The use of a virtual electric fence for dairy cow grazing

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Animal Welfare

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Grazing of dairy cows

- Many farmers keep cows year round inside
- Growing demand for grazing possibility
- Efficient grassland use > strip grazing > labour intensive
- Dairy cows with sensors:
  - Definition of the grazing area
  - Location information of cows (GPS or other)
  - Transmission of signals to animals
- Questions:
  - Can cows be kept in dedicated area with sensors?
  - Effects of virtual fence on behaviour and welfare?

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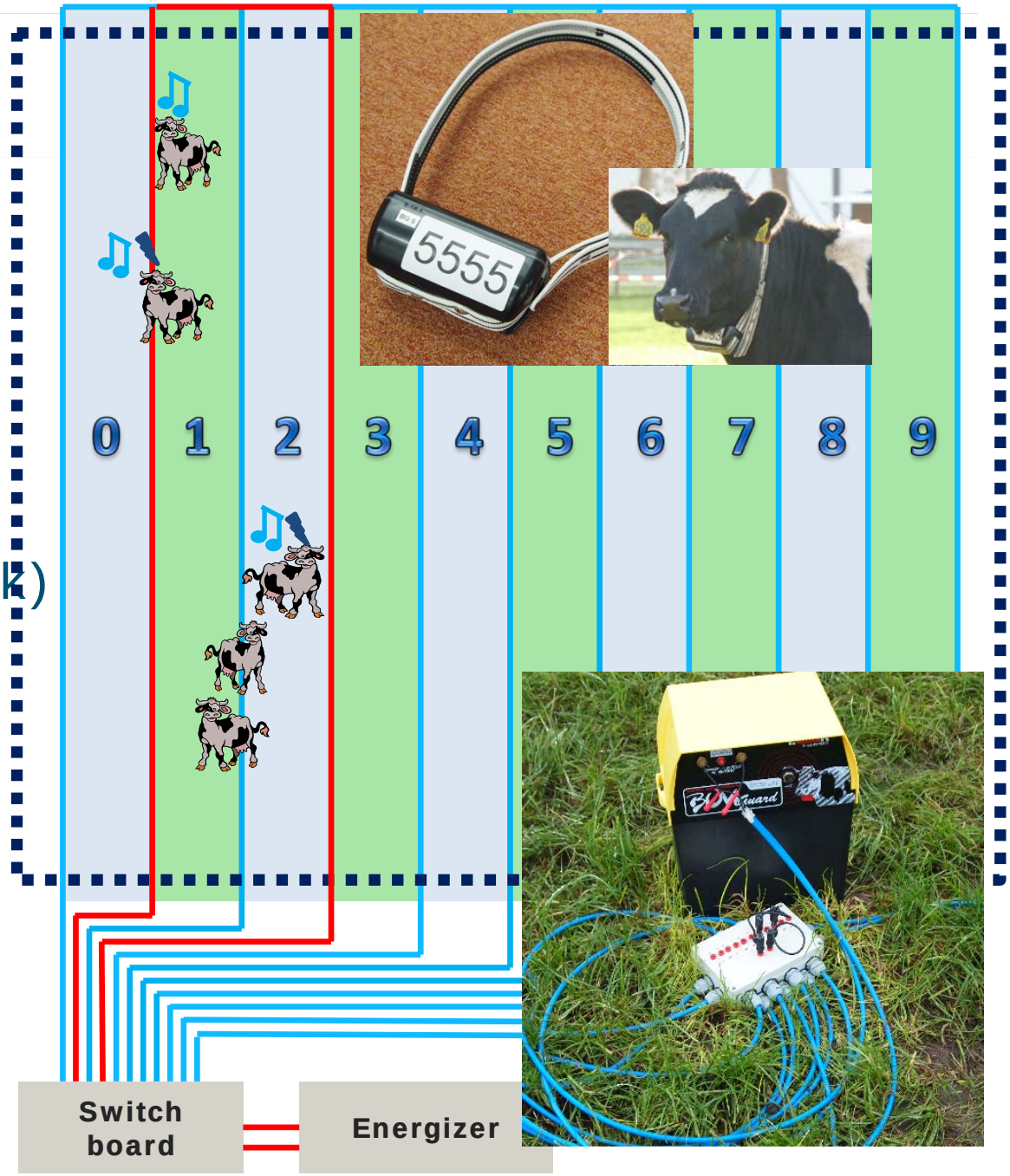
Carus research farm 2015

