

The impact of virtual fence on cattle's learning curve and adaption over several weeks with multiple borders

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Agenda

- What is a virtual fence, and how does it work?
- Results from the first study with virtual fences in Sweden
- Conclusion and future research in Sweden



Livestock on pasture requires fences!

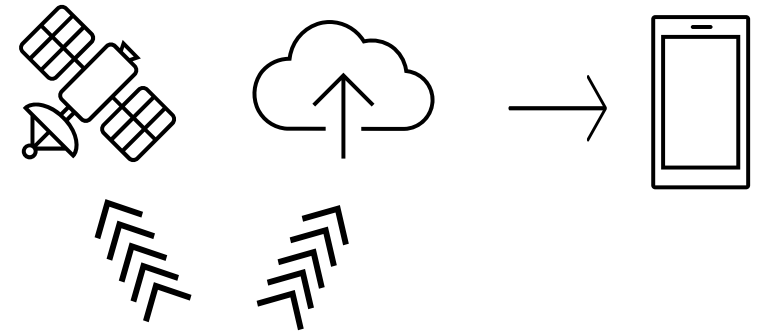
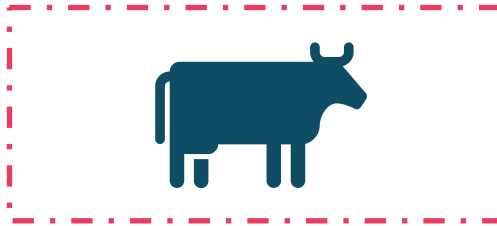
- Physical electric fences

- Commonly used
- Low in flexibility
- Time consuming

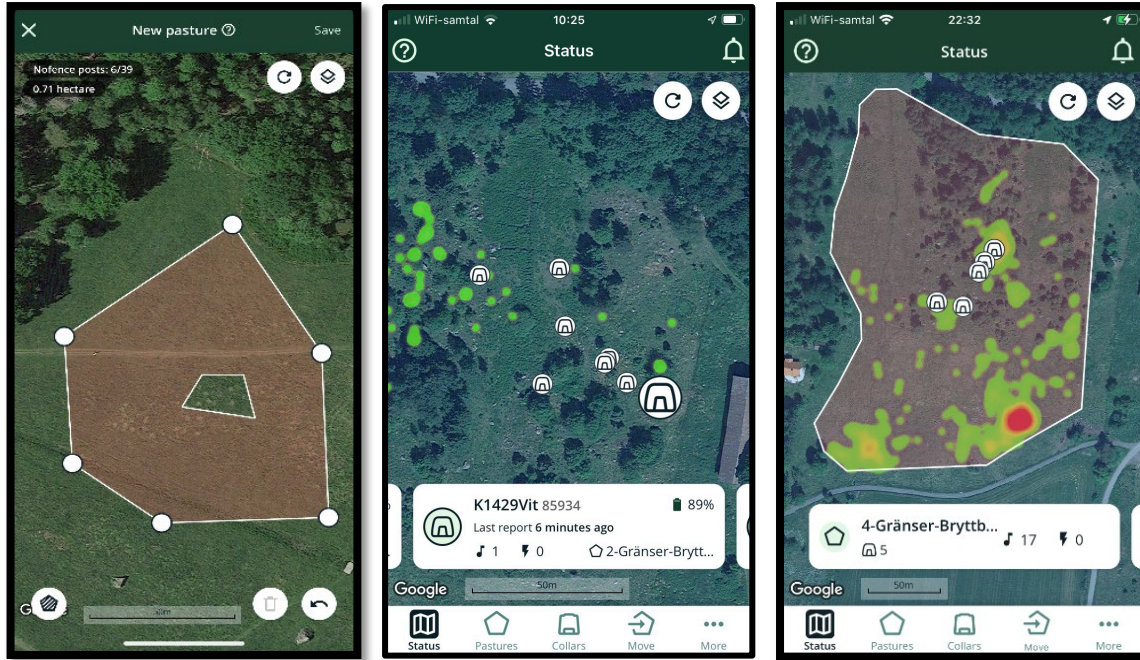


- GPS-based virtual fence

- Interest is increasing
- High in flexibility
- Few work hours
- Lot's of research going on

