Welcome at this workshop on elimination: From dirty to clean pens

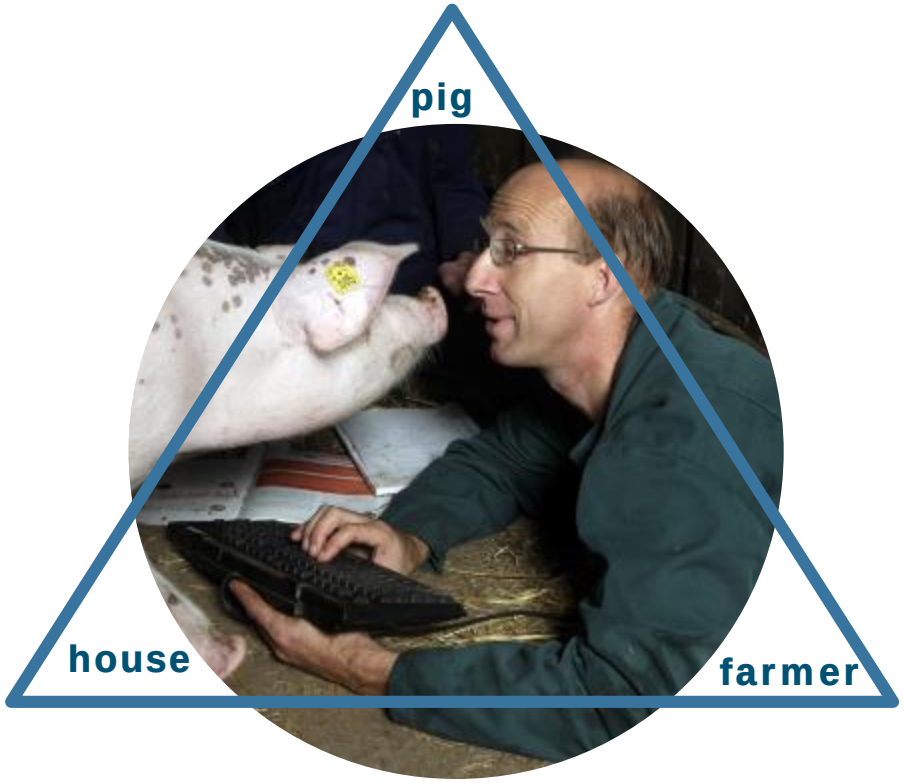
- Organisatie: Leveranciersvereniging De Groene Weg
- Voorzitter: Joost van Alphen, bestuur Leveranciersvereniging
- Beheer chat: Henk Oudenampsen, De Groene Weg
- Spreker: Herman Vermeer, Wageningen Livestock Research

De Groene Weg
BIOLOGISCH BOEREN
voor't goede leven

Elimination: From dirty to clean pens

Leveranciersvereniging De Groene Weg, 3 mei 2021

Herman Vermeer, Wageningen Livestock Research



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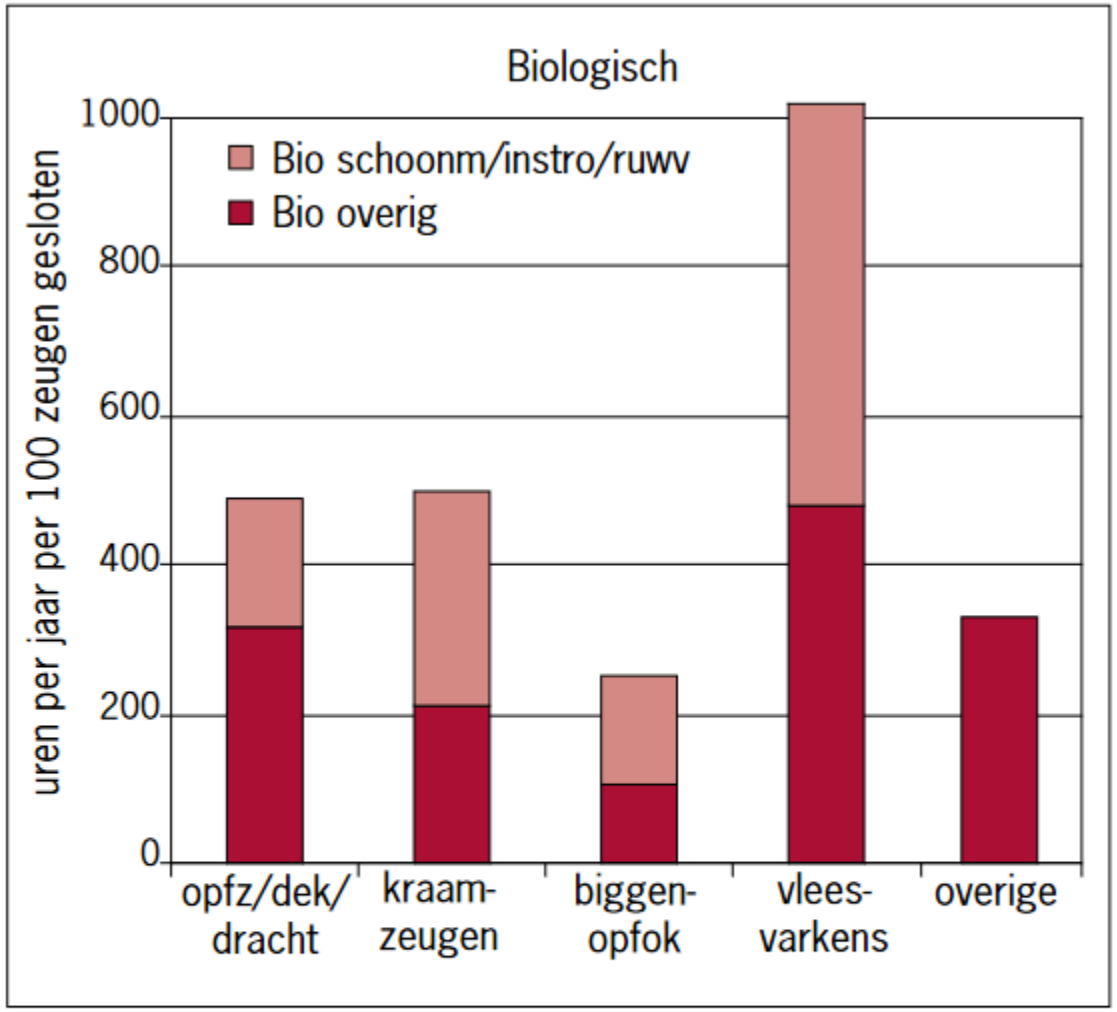
Why clean pens?