- Induction loop
- 10 strips:80mx10m
- BoviGuard actuator
  - Warning (sound)
  - Correction (shock)



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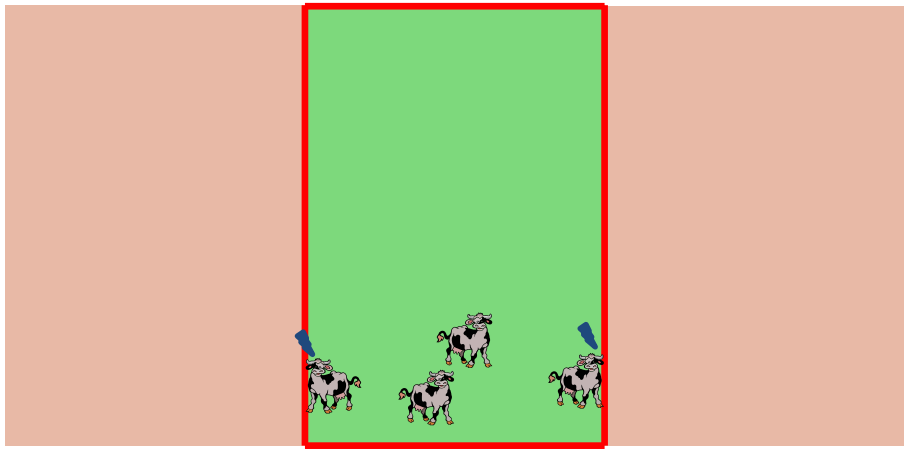
Exp 2015: Virtual versus Electric Fence

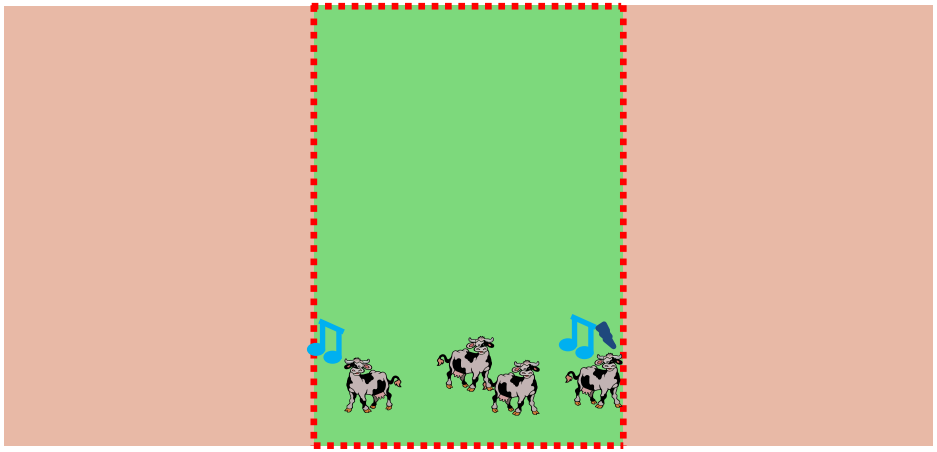
Control group

- Electric fence
- Signals
  - Wire (visible)
  - Shock (contact wire)

Experimental group

- Virtual fence
- Signals:
  - Sound (BoviGuard)
  - Shock (BoviGuard)





Border area defined as 2 m from electric or virtual fence:

Schedule

Test of October / November 2015 with 2x2x4 heifers

- Grazing experience (barbed wire)
- No experience with electric fence
- Every day, new + grazed strip

Steps:

1: Training (3 days) + virtual border / wired fence (9.00h-15.00h)

2: Training (3 days) + virtual border / fence at 2m (9.00h-15.00h)

