Future housing options for lactating sows

- How to ensure the best conditions?

Chief Scientist

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

7th+8th October 2025

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

FACULTY OF HEALTH AND MEDICAL SCIENCES
UNIVERSITY OF COPENHAGEN

Svineafgiftsfonden

SEGES INNOVATION

The future is not 'only' welfare
- it's a more *sustainable* pork production

And the global demand for protein is increasing

- Pork is and continues to be important

Environment / climate impact

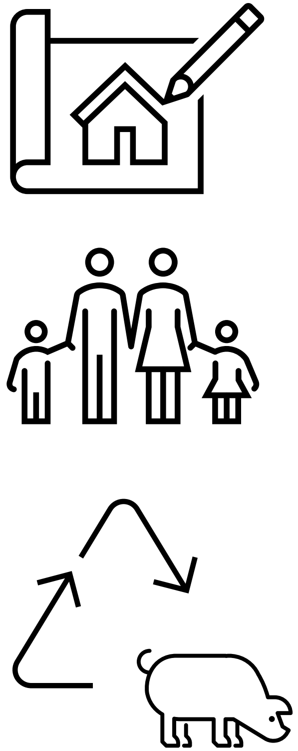
Social responsib

- Incl. animal welfare

Business earnings

SEGES INNOVATION

Future proof-housing



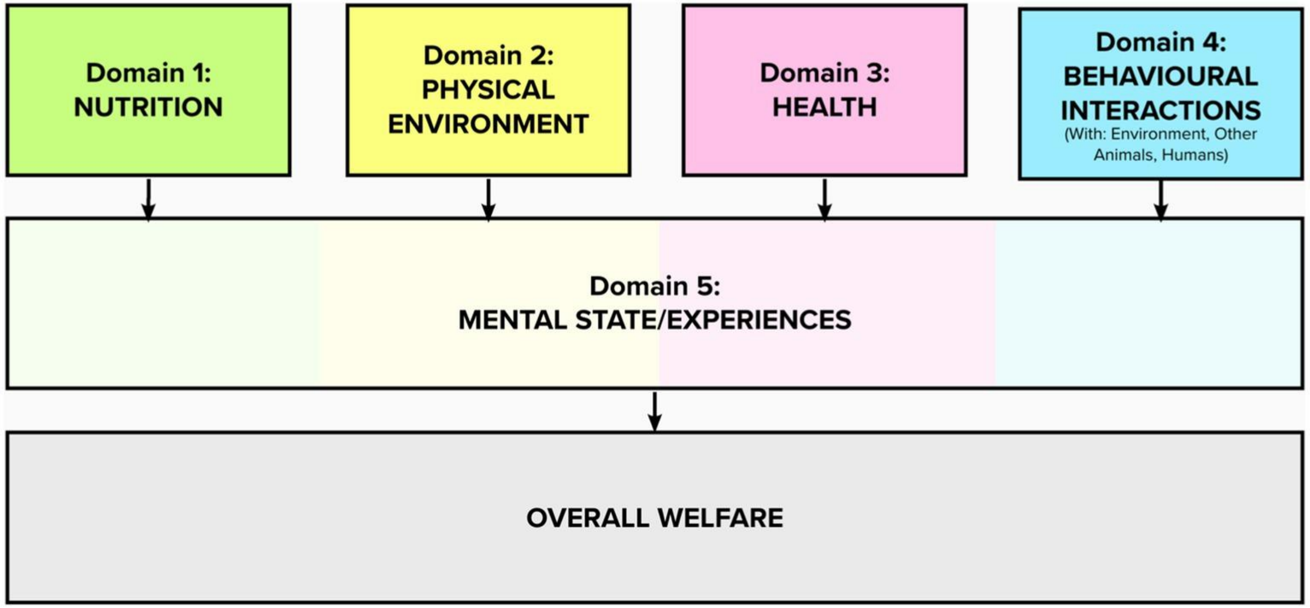
- There is an increasing global population and demand for food
  - → There is a need and future for pig production
- Animal sourced food should be produced in a sustainable way
  - → Focus on environment, welfare and economics
    - → We need to understand interactions, connections, dependence, influence…,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

WelFarmers

SEGES INNOVATION

Why loose lactating sows?

