications of the VH technology for the sheep industry. These include:

- bringing sheep into yards/shearing shed for routine husbandry practices,
- restrict sheep to certain areas to improve pasture and crop residue utilisation,
- exclude sheep from environmentally sensitive areas,
- restrict sheep to certain areas to improve weed management,
- divide the flock into smaller groups at lambing to improve pre-weaning survival of lambs.

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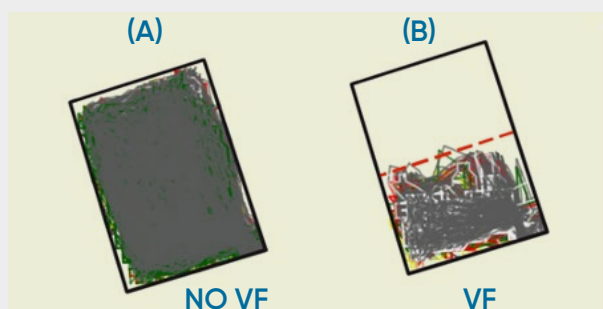
CASE STUDY

Excluding sheep from an area

In early 2018, a four week trial was conducted at CSIRO in Armidale to look at the flock interaction with the virtual fence, and the fence's ability to restrict a small flock of sheep to a portion of a small paddock. Sheep in a flock of 18 were GPS monitored for paddock usage and flock interactions over a two week period. Following this two week period, the flock were split into two flocks of nine sheep. A virtual fence was established half-way down the paddock and each flock of nine sheep were tested in successive weeks. A GPS was used to monitor the usage of the paddock by the sheep before and during the implementation of the virtual fence. Sheep quickly learnt the association between the cues for the virtual fence early in each week in this paddock situation.

The ratio of electrical cues: audio cues was about 0.2 early in the week and dropped to 0.1 later in the week, after the sheep had learnt the association between the cues. All sheep quickly responded to the virtual fence and remained within the allocated area (Figure 1). The majority of interactions with the virtual fence occurred as a flock interaction, where one sheep in the flock had an interaction with the fence and caused the other sheep to turn around and away from the virtual fence

Figure 1 The black rectangle indicates the outer borders of the paddock (40 m x 60 m). Plot A: includes the GPS movements of 18 sheep within the paddock for 2 weeks. Plot B: the dashed red line indicates where the virtual fence was established and shows the GPS tracks of 18 sheep tested as two flocks of nine in each week.



The interactions of small flocks of sheep with the virtual fence showed that naive sheep exposed to the virtual fence as a flock have a low probability of receiving an electrical pulse. This was seen for their first interaction with the fence (24 per cent) and for interactions with the fence after learning (10 per cent). Furthermore, the virtual fence was highly effective at restricting sheep from a section of a paddock they previously had access to.

CASE STUDY

Comparison of an electric fence with a virtual fence in grazing management of sheep.

This intensive grazing study was designed to determine if VH technology could be used for applications such as strip grazing or technograzing for sheep. There were two treatments; 1) electric fence (total n = 18) and 2) virtual fence (total n = 18).

For each treatment, the sheep were split into three flocks of six and each flock was tested for 1 week with either the electric or virtual fence. Sheep allocated to the virtual fence treatment had prior experience to the VH technology. Sheep were restricted to small grazing plots (8 m x 8 m, Figure 2) for four hours each day and moved on to a fresh plot the following day.

Figure 2 Photograph of the virtual fence sheep at pasture. The paddock was divided into six laneways (8 m wide), and animals were restricted to a section of the lane each day. The yellow tape on the fence indicates the virtual fence boundary (8 m length)



Sheep in both the virtual fence and the electric fence treatments were successfully restricted to their plots throughout the trial. Consumption of pasture was similar as there was no difference between treatments in the crop biomass removed after each grazing. Furthermore, implementation of the virtual fence in a small area did not impact the behavioural patterns of the sheep. The results of this study showed that using VH technology to manage intensive grazing of a small flock of sheep in a restricted area is effective and does not negatively impact their welfare.

KEY CONTACTS

Dr Ray King – Project Manager
E r.h.king@bigpond.net.au
M 0412 322 047

Cath Lescun – Dairy Australia
E clescun@dairyaustralia.com.au
M 0408 568 003