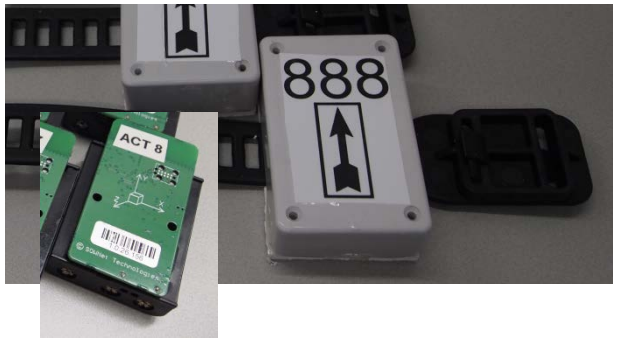
3: Control (3 days) + virtual borders (9.00h-15.00h)

4: Verification (3 days) 24 hour grazing in 1 & 2 strips

NB: animal control groups with electric fence

Observations

- Observer: recording animal behavior (observers 9.00h-15.00h)
- GPS: record walking movement
- 3D: walk, stand, lying behavior
- Heartbeat: stress



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Experimental setup

- Day 1 – day 9:

  3 Phases & 3 repeats

  (Electric fence at 0m, 2m, No)

- Day 9 – day 12:

  No Electric fence

  Number of strips 2-1-2-1

- Virtual fence (4 cows), Electric fence (4 cows)

  Replicated

- Virtual fence (4 cows), Electric fence (4 cows)

Results (escapes, grazing)

Escapes recorded by observers

- Electric fence: no escapes
- Virtual fence: 5 escapes

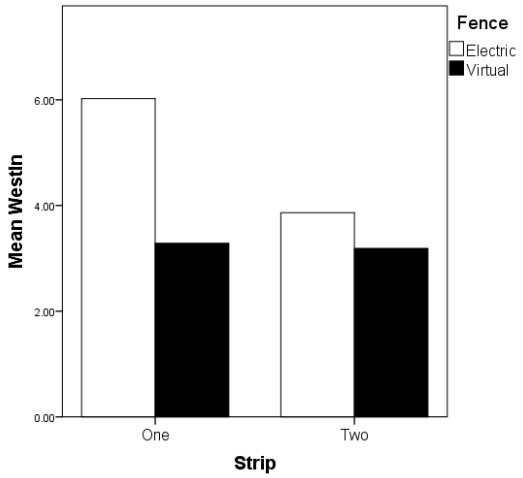
(2* on day 1, 1 on day 10 & 2* on day 12; * same cows)

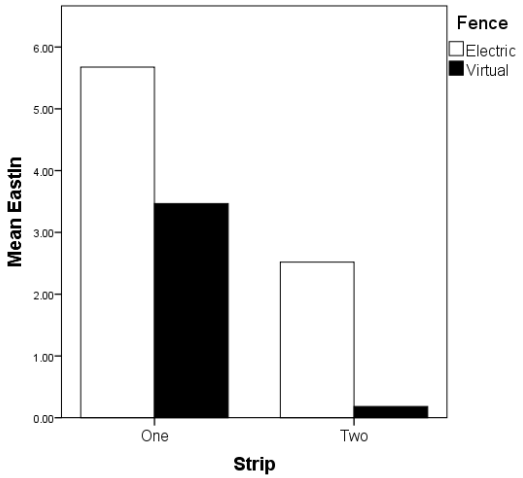
Differences for:

- Grazing activity: Electric f. 62%, Virtual f. 53% (P=0.034)
- Grazing time: two strip 63%, one strip 52% (p=0.013)

Ruminating time not influenced by fence type or strip size

Results (time spend in border area)



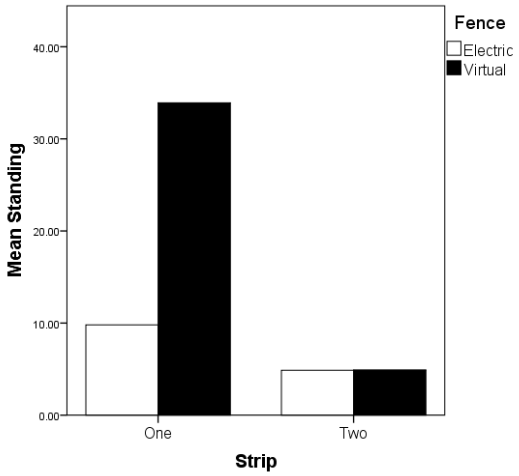


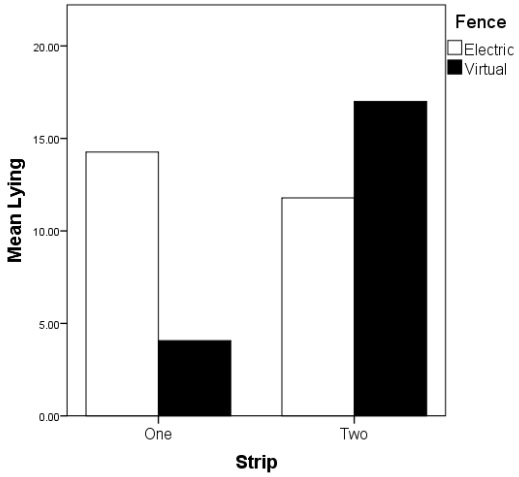
Electric f. cows less in border area as expected (based on total surface available for the animals)

Virtual f. cows less in border area as Electric f. cows ($p<0.001$)

=> Electric f. cows came closer to fence

Results (standing)





In one strip area Virtual f. cows:

- more standing idle ($p<0.001$)
- Less lying ($p<0.01$)

No difference for laying and standing in two strip area

Discussion

- Escapes (virtual fence):
  - Day 1 escapes were in early learning phase
  - Other escapes were when having 1 strip available
    - Small grazing area (60%)
    - Large border area (40%, were animals receive warning signals)

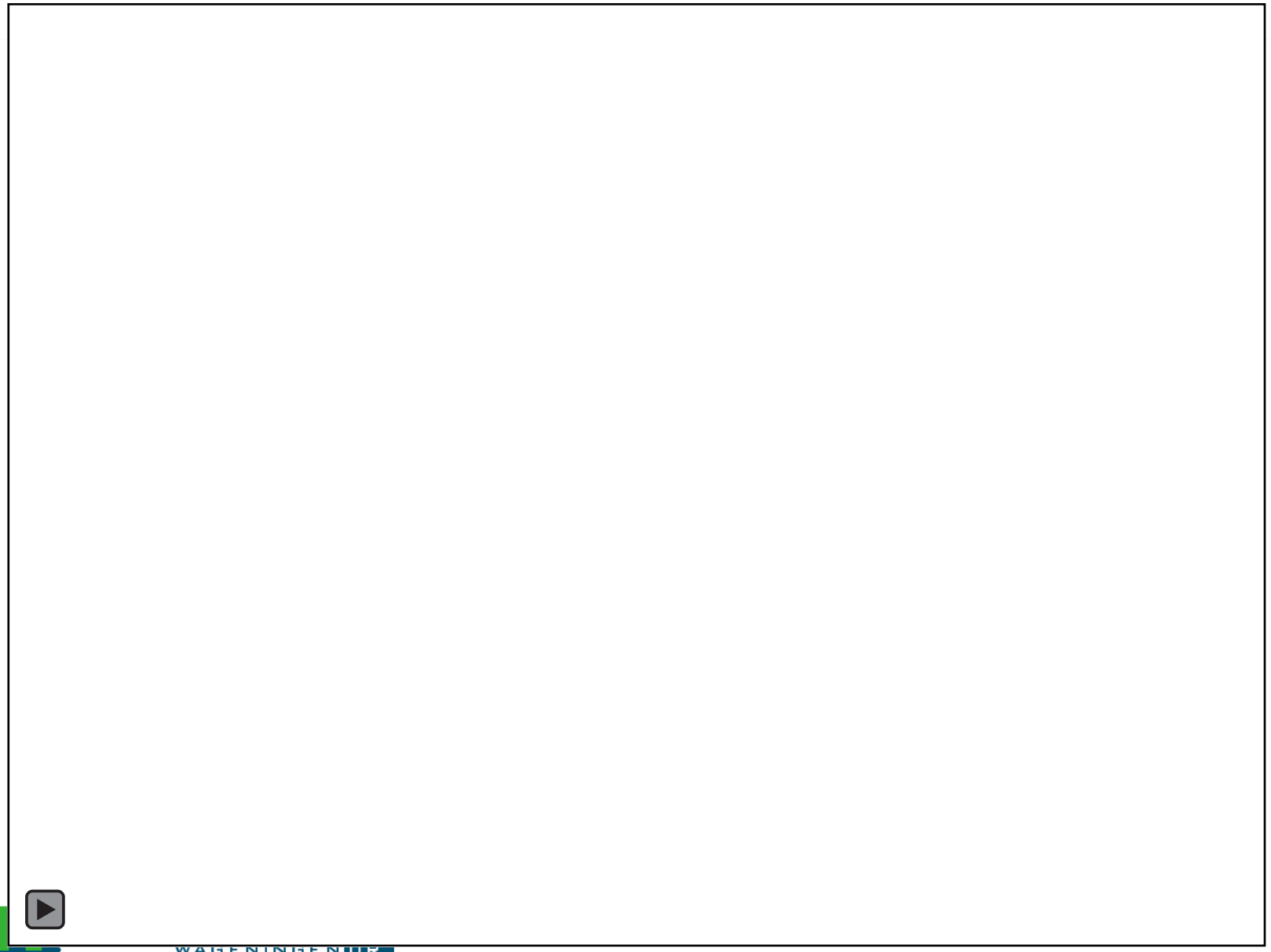
- Virtual f. cows avoided border area more as Electric f. cows. Might be that cows avoid area were sound signal is given.

- The time spend grazing was affected in the Virtual f. group on one strip, because ‘safe’ graze area became quite small.

Discussion

- The cows showed more standing idle and less lying in the one strip Virtual f. group. Both behaviors may be indicative of restlessness
- This result implies that there is minimum strip size needed for the Virtual f. group that is larger than the minimum strip size for the Electric f. group.
- Especially the behavior standing idle may be a welfare indicator of grazing cows.

Reaction of cow to sound signal



Conclusion

- The virtual fence may become a tool for precise allocation of grazing to cows.
- It is important that the minimum strip size is corrected for the virtual border making this minimum size larger than needed for grazing in an electric fenced area.

Thanks!

Courage

Amazing Grazing

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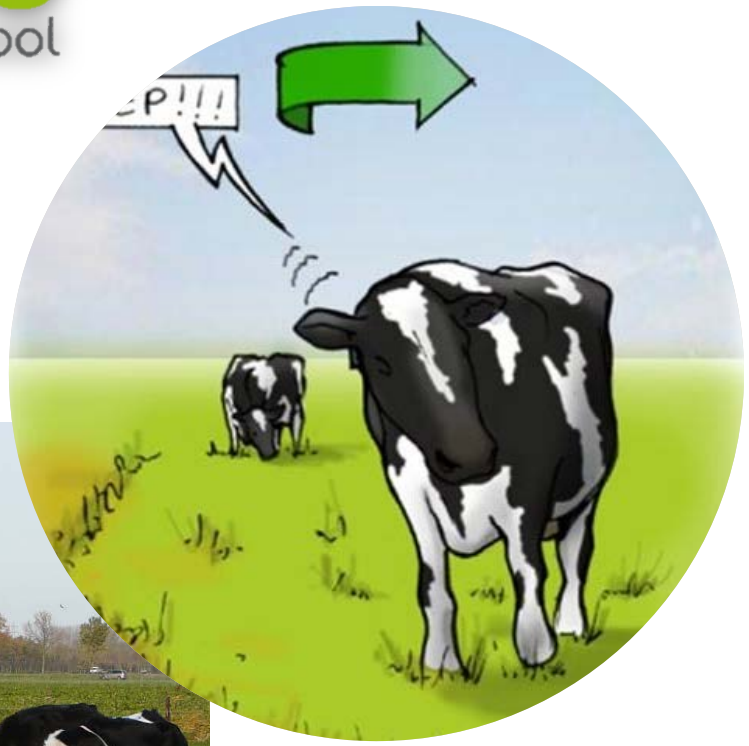
Questions?



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