- Welfare - Beter welzijn (dier én mens
- Less labour - Minder arbeid
- Less emission and odour - Minder em
- Better hygiene
- Less costs for straw and water
- Better for the legs
- Image: “Nice advertisement”



Figuur 2. **Arbeidsbehoefte in uren per jaar voor een biologisch gesloten bedrijf van 100 zeugen; het schoonmaak-, instrooi- en ruwvoerwerk is bovenop het overige werk gestapeld.**

Labour demand: 50% for cleaning

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Programme

- Natural behaviour
- Present buildings and (inter)national developments
- Possibilities per pig category

- Pen fouling/soiling= dirty by manure and/or urine

Natural behaviour

- Communal nest as start
- Walk away 5-15 m from nest for dunging
    - Also away from feeding place
- After periods of resting in nest
- Or “on the road” on a quiet place
- No fixed spot
- No territorial marking
- Already from birth

Elimination frequency?

	Urination	Defecation	Elimination	References
Piglets:				
1-15 days of age			16.4	Buchenauer et al. (1982)
10 days of age	every 2 h	every 6 h		Whatson (1985)
Growing pigs[a]:				
25 kg	4.1	7.0	13.9[b]	Aarnink et al. (2006)
45 kg	4.2	4.0	9.4	
65 kg	4.9	4.7	10.1	
85 kg	2.5	3.2	7.2	
105 kg	2.7	3.1	6.2	
62 kg				Huynh et al. (2005)
50%RH	3.4 ± 0.1	2.0 ± 0.1		
60%RH	4.0 ± 0.2	2.3 ± 0.2		
80%RH	3.0 ± 0.2	2.6 ± 0.2		
45-70 kg[c]			17.9 ± 0.32	Guo et al. (2015)
26-112 kg				Aarnink et al. (1997)
Female	4.3 ± 0.3	4.1 ± 0.3		
Male	4.2 ± 0.2	4.3 ± 0.3		
28-106 kg[d]	7.1 ± 0.9	6.1 ± 1.6		Aarnink et al. (1996)
Sows:				
115-120 kg[e]				Ferretti et al. (2015)
Summer (July)		3.8 ± 0.3		
Winter (November)		4.3 ± 0.4		
Pregnant	3.8-5.8	3.6-4.5		Ivanova-Peneva et al. (2006)
72-48 h before farrowing	3.0	1.7		Hartsock and Barczewski (1997)
48-24 h before farrowing	3.9	2.5		
24- 0 h before farrowing	11.7	3.8		
24-1 h before farrowing	7.9 ± 0.85[f]	6.4 ± 0.67[f]		Damm and Pedersen (2000)
5 to 1d before farrowing:				Tabeling et al. (2003)
Restrictive feed		3.0-4.0		
Ad libitum feed		5.0-5.5		
Day of farrowing to 5d after:				
Restrictive feed		1.5-2.5		
Ad libitum feed		3.5-4.5		
2-4 weeks after farrowing	3.3 ± 0.2	2.0 ± 0.1		Andersen and Pedersen (2011)

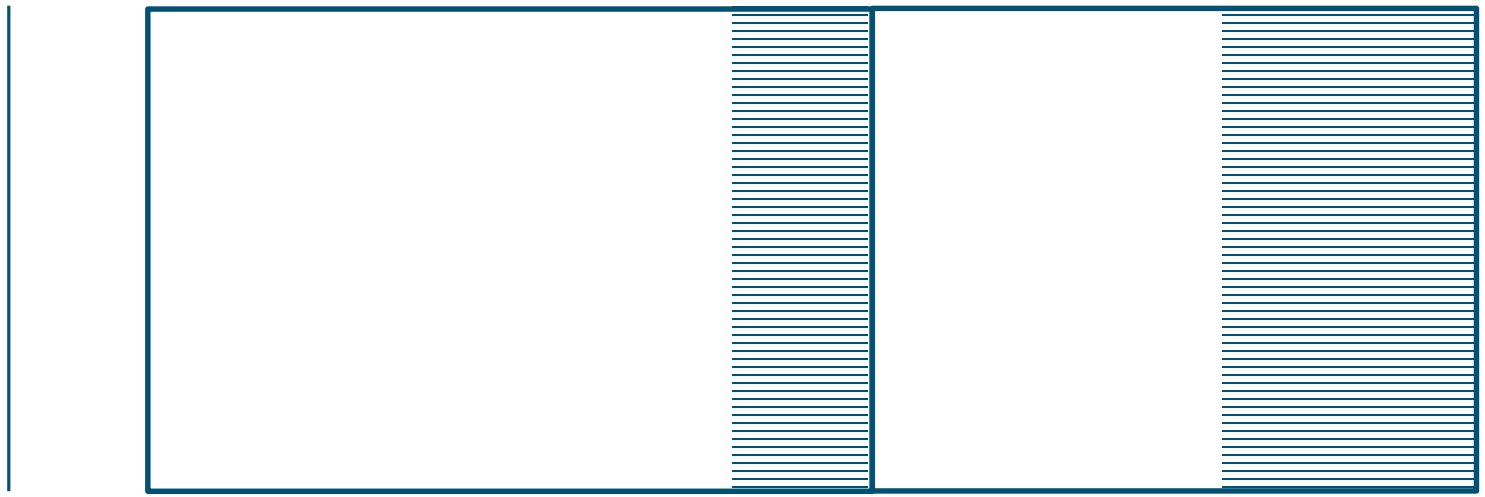
Vulnarable position: safe, protection, non slippery floor

Dirty floors mostly on the outdoor run

- We investigated the cleaning frequency of the outdoor run in relation to the Ascaris infections, but without any difference between treatments.

