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Development of a virtual fencing system for cattle

Dr Dana Campbell and Dr Caroline Lee




Dairy Australia
mla MEAT & LIVESTOCK AUSTRALIA
awi Australian Wool Innovation Limited
Australian Pork
CSIRO
The University of Melbourne
The University of Sydney
tia Tasmanian Institute of Agriculture
une University of New England
AGERSENS




What is virtual fencing?

- Definition:

  To contain cattle without the use of a fixed fence, *using signals to the animals – audio tone + electrical stimulus.*

  - ***Animal learns to avoid a virtual boundary based on audio tone***

- Applications
  - Greater control of grazing and optimisation of pasture use
  - Increased animal monitoring
  - Protect environmentally sensitive areas
  - Fence difficult terrain
  - Reduce labour/fencing costs

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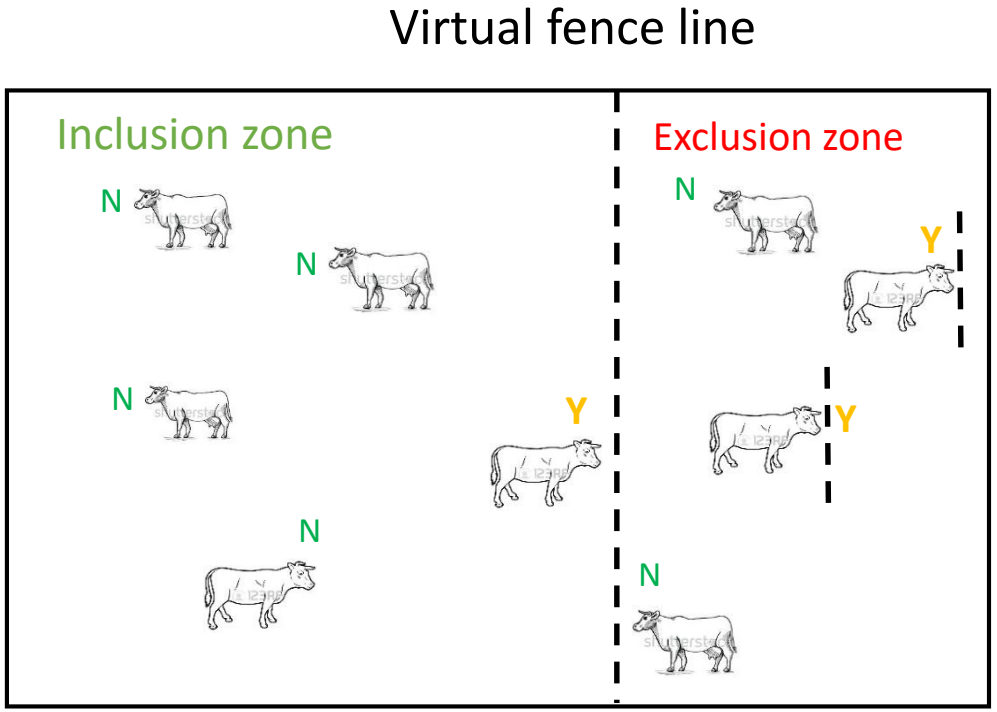
The virtual fencing system



N = no signals given
Y = yes, signals given

New virtual fence lines are set directly in front of each animal that crosses into the exclusion zone




CSIRO and Virtual Fencing

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- Two CSIRO patents developed from early research:
- **agersens.com**

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CSIRO

une University of New England

THE UNIVERSITY OF SYDNEY

tia TASMANIAN INSTITUTE OF AGRICULTURE

THE UNIVERSITY OF MELBOURNE

Grazing Control




Research milestones

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2017:

- Optimise the cues
- Cattle responses to moving and complex virtual fences

2018:

- Applications for herding

2019:

- Long-term effects on behaviour and welfare

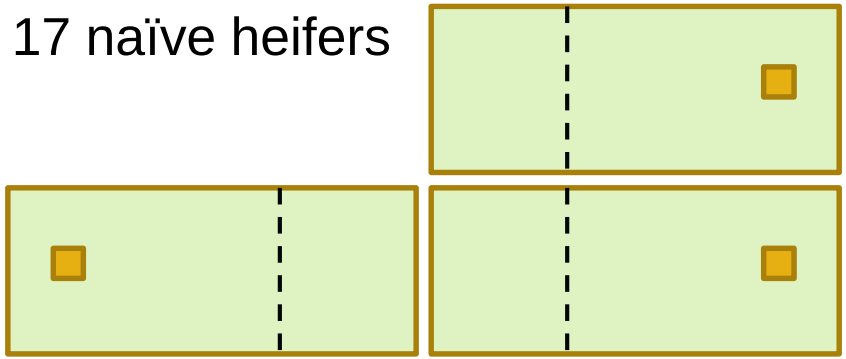
2019/2020:

- Specific applications of virtual fencing technology in field settings

Individual testing of animals

March 2017

17 naïve heifers



- Animals learned the audio/stimulus association
- Learning rate varied
- Animals learned the location of the fence

Cattle responses to moving virtual fences

- Moving fence: Important for strip grazing, pasture management, temporary exclusion
- Do cattle learn the audio cue or the fence location?

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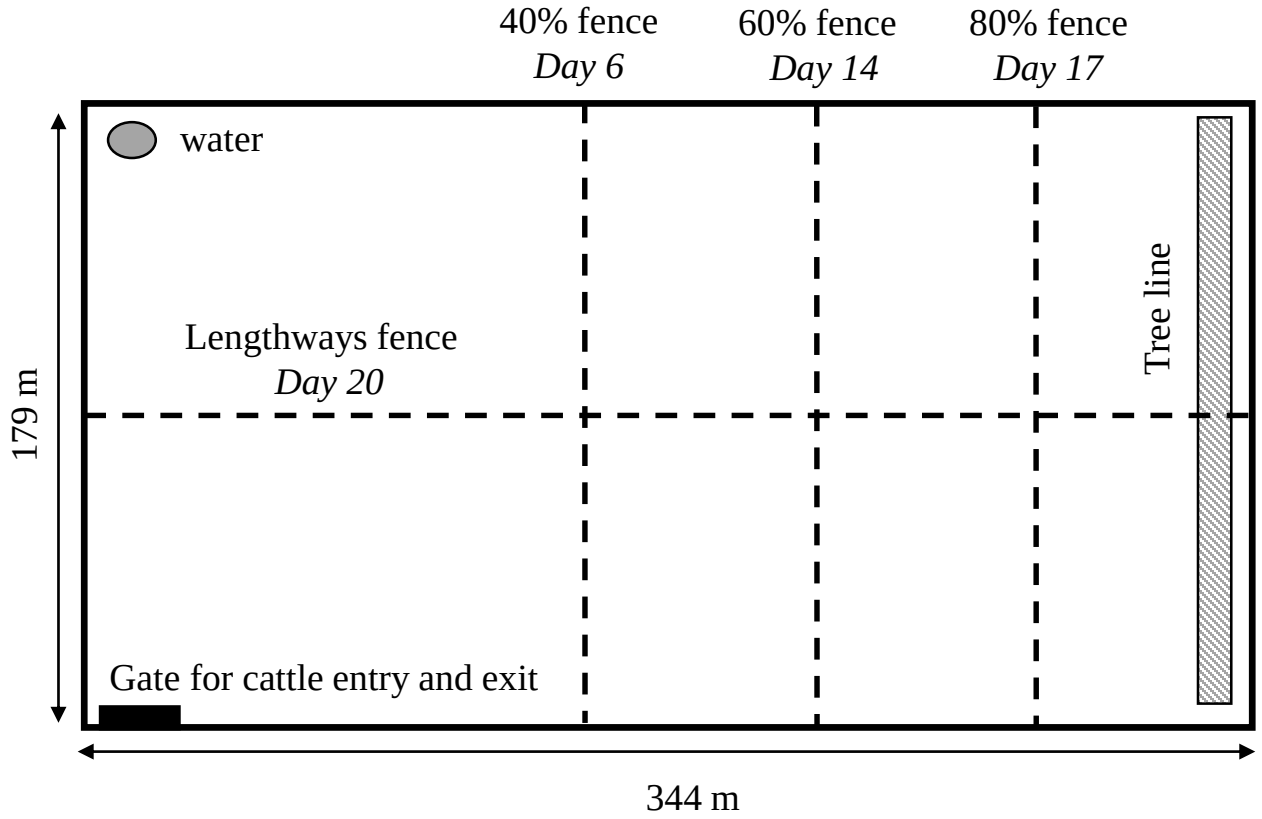
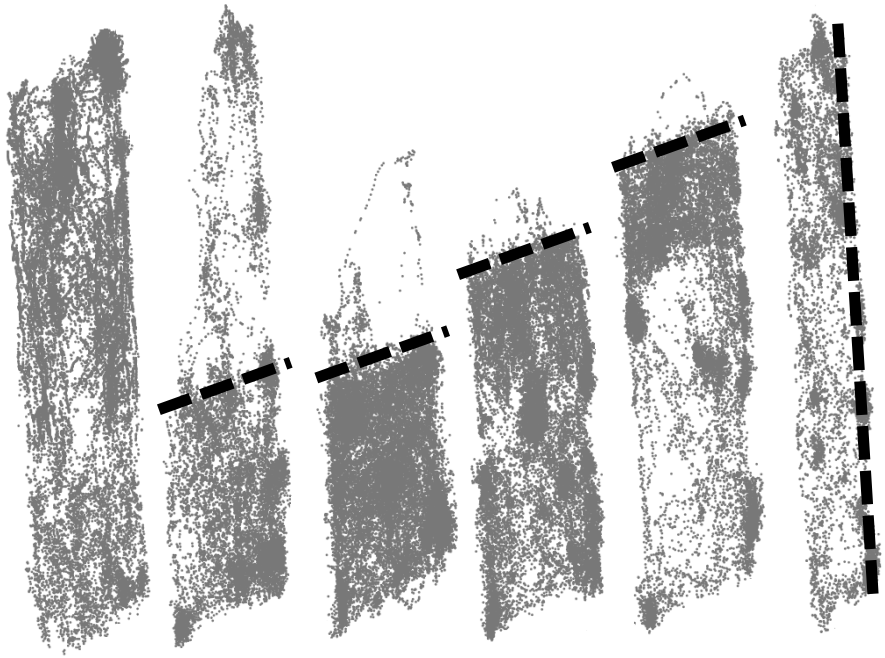
Moving fence trial



GPS plots



No fence	40% training	40%	60%	80%	Lengthways
69 h	*48* h	*89.15 h*	*69.15 h*	*68.15 h*	*54.75 h*

Virtual fence lines

Approximately 4 h until first new fence interaction

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animals

MDPI

Article

Tech-Savvy Beef Cattle? How Heifers Respond to Moving Virtual Fence Lines

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Received: 3 August 2017; Accepted: 14 September 2017; Published: 18 September 2017




Commercial riparian zone

Tumbarumba, NSW

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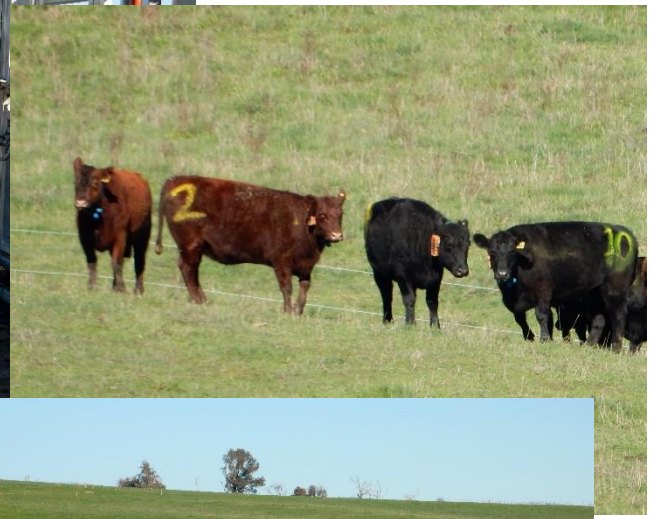
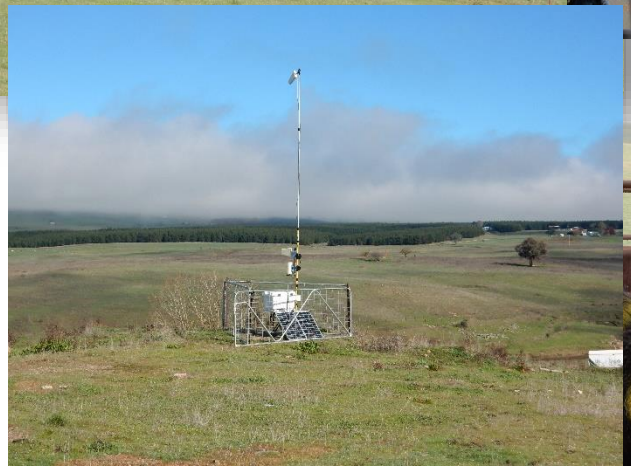
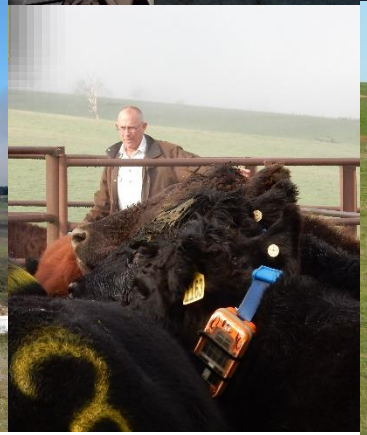
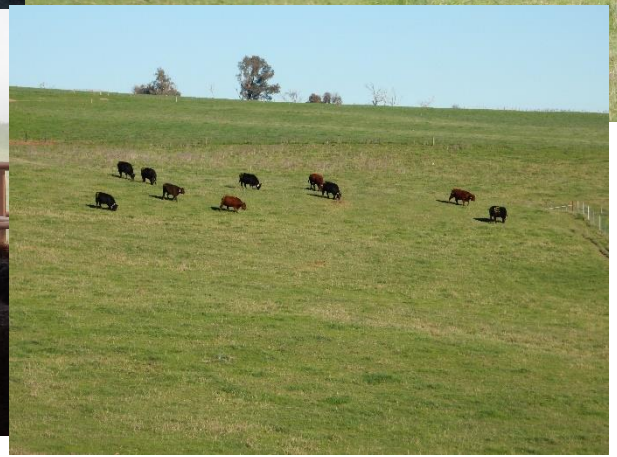
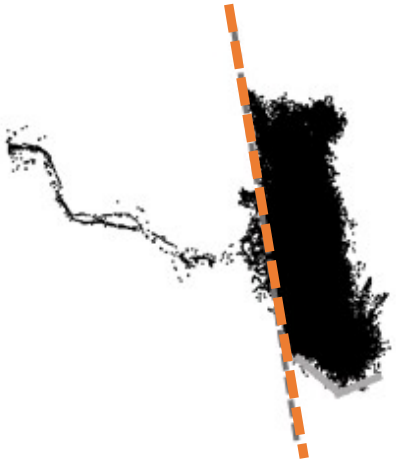








GPS plots

No virtual fence



Virtual fence activated

Virtual fence deactivated

Collar signals

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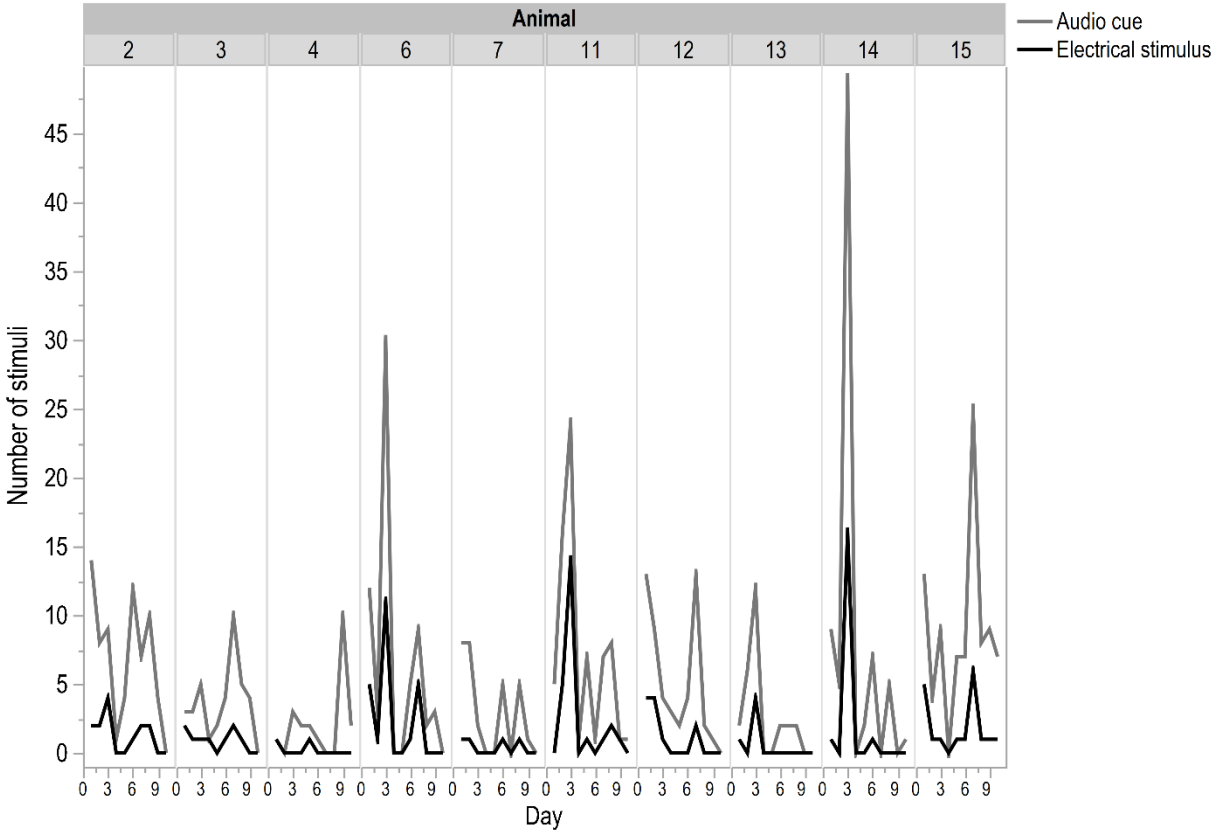

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animals

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Article

Temporary Exclusion of Cattle from a Riparian Zone Using Virtual Fencing Technology

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Received: 2 November 2018; Accepted: 20 December 2018; Published: 22 December 2018




Automated eShepherd™ system

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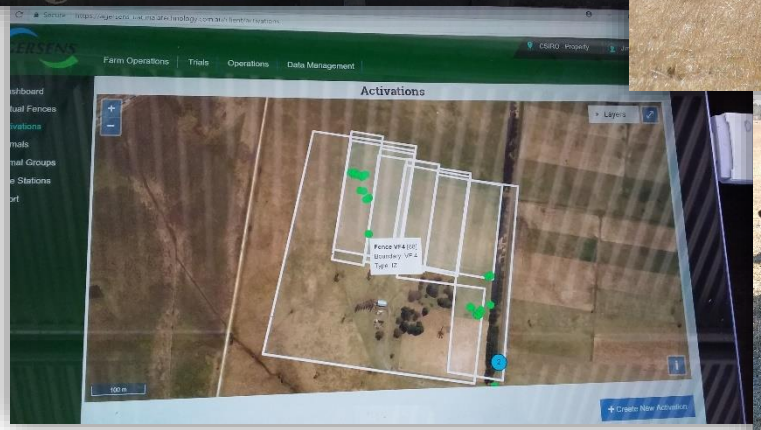




Herding with automated collars

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Training fence deactivated
Animals in yards

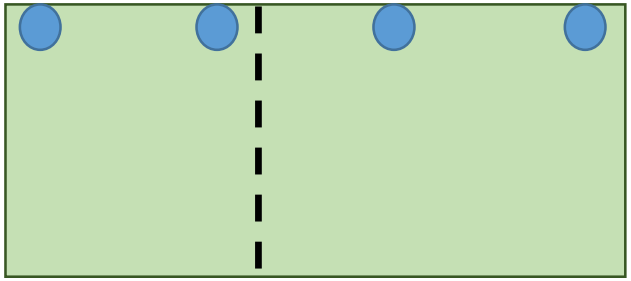
Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7

Animals placed in paddock
GPS tracking only

Training fence activated

Herding

Herding
(opposite direction)



6 ha paddock
5 groups
12 animals/group

Virtual fence training

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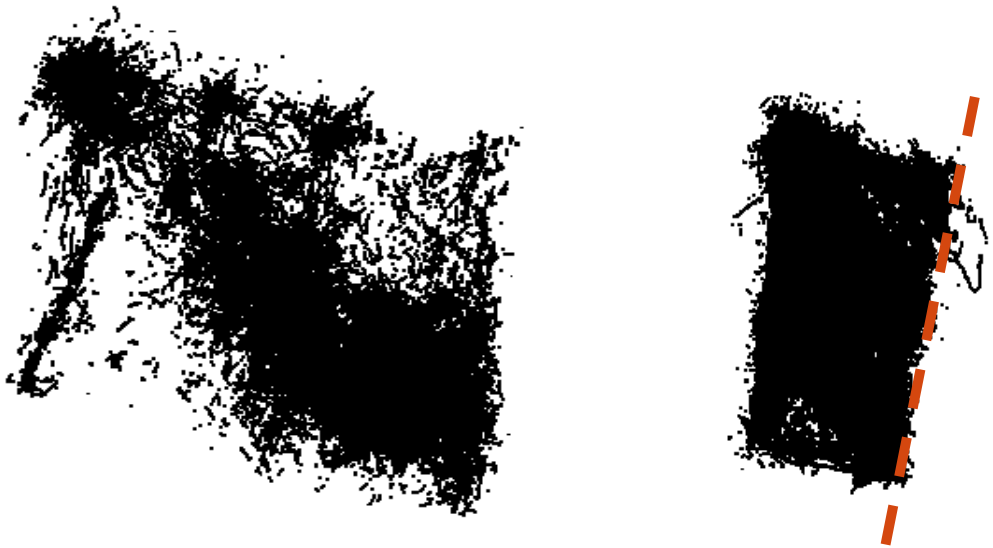

No virtual fence

Virtual fence activated




Back fence herding

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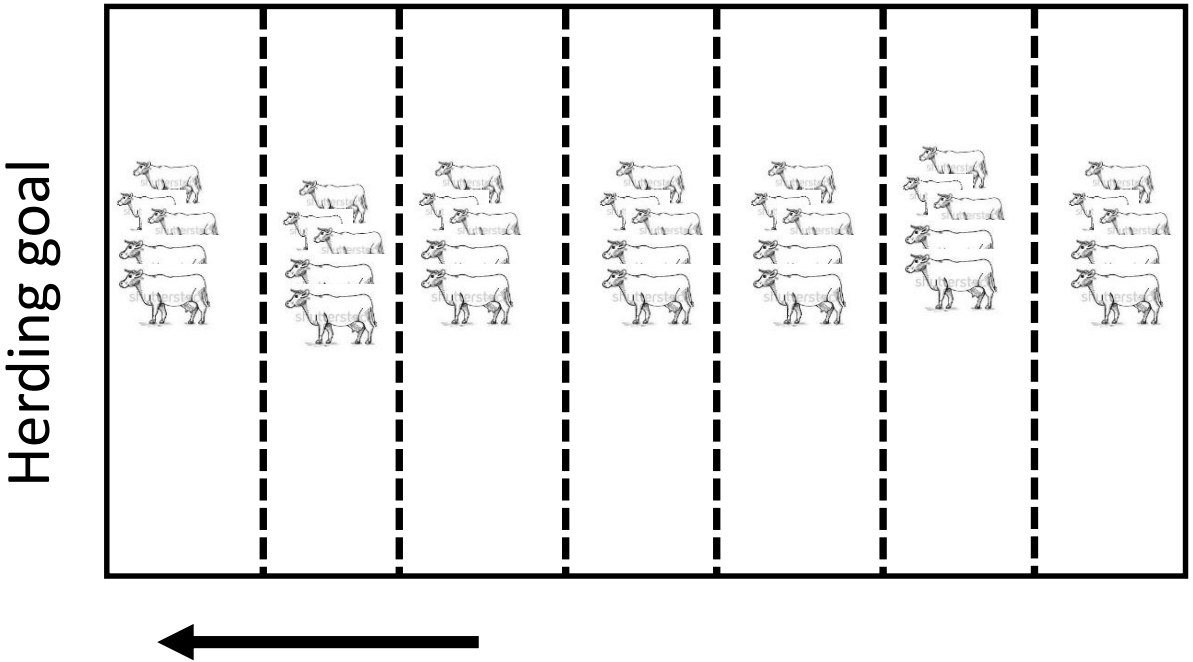
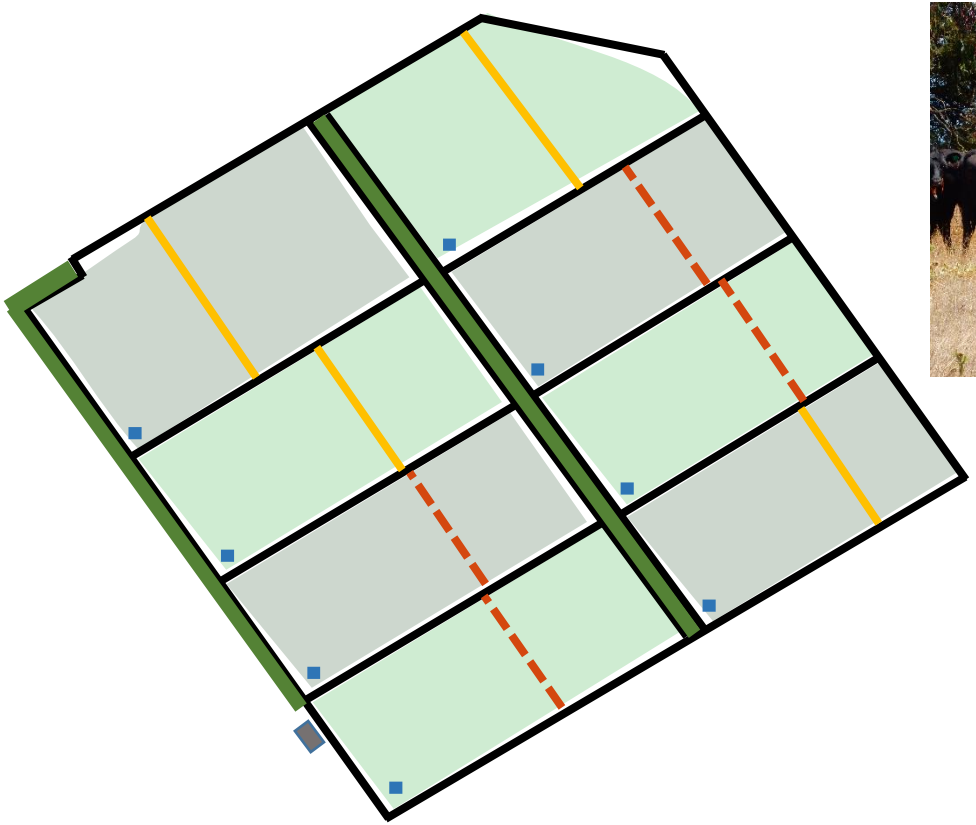





Virtual fence vs. electric tape



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Eden Valley

- Long-term commercial application
- Learning
- GPS patterns
- Behavioural patterns
- Environmental impacts

Thank you

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https://agersens.com




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