

Opportunities for virtual fencing to better manage sheep



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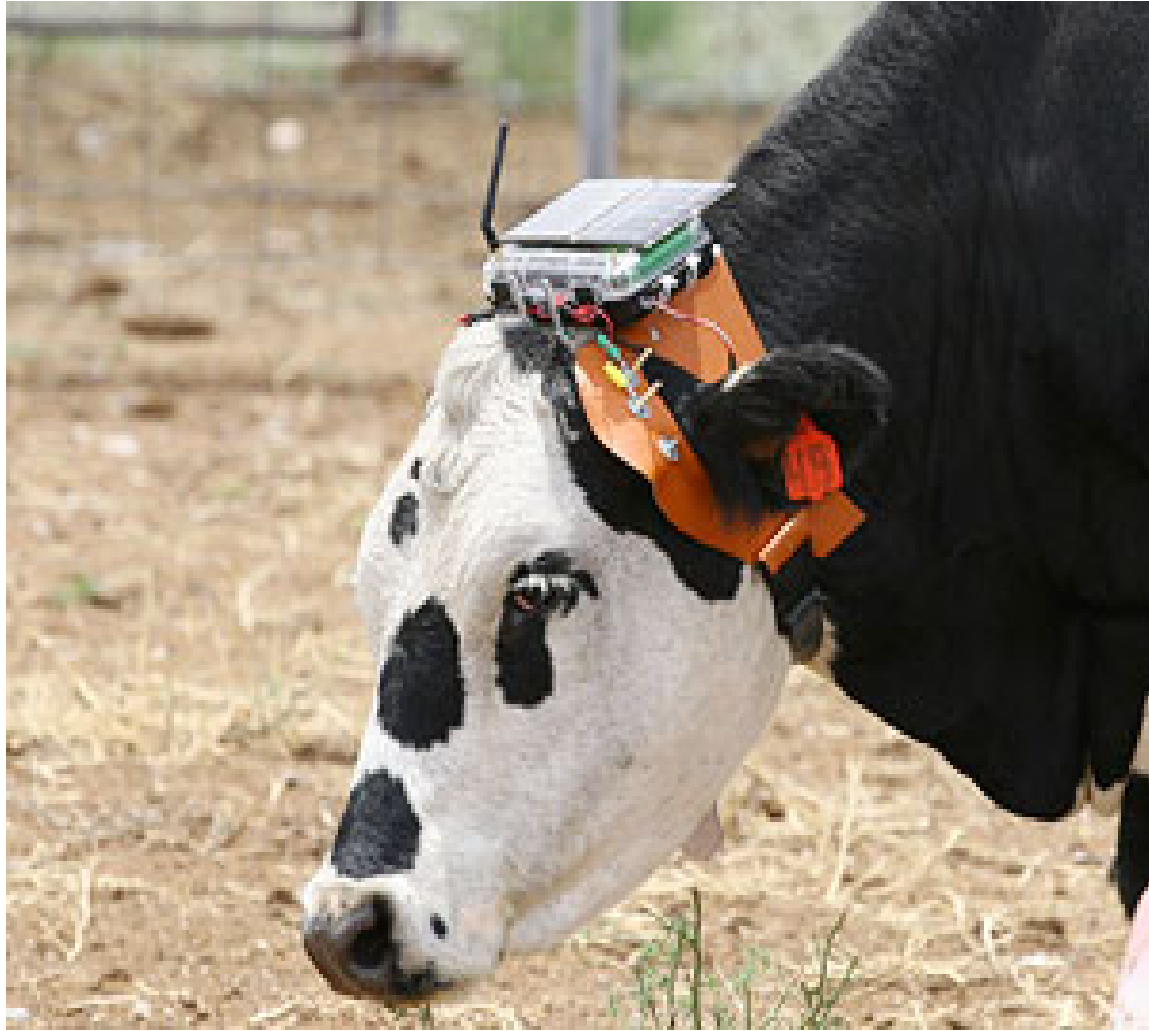


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Farming









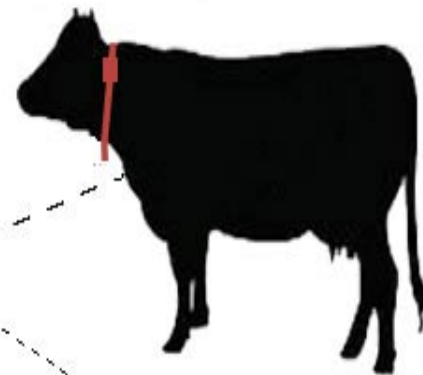


- 1 DRAW YOUR FENCE USING THE SMARTPHONE APP



- 2 BASE STATION RELAYS FENCE POSITION AND ANIMAL LOCATION USING GPS

- 3 COLLAR TRAINS ANIMAL TO AVOID VIRTUAL FENCE USING AUDIO CUE

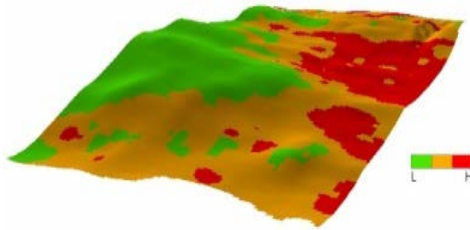




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Potential value from spatial grazing

- Managing grazing on increasingly large paddocks
- Reducing grazing pressure on vulnerable areas
- Targeting crop grazing
- Improving feed utilization (eg strip grazing)
- Labour saving
- Reduced fencing costs
- Targeted grazing for weed control





Principles of a conventional electric fence

Conditioned stimulus

(visual)



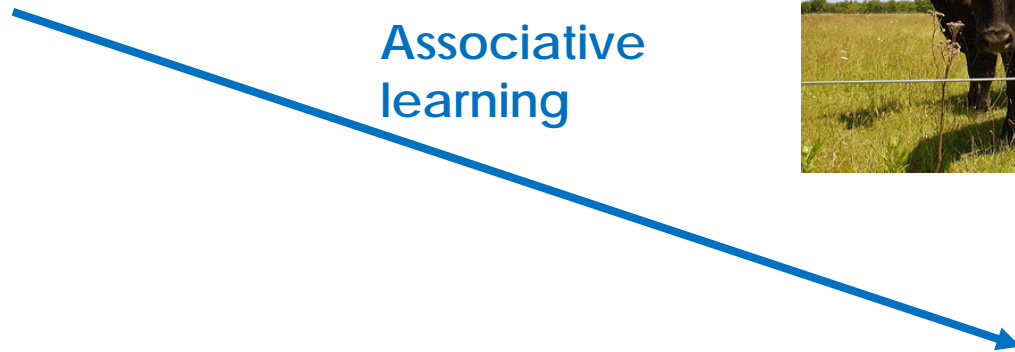
Contact fence



Unconditioned stimulus

(electrical)

Associative
learning



Response

(avoidance)





Principles of a virtual fence

Approaches boundary



Conditioned stimulus
(audio)



No response



Unconditioned stimulus
(electrical)

Associative
learning



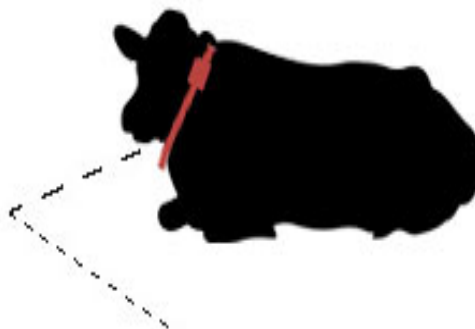
Response
(avoidance)



Animal's Choice

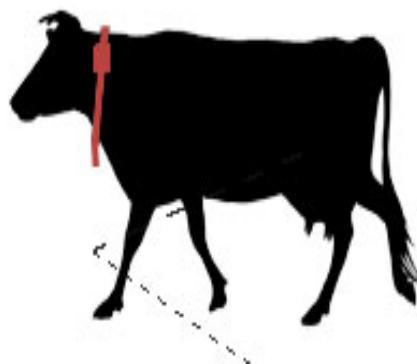


1 ANIMAL IS RESTING OR MOVING
IN THE RIGHT DIRECTION



eShepherd does nothing
- even if the animal is lying down
or standing at the fence boundary

2 ANIMAL RUNS THROUGH
THE BOUNDARY



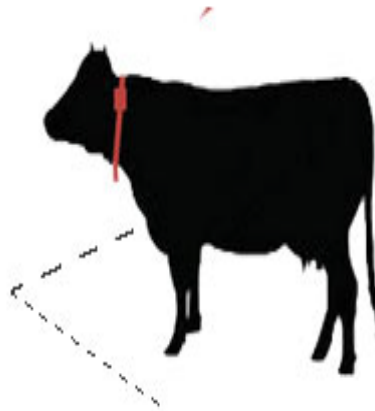
eShepherd lets it run. When the
animal has calmed down, it
gradually shepherds it back.

- 3 RESTING ON WRONG SIDE OF FENCE OR WALKING TOWARD CORRECT SIDE



eShepherd does nothing.
The audio cue is only given if they are on the wrong side AND heading in the wrong direction.

- 4 ANIMAL IS MOVING TOWARD THE FENCE LINE



eShepherd emits an audio cue.
If the animal ignores the audio cue and continues towards the fence, the collar delivers a single mild, but aversive, electric pulse



How do we test a virtual fence with sheep?

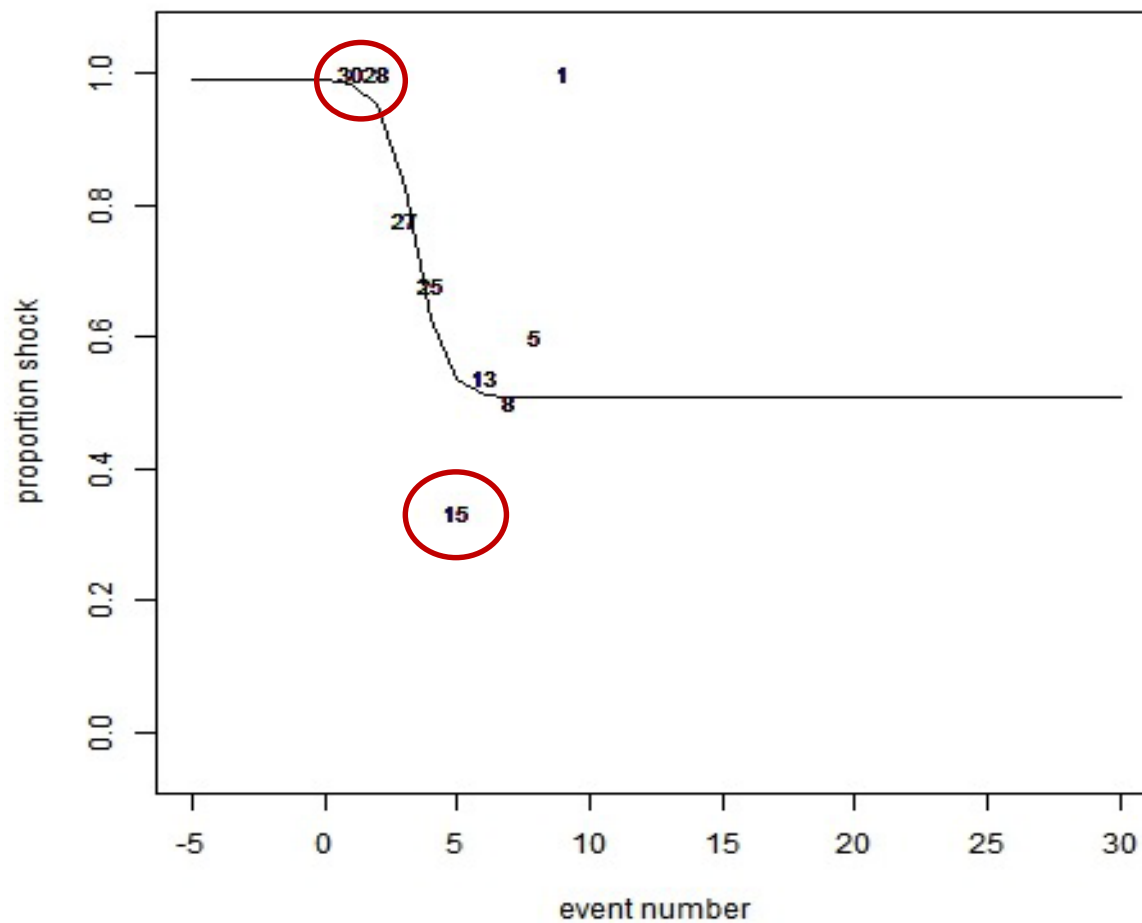




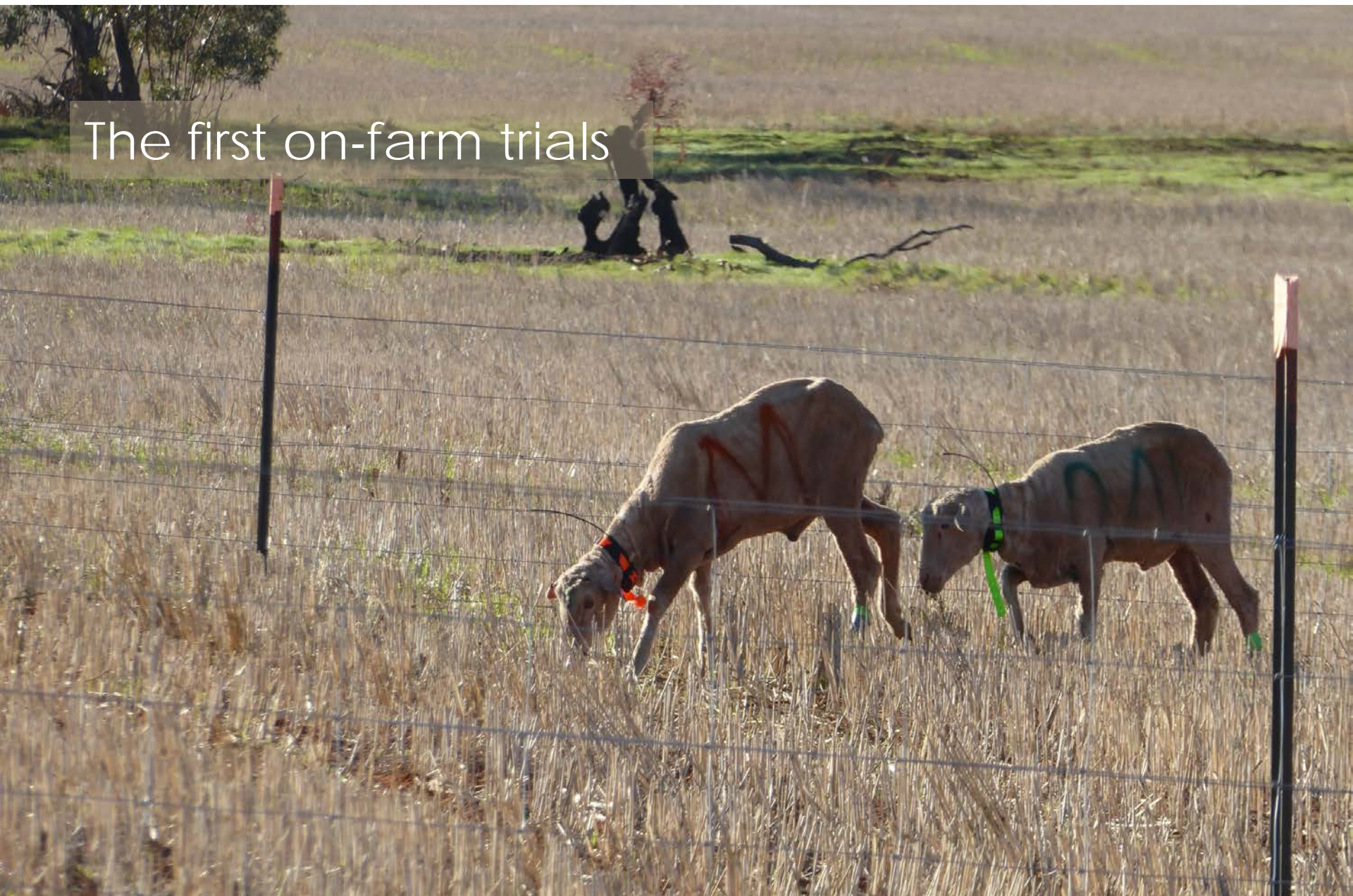
Associative learning test

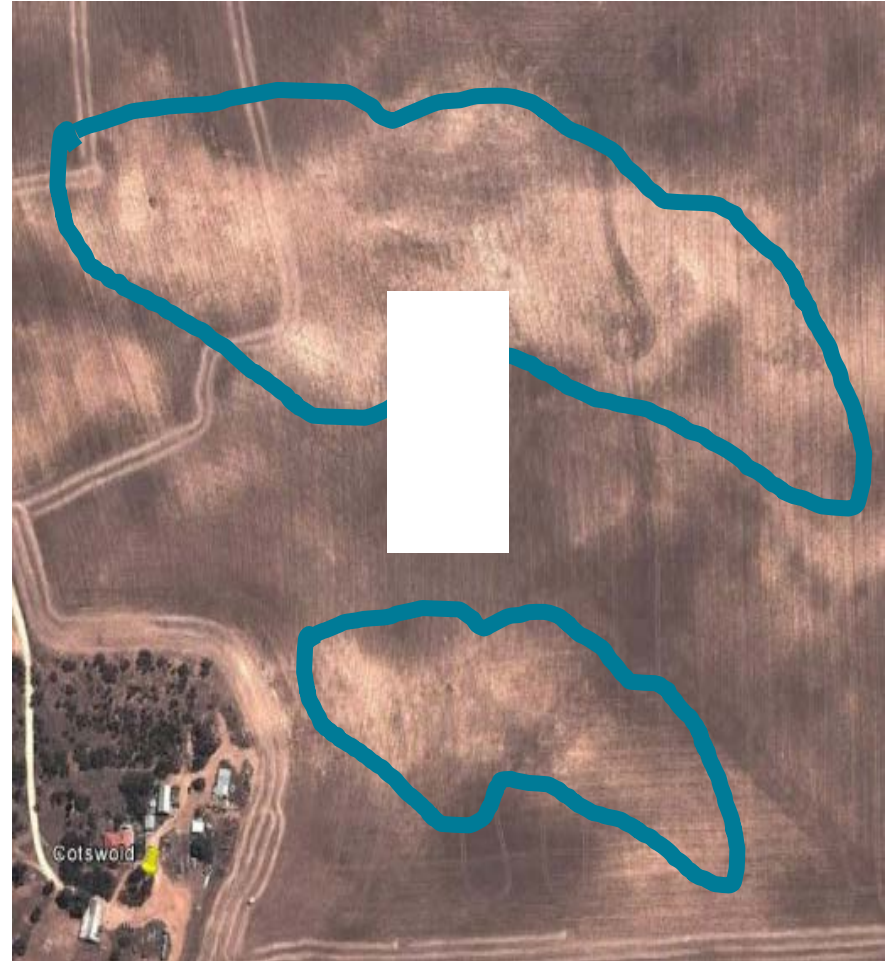
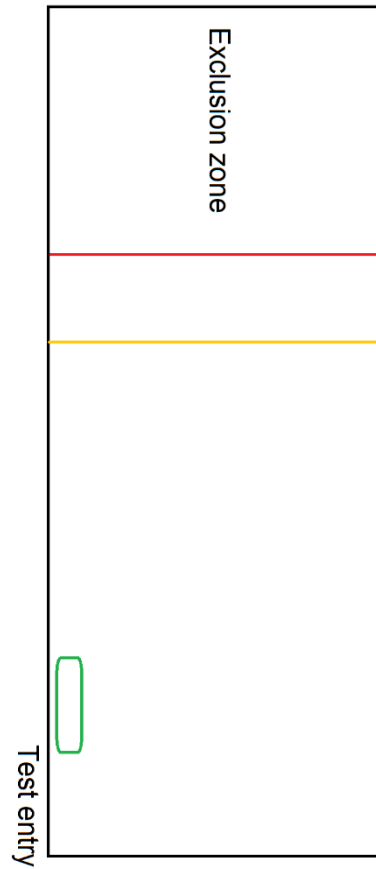


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The first on-farm trials





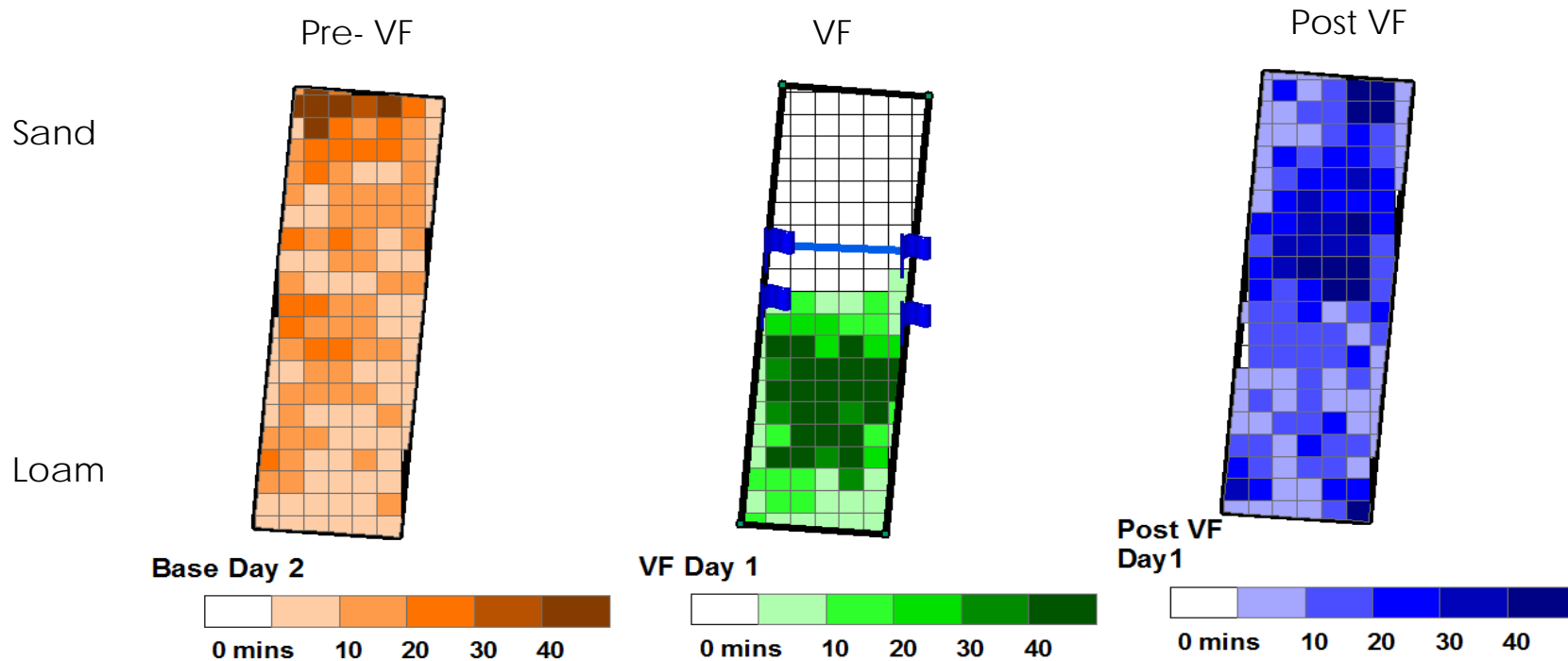




The effect of virtual fencing on paddock utilisation



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Control

33% Collared

100% Collared

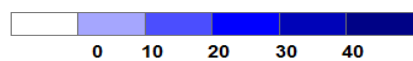
66% Collared

Sand

Flat

Virtual Fenceline

Time spent in area (mins)



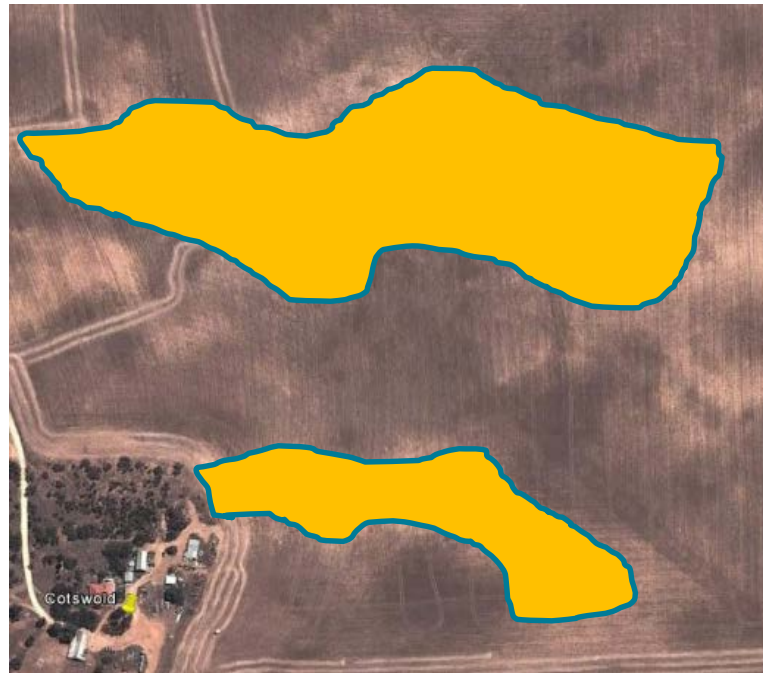
0 20 40 60 Meters

Marini D, Llewellyn R, Belson S, Lee C. 2018. Controlling within-field sheep movement using virtual fencing. *Animals*. 8:31

Could it pay?



Could it pay?



Could it pay?

Whole-farm scale





Could it pay?

Whole-farm scale

- Farm with 6 soil main types
- Paddocks grazed (and cropped) with 3 soil zones
- Sheep excluded from a zone when minimum groundcover reached
- Relative to removing sheep from whole paddock when a minimum groundcover is reached in one zone



Whole-farm profit increased by 16%



Stocking rate that maximises profit more than doubles

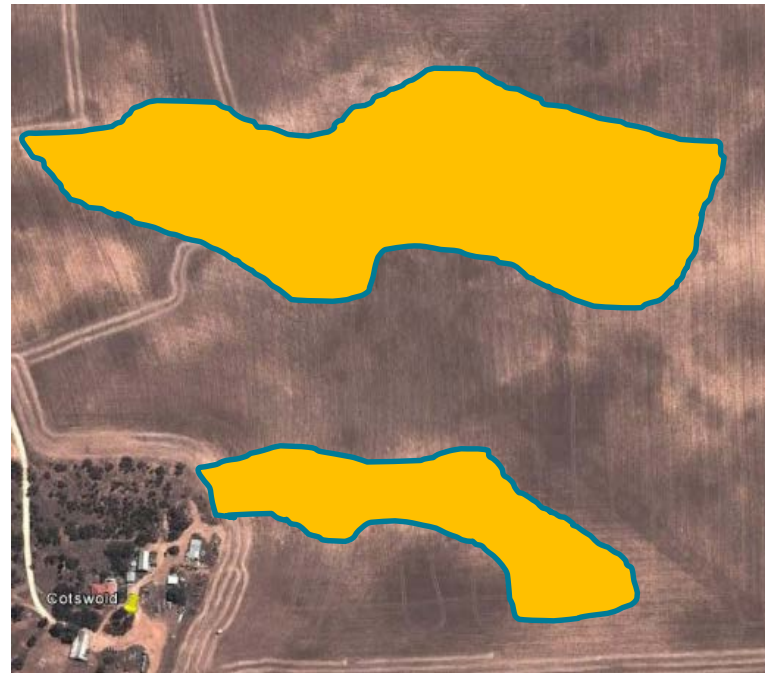
70-80% cropping



Mallee MIDAS (no technology cost)

Weed management potential from spatial grazing

Paddock scale



Brome RIM analysis of spatial grazing

	Uniform grazing (baseline)			Spatial grazing		
	Sand	Mid	Loam		Mid	Loam
Annuity (\$/ha/year)	17	59	21	17	71 (+20%)	31 (+48%)
Mature brome grass plants setting seed/m ²	1	1	1	1	<1	<1
Seeds in soil next autumn/m ²	11	23	23	11	8 (-65%)	8 (-65%)



Finally

- Potential game changer for crop-livestock systems
- Aiming for SA cattle trials in coming year
- So far so good with managing sheep with virtual fencing
- Next step is testing virtual fencing under higher grazing pressure
- Potential to use virtual fencing for 'herding'
- Development of a feasible commercial virtual fencing platform for sheep still needed



THANK YOU



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Department of Agriculture
and Water Resources



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