Dunging behaviour organic pigs

- Mostly indoor clean, outdoor dirty
- Huge differences with good and bad experiences
- Outdoor solid floors often wet, often with fully slatted floor
- (sketch below is used for drawing during the presentation – whiteboard)



Moving pigs = Meandering river: deposition when wide, at low water speed (flowing rate); narrow has higher speed

Licht en lucht (Licht und Luft; Light and Air)

- Preference for lying in the shimmering, activity in the light
- Lying: clean air in thermal comfortzone
- Air inlet not through outdoor run access
- Dunging area: cold, draught, neighbours (fence line contact)
- Exchanging dunging and lying locations (from slatted to solid floor) sooner in conventional than in organic pigs

Roof

- 50-75% good compromise
- Enrichment under roof
- “wet area” at unroofed end
- Rain dilutes slurry and buffers ammonia

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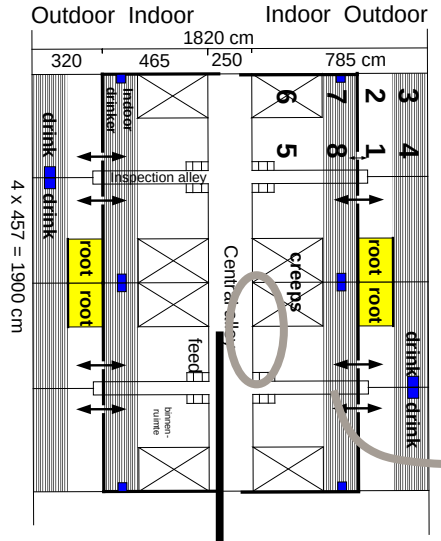
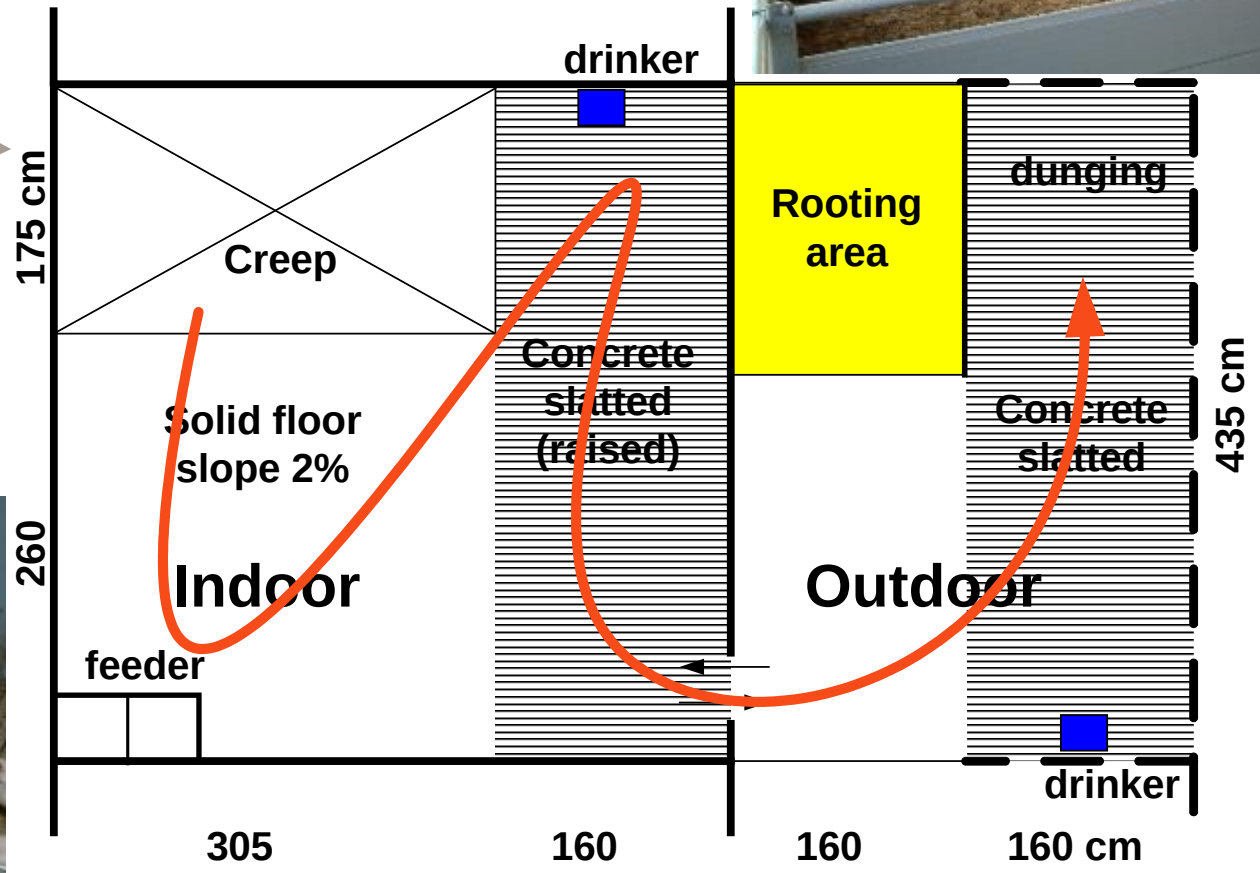
Growing finishing pigs

