Future-proof housing of hyper-prolific lactating sows

Chief Scientist
Vivi Aarestrup Moustsen, Ph.D., M.Sc.

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Affiliate associate professor of
Animal Husbandry, Pigs.
Department of Veterinary and Animal Science

FACULTY OF HEALTH AND MEDICAL SCIENCES
UNIVERSITY OF COPENHAGEN

OBS: Slide 23-30 vedrører resultater fra SAF-projektet Pattegriseoverlevelse, AP5.

SEGES INNOVATION
Svineafgiftsfonden

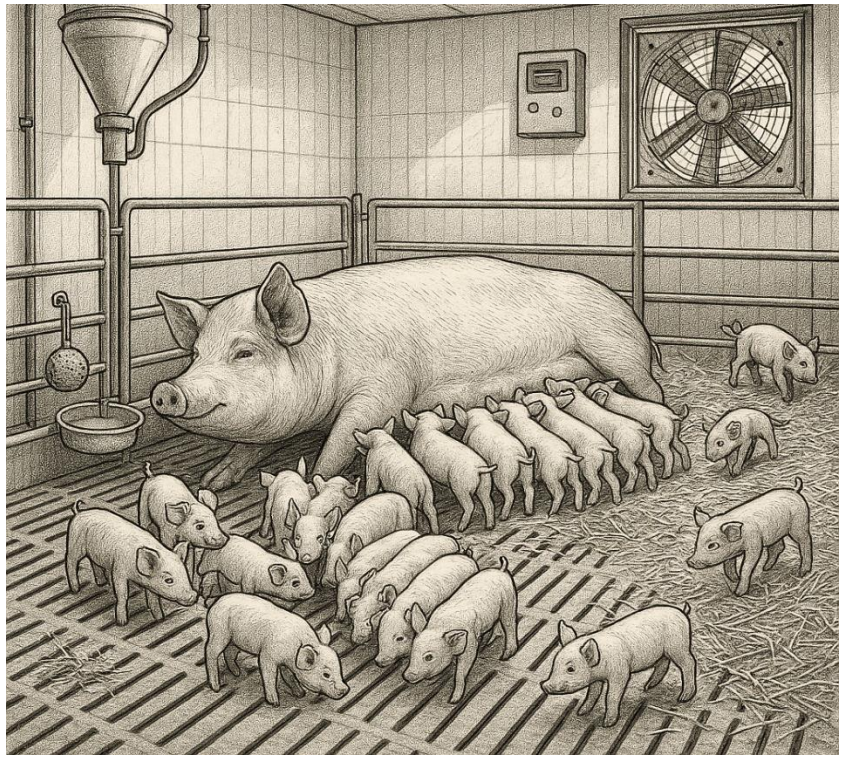
The sows are top-athletes

- There is potential
  - Variation between sows and herds => possible to improve
  - Requires an effort
    - In all parts of the herd
    - Legs, hooves, body condition -> sows are fit
  - High feed intake
    - High feed level supports farrowing and milk production
  - Good conditions
- Challenges
  - It takes courage and motivation

SEGES INNOVATION

Future proof housing of hyper-prolific lactating sows

- Loose sow
- 20+ piglets
- High welfare
- Low emissions
- High productivity
- Motivating and safe work conditions
- Limited premium payment
- *Societal acceptance and acknowledgement of pig production*



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Hyperprolific sows

Balanced breeding

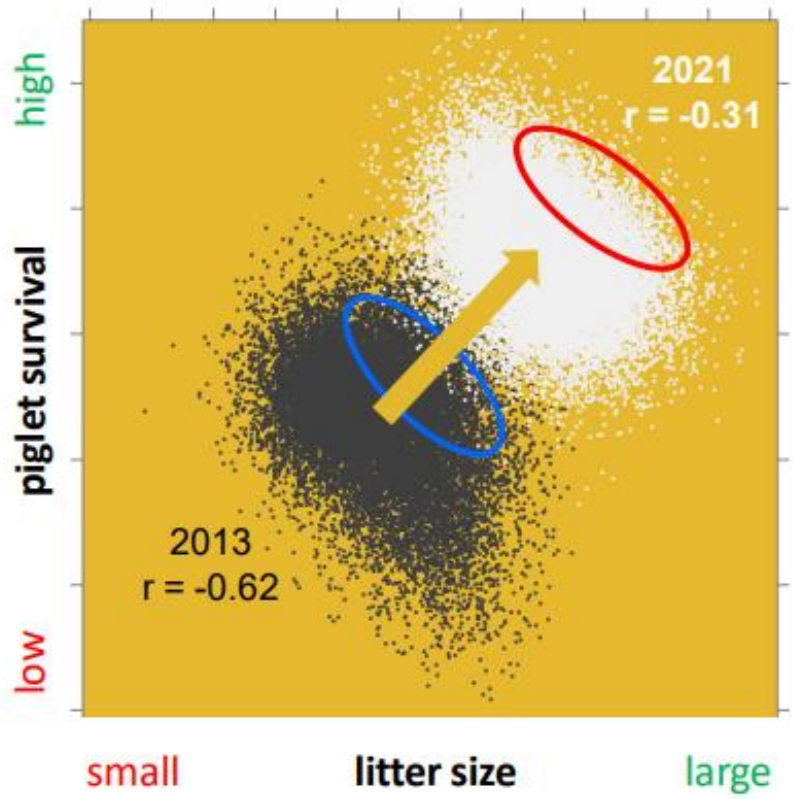
Balanced breeding goals → joint selection for piglet survival **and** litter size

	Proportion of breeding goal	
Breeding organization	**Reproduction[1]**	**Survival**
DanBred	20	29
Danish Genetics	13	22
German Genetic Landrace	36	40
German Genetic Large White	26	46
Hypor	27	30
PIC	20	59
PiG Austria	36	20
PrimeGro Genetics	28	32
Suisag: Ladnrace	18	39
Suisag: Large White	17	37
TopigsNorsvin	19	27

[1] Reproduction traits: Littersize and weaning to mating interval

Knap et al., 2023

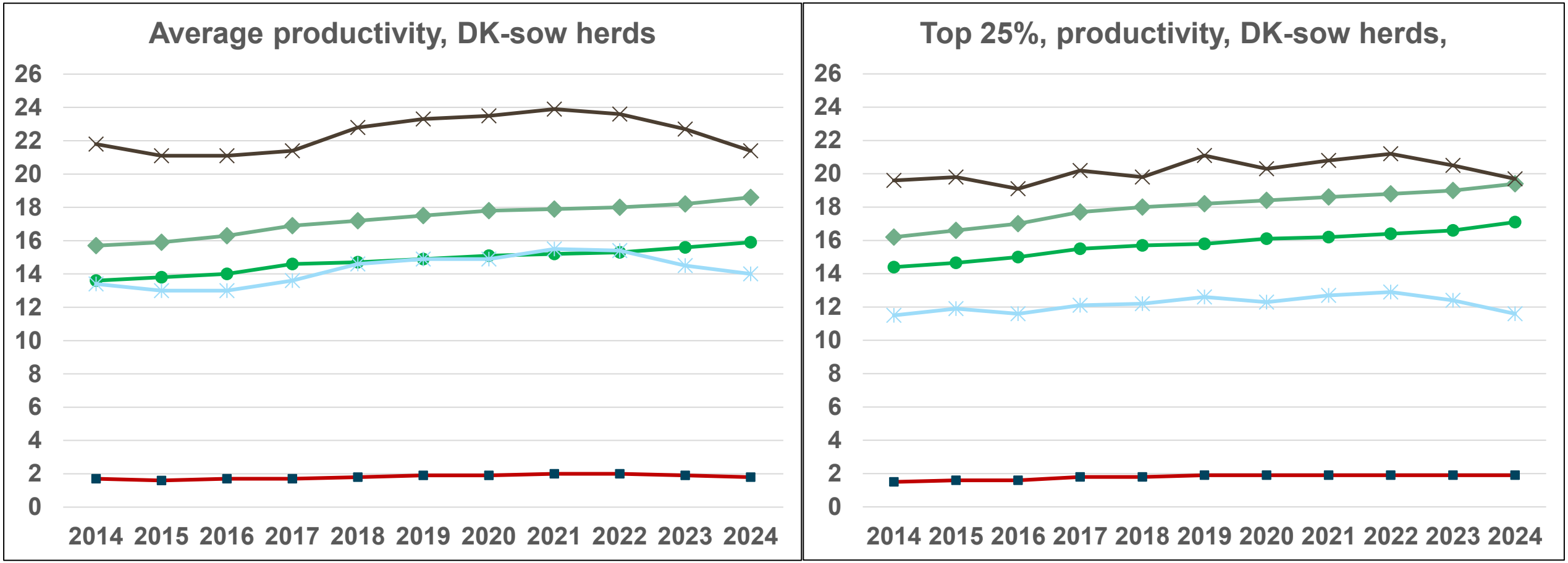
Breeding can increase litter size AND piglet survival



