

Proper enrichment materials for intensively-farmed pigs – From review to preview

Marc B.M. Bracke

Wageningen UR Livestock Research

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Enrichment, tail biting and tail docking

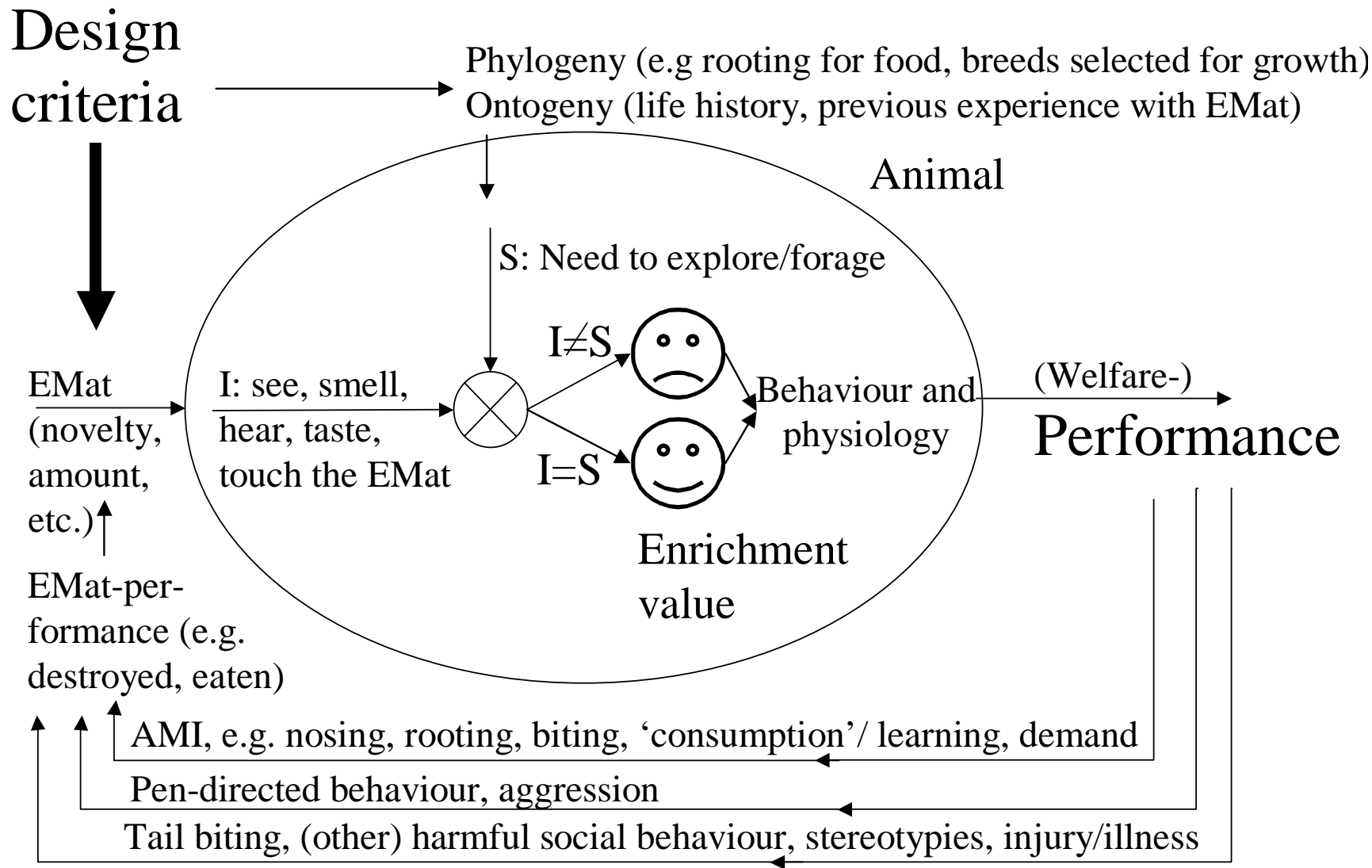
- Enrichment is provided to reduce boredom/stress and to prevent tail biting.
- Tail biting is a well-known production disease in intensively-farmed pigs
 - May involve other body parts (ears, flanks, legs), lead to cannibalism & affect growth & economy
 - Piglets' tails are routinely docked to prevent tail biting
- Inadequate enrichment is a welfare concern

What is proper enrichment for intensively-farmed growing pigs?

- EU Directive 2001/93/EC requires that pigs have permanent access to a sufficient quantity of safe material to enable **proper** investigation and manipulation activities (Art 4, Annex).
- Focus on research @ Wageningen Livestock Research
 - RICHPIG
 - Responsible Tail Management
 - FareWellDock (AMI sensors)
- Look back & forward (IND)

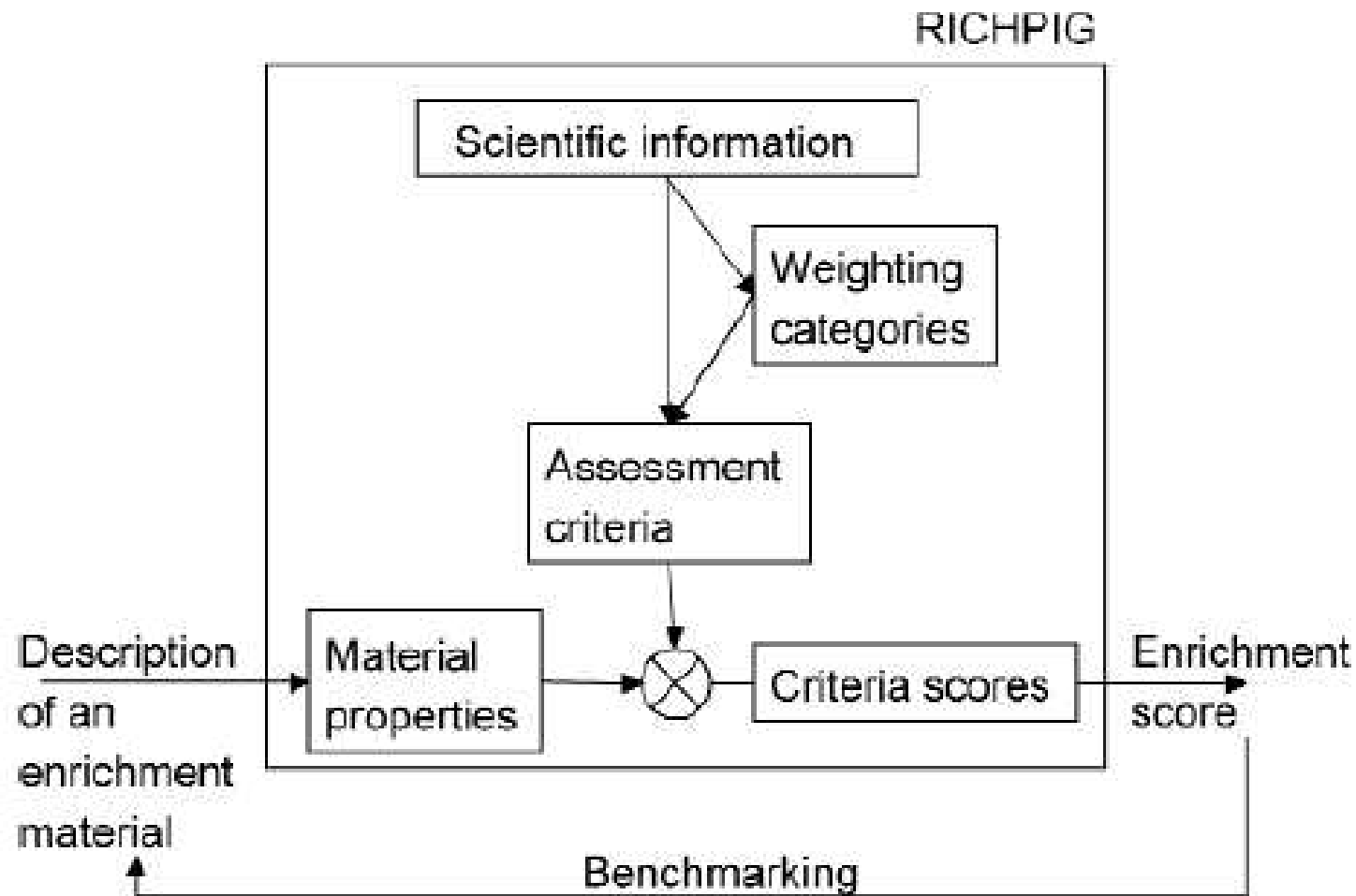
RICHPIG – Review state of knowledge

- Semantic model
- Based on scientific information
- Assessment criteria
 - Material properties like novelty, destructibility, hygiene, accessibility, (known effects on) tail biting, AMI/occupation, aggression, etc.
 - 30 in total
 - Weighted
- Expresses welfare of an enrichment material as a score on a scale from 0 tot 10.



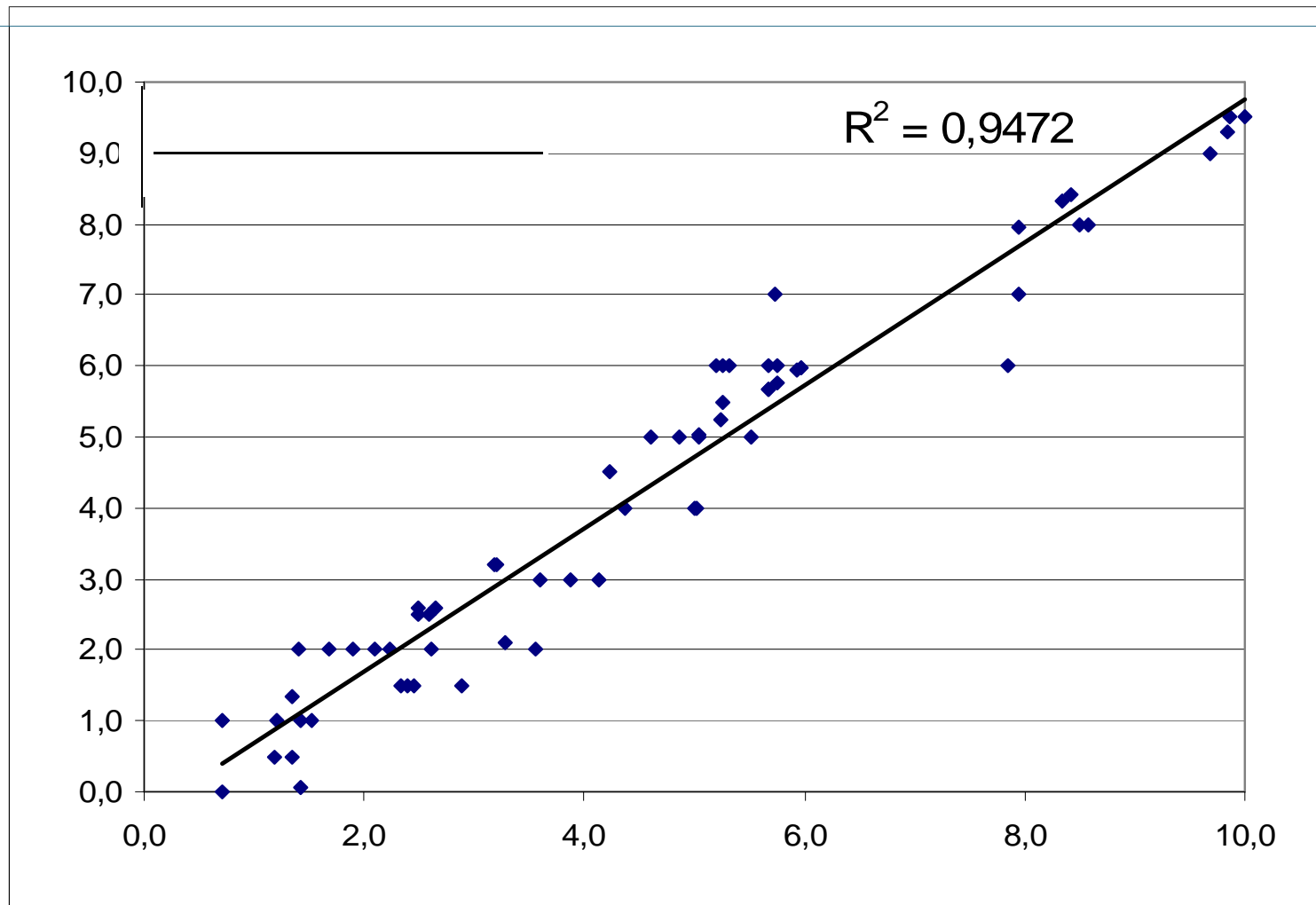
Bracke, 2008

Pigs have evolved to root for food in forest soil (directed downwards), and a history of tail biting may affect their need to explore (and what is 'proper' enrichment)



Overview of RICHPIG's structure showing the assessment of a new enrichment material on the horizontal axis and the modelling procedure on the vertical axis.

RICHPIG: Enrichment scores correlate well with expert opinion




Implementation into Dutch legislation (July 2007):

METal	1,42
RUBber	2,21
ROPe	2,66
WOOD	3,78
SUBstr	4,61
STRaw	5,15
COMpou nd	5,95
ROUgha ge	7,47

EC Directive 2001?



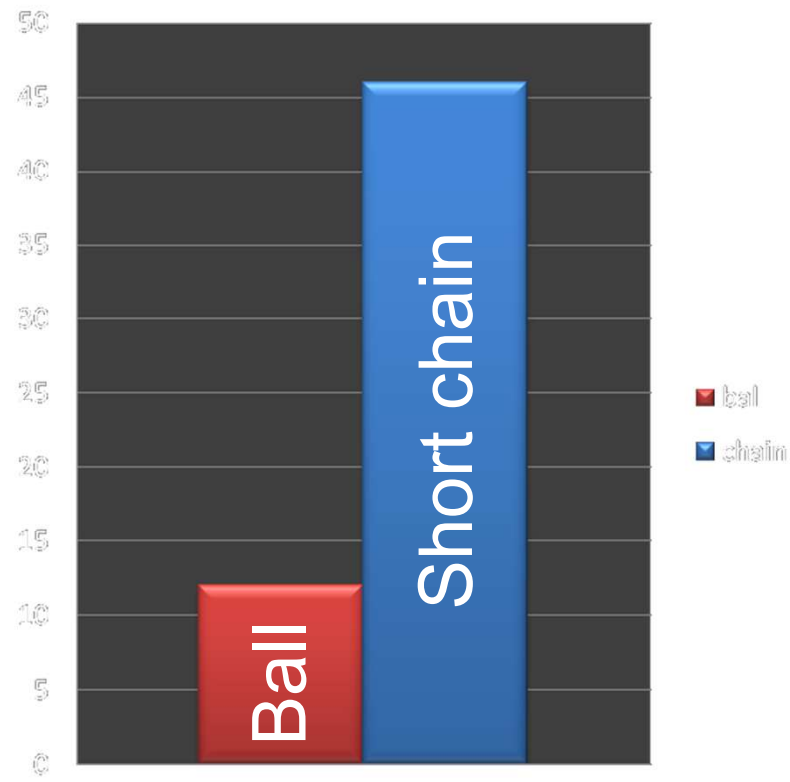
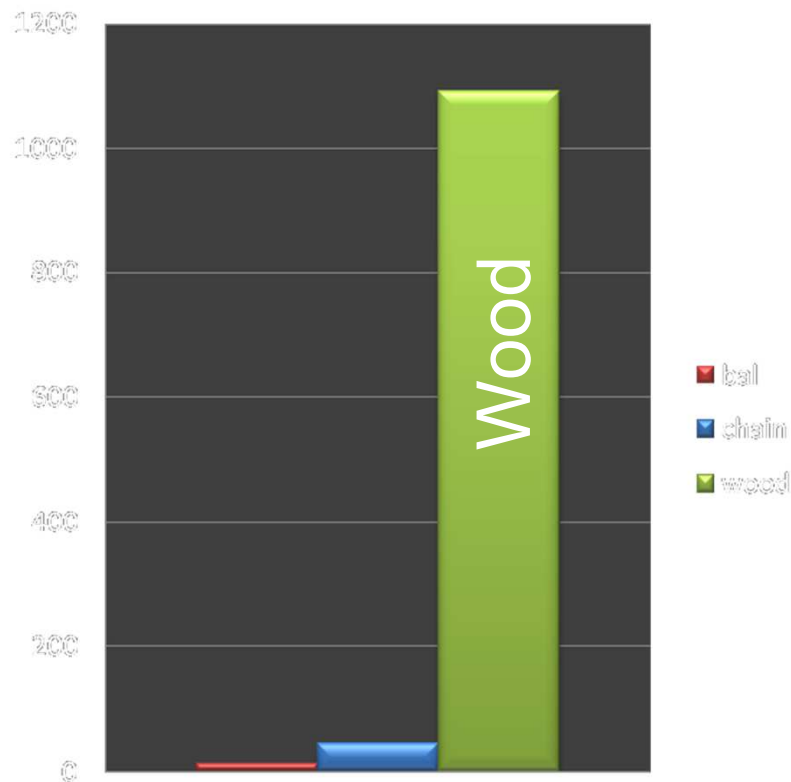
Expert cut-off
for acceptability



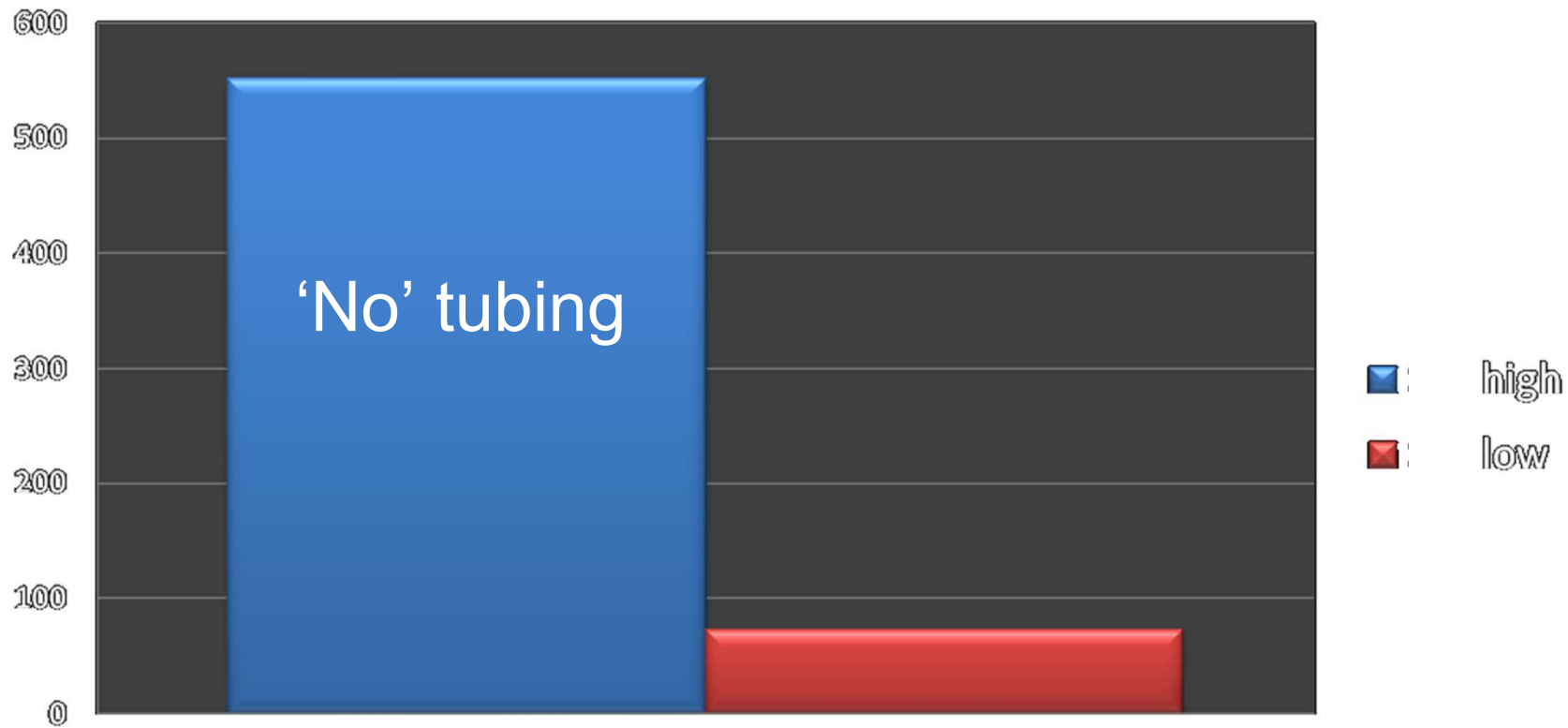
(Hockey-type) balls on a chain seem to cause frustration and may collect dust

Growing pigs in the Comfort Class

prefer (soft) wood, and they prefer a (short) chain over a chain with a ball



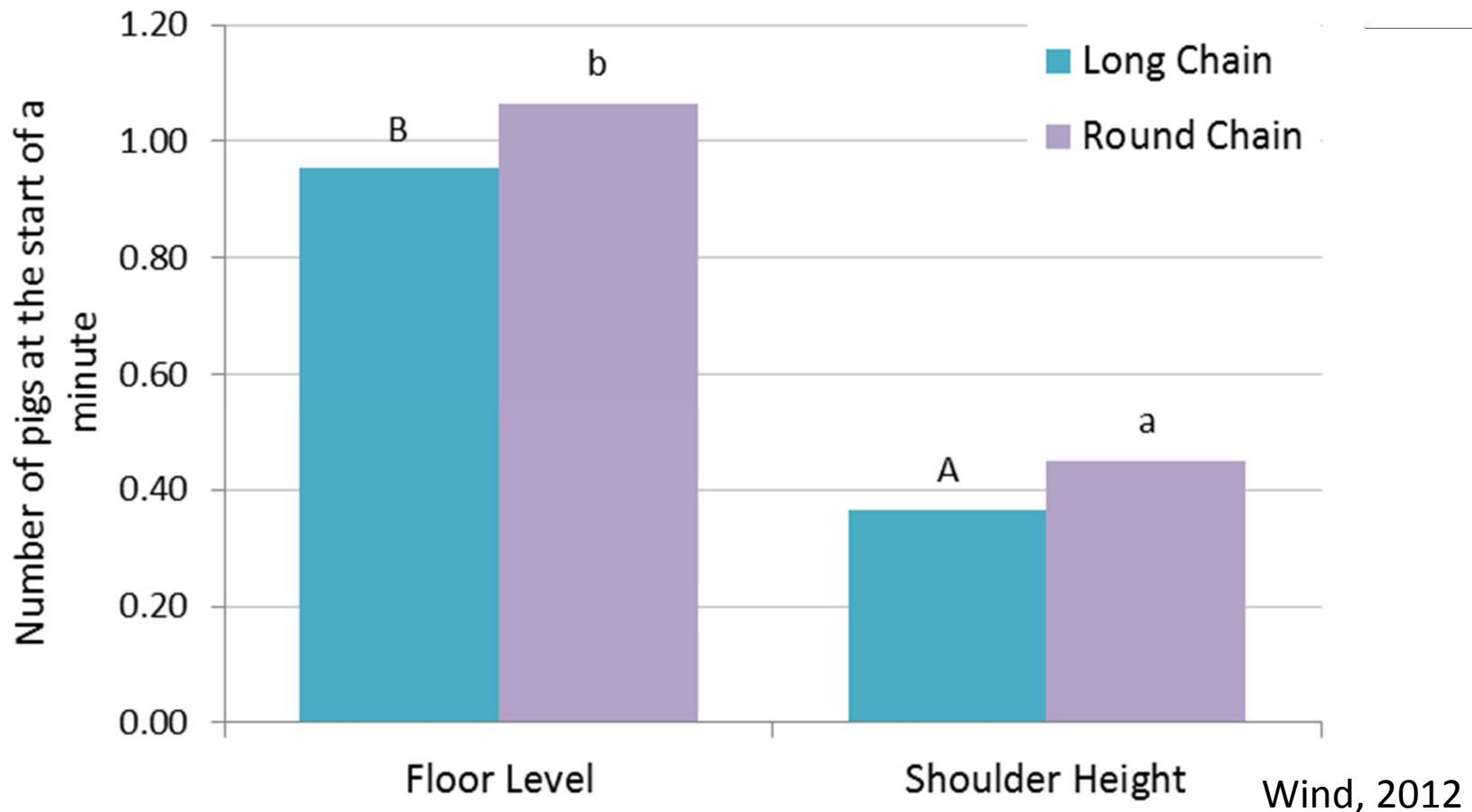
Sows prefer a chain 'without' tubing



Chain manipulation

Ettema, 2010

Pigs are not giraffes. They prefer to play with chains on the floor (> twice as much)



Note: Even on ample straw pigs have been observed to interact extensively with proper chains (stainless steel, anchor chain, proper size & placement).

Enrichment value

- Short chains better than short chains with balls or pipe ->
 - The implementation of EC Directive seems to often have reduced pig welfare in NL
 - Other countries: Often poor implementation (CIWF, 2013)
 - Chains can be improved, e.g. til floor level, sufficient quantity (e.g. 1 chain per 5 pigs)

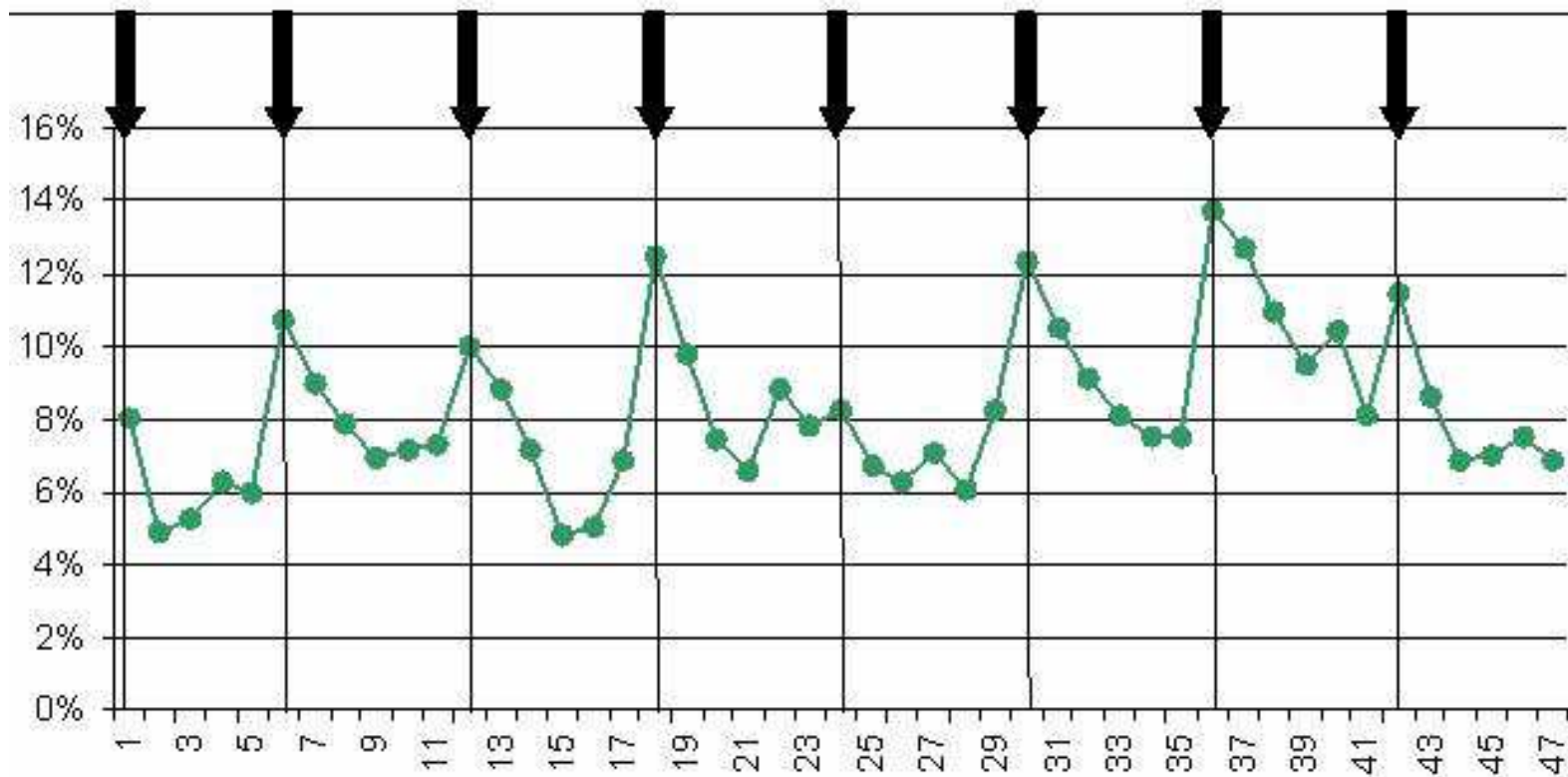
Suggestions

- What is proper, feasible enrichment for pigs?
- Need a **test** prior to on-farm implementation/market introduction
- **AMI-sensors** measuring Animal-Material Interactions (AMI)
 - Objective
 - Farm specific
 - Feasible (expertise & costs)

AMI sensor work

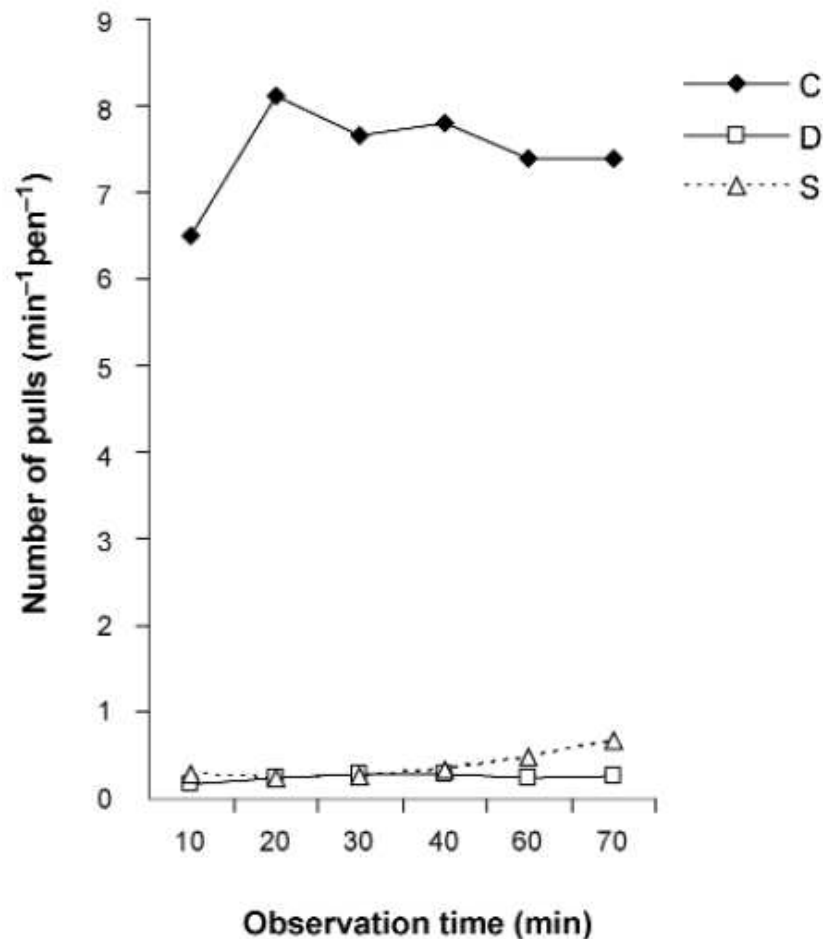
- AMI logging
 - Flank biting (Measuring Behavior 2014)
 - Illness (Streptococcus infection)
 - Food deprivation/anesthesia
 - Enrichment
 - Maize silage
 - Rearing

Changing enrichment materials weekly 'renews' interest



Zonderland et al., 2003

Figure 1



Back-transformed predicted means of rope-pulling frequency (n = 8 pens per treatment) over 6 observation times. Observation times were taken respectively at 10, 20, 30, 40, 60 and 70 min after treatment (C: controls; D: Dippel's oil; S: Stockholm tar). There were no significant effects of observation time, but treatments differed in that both ointments significantly reduced pulling frequency compared to controls (standard errors of predicted means were approximately 0.6).

Repellents reduce rope Manipulation (Bracke, 2009). So does soiling with faeces. Bu contrast, improved destructibility enhances it (Bracke 2007)

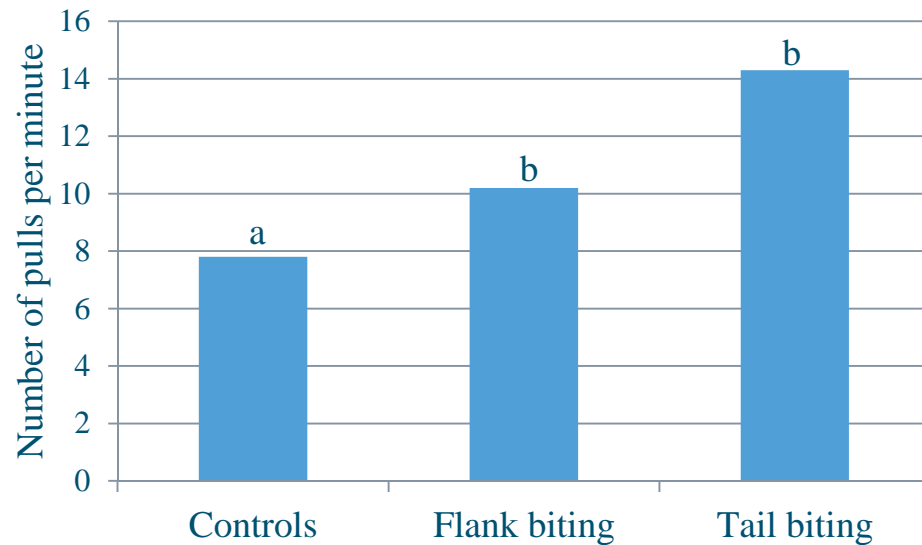
Logging biter pens in matched control study

Bracke and Ettema (2014)

- 22 pens, i.e. 20% of 112 pens, contained one or more pigs with biting wounds
 - Tail biting was found in 6 pens (5.4%), of which 2 contained only gilts, 3 only barrows and 1 group was mixed-sex
 - Flank biting was found in 16 pens (14.3%), of which 12 pens contained only gilts and 4 pens only barrows

Results

- Groups containing wounded animals interacted more with the rope than controls -> higher need for proper enrichment
- Conversely, sick pigs played less immediately following an experimental streptococcus infection -> AMI may be early warning and help reduce the use of antibiotics
- Figure shows the average number of pulls per minute in control pens, flank biting pens and tail biting pens, superscripts differ at $P < 0.001$).



Maize silage is interesting for about 30 min.

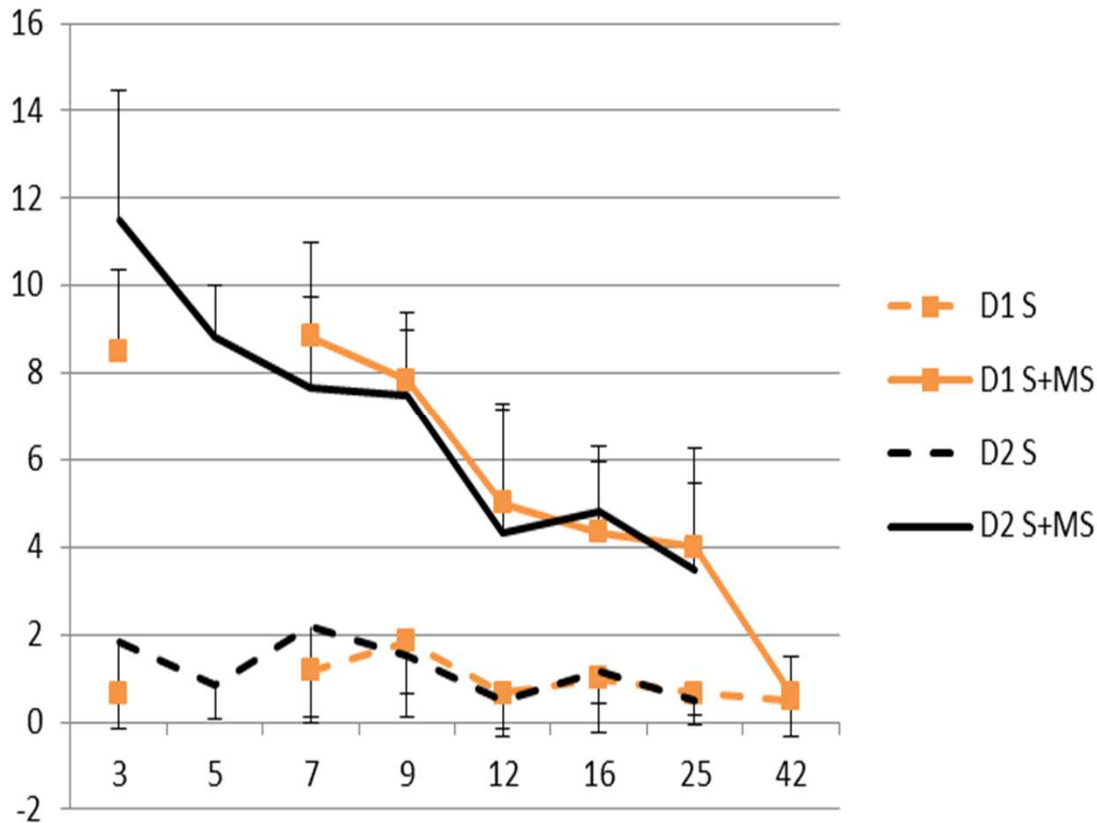


Figure 11: Average number of pigs 'feeding' (i.e. head down in the provisioning area, y-axis) at 3-42 min (x-axis) after providing straw (S) with or without maize silage (MS) on Day 1 and 2 in Starplus. (Day 1: brown; Day 2: black lines; S+MS: solid lines; S: dashed lines).

Overall: no effect of maize silage on rope manipulation

- No overall significant effect of maize silage on average rope manipulation frequencies, but there were some indications of reduced rope manipulation with maize silage compared to without (eg on day 3).
- And a rope was manipulated more than a chain with a ball.
- And a jute sack was used more than a metal chain
- We did pick up background enrichment in another experiment with more enrichment (space, straw, compost, branched), and found that AMI Poor > Rich pen (farrow & weaned) and, more importantly, that a bit longer chain > Short chain (in Poor pens)

AMI suggestions

- AMI sensors may be used to measure the use of enrichment materials by pigs
 - Objective
 - Flexible (on-farm)
 - Feasible
- But rather complex
- AMI-sensors can supplement other types of assessment
 - Using RICHPIG / Expert opinion
 - Behavioural observations

Exploring solutions

- Types of solutions
 - Economy
 - Legislation
 - Means prescriptions
 - Goal prescriptions
 - Market schemes

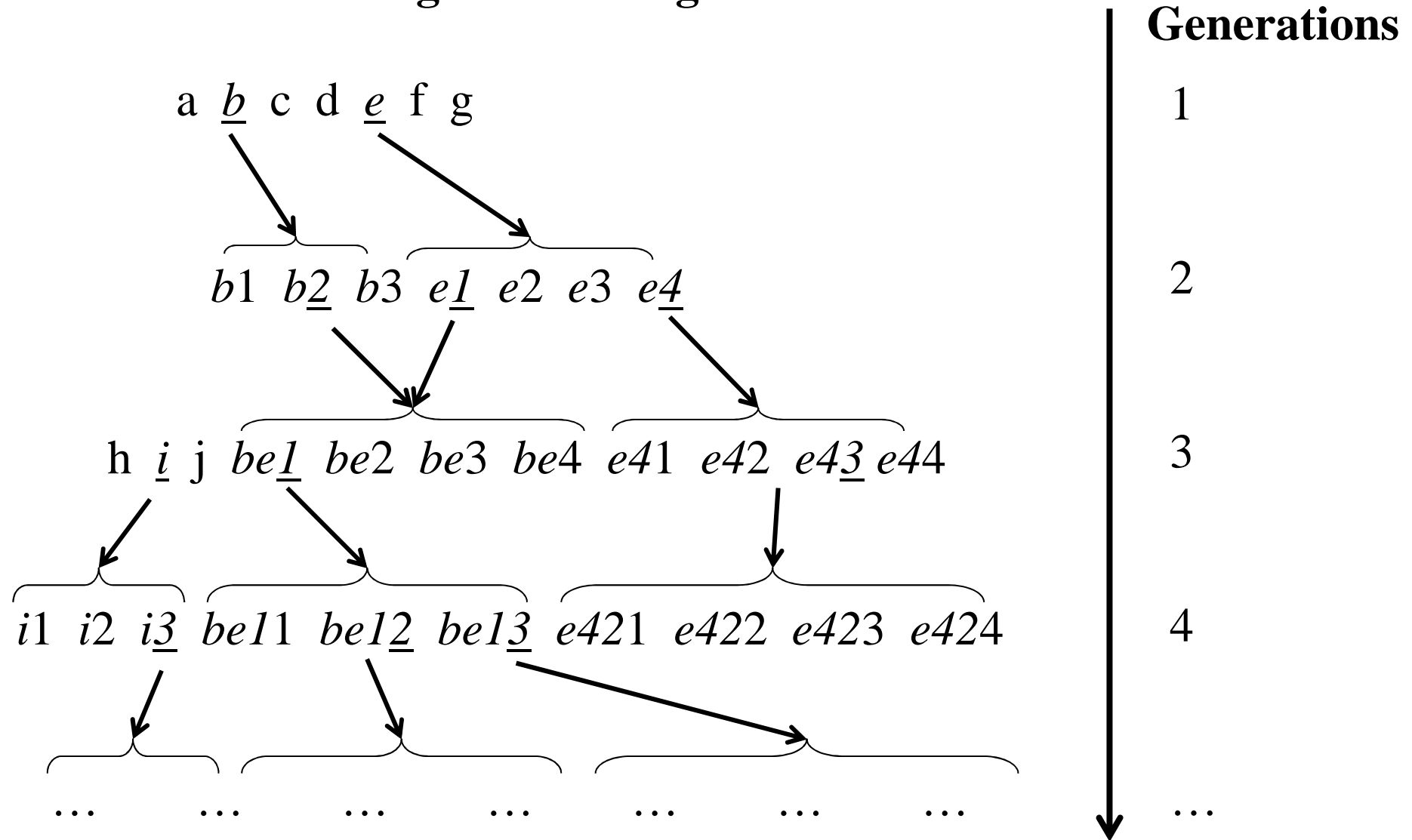
'New' method: IND – Intelligent Natural Design

- Natural selection + Intelligent design =

→ Intelligent Natural Design (IND)

- (R)Evolutionary approach to improve the moral status of intensive livestock farming, e.g. to design proper enrichment and to solve tail biting and tail docking problems within the constraints of intensive pig farming and based on available scientific information

Solution strategies for biting



a, b, c, etc: 'Primary' solutions (designed based on existing knowledge and experience)
 (e.g. enrichment materials, tail biting prevention/treatment strategies)

b, e, i: better solutions from their generation ('the fittest'); i: New solution (mutation 'de novo');
be1: New cross from b2 and e1. e42: Solutionstrategy that is not 'surviving'.

Generations consist of groups of farmers (across farms) and/or groups of pigs (within farms)

Bracke, 2011
 Herning

Evolution of an enrichment material

1. Short chain, hanging

2. Wood loose in the pen

3. Short chains with wood

4. Long chain

5. Long chain with wood and pipes

(‘Bracke plank’)

6. Long chain with shackles

7. Branched chain

stainless steel, anchor chain, proper size, 1 per 5 pigs)



(optimise further: e.g.

Proper enrichment: From Review to preview

- EC Directive should improve pig welfare (it didn't)
- Balls & pipes < short chain =>
- Minimum standard: optimised, **branched chain**
- **AMI**-sensors can be used to confirm interaction (and/or Behaviour/ RICHPIG / expert opinion)
- Ideally: Intact tails
- Intelligent Natural Design (IND) : select 4 welfare
 - EC directive: proper enrichment, but also
 - No routine tail docking
 - Plentiful straw when biting
 - Slaughterhouse reward longer/intact tails

Acknowledgements



- ANIWhA Era-Net initiative (FareWellDock project, See www.farewelldock.eu)
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