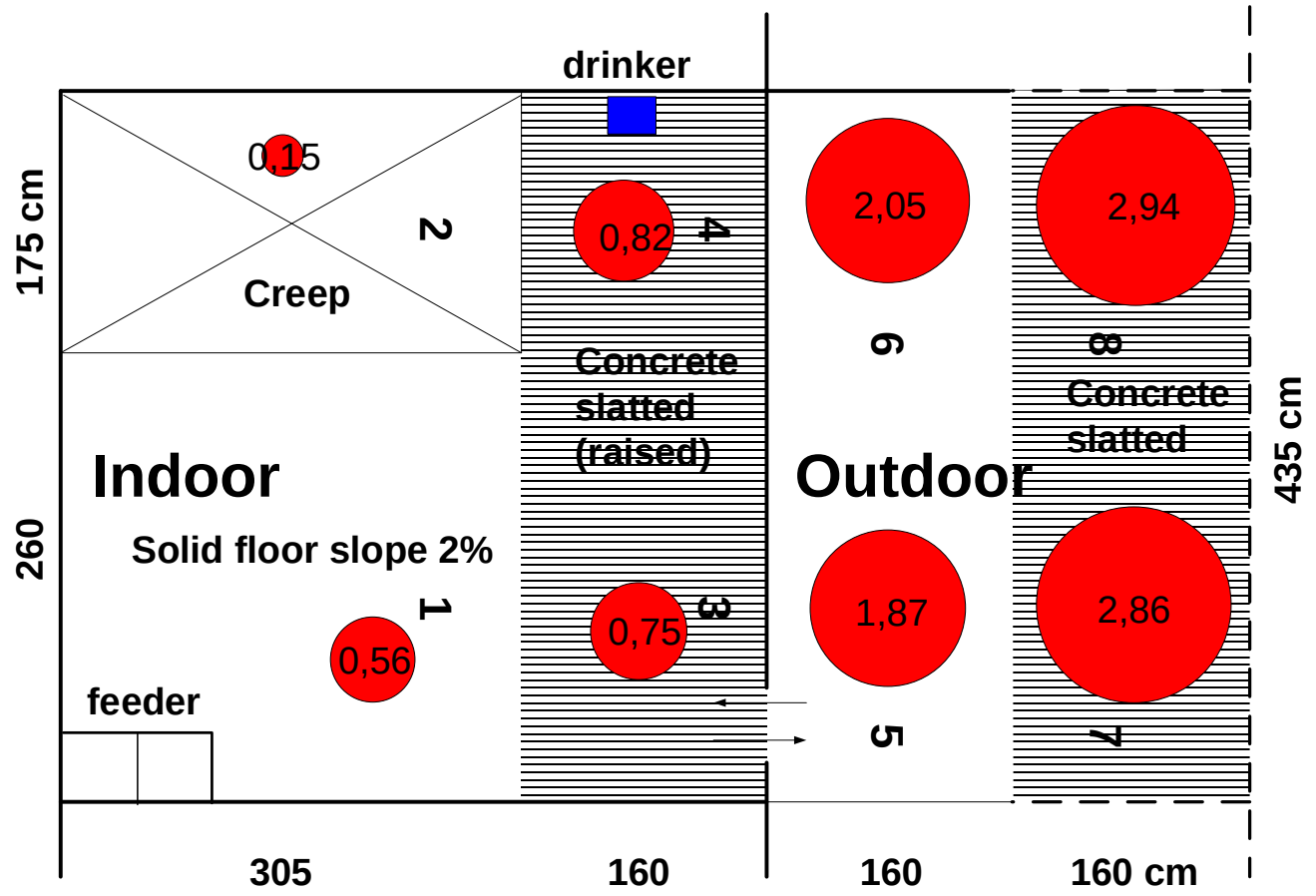
- Growing from 25 to 120 kg makes simple solution difficult
- Is anyone using a movable front partition (incl feeder) of the pen?
- Dry – wet feed: Simultaneous feeding requires a larger dunging area
- Slope in solid floor: 1-2% indoors, 3-4% outdoors
- Slatted floor: Increasing % of openings the closer to the dunging area
- Different slurry channels to collect different fractions (straw, urine, manure, rain)
- At the moment emission measurements at 2 commercial farms in NL to make variation clear