EFFAB European Forum of Farm Animal Breeders

SEGES INNOVATION

An example of hyperprolific lactating sows, 2014-2024

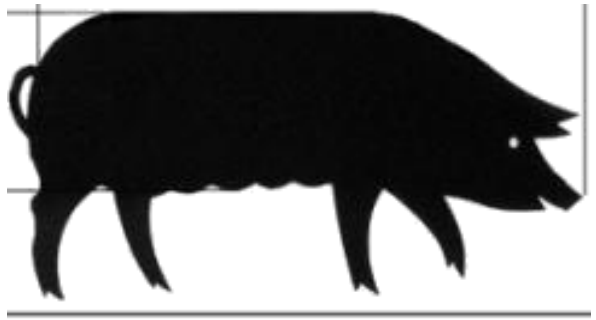


SEGES INNOVATION

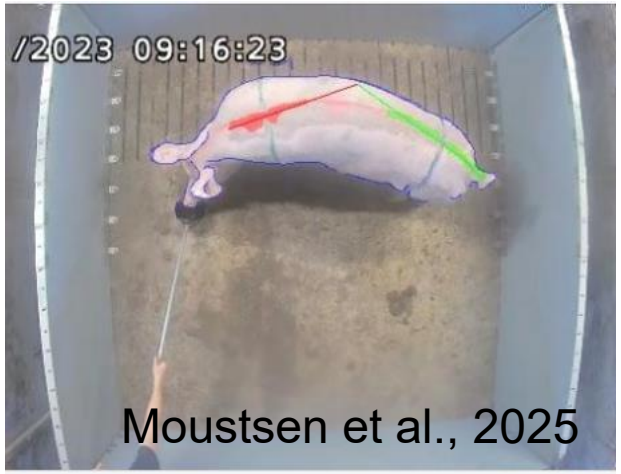
Housing - start with the sow

- Dimensions - sows
- Postures and behaviours
  - Standing and lying
  - Eat, drink, dung, nurse, turn, nest build
- Distances
- Space allowance
  - Areas can overlap spatially

Parity 5+ length (cm) mean (std)



2011: 193 (±0.6) (Moustsen et al, 2011)
2018: 192 (± 1.2) (Nielsen et al. 2018)
2025: 196 (± 6) (Moustsen et al., 2025)



Moustsen et al., 2025

SEGES INNOVATION

Why focus on the sows' possibility to turn around?

- Natural behaviour
  - Pigs do not feed, rest and dung in the same 'spot'
- Todays farrowing units
  - Sows enter 3-5 days before parturition + lactate for 30 days (including days as nurse sows)

    → A farrowing pen is used by 10 sows every year

    → 340 days/year/farrowing pen where a sow cannot turn around

    → *1,200 sow herd*: app. 300 farrowing pens * 340 days/year/pen

    → ***120,000 days every year*** where the sows cannot turn around

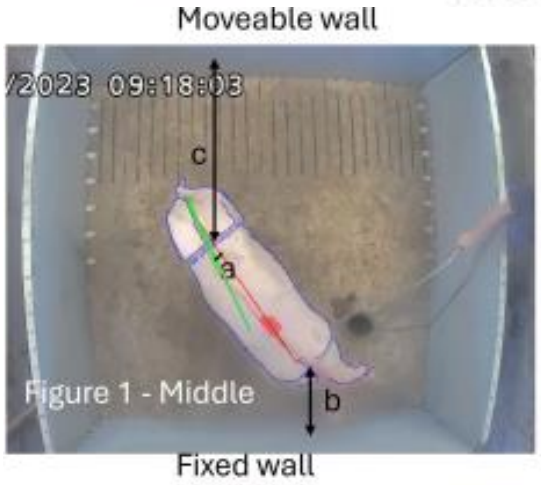
SEGES INNOVATION

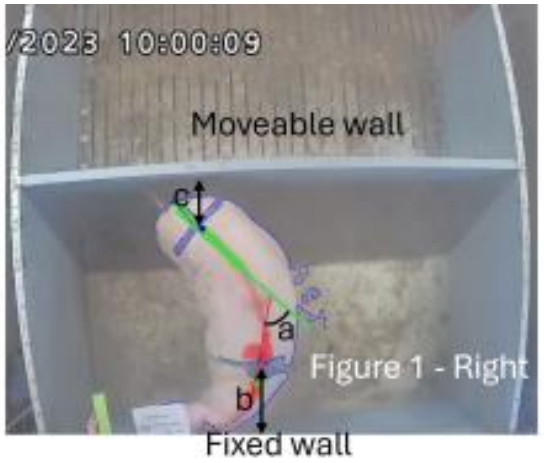
How much space do sows need to turn?

- Sows – late gestation
  - parity 2-4
  - parity 5+

- Pens
  - 1.2-2.2m – in 0.2m intervals; random order

- Trial
  - Direct observations
  - Automated image-analysis





SEGES INNOVATION

(Moustsen et al., 2025)

Sows turned unhindered at less than their own body length

- 236 video of turns

- Curvature of body (with W2.2 as reference):
  - Sows curved their body significantly more W1.2 than at W2.2
  - For both age-groups the highest curvature was observed at W1.2
  - The curvature at the pen dimensions W1.4, W1.6, W1.8 and W2.0 did not differ significantly from the curvature at W2.2
- Distance to pen walls – when the sow's back curved the most (with W1.2 as ref):
  - Distance to the wall in W1.4 did not differ from the distance in W1.2
  - For W1.6 there was a tendency
  - Distance in W1.8 and upwards was significantly different from distance in W1.2

SEGES INNOVATION

(Moustsen et al., 2025)

If we use confinement

Sow: Confinement reduces sow welfare

- Loose during nestbuilding
  - Sows are very active
- Confined during farrowing
  - Sows are lying lateral
- Confined for the first 2-4 critical days
  - Sows are lying lateral (80-120min of 2h intervals) [1]
- Loose during the remaining lactation period
  - Sows increase activity

Piglets: Confinement reduces piglet mortality

- Loose during nestbuilding
  - No piglets born yet → no piglets at risk
- Confined during farrowing
  - Piglets at the udder → risk of crushing↑
- Confined for the first 2-4 critical days
  - Piglets at the udder → risk of crushing↑
- Loose during the remaining lactation period
  - Piglets use creep area↑
  - Increase duration of milk letdown by 25% [2]

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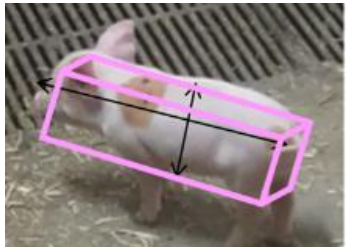
[1] Hales et al., 2016

[2] Pedersen et al., 2011

Followed by piglets



- Dimensions at
  - Birth
  - Weaning (weaning age)
- Numbers at
  - Birth
  - Weaning
- Postures and behaviours
  - Standing and lying (length and width)
  - Nurse, rest, play, safety zones
- Distances
- Space allowance

Piglet dimensions in litters with ave. liveborn 17.2

Moustsen and Nielsen, 2017

Age, days from birth	1-3	4-6	10-14	18-26
Number piglets	42	46	49	65
Weight, kg	1.4	1.6	3.8	5.0
Length, cm	31.3	31.0	41.0	44.0
Height, cm	17.8	17.5	22.0	24.5
Shoulder, cm	7.3	7.5	9.5	11.0
Depth, cm	8.0	8.0	12.0	12.5

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Sow and piglet behaviours

Sows:

- Nestbuilding: 24-2 hours before farrowing
- During farrowing: Lying majority of time
- Initial 2-3 days after farrowing: Lying 110+ minuts out of 120 min observed
- Milk letdown: 8-10 seconds every 43-45 minuts
- Grunting sequence: Sow calls at piglets
- Crushing: 50% of sows are ‘crushers’; More crushings, when warm – piglets take up more space

Piglets

- Can suckle on a simulated teat one-two hours after birth
- Takes up to 5-7 days before using milkcup – depending on design

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Dimensions – pen equipment

Sows:
Dunging
Lying
Thermoregulate
…

Piglets:
Shoulder width
Safety zones
…..

