Tail biting

What we do and do not know from a genetics perspective

N. Duijvesteijn and E.F. Knol

Topigs Norsvin
PROGRESS IN PIGS

Presentation

I. What is the problem?

II. History tail biting. What has been done?

III. Which research fits and provides answer to the problem

Possible factors

Climate - draft

Change season

Disease

Small pigs

Change feed

Stress

Occupation pen

Genetics?

Interest breeding company

- Economic losses can be large
  - Rearing gilts not sold
  - Lower growth?

- Difficult to measure
  - Sporadic
  - Difficult to define trait
  - Time consuming
  - In taildocking farm: trait obscured

What has been done: literature

- Difference between lines in tail biting
  - 2.8% Large White (LW) vs. 3.5% Landrace (LR)
  - LR h^2 binary trait: 0.05, h^2 continuous: 0.27
  - LW h^2 binary trait: 0.00 →*Breuer et al., 2005* *

  - Yorkshire pigs more often victims than Landrace pigs, 13.8% and 10.0% →*Sinisalo et al., 2012*

- Correlation performance traits
  - Unfavourable correlation with lean growth (r_g=0.27) and backfat (r_g=-0.28) →*Breuer et al., 2005* *
  - Non-victims had a greater ADG than victims →*Sinisalo et al., 2012*

10% tail docked, ~3000 LW en ~6000 LR. Biter: >50% of observations chasing or showing biting behaviour .

History tail biting. What has been done?

- Monitor biter (by farmer)

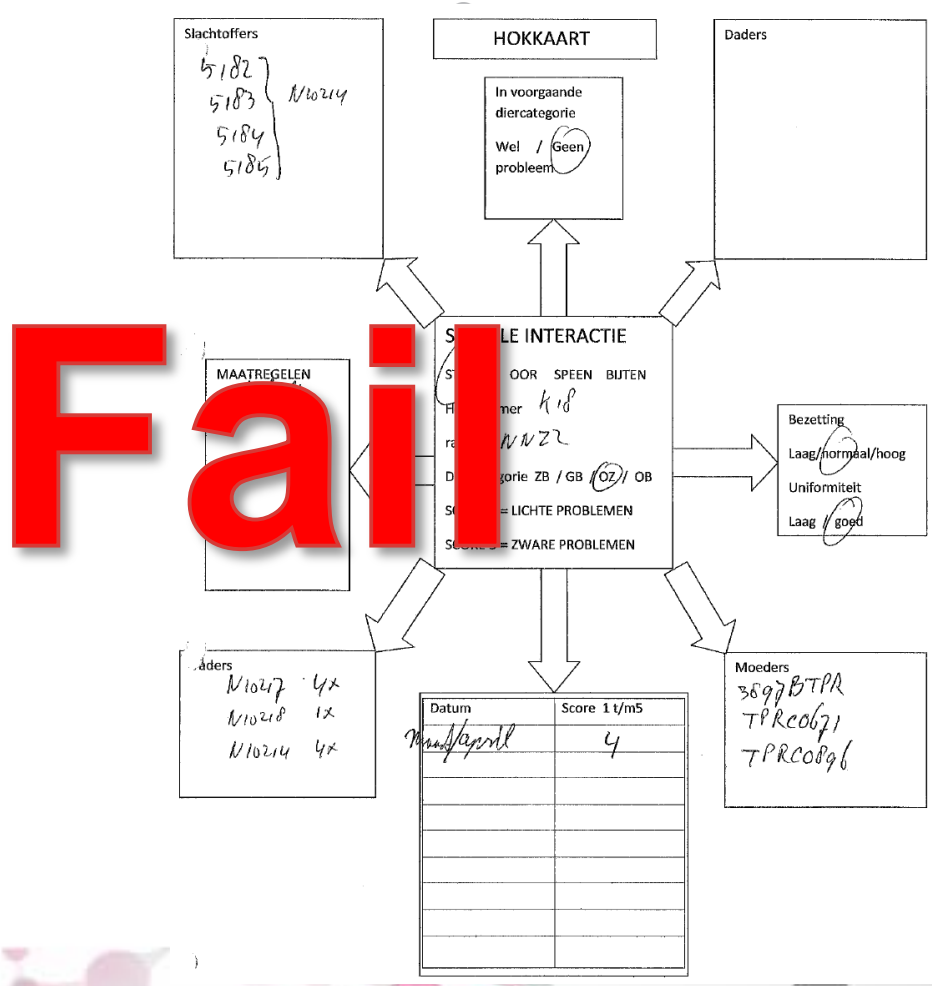
- Students at research farm
  - Intact tails, record behaviour
  - Electronic recording of use rope as proxi