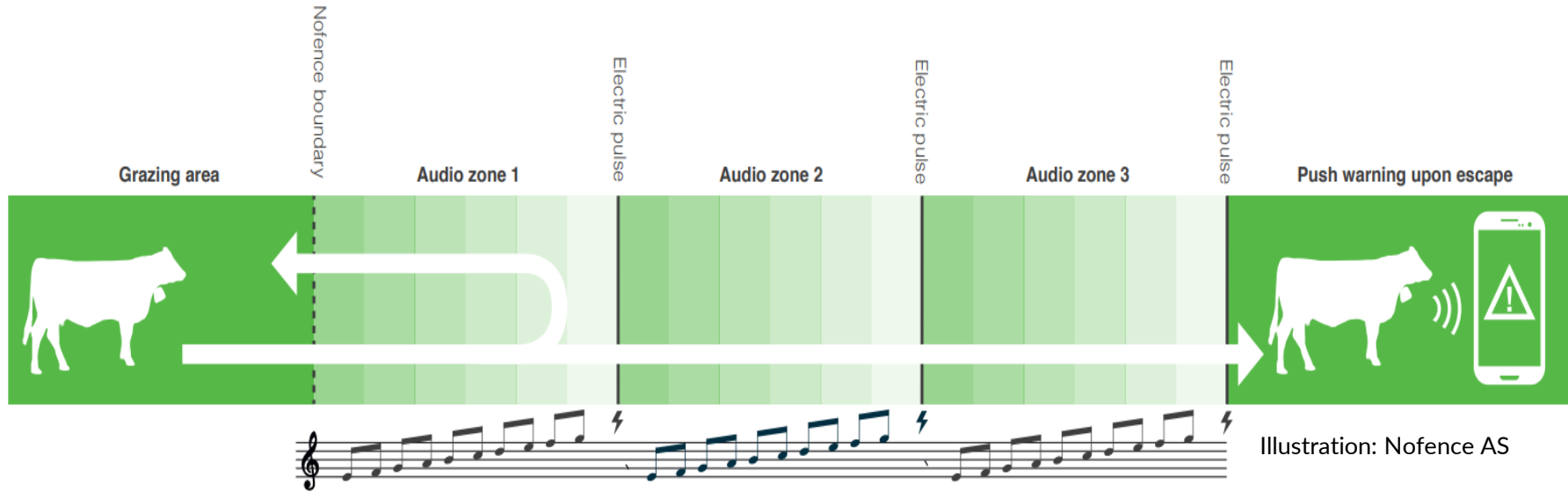


Functionality of GPS -based virtual fence



- System is controlled true a mobile app
- Create & change virtual pastures/borders
- “Real-time” position
- Individual data 🎵 ⚡
- Heat maps

How does it work for the animal?

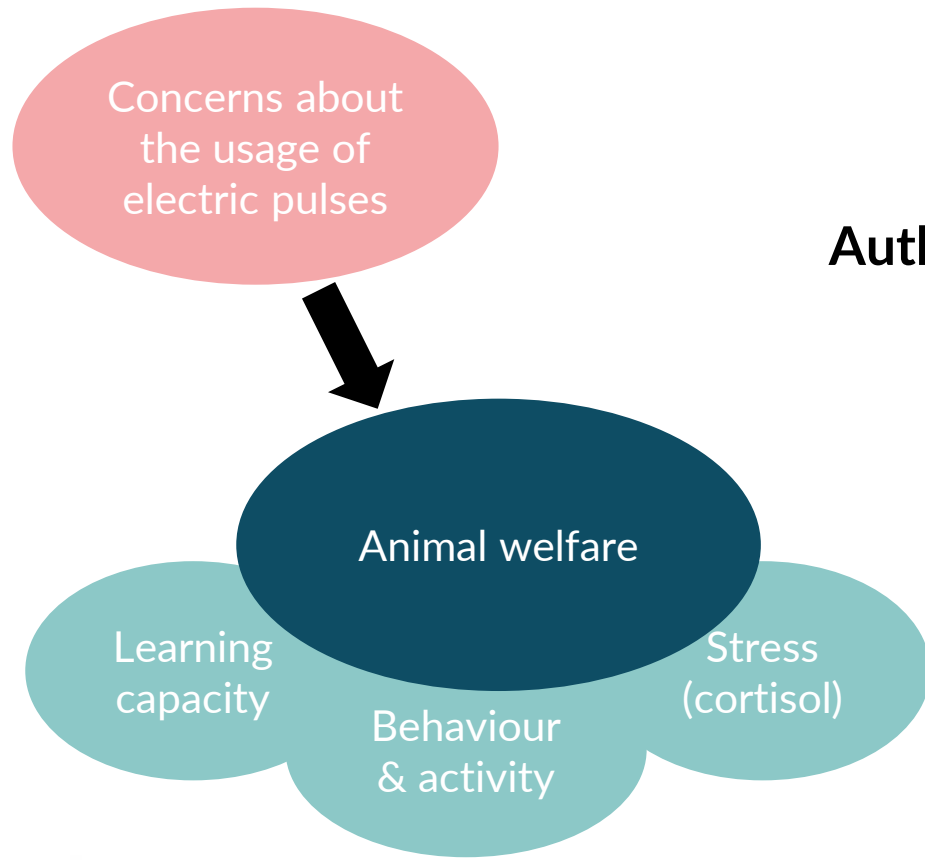


- The goal is for the animals to turn around on an audio cue to avoid an electric pulse
- Maximum of three audio cues and three electric pulses → escaped

Strength of the electric pulse

0,1 Joule for sheep/goat and 0,2 Joule for cattle with a maximum voltage of 3.0 kV for 0,5 seconds
“Normal” electric fences 5 Joules with a voltage of 7kV

Why research on virtual fences?



Authorities require more knowledge of:

- individual differences in the learning curve
 - adaption over long time
-
- Animal welfare
 - Comparinon to physical electric fences

Method



Collection of data

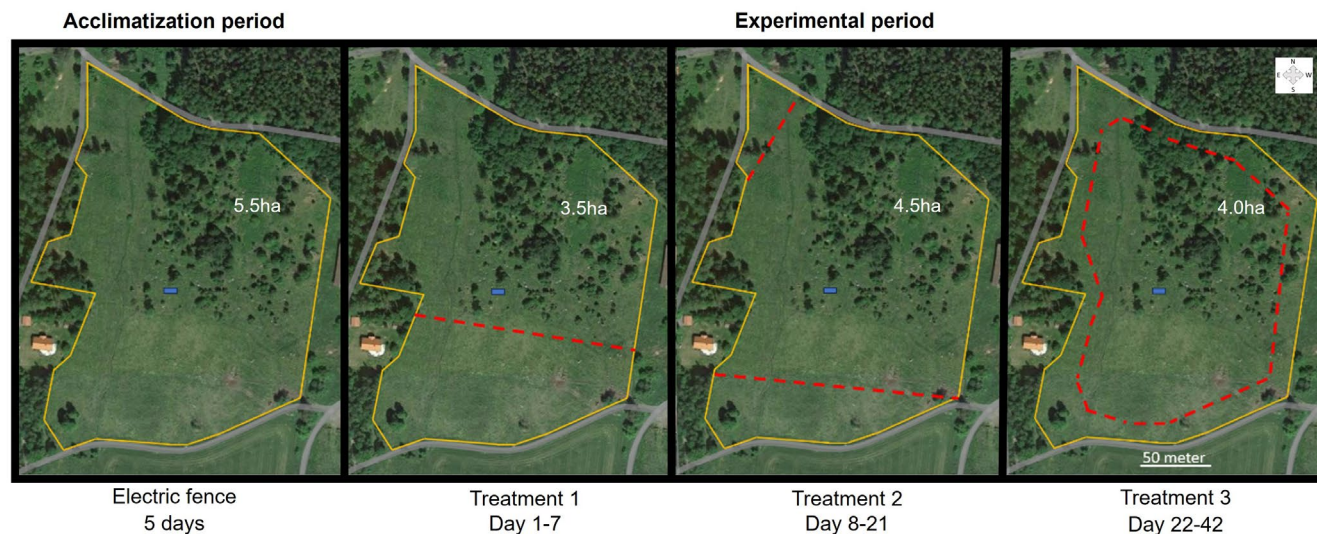
Audio cues

Electric pulses

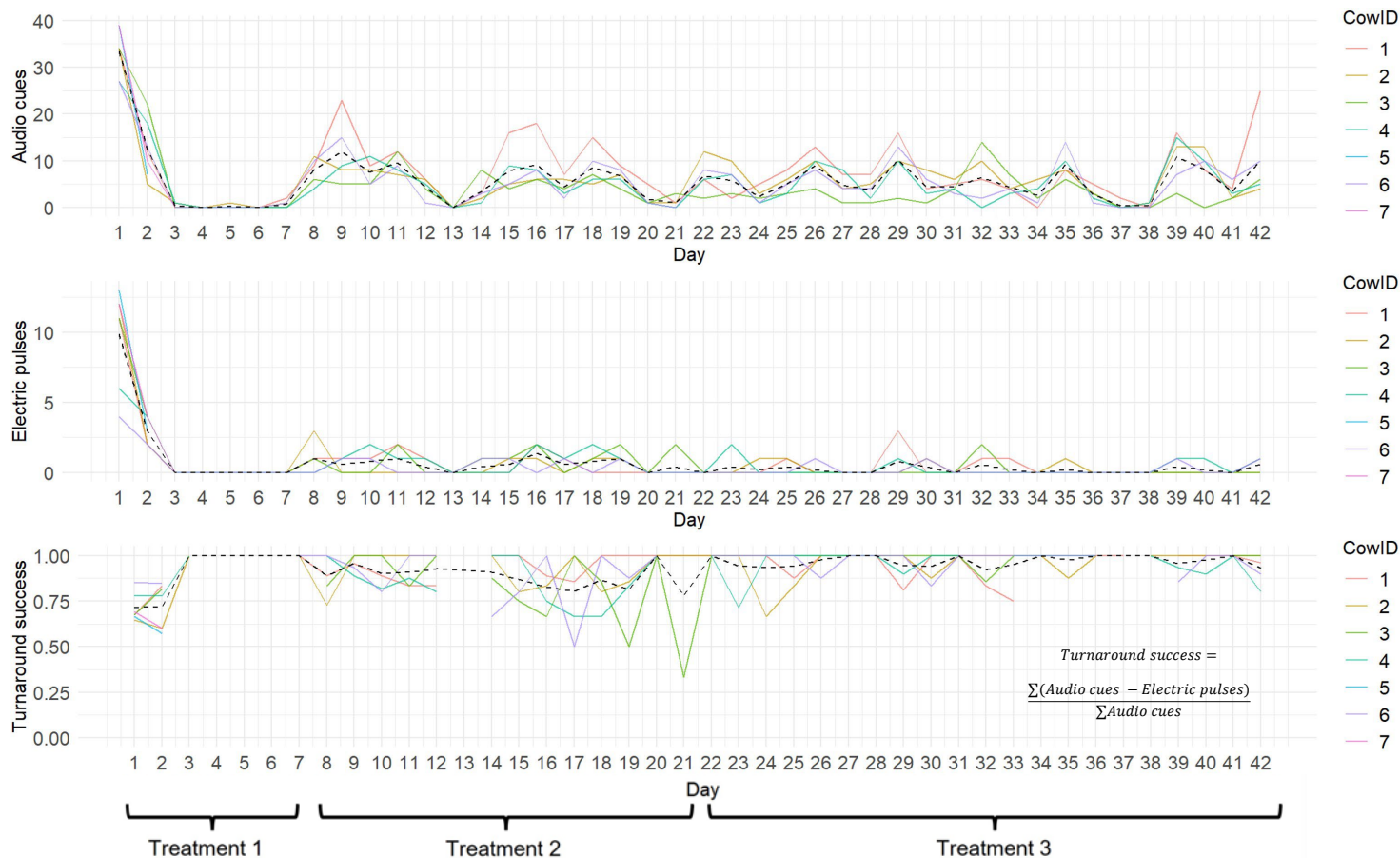
Treatments

- T1: one VF-border
- T2: two VF-borders with relocation
- T3: four-sided virtual fenced pasture

- 7 heifers
- 12 months
- At start, naïve to;
 - grazing
 - electric fences (EF)
 - virtual fences (VF)



The number of audio cues, electric pulses & turnaround success per CowID and Day



Day 1

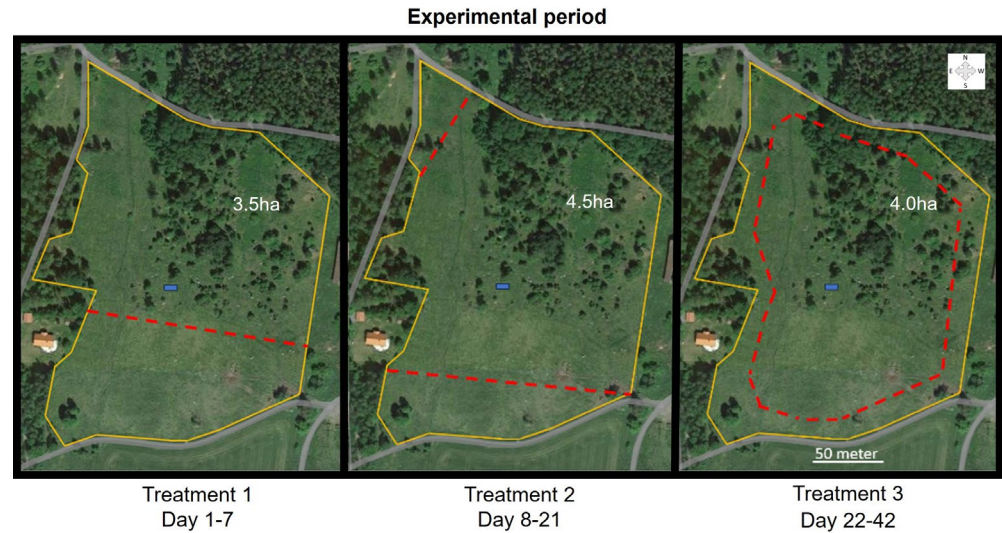
- Highest EP & AC
- Escapes

Day 2

- Two CowID excluded

Differences between and within Treatment

Output variable	Treatment		
	1	2	3
Audio cues	↓	↓	→
Electric pulses	↓	→	→
Turnaround success	↑	→	→



Conclusions

- Cattle can learn to avoid electric pulses through audio cues
- The level of electric pulses per day remains stable over time after the initial learning phase and is not affected by the number, or relocation of the virtual borders
- No individual difference in learning curve and adaption

→ Few animals in study!



What 's up next in Sweden?



- Several studies going on
 - practical usage of VF for nature conservation aspects
 - cattle and sheep
- Publishing plans
 - Comparion between VF & EF
 - cortisol in feaces & hair, behavior and activity
 - Learning curve for sheep in different group settings

Questions

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