Dairy Australia

Australian Government
Department of Agriculture, Water and the Environment

VIRTUAL HERDING RESEARCH UPDATE

TECHNOTE 6: USE OF VIRTUAL HERDING TECHNOLOGY TO CONTROL SUB-HERD LIVESTOCK MANAGEMENT

Background

Virtual herding (VH) technology allows for the control of an animal's movement and distribution without the need for physical fencing. The technology controls animal location and movement through associative learning of a paired audio cue (AC) with an electrical pulse (EP). The application of an AC before an EP has been shown to be ideal for cattle learning over EP alone.

As cattle are gregarious animals, complex herd interactions (dominance, temperament, sociability) may influence or alter the response to VH cues. In pasture based dairy systems, pasture allocations are designed to meet set nutritional requirements of each herd. This restricted access to feed and the use of a VH technology may be problematic if some individuals have a higher motivation to reach additional feed because of hunger or social attraction. Furthermore, these factors may limit the ability of the technology to separate and contain multiple subgroups of cattle within the same paddock.

Applications of VH technology for sub-group management

Virtual fencing has great potential for managing subgroups of cattle within a larger herd or within the same paddock. However, we need to understand how social motivation will impact on the animal response to VH stimuli, and evaluate the ability of the technology to separate groups of animals.

There are many potential applications of VH technology for sub-group management that can improve herd management, productivity and welfare. Some applications include:

- Managing pasture access around milking order to ensure cows later in the milking order have access to the same quality and quantities of pasture when they return to the paddock.
- Separating larger dairy herds based on days in milk and/or parity/lactation number to better manage feed requirements.
- Allow more access to pasture for high producing animals or younger cows in a herd.
- Separation of the herd into weight classes to reduce the impact of social hierarchy, shy feeders and feed competition.
- Breeding management by grouping cows with specific bulls.
- For the sheep industry there is potential to create smaller lambing groups within a flock to allow for monitoring and access to windbreaks during lambing for improved lamb survival.

This project is supported by funding from the Australian Government as part of its Rural R&D for Profit program.

CASE STUDY

Separation of groups of grazing dairy cows on pasture

The University of Sydney has conducted an experiment evaluating the ability of VH technology to keep two groups of grazing dairy cows separated within the same 1 ha paddock. Twenty-four dry cows were trained to a virtual fence for 6 days. Cows were then divided into two groups of 12 animals based on social hierarchy, whereby there was an equal representation of dominance within each group.

A 1 ha paddock of irrigated kikuyu pasture was divided into 2 x 5-day allocations at each end of the paddock, with a buffer zone of pasture in the middle (Figure 1). There was about 3,500kg DM/ha pasture available in the paddock which allowed an average of at least 20kg DM pasture available to each cow every day. The two groups of cows were allocated to opposite ends of the paddock (approximately 100 m distance between the two groups).

On day one of the experiment, the group of cows at each end of the paddock were provided with a two day pasture allocation, with an electric fence tape used in addition to a virtual fence to prevent the two groups of cows mixing. On day two the electric tape was removed, but the virtual fence remained. On days three and four the virtual fence for each group was moved each day approximately 20 m toward the middle of the paddock. Cows continued to graze and remain within their groups until day five, when two cows from each group crossed over to the other group and did not return.

While the results of this study have demonstrated that VH technology can be used to separate small groups of cows in a paddock, a minimum distance of greater than 50 m may be required based upon these results. The results of this study also indicate that social attraction may be a stronger motivator than hunger for dairy cows. The social relationships and interactions within a herd of cattle need to be considered when using VH technology to manage sub-groups within a herd.

Figure 1 Experimental paddock (not to scale)-two groups of cows (A and B) grazed toward each other from opposite ends of a 1 ha paddock. On day 1, cows were contained behind a conventional electric fence tape (approximately 100 m distance between fences). On day three this was removed, and the virtual fence was moved one grazing allocation (approximately 10 m) per day toward the centre of the paddock. Each allocation varied in size due to the non-symmetrical shape of the paddock, and the amount of pasture available as measured by a rising plate metre.

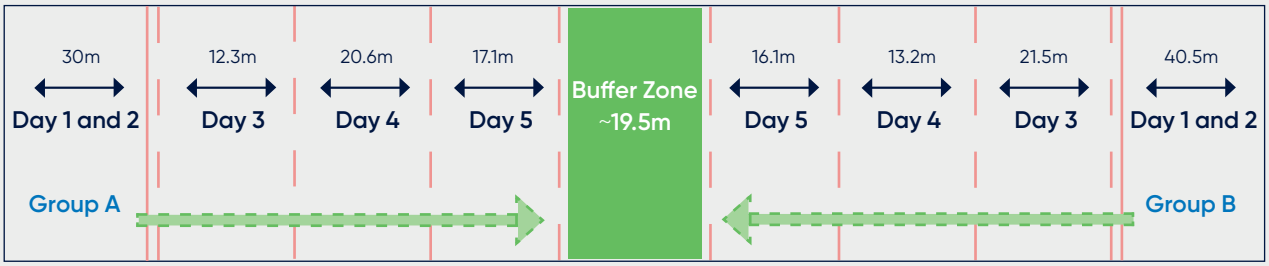
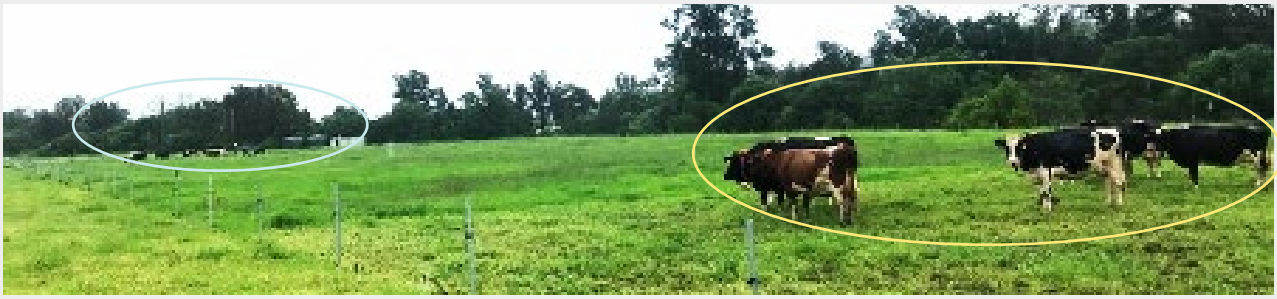


Figure 2 Two groups of cows separated by two virtual fences on the same 1 ha paddock. Group A (Blue circle) and group B (yellow circle) grazed toward the centre of the paddock for 3 days. When the two groups were approximately 50 m apart, they started to mix and the experiment was ended.



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

Dairy Australia Limited ABN 60 105 227 987
E enquiries@dairyaustralia.com.au
T +61 3 9694 3777
F +61 3 9694 3701
dairyaustralia.com.au

2542.6 | Oct 2020