Experiment with outdoor rooting area and drinker



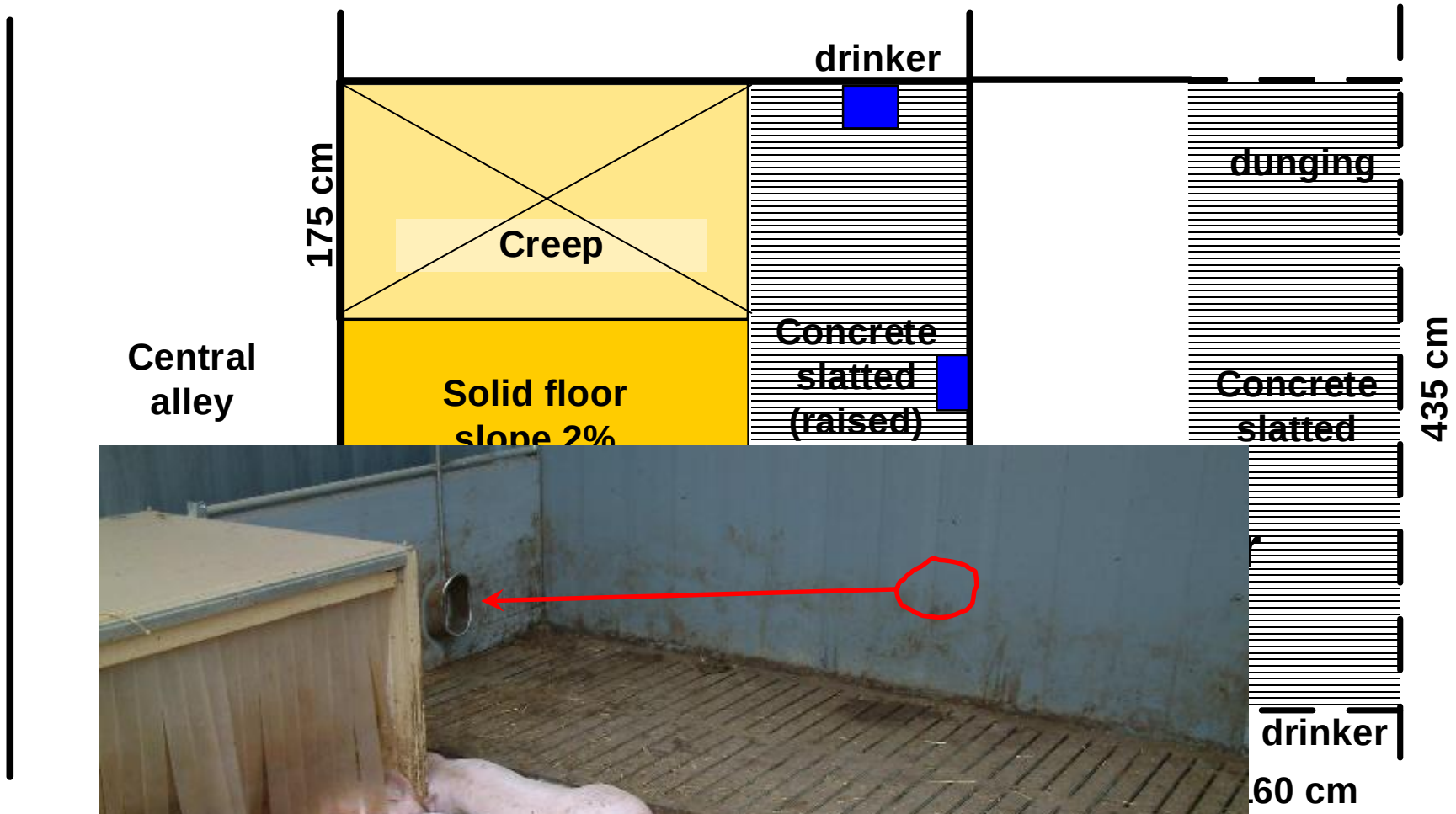


Pen fouling score

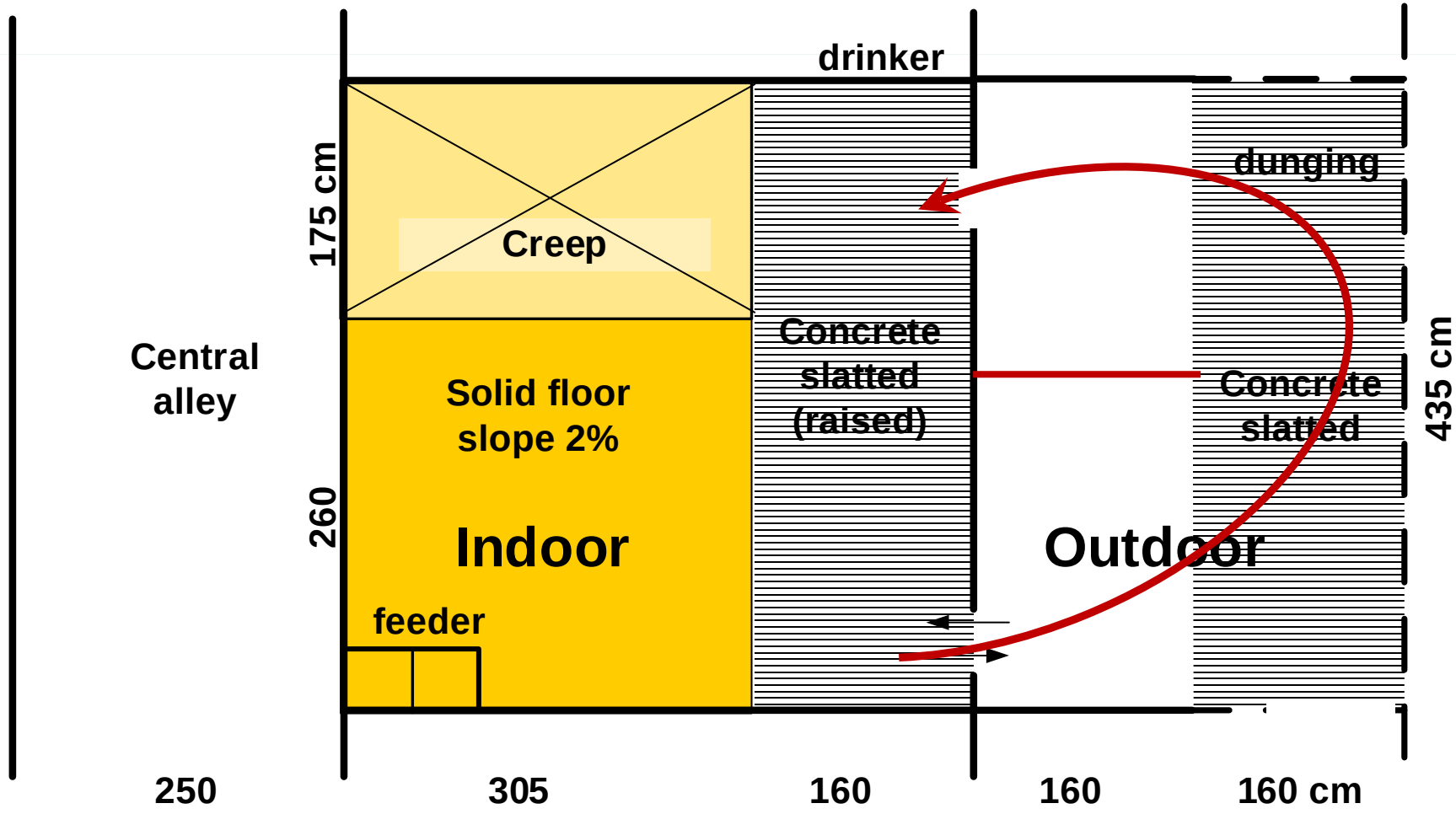


With an outdoor rooting area and an additional drinker dunging behaviour can be directed, however the risk of indoor fouling increases

Location of indoor drinker



One way traffic: keeping the water flowing as in the meandering river (not successfull yet)



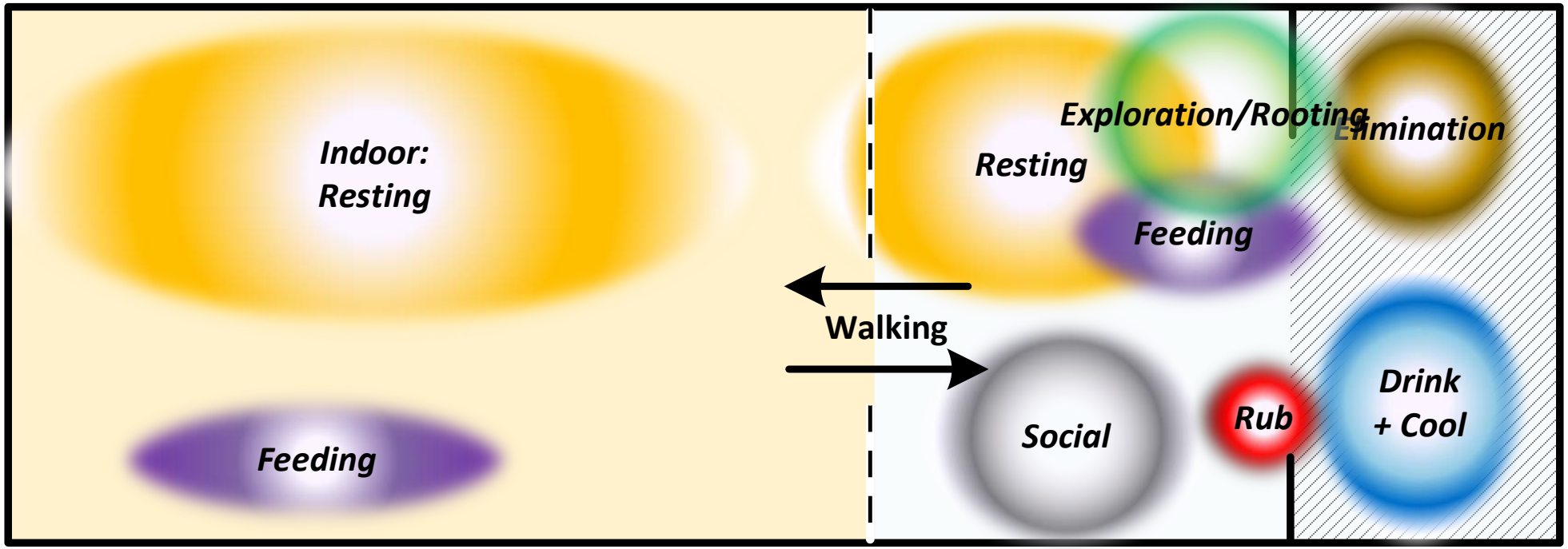
4 pens

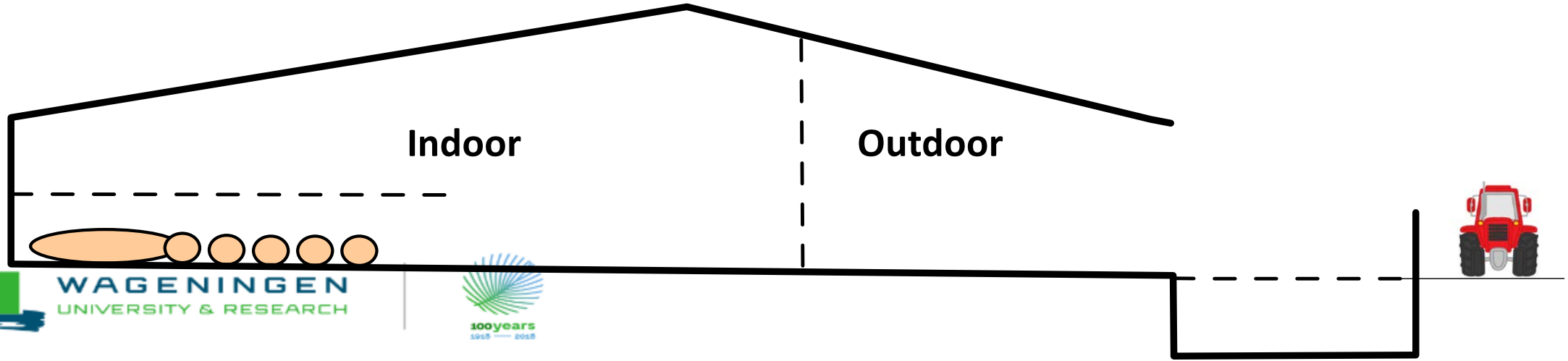
5 days after start at 25kg with only one access to the outdoor run

4 pens

5 days after start at 25kg with separate entrance and exit to the outdoor run

Pen organic finishing pigs (12 pigs, total 10.70 x 2.60 m = 27.8 m²)





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Some international examples

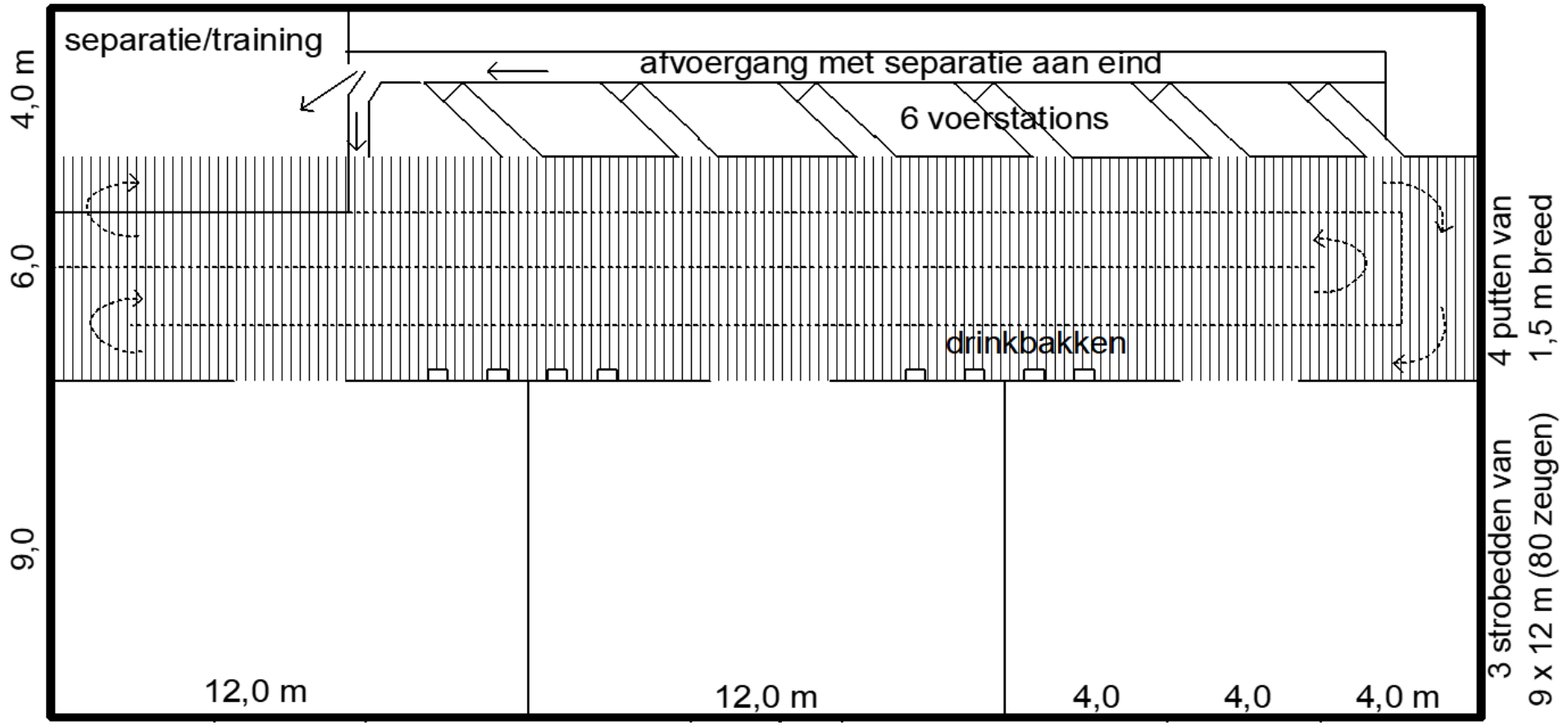
Figur 2. 'Delvis åben': Delvis åbent staldsystem med åben væg mellem ude- og indeareal, men med halvmur ind mod lejeareal. Lejeareal havde dybstrøelse. Gruppestørrelsen var 350 grise og der indgik 3 forskellige stier i undersøgelsen.

Figur 3. 'Delvis lukket': Delvis lukket staldsystem med lille adgangshul mellem inde- og udeareal. Stier var placeret i stor hal. Lejeareal havde dybstrøelse. Gruppestørrelsen var 35 og der indgik 9 forskellige stier i undersøgelsen.

Pregnant sow

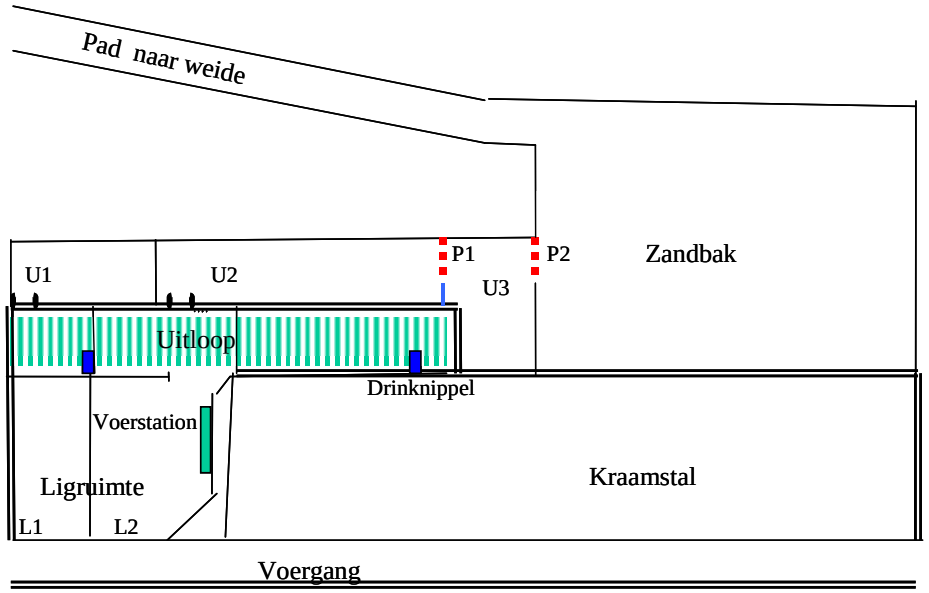
- Straw bedding dry (not for collection of manure and urine)
- Lying area access and dunging area need periodical cleaning
- Fouling outdoor run strongly dependant on design
- Roughage can lead to obstruction of slatted floor(s)
- Prevent hotspots (mineral leaching) in pasture

Sows: exit race in ESF systems to direct dunging

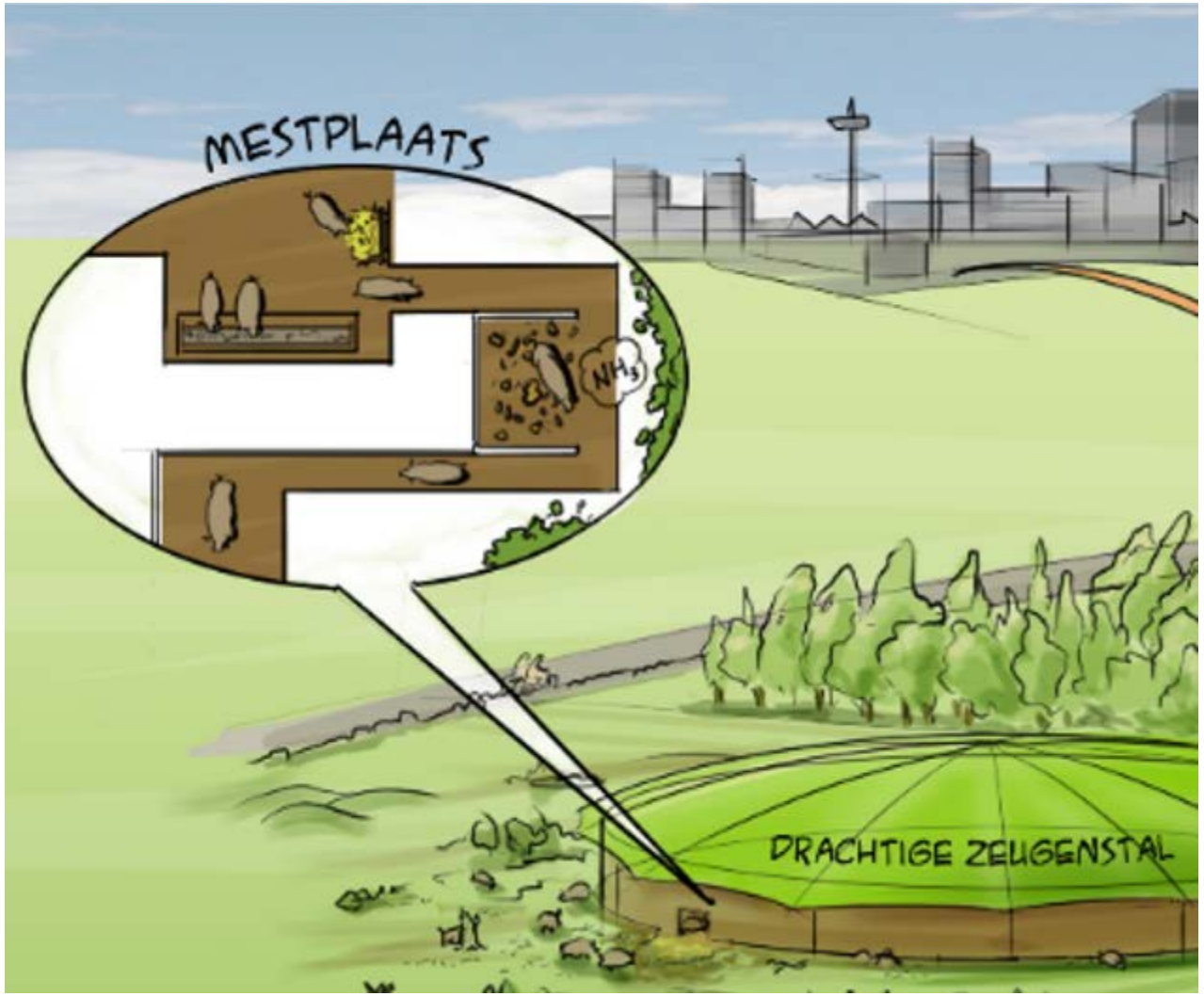


Sows: less P and K in pasture

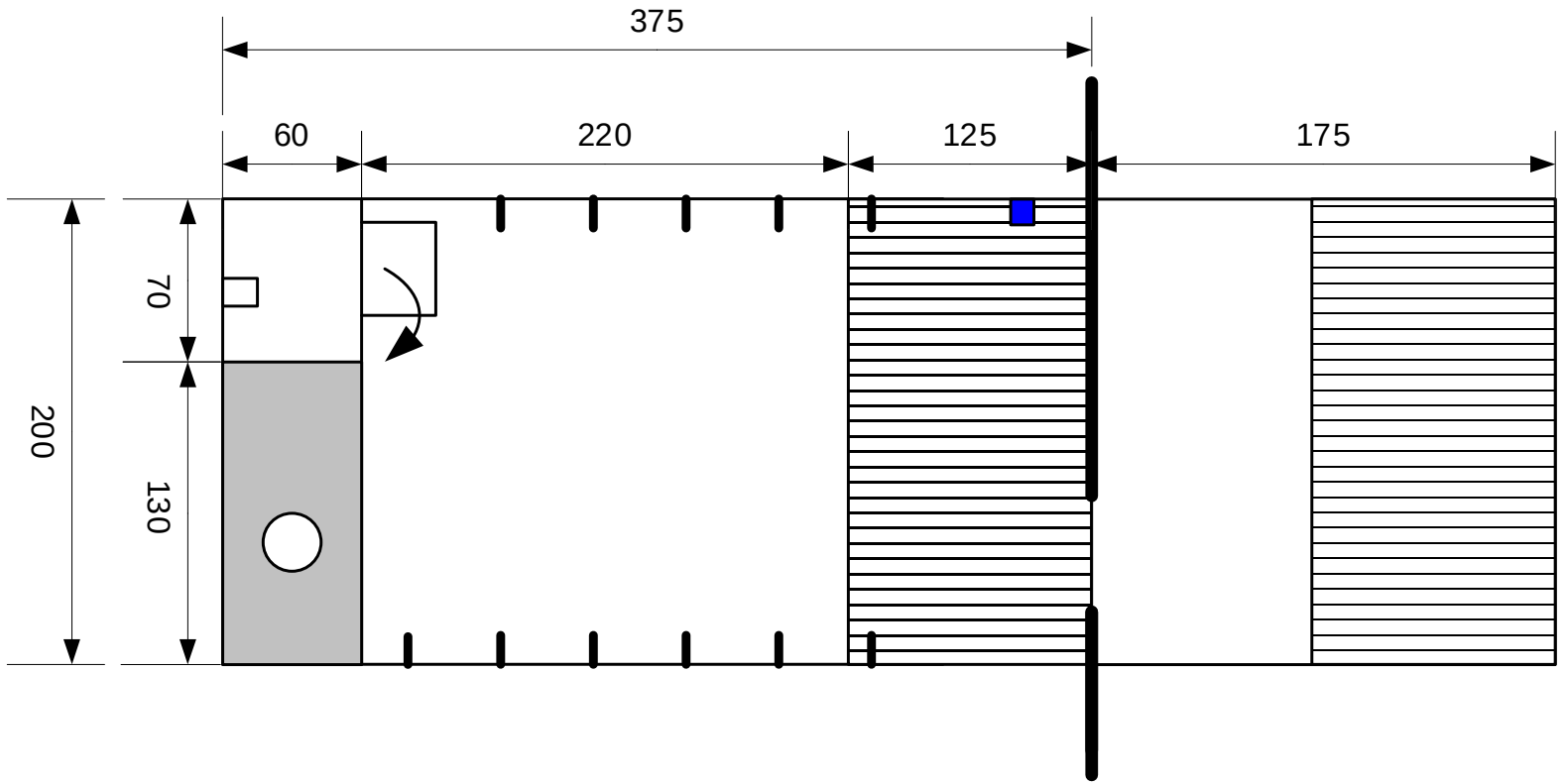
- From indoor to pasture:
  - Indoor lying and feeding
  - Outdoor area concrete
  - Pasture with hotspots with mineral leaching
- 30 min delay before opening gate to pasture in subgroups
- Longer route to pasture including specific dunging area



Sows: route to pasture



Farrowing pen



Weaners (12-25kg) / Growing pigs (12-50kg)

- Small version of finishing pigs
- Additional attention for indoor climate
- Pen fouling mostly limited
- Flushing gutters with liquid fraction (incl chopped straw) function well in Dutch “Free Range” pig systems
- Large groups are more difficult to direct the dunging behaviour

Photos for discussion

Thermoregulation?? Preference for sprinklers/showers

Figur 1: Udeareal med sølekar i besætning 1

Figur 2: Udeareal med sølekar i besætning 2

Partitions

- Fence/solid
- Solid between rooms/age groups and at solid floors
- Fence at slatted floors
- Wind break fabric on wind side
- Doors/curtains
- Lower half of partitions solid
- Free view >5 m

Summary

- Pigs eliminate in free and safe place
- Pigs walk away from lying and feeding areas for dunging
- Give pigs no choice concerning dunging area (functional areas)
- Dunging area: quiet, draught, cold, wet, neighbours, fence, non slippery floor
- Use your farmer network to learn from eachother
- Every building/farm/farmer needs a custom solution

Thank you for your attention!

herman.vermeer@wur.nl