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Space for the sow

- Sows' dimensions
  - Minimum

- Planar width – turning space
  - Minimum
  - Ease of movement

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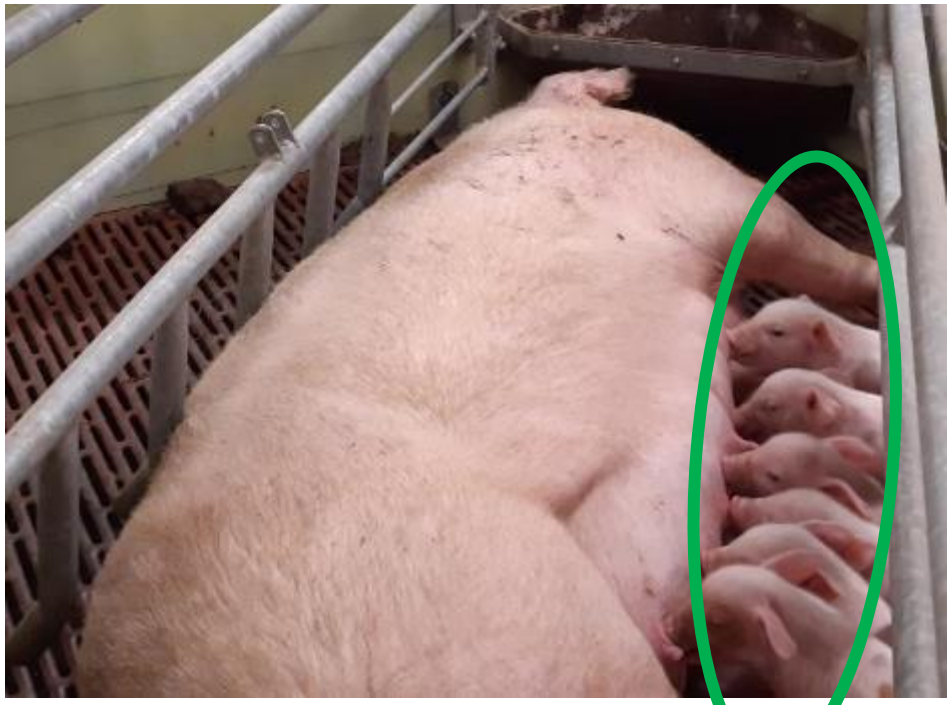
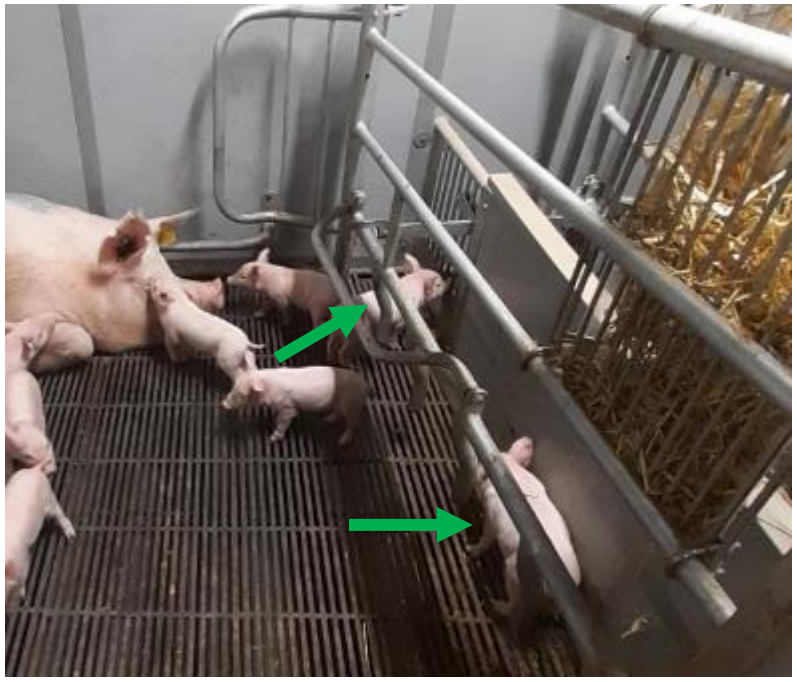
Space for the piglets

- Dimensions*number
- Piglet dimensions
  - Birth,
  - One week
  - Four-five weeks
- Litter size in pen
- Functional areas
- Piglet safety zones





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Space for the sow and piglets

16

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Which layout works best in practice?

- If used most days – place it at the passageway
  - Sow feed – every day
  - Piglets in creep – ‘every’ day
  - *Farrowing surveillance – only once – and often after work-hours*
- Equalsided
  - Fully drained /-slatted
- Rectangular
  - Possible to have partly solid floor (reducec pit and slurry surface)

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Choice of material and equipment - nestbuilding, flooring, heatsource - piglets

- Smaller sections
- Durable material
- Height of pen divisions – max 90cm
- Open pen division – upper part and slatted area
- Nestbuilding, straw (rack), jutesack…
  - Scraper system – reduce methane emission
- Warmth for piglets
  - Floorheating and heatlamp/-panel
- Flooring
  - Equalsided pen – fully drained/slatted
  - Rectangular pen – option to have partly solid floor
- Slurrysystem and –pit – depends on pen layout

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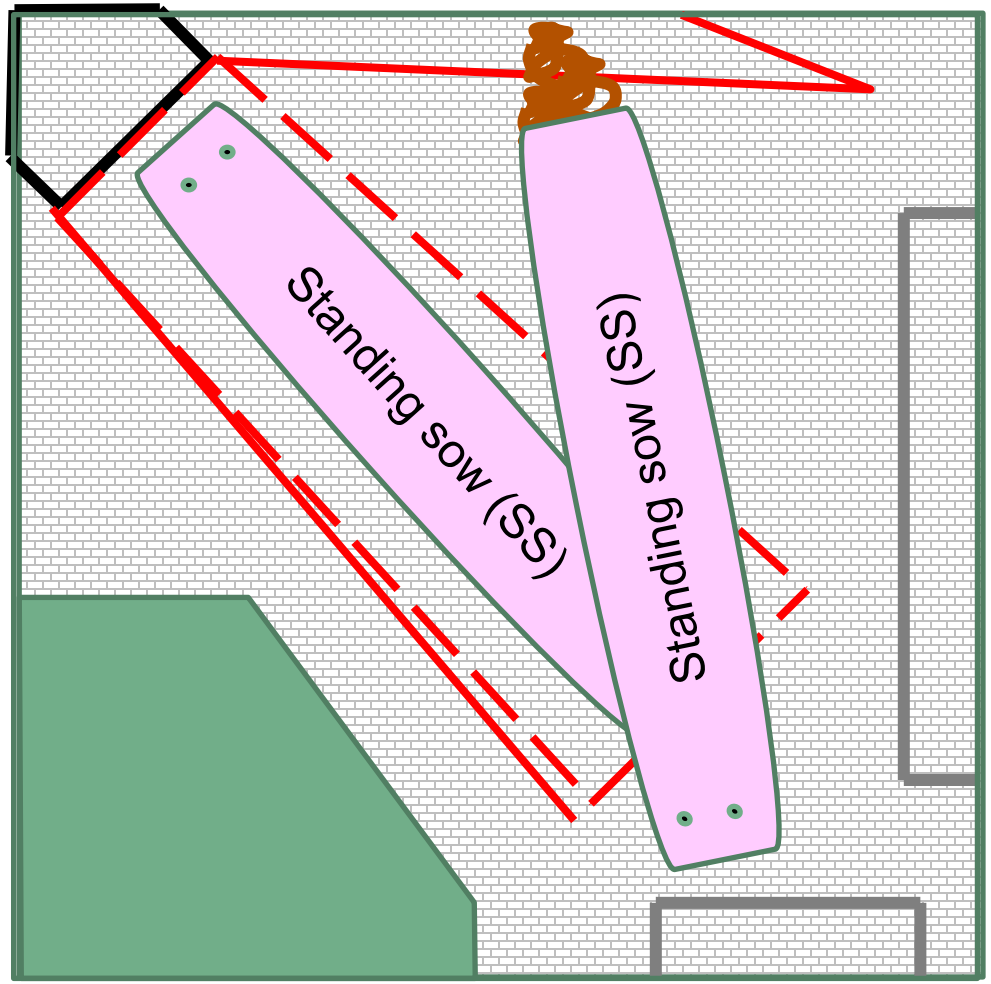
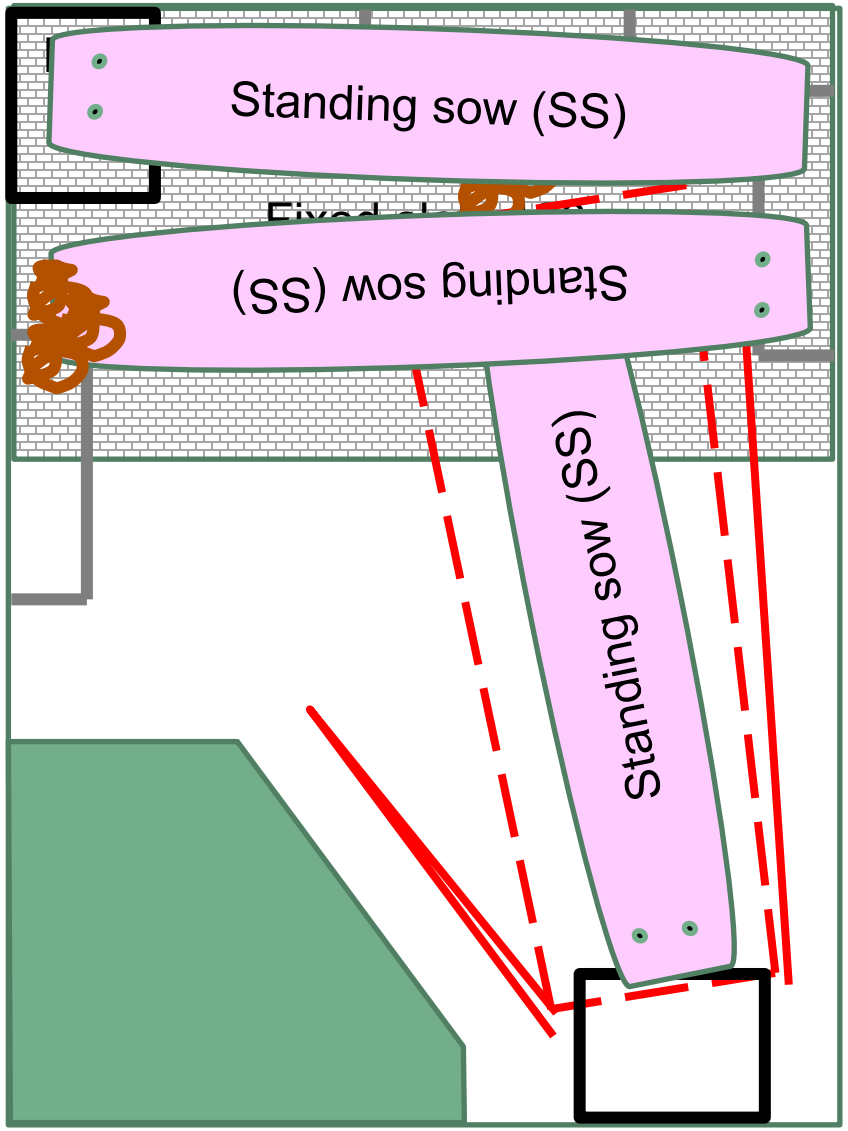
Emissions – understand dunging behaviour and pen design

Equalsided pen (*255*255*)



Rectangular pen (*220*300*)



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Area and pen dimensions – welfare and environment

Equalsided – fully slatted:

Solution **under** floor

Rectangular pen – option for partly solid floor:

Solution ***above*** floor

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Teaser-video of manure systems

For more – see Gyllesystemer i farestalde med løse søer - SEGES TV (choose English subtitles)

Environmental impact

- Piglet survivability↑
  - → number of sows needed to maintain production level↓
    - → herd size of one sow↓
      - → annual emission ↓ by 521 kg of CO^2e
      - + if including feed production, → annual emissions ↓ 1,550 kg CO^2e.

Hyperprolific sows and high piglet survivability is part of the solution in producing sustainable pork

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Productivity

- Milkproduction
  - Potential milkyield for a sow is 25 kg milk/day (Krogh et al., 2021).
  - Milk consists of app. 80% water
  - Sows with high milkproduction produce more heat → increase need for water
  - → Water needs to be easily accessible

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How much water does the lactating sow need?

		Day 4	Day 11	Day 18
Water intake	Drinking water	17.6	24.2	26.0
	Water from feed	0.44	0.67	0.87
	Water from metabolic processes	1.86	1.86	1.86
	Total intake	***19.9***	***26.7***	***28.8***
Water excretion	Deposited	-	-	-
	Respiration	2.5	2.5	2.5
	Skin	1.1	1.1	1.1
	Milk	6.5	10.7	12.2
	Urine	8.8	11.1	10.8
	Faeces	0.9	1.3	2.1
	Total excretion	***19.9***	***26.7***	***28.7***
	Drinking water : milk	**2.7**	**2.3**	**2.1**

More inf:
Review: Højproduktive søers forbrug og behov for vand (landbrugsinfo.dk)

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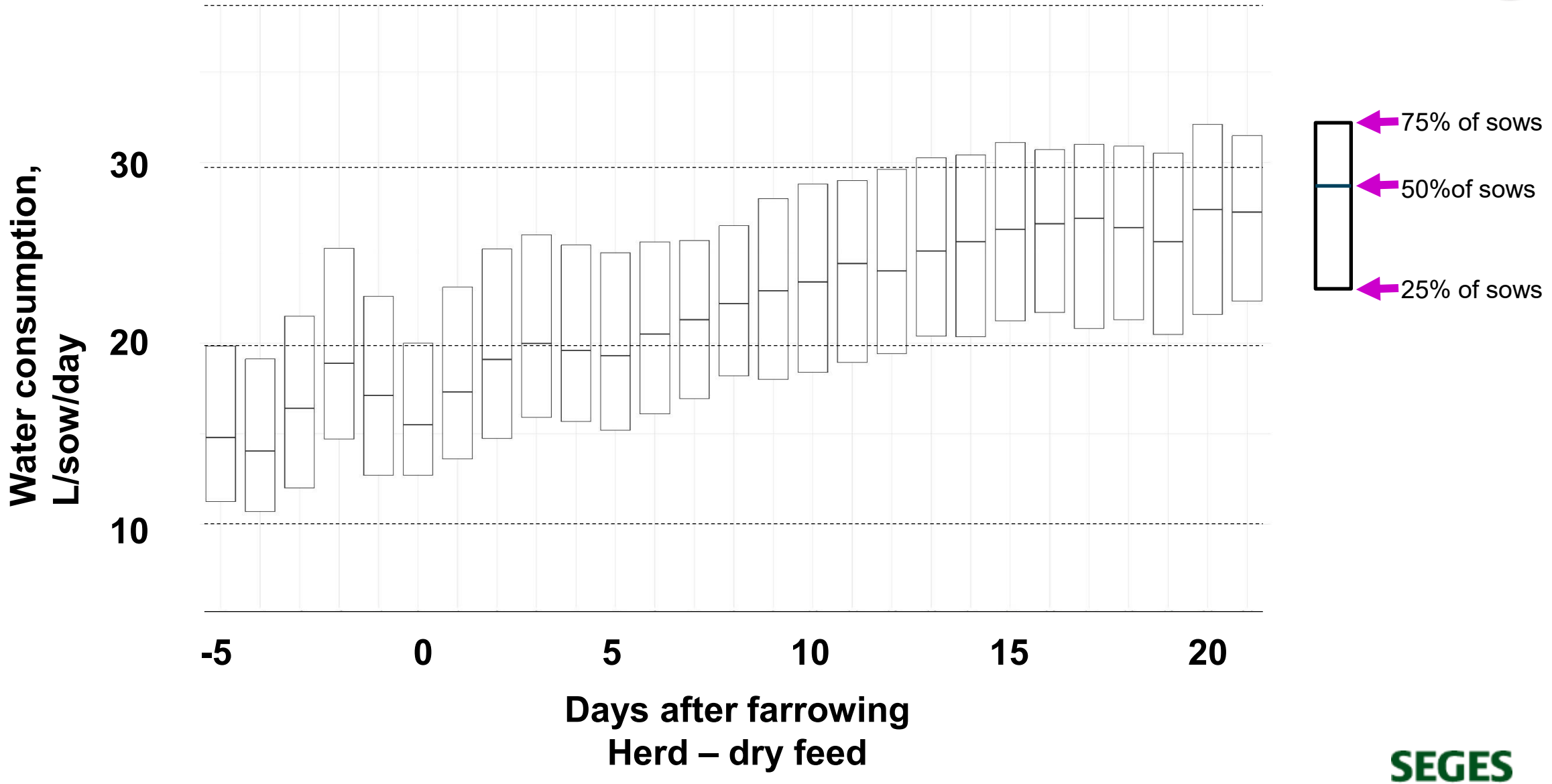
How much water did the sows drink in a herd with dry feed?



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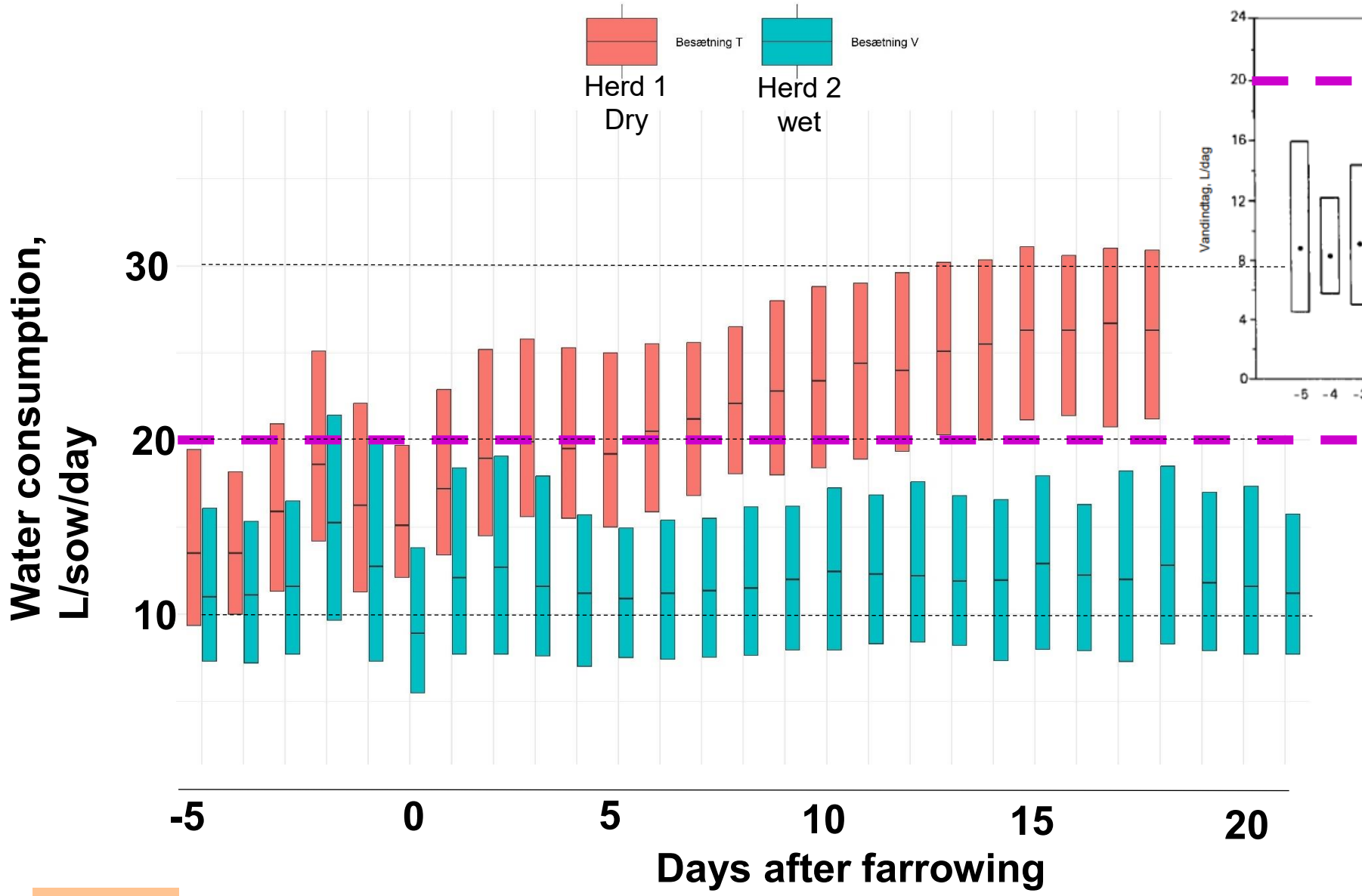
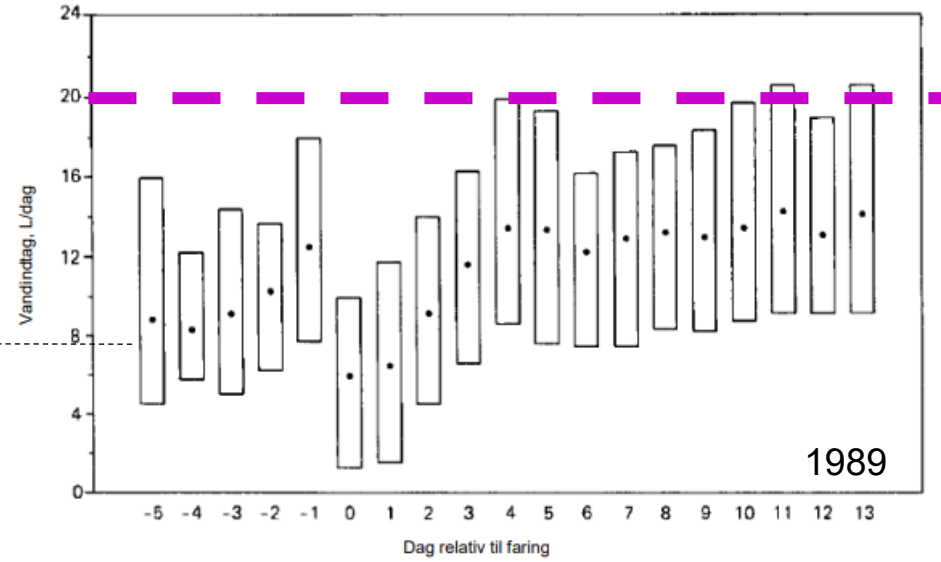
Erfaring 2303

Water consumption day -5 till day 21 (dry and wet feed)



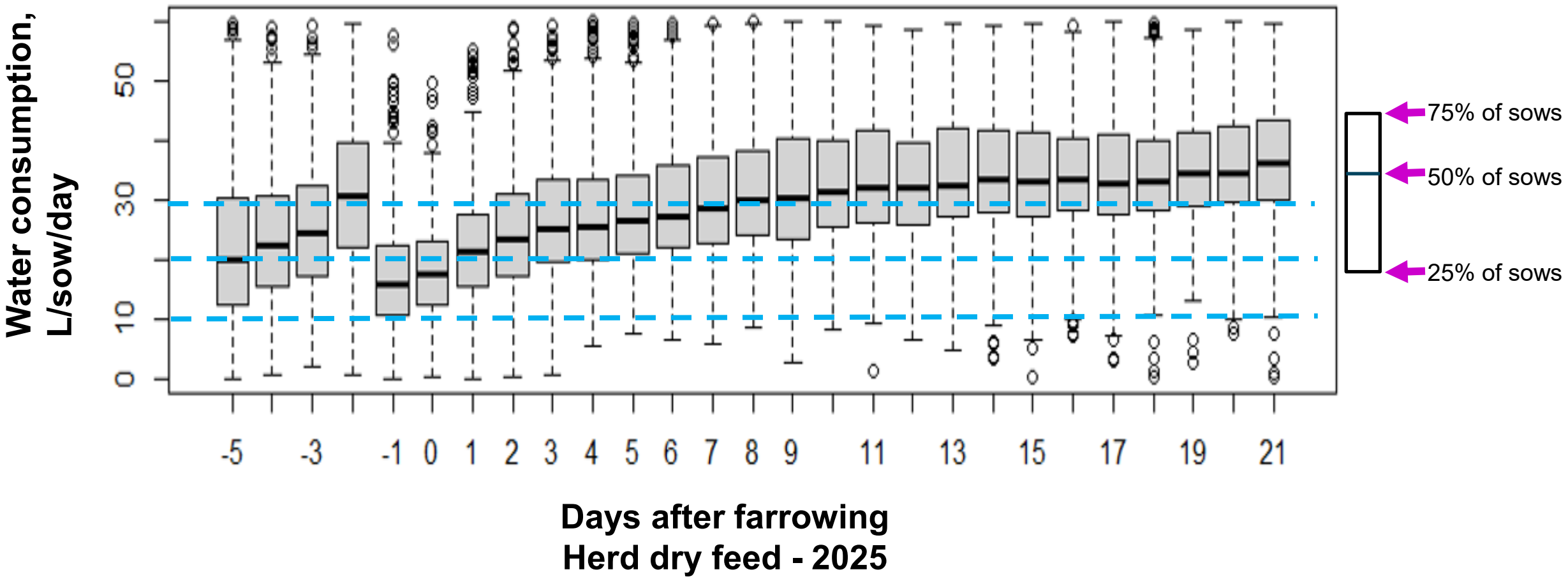


- Same curve
- Higher level

→ is the capacity OK?

Erfaring 2303

How much water did the sows drink in the herd with dry feed?



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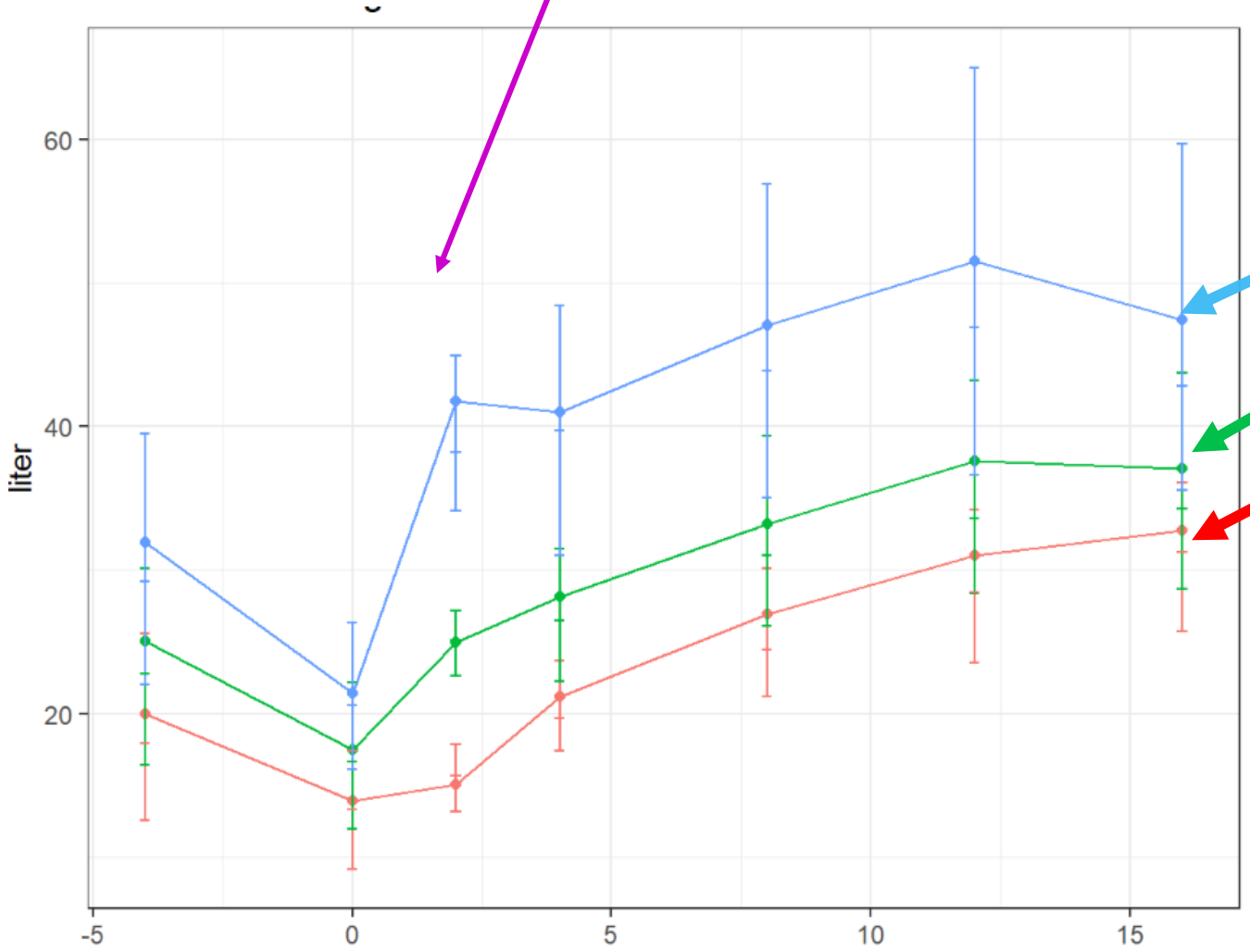
Water consumption *day 2* after farrow. – and the rest of the lactation



Water consumption L/sow/day

Day after farrowing
Herd 3

30- L - highest

20-30L - middle

0-20L - lowest

High milk production?

Low milk production

OR low water flow??

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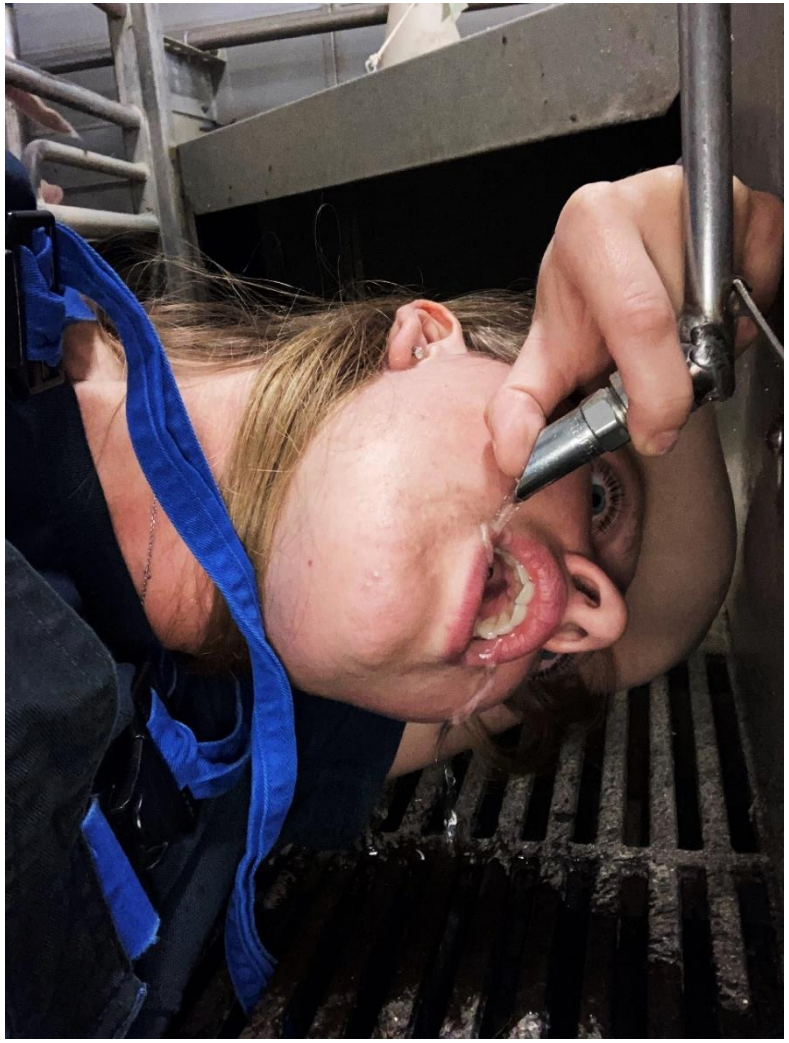
Production efficiency – sows - housing

- Access to water
  - Quality
  - Timing
    - Drinking,

      mixing, washing



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Is the water supply OK? And for all pigs

- The lactating sow
- The section with lactating sows
- All farrowing sections
- Gestating sows
- Weaners
- For wet feed
- Soaking the stables
- The seasonal variation

Is the capacity for water good enough for all pigs?
– turn some handles?
– change routines?

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Productivity – also includes…..

- Feed – sows eat at floor level

- Supporting the sow

- Piglets access to the udder

- Temporary Confinement

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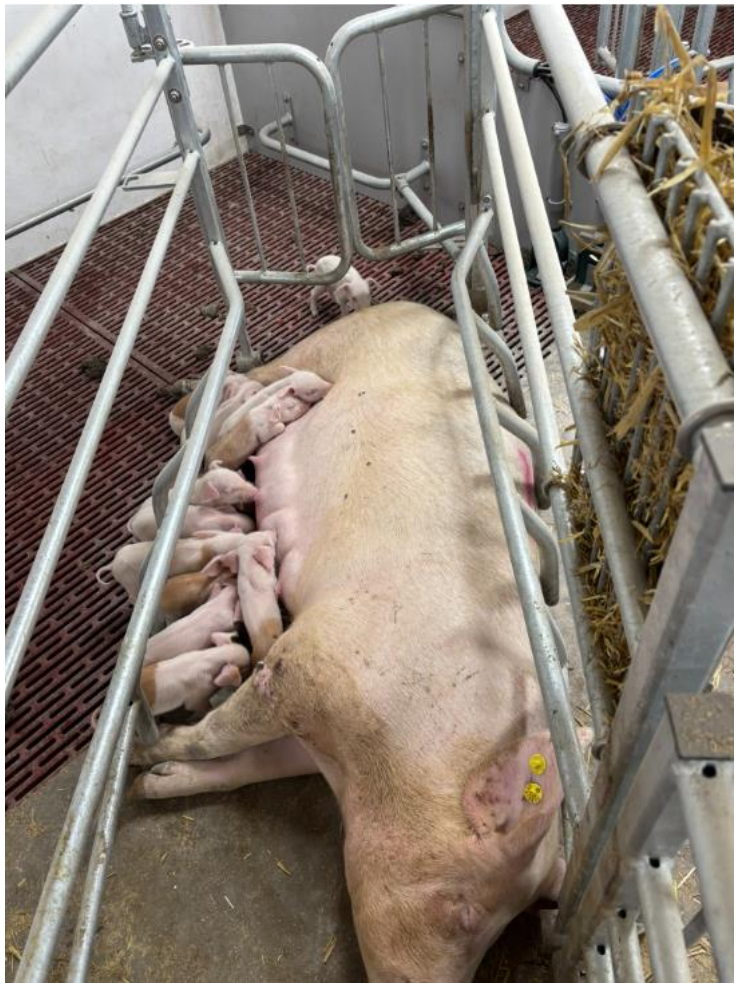
Design – Space need and freedom to move

Recommendations

- At least 6.5 m2
- At least a distance of 160 cm to turn around
- Confined up to 1+4 days
- Space allowance when confined
- Solid floor for all piglets to rest
- Additional solid floor depends on choice of nesting and enrichment material



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Production efficiency - piglets

- Piglet survivability
- Genetic improvements of piglet survivability and litter gain
- Ensuring colostrum and milk for the piglets and supporting the sows nursing capability (Theatre session #55)
- Understanding of innate piglet behaviours and preferences
- Meeting the piglets' need especially in the first days of life
- Water – quality and quantity – and timing

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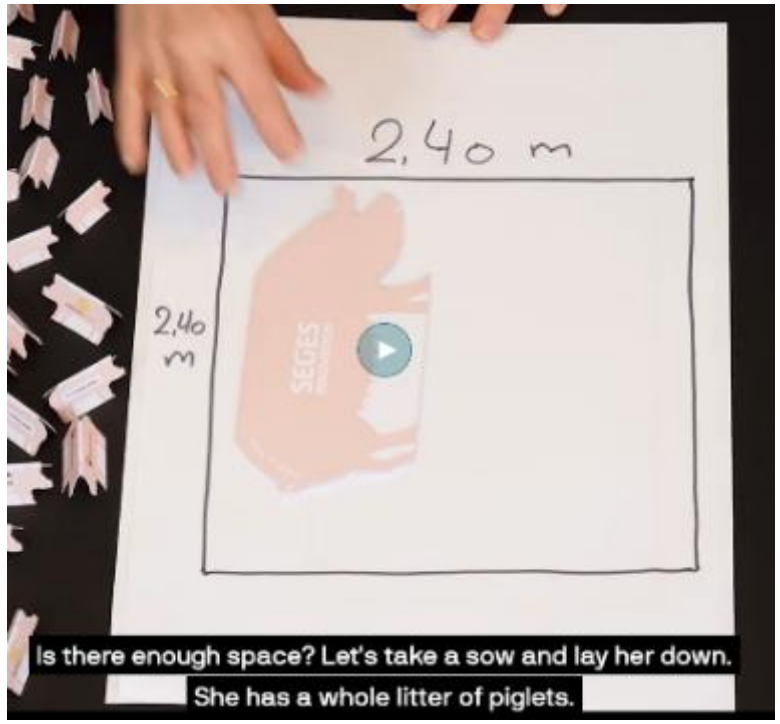
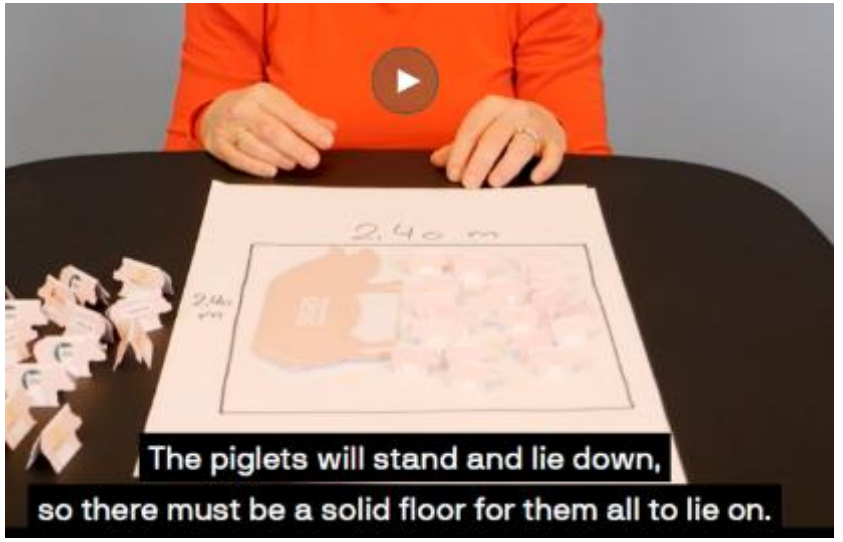
Decision support tool

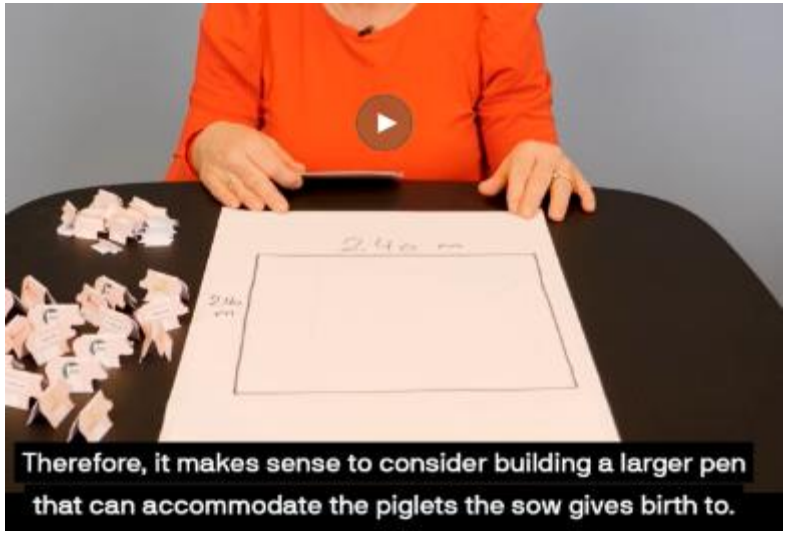
- Is the design criteria meeting the needs of the sow, piglets and caretakers?



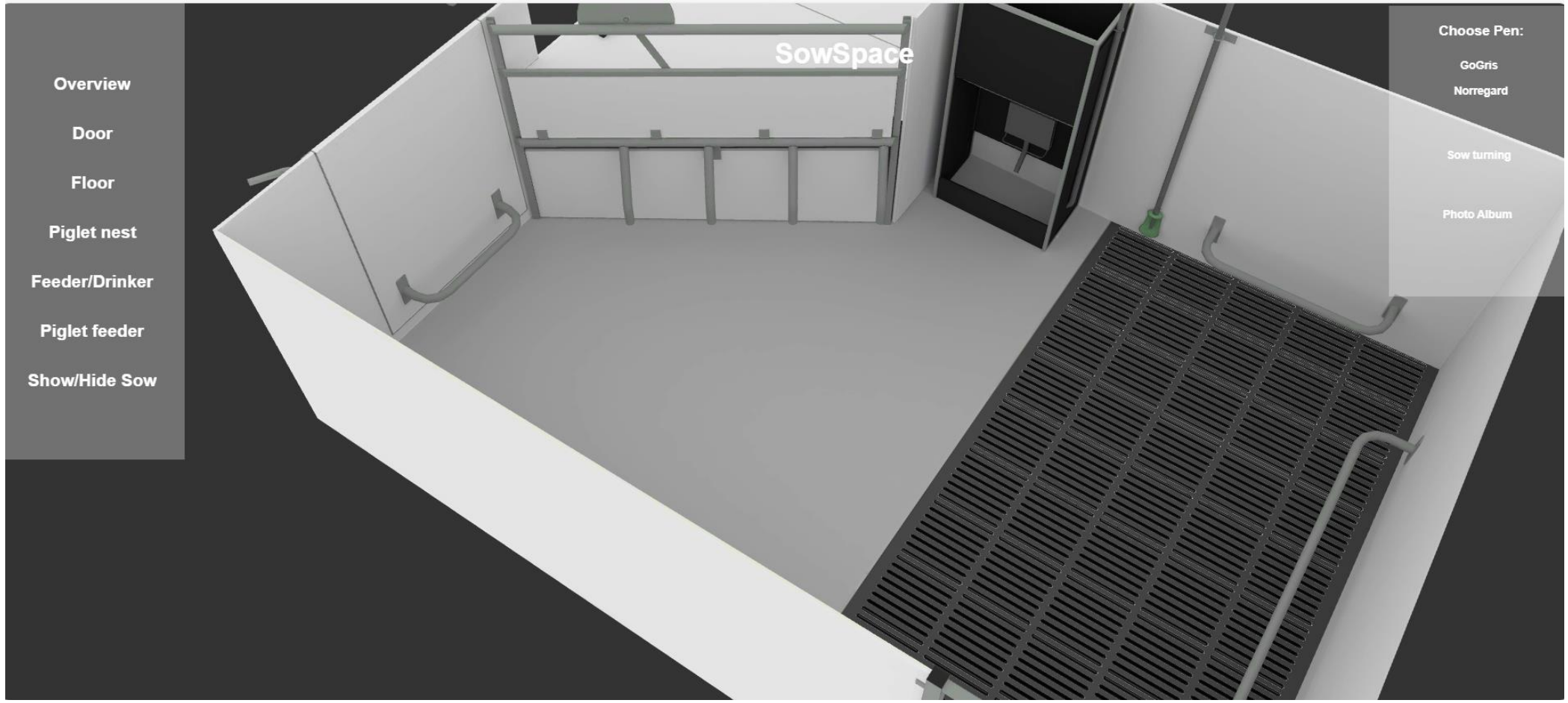


- Papgrise og checkliste hjælper dig til bedre staldindretning - SEGES TV

Video – with English subtitles



SowSpace



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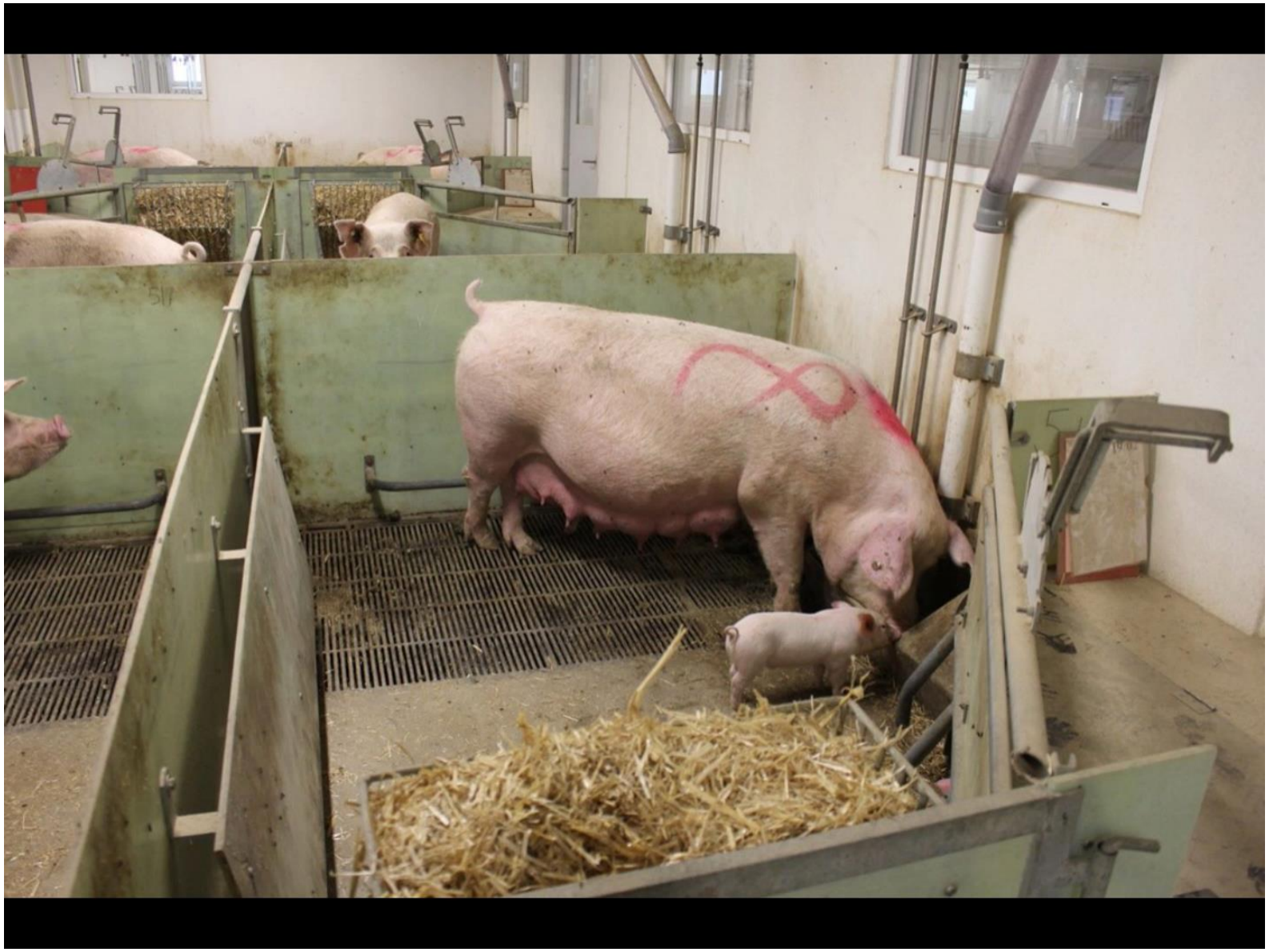
SowSpace



SEGES INNOVATION

More information can be found in eg:

Baxter et al (2025)
End the Cage Age…

Moustsen et al (2025)
Sows turn unhindered…

Jensen et al (2025)
Simulated udder….

frontiers in Veterinary Science

REVIEW
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Review of Temporary Crating of Farrowing and Lactating Sows

Sébastien Goumon[1*], Gudrun Illmann[2,3], Vivi A. Moustsen[4], Emma M. Baxter[5] and Sandra A. Edwards[6]

[1] Animal Physiology, Institute of Agricultural Sciences, ETH Zürich, Zürich, Switzerland, [2] Department of Ethology, Institute of ces, Czech Univer ark, [3] Animal Beh Kingdom, [6] Schoo m

frontiers | Frontiers in Veterinary Science

TYPE Review
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Transitioning from crates to free farrowing: A roadmap to navigate key decisions

Emma M. Baxter[1]*, Vivi A. Moustsen[2], Sébastien Goumon[3], Gudrun Illmann[4,5] and Sandra A. Edwards[6]

[1]Animal Behaviour and Welfare, Animal and Veterinary Sciences Group, Scotland's Rural College, Edinburgh, United Kingdom, [2]SEGES Innovation, Aarhus, Denmark, [3]ETH Zurich, Animal Physiology, Institute of Agricultural Sciences, Zurich, Switzerland, [4]Department of Ethology, Institute of Animal Science, Prague, Czechia, [5]Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Prague, Czechia, [6]School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, United Kingdom

Journal Pre-proofs

Animal board invited review: The need to consider emissions, economics and pig welfare in the transition from farrowing crates to pens with loose lactating sows

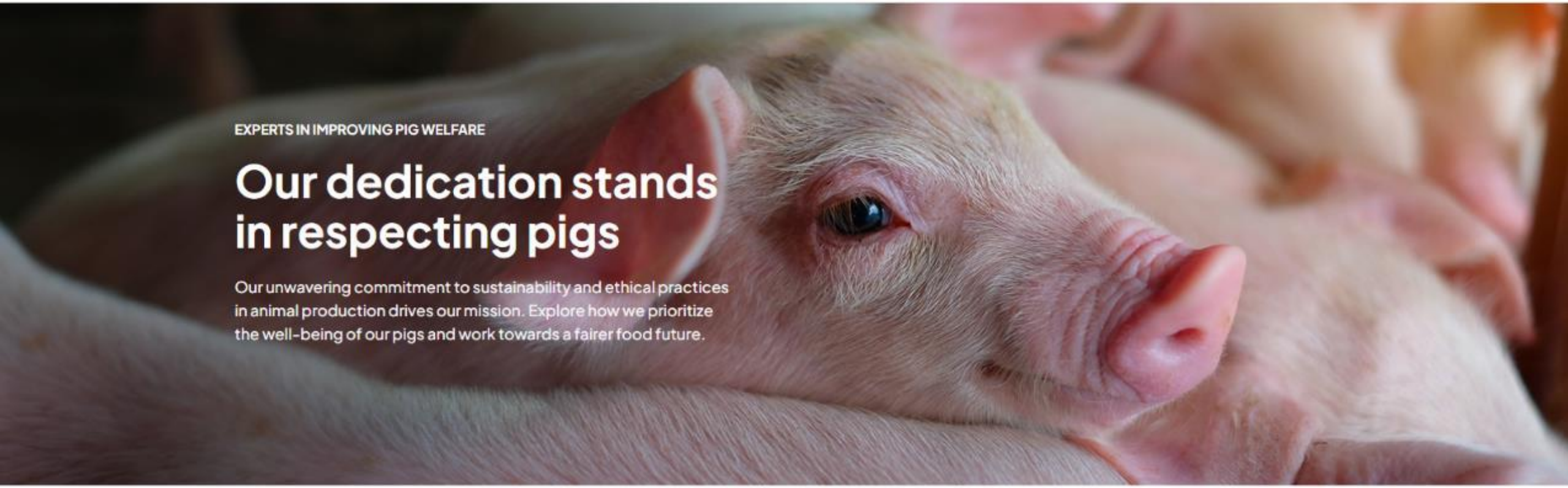
V. A. Moustsen[a], Y. M. Seddon[b], M. J. Hansen[c]

[a]*SEGES Innovation P/S, Agro Food Park 15, 8200 Aarhus N, Denmark*

[b] *Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, 52 Campus Drive, Saskatoon, S7N 5B4, Saskatchewan, Canada*

[c] *Department of Biological and Chemical Engineering, Aarhus University, Gustav Wieds Vej 10, 8000 Aarhus, Denmark*

SEGES INNOVATION



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What is WelFarmers Project?

The WelFarmers Project is a collaborative initiative aimed at improving the welfare of pigs within the European Union. Funded by the Horizon Europe Program, WelFarmers will set up eight national innovation networks from eight different countries and will put together pig farmers, advisors, veterinarians, and researchers to address the challenges of the upcoming change in the European pig welfare legislation.

Future proof housing of hyper-prolific lactating sows

- Loose sow
- 20+ piglets
- High welfare
- Low emissions
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- *Societal acceptance and acknowledgement of pig production*

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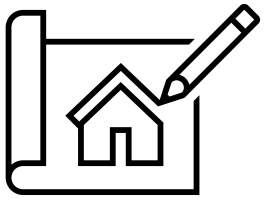
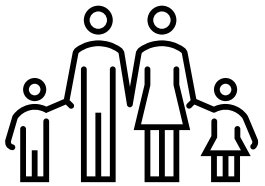
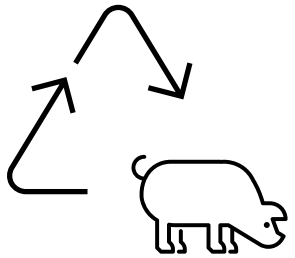
Future proof-housing







- There is an increasing global population and demand for food
  - → There is a need and future for pig production
- Animal sourced food should be produced in a sustainable way
  - → Focus on environment, welfare and economics
    - → We need to understand interactions, connections, dependence, influence…, compromises
    - → Europe can do this

SEGES INNOVATION

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