- Animal welfare
  - Loose during lactation – because we have an ethical responsibility
  - Five Freedoms – 1964
  - Five domains



Littlewood et al., 2023

SEGES INNOVATION

Why loose lactating sows?

- Animal welfare
  - Five domains
  - Pigs will never dung, rest, eat in the same spot – but in the crate….
    - In average – a sow spends 78 days in the farrowing crate every year
    - For every 10 sows in a herd there is each year ‘two years., where the sows cannot turn around;
    - For every 1.200 sows …that adds up to 250 years every year….

SEGES INNOVATION

Why loose lactating sows?

- Danish legislation
  - Was expected 1st Jan. 2025 – most likely 1st November 2025
    - Proposal: 6.5m^2, optional to use confinement 1+4 days; solid floor 3m^2, turn around unobstructed nesting matieral in the week before farrowing, transition period 15 years
- EU-legislation
  - EFSA's recommendations: 7.8m^2, 'end the cage age' -> free farrower

End the cage age

The ‘End the Cage Age’ initiative was submitted to the Commission on 2 October 2020, having gathered 1,397,113 statements of support. See press release.

In its response to the ECI, the Commission commits to table, **by the end of 2023, a legislative proposal to phase out, and finally prohibit, the use of cage systems for all animals mentioned in the Initiative**.

In particular, the Commission’s proposal will concern:

- Animals already covered by legislation: laying hens, sows and
- Other animals mentioned in the ECI:rabbits, pullets, layer bree ducks and geese. For these animals, the Commission has alre Food Safety Authority) to complement the existing scientific ev conditions needed for the prohibition of cages.


1 / 319

SCIENTIFIC OPINION

EFSA Journal

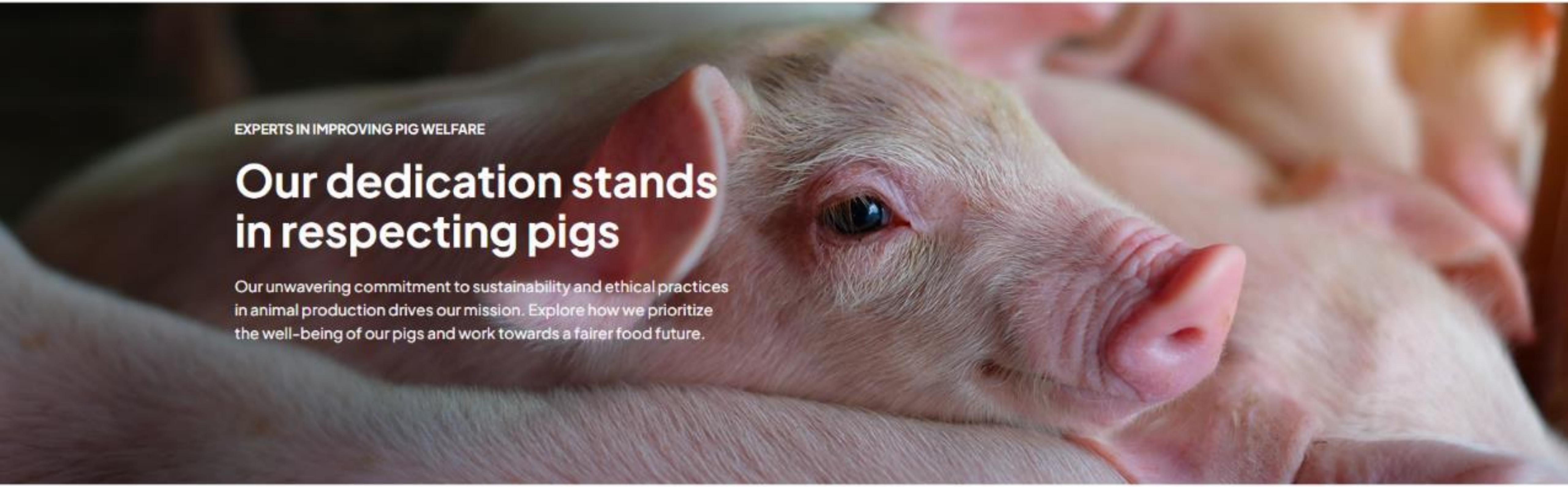
ADOPTED: 30 June 2022

doi: 10.2903/j.efsa.2022.7421

Welfare of pigs on farm

EFSA Panel on Animal Health and Welfare (AHAW),
Søren Saxmose Nielsen, Julio Alvarez, Dominique Joseph Bicout, Paolo Calistri,
Elisabetta Canali, Julian Ashley Drewe, Bruno Garin-Bastuji, Jose Luis Gonzales Rojas,
Gortázar Schmidt, Mette Herskin, Virginie Michel, Miguel Ángel Miranda Chueca,

WelFarmers



EXPERTS IN IMPROVING PIG WELFARE

Our dedication stands in respecting pigs

Our unwavering commitment to sustainability and ethical practices in animal production drives our mission. Explore how we prioritize the well-being of our pigs and work towards a fairer food future.

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.

A unique collaboration

- 8 countries
- 56 % of EU pig production
- Different realities
- Each country represented by pig producers and university/R&D-organisation

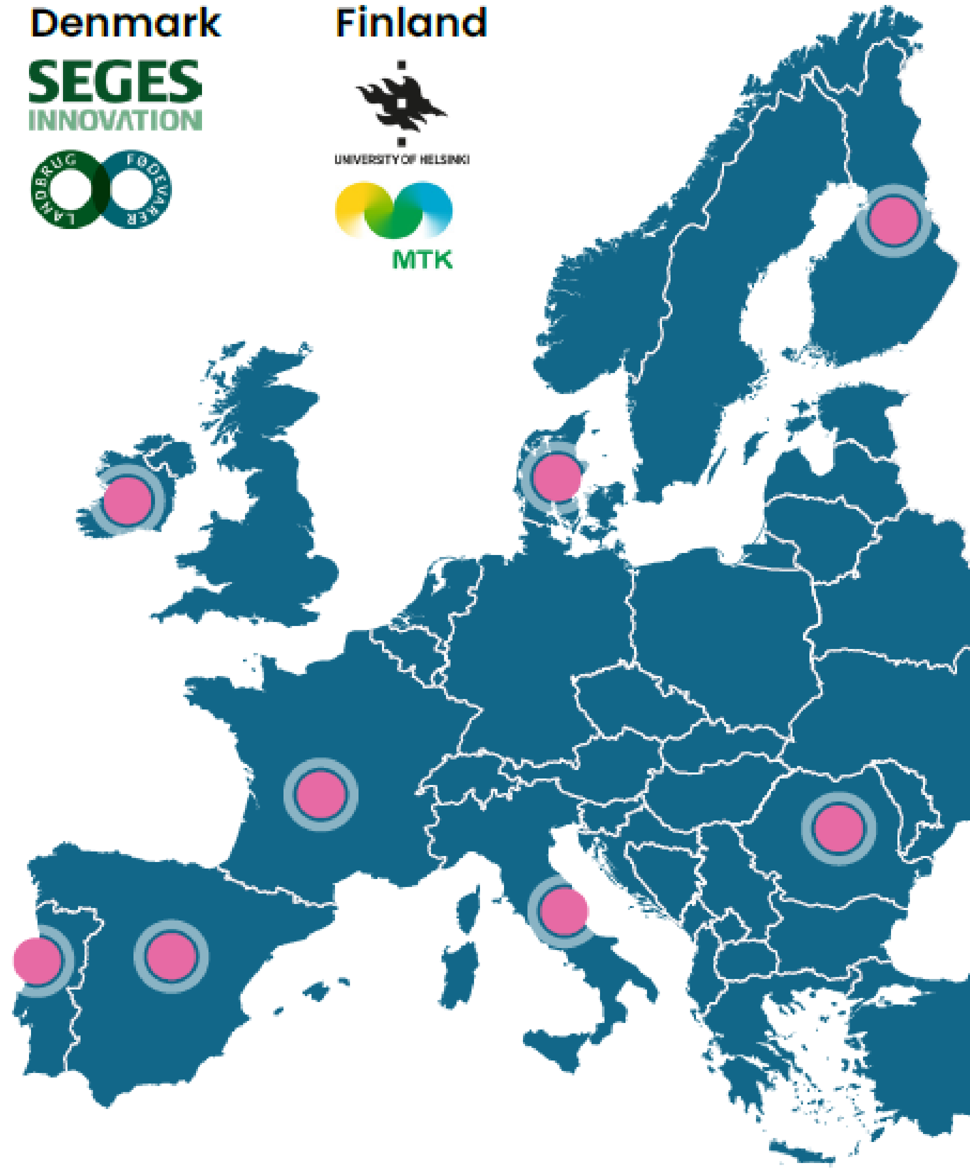
Ireland

Denmark

Finland

France

Spain



Portugal

Italy

Romania

Space allowance – traditional farrowing crate

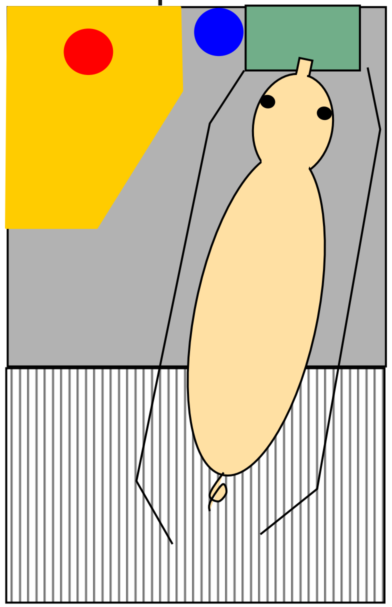
- 1,6 x 2.6 m ≈ 4.2 m^2
- As the sow is restricted from turning – a high hygiene is obtained even if limited sltted area

SEGES INNOVATION

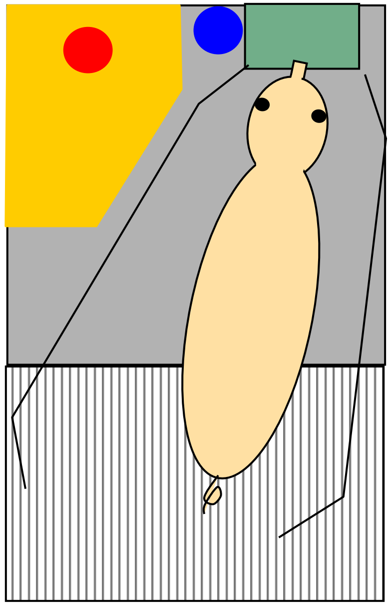
Development

- Opening farrowing crates
  - They will not be opened – because of bad hygiene
    - Sows eat, drink, dung + uniate
      - But **NOT** in the same position
  - Sows need more space
  - Caretakers access to creep area

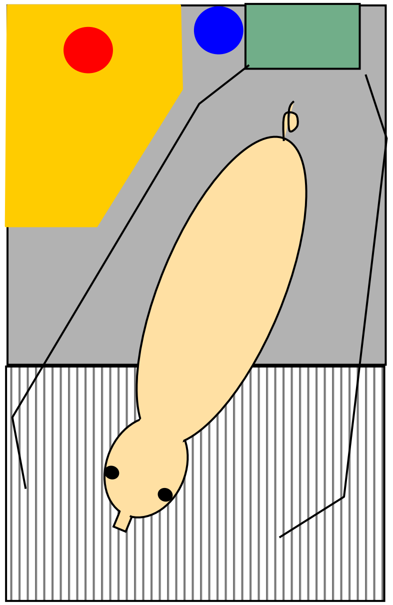
While the sow is **confined**, it eats and drink in the same position.



When crate is **opened**, sow eats in the same position



But turns away from feeder, when dunging



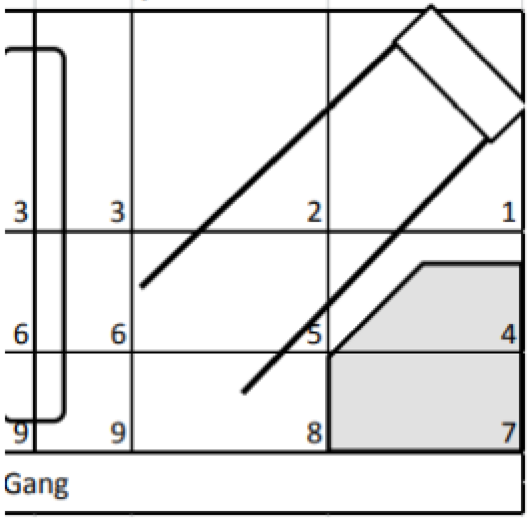
Very difficult ('impossible') to use same footprint and flooring for permant crate and for loose

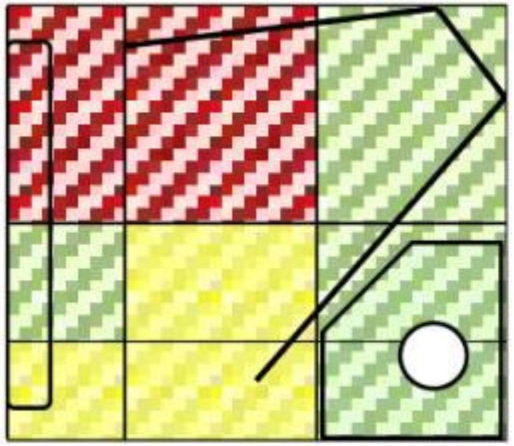
Development

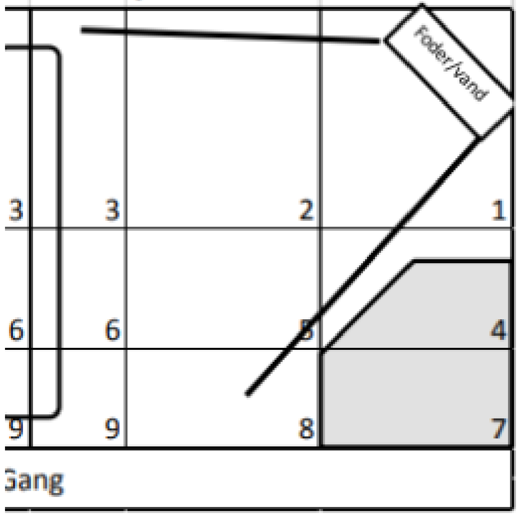
- Equalsided pens
  - 240*240
    - 2009-littersize
  - Sows dunging behaviour – fully slatted

Figur 6. So opbokset kortvarigt omkring faring.

Figur 7. Løsgående so.







Erfaring 1721

SEGES INNOVATION

Space allowance

- Pen - size
  - Recommendations from EFSA
    - 7.8 m^2 ≈ piglet survivability loose farrowing at same level as permanent crating
    - 4.5-9.8 m^2 (+1.2 m^2 for piglets)
  - German requirement
    - 6.5 m^2
  - Austrian
    - 5.5 m^2

- Since the 2021 EC response to End the Cage Age **momentum has stalled**
- Many want to progