

Current and future technology for grazing animal management

Dr. Anthony Parker PhD
Department of Animal Sciences



THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

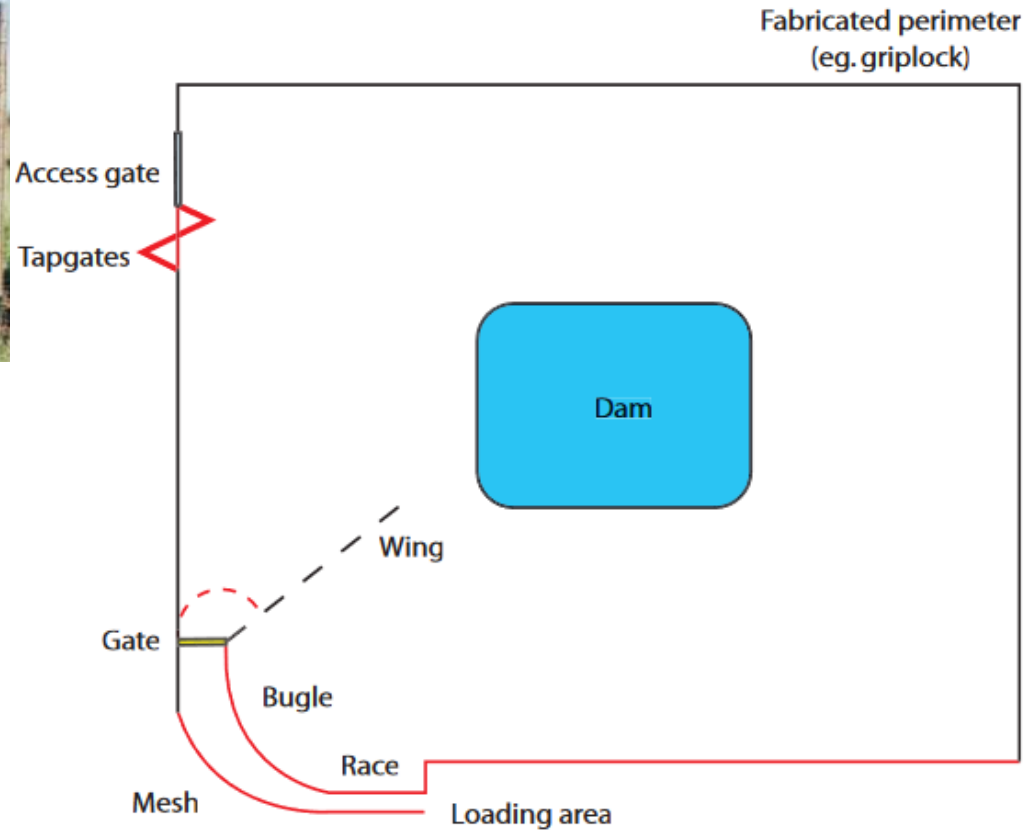
Tools on a continuum for grazing management

Four tools for grazing animal behavior and management

- Trap Yards
- Walk over Weigh technology
- GPS collars
- Virtual fence technology

The future of grazing technology

Trap yards

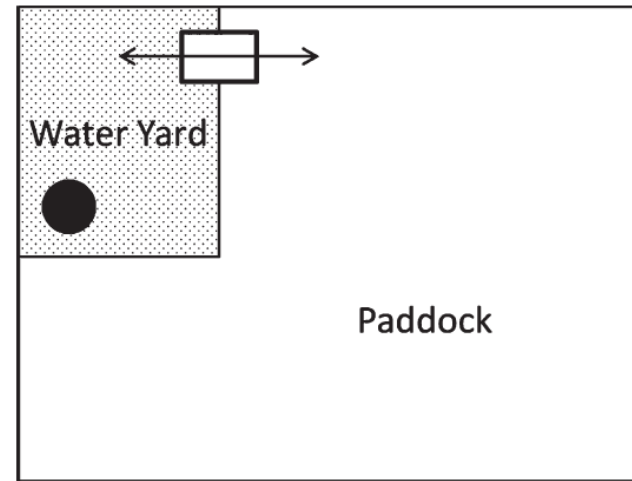


Source; Underwood, C. (2002), Total grazing management field guide self-mustering systems for cattle, sheep and goats. Department of Agriculture and Food, Western Australia, Perth. Bulletin 4547

Walk over weigh systems



<https://livestock.tru-test.com/en-au/product/remote-wow-drafter>



Aldridge et al. 2017 <http://dx.doi.org/10.1071/AN15172>



<https://theconversation.com/technology-is-changing-the-face-of-northern-australian-cattle-farming-31552>





Remote drafting evaluation on sheep given access to lupin supplement

Effect of allocated frequency of access to lupins supplement on the actual frequency of sheep entry to both the water and supplement yards and on the time spent by sheep in the supplement yard

Values within rows followed by different lowercase letters are significantly different at $P = 0.05$

	Treatment					s.e.d. ^A
	Control	Lup1	Lup2	Lup4	Lup7	
Logit (% of days sheep accessed the water yard at least once per day)	1.6a (83)	2.5b (92)	2.6b (93)	2.3b (91)	2.4b (92)	0.19
No. of water yard accesses per week	11.0a	12.7ab	14.9b	13.5b	13.4b	1.08
Logit (% of days sheep passed through the drafter at least once on their day of supplement access)	–	2.8ab (94)	4.2b (98)	2.0a (88)	2.4a (92)	0.52
No. of supplement yard accesses per week	0.02	0.69	1.98	3.35	6.04	
Time in supplement yard (min per feeding session)	–	13.1ab	14.4b	9.6a	8.8a	2.66

^AAverage of all treatment groups.

Bowen *et al.* *Animal Production Science*, 2009, **49**, 248–252

Remote drafting evaluation on sheep given access to lupin supplement

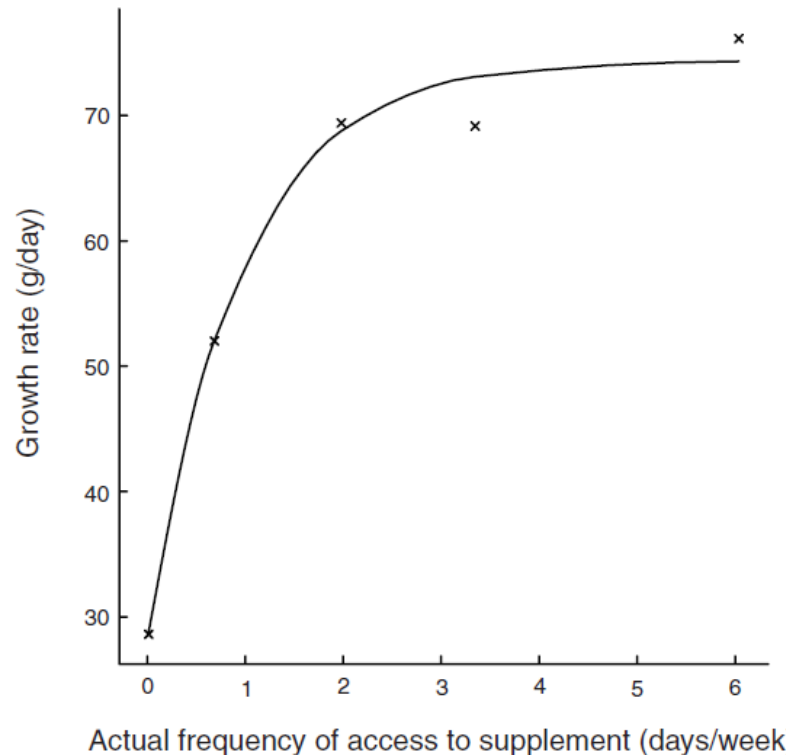


Fig. 1. Mean growth-rate response to actual frequency of access to supplement: $y = 74.4$ (s.e. 2.32) $- 46.3$ (s.e. 6.27) $\times 0.345$ (s.e. 0.0896) x , (adjusted $r^2 = 0.94$, $P = 0.030$).

Bowen et al. Animal Production Science, 2009, 49, 248–252

Walk Over Weigh (WOW) Technology



Setup cost required in time and \$



Enables automatic drafting on any category

Liveweight, pregnancy status, lactation, FEC



Records animal number, BCS & body weight daily



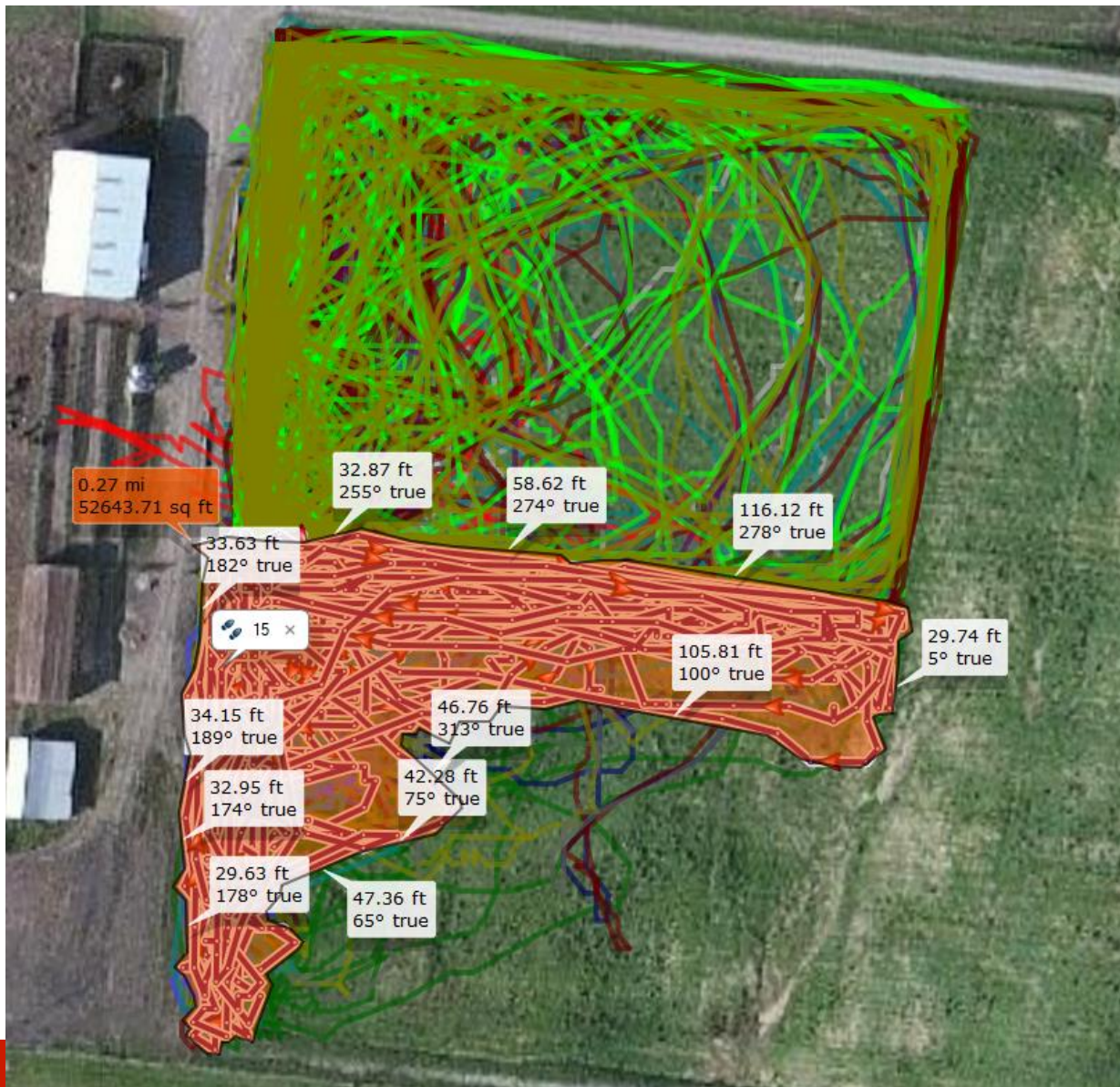
Can enable in field supplementation for groups



Can be fitted with camera or video

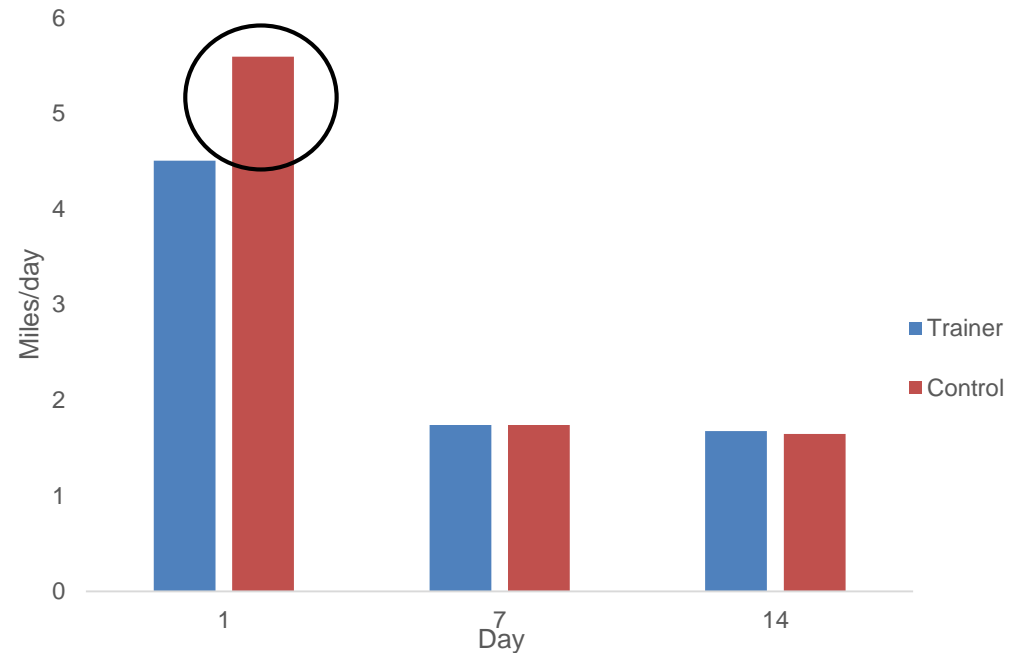
Global positioning system collars





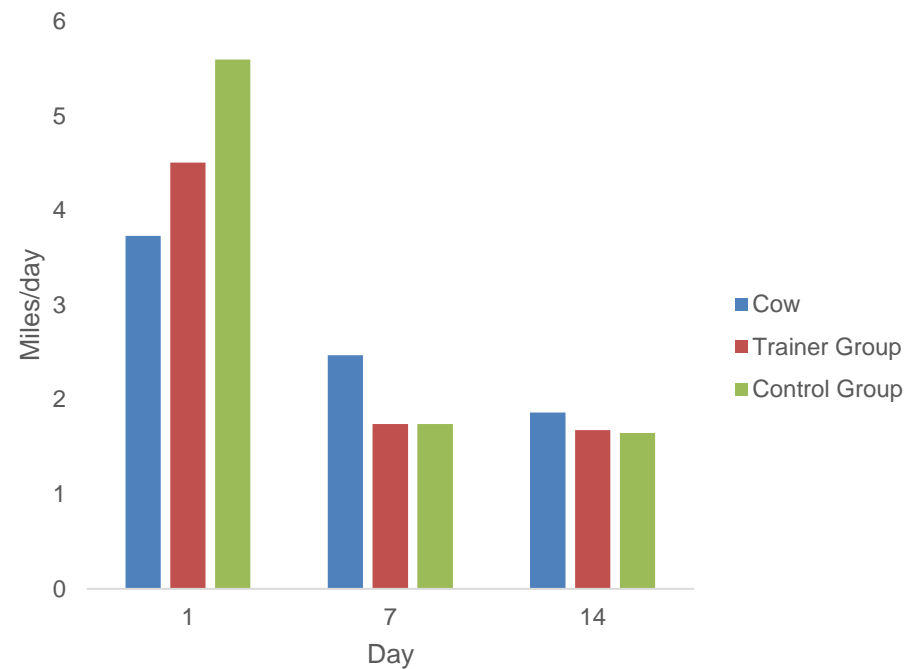
Distance walked between calf groups

- D1 Control calves walked more
- D7 and D14 there was no difference



Distance walked + cow behavior

- An unexpected result
- Cow walked more on D1 than D7 and D14
- Re-establishment behavior of the adult?
- What is the effect if the cow was accustomed to the area



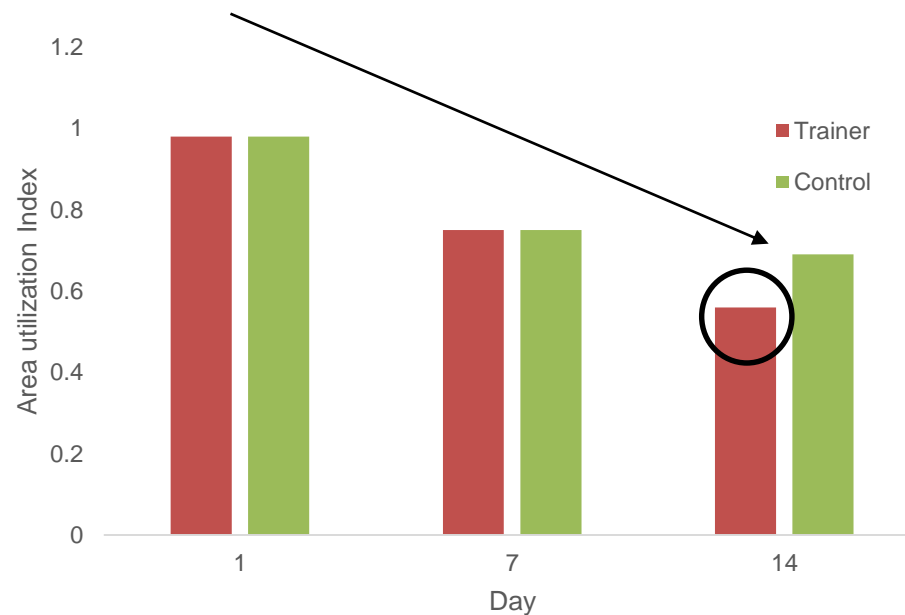
Area Utilization Index

-
- Area walked over/total area available

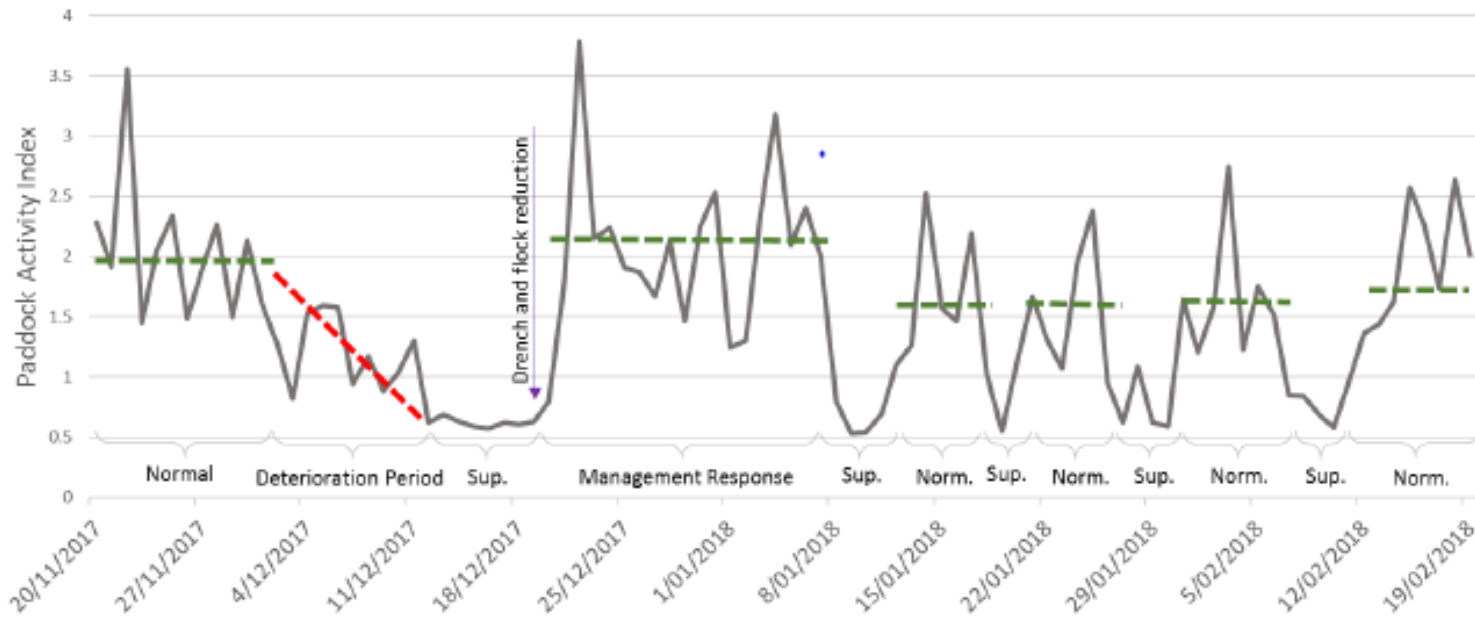


Area Utilization Index

- Decreased AUI with day
- Trainer group on day 14 utilized less area



Identification of parasitized sheep in rangelands



Source; Trotter et al. 2018. Meat and Livestock Australia final report P.PSH 0385

Global Positioning systems



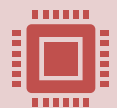
Improves our understanding of animal behavior



Real time monitoring of animals



Recognition of sick animals



Used to create algorithms for other technology

Virtual Fencing with GPS informed collars

Solar energy harvesting – no battery changes required

GPS location – no need for mobile phone network
LoRa comms to Base Station

Rugged and robust casing – 5-10 year life

Adjustable strap

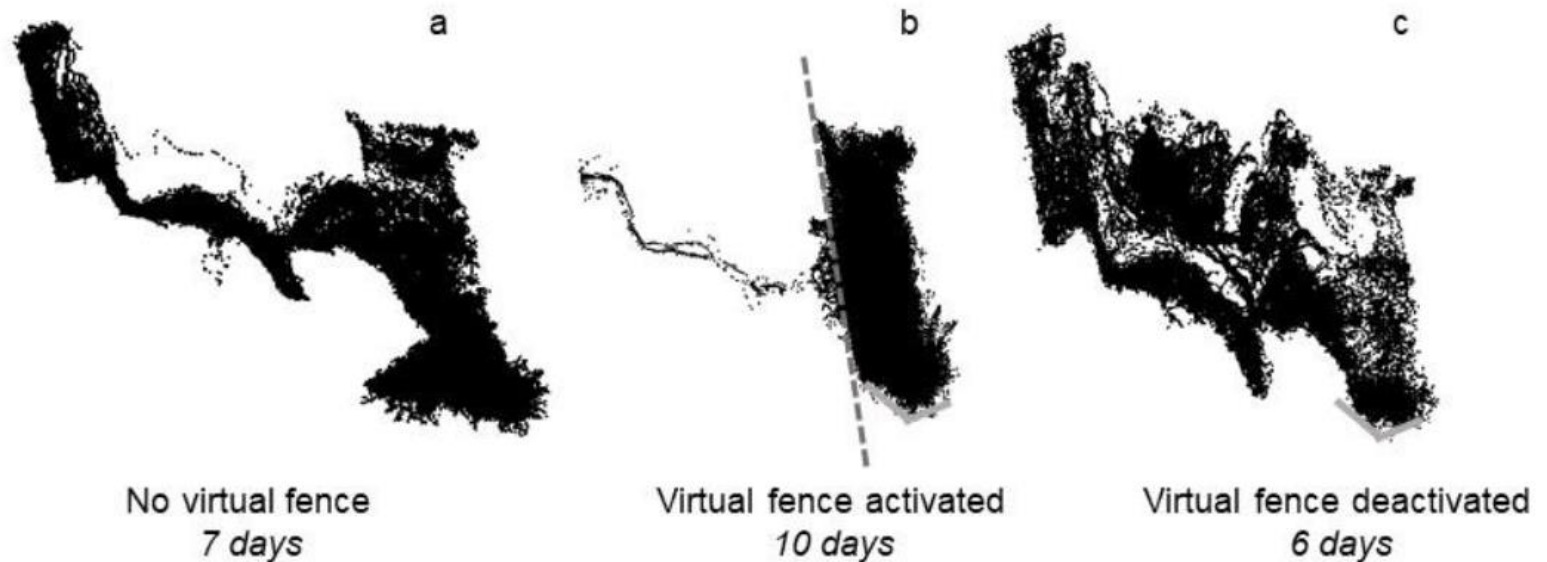
Counterweight maintains collar in position

Aversive stimulus

Non aversive audio cue



Exclusion of Cattle from a Riparian Zone Using Virtual Fencing Technology



Campbell et al. 2019. *Animals*. <http://dx.doi.org/10.3390/ani9010005>

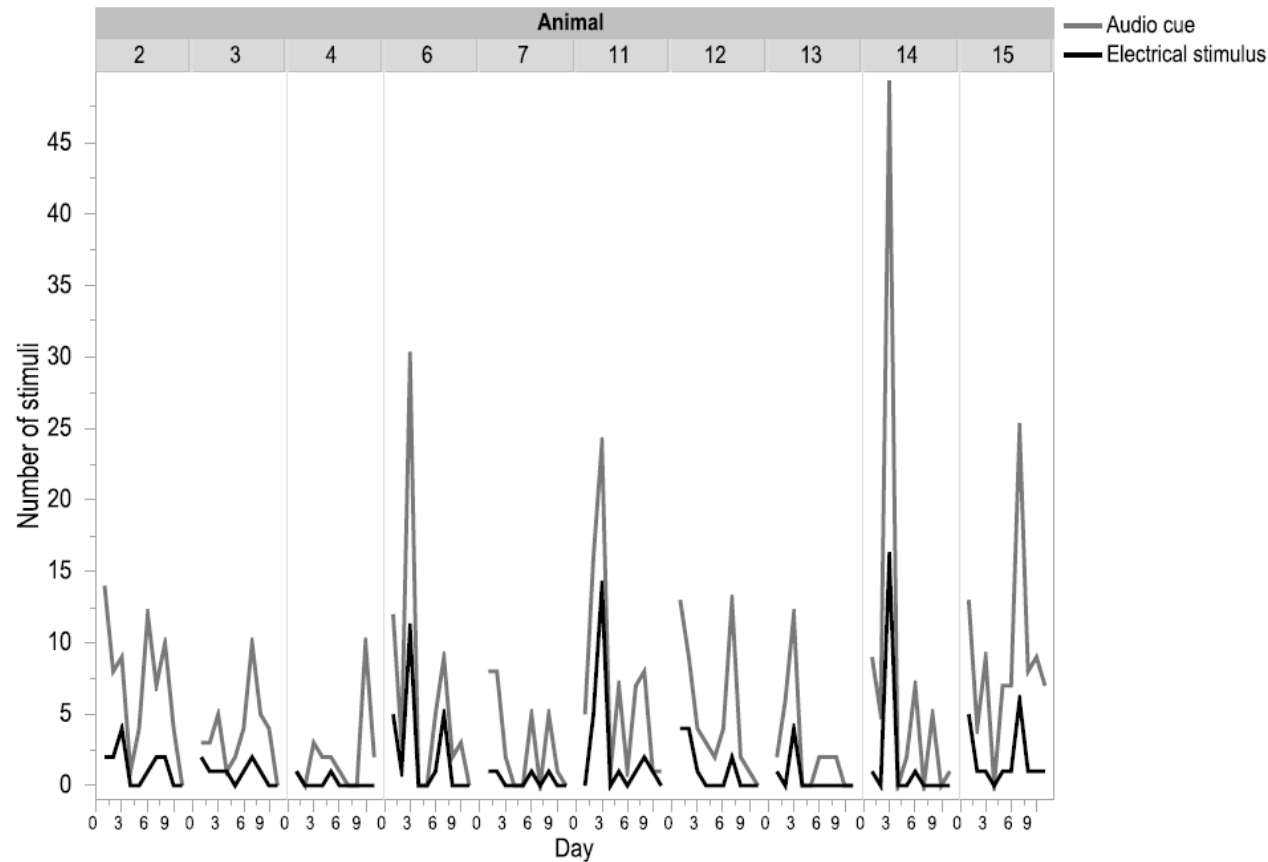


Figure 3. The number of audio and electrical stimuli that each individual animal received during the 10-day period of virtual fence activation. Animal 5 was removed from this dataset as there was a functionality error in the delivery of the electrical stimulus.

Campbell et al. 2019. *Animals*. <http://dx.doi.org/10.3390/ani9010005>

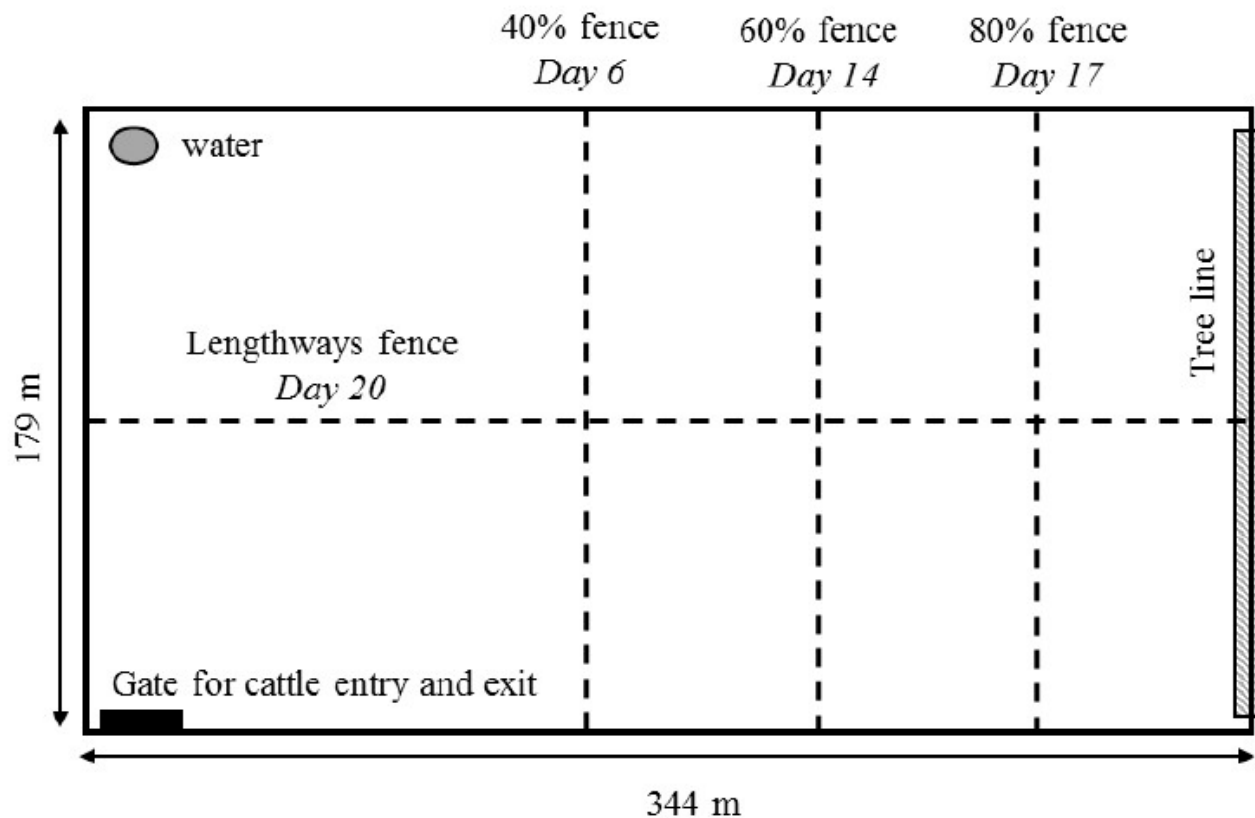
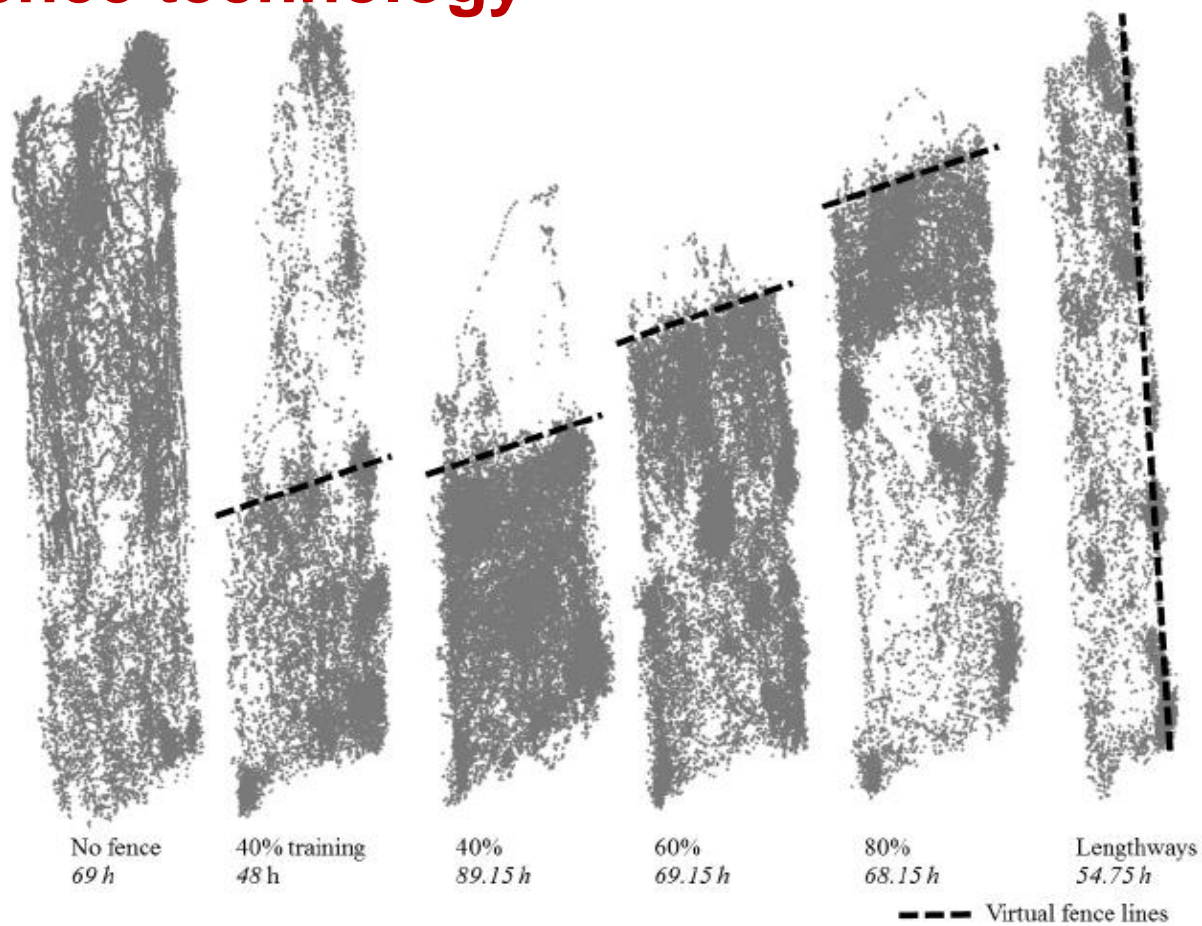


Figure 1. The test paddock for the virtual fencing trial showing the position of the water trough, the tree line overhanging the upper physical fence boundary, and the gate for cattle entry into and exit from the paddock. The dashed lines represent the virtual fence boundaries that were sequentially implemented in the paddock over the trial duration.

Campbell et al. 2017. *Animals.*, 7, 72

Virtual fence technology



n = 13

n = 6

n = 6

n = 6

n = 5

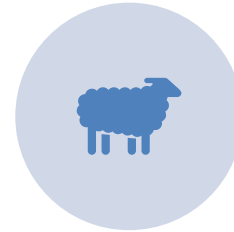
n = 4

Campbell et al. 2017. *Animals*, 7, 72

Virtual Fence technology



Published studies validate the technology



Limited numbers of cattle and sheep



Lack of controls to compare grazing regimens



Not all animals comply with the cues



Cost/unit suggested at \$120 to \$320