- Students at Nucleus farm Canada
  - Crossfostering litters
  - Recording tail damage before and at weaning

- Trial at dutch Nucleus farm
  - Use of burlap bag as distraction to reduce tail biting

- Indirect genetic effects: experiment WUR on growth

- Not for all pens a list is received
- Some pens had more than one list
- Offender pigs sometimes filled in
- One score was given to the whole pen

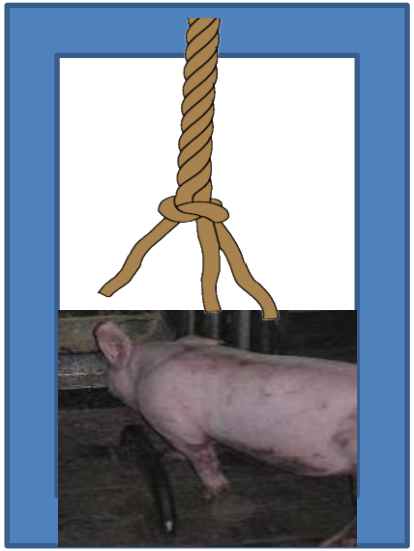


Trial Research farm

Experience what happens if you stop tail docking

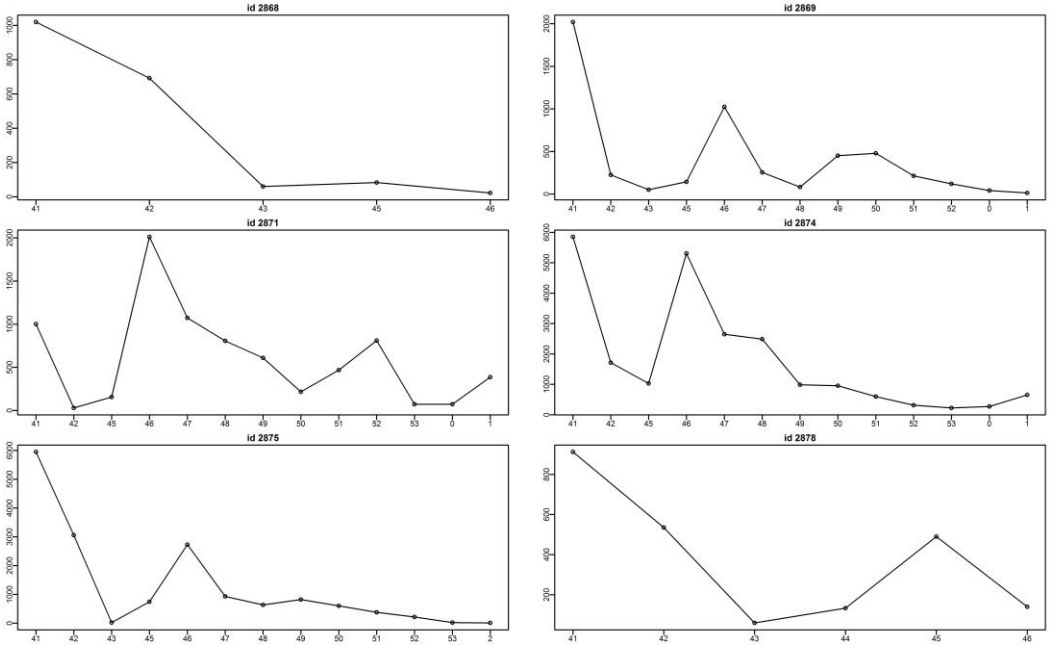
Trial Beilen

- 2 batches of 72 animals
- 12 pens recorded use rope
- Data editing rope recording
- Record sum, freq and mean/day /week
- Record behaviour observation to link with



Trial Beilen

- Stations were not always functioning (weeks missing)



Trial Beilen

	Mean	Min	Max
Sum (Minutes)	2.7	0.1	40
Frequency	3	1	60
Average (Minutes)	0.5	0.1	5

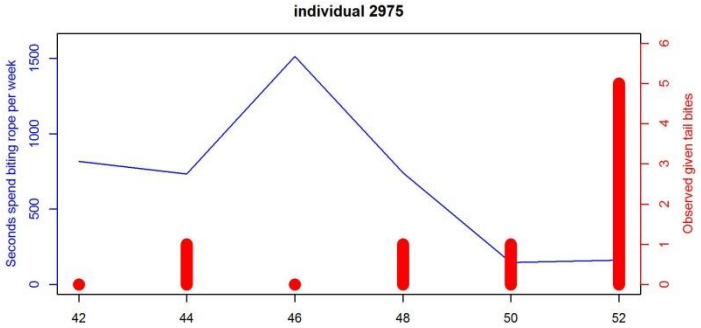
- Link to behaviour observations
  - Once every 2 weeks 10 minutes
  - Focus on tail biters
  - Correlate to use rope

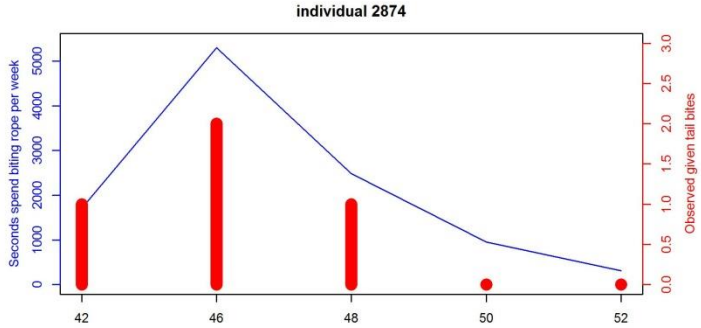
Trial Beilen

N=28

- Correlation between number of bites and use rope (sum):0.0
- Correlation between number of bites and use rope (freq): 0.0

- Large individual differences (cor -0.65 through 0.95)





Trial Beilen

- **Lot of data missing**
- **Behaviour observation ‘just a moment’**

Use of video recording usefull

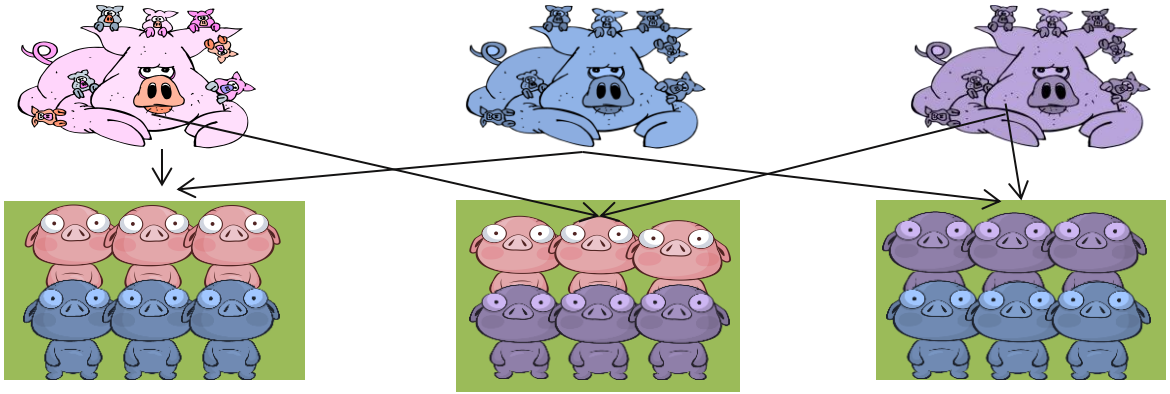
- Rope monitored by video recording to connect to behaviour

Research Nucleus farm Canada

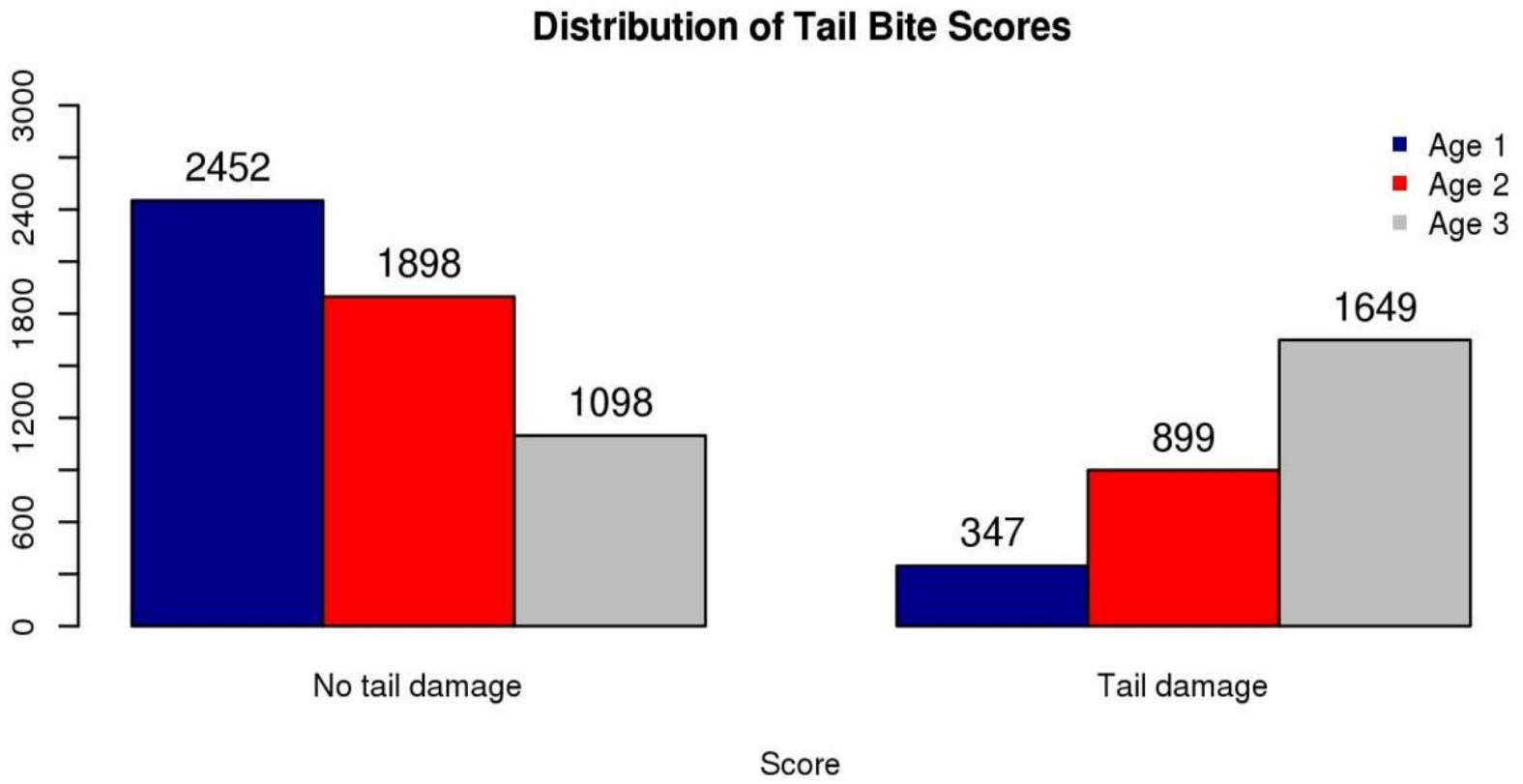
Aim: record tail damage before and at weaning from cross-fostered litters and estimate genetic parameters

Research Nucleus farm Canada

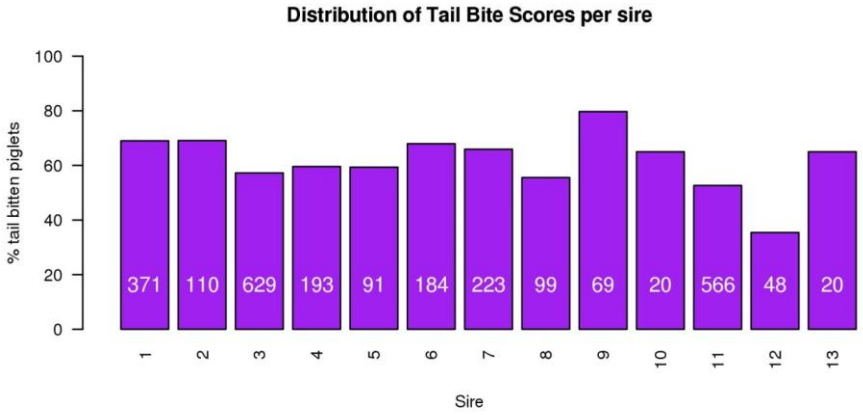
- Measure of tail score before/at weaning from cross-fostered litters
  - 2799 measurements of tail damage (before weaning)
  - 266 groups, 32 sires

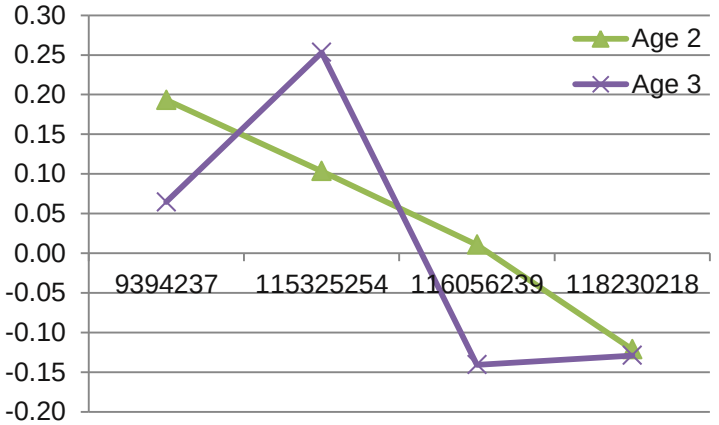


Age 1: 4.3 days
Age 2: 8.5 days
Age 3: 18.9 days



Evaluate sires





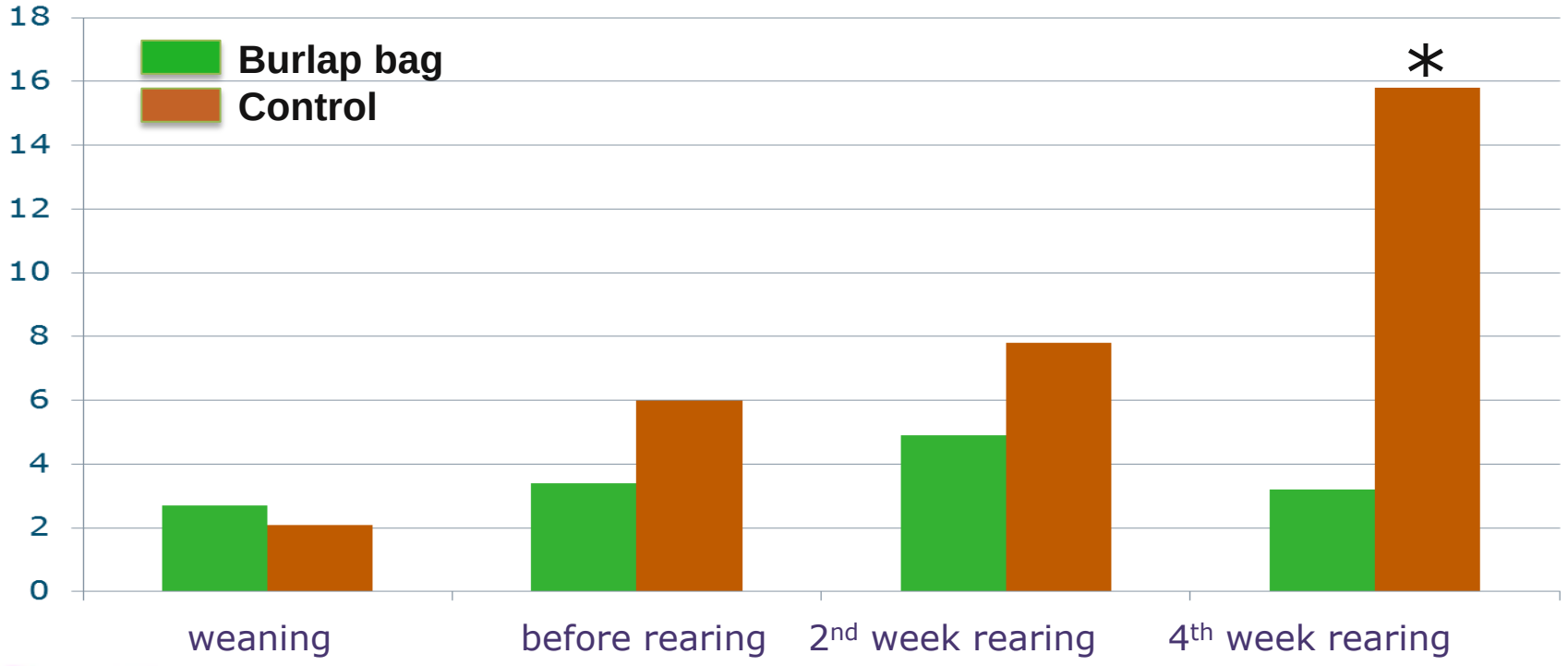
Differences between sires in % bitten offspring (35%-80% / 52%-70%)

Use animal model: correlation age 2 and 3 between EBVs sires (0.67 for reliable sires)

Trial at Dutch farm

- Management tool
  - Burlap bag in pen or control pen (no burlap bag)
  - Two batches, 72 litters in total
  - ~ 480 pigs followed (potential rearing gilts)

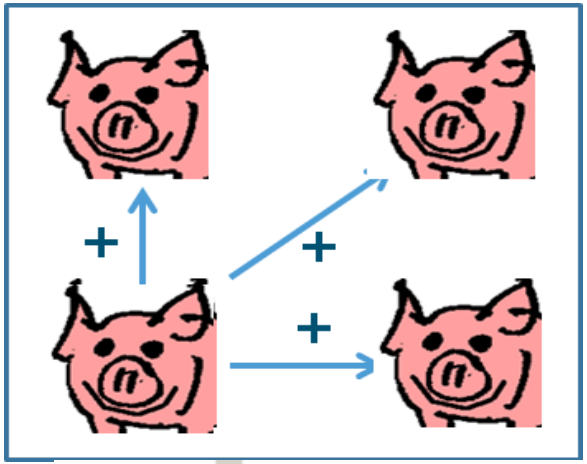
% animals with tail wound *Ursinus et al., 2014*



Trial at Dutch farm (*Ursinus et al., 2014)*

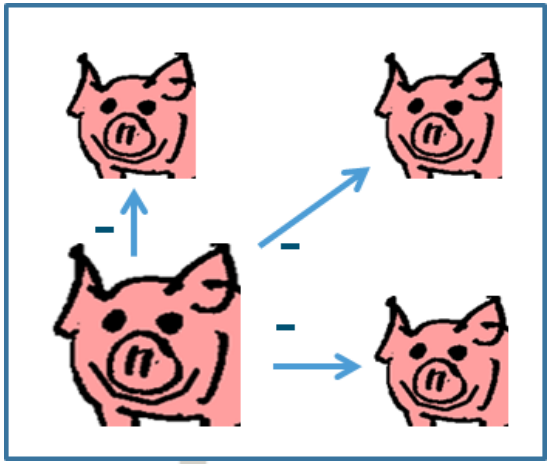
- Biting behaviors directed at pen mates were up to 50% lower in burlap bag pens
- Higher genotypic litter size, litter birth weight, growth, and lower back fat seemed associated with higher levels of biting behaviors
- Higher phenotypic litter sizes were associated with higher levels of biting behaviors

Indirect Genetic Effects (IGE)



Positive influence on growth pen mates

‘ High IGE’ (on growth)

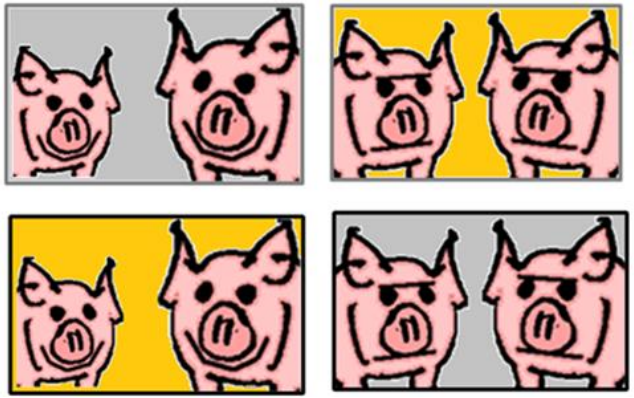


Negative influence on growth pen mates

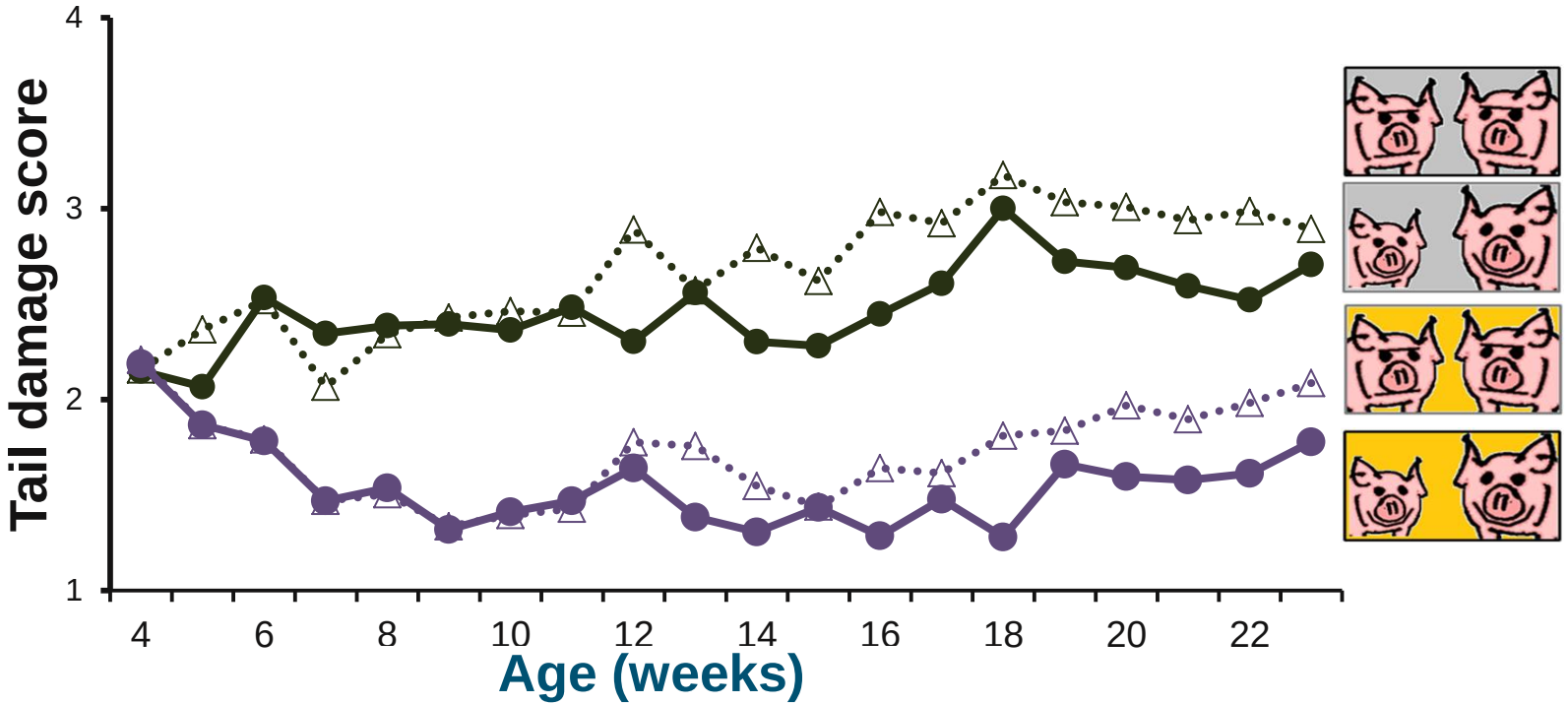
‘ Low IGE’ (on growth)

Experiment WUR on growth

- Large experiment WUR (N=480)
  - High and low Indirect Genetic Effect (IGE) on growth
  - Housing barren or straw



Tail damage: IGE_g and effect housing



Camerlink et al. 2014

Evaluate research

1. Use IGE growth
   - Indirect measure of biters
2. Use parameters estimated at weaning
   - Missing connection with finishing pigs / reared gilts
   - Identification of biter via IGEs (link laying hens feather pecking)
   - Validate high low trial
3. Record tail biting using webcam in finishing pen
   - Difficult to see who is doing what, need people for checking

Evaluate research

4. Phenotypic markers for tail biting
   - Rope did not work so far
   - General activity of pen

5. Molecular markers
   - Genotype high low samples

Molecular markers

- Gene expression study *(Brunberg et al., 2012)*
  - 19 genes different expression pattern in neutral pigs compared to performers and receivers
  - genes associated with production traits in pigs (PDK4), sociality in humans and mice (GTF2I) and novelty seeking in humans (EGF)

- Selective sweeps *(Moon et al., 2015)*
  - strong signal of artificial selection in *GRM7* and *GRM8:* mGlu group III receptors
  - Might influence process of domestication
    - converts anxiety-associated aggressive behaviors of wild population to tame behaviors for the adaptation to the community (studies mice and dogs)

Current genetic selection

Higher growth, lower backfat, larger litter size → more tail biting?

- tail biting in burlap bag pens showed a stronger relationship with growth
  - tail biters have a specific metabolic motivation to start tail biting
  - tail biters from control pens broader motivation; driven more by boredom

- Enrichment of the environment will not 100% solve tail biting
  - Also tail biting in organic systems

Concluding remarks

- Difficult trait: can’t bet on one horse
  - Combination of environment and also genetics (we presume)
- IGE for growth seems to do the job, not available for all lines
  - Tail docked animals same results?
- IGE specifically on tail biting requires new protocol
- Video recording offers huge new potential, but new field of phenotypes
- Use of genetic markers will be no problem when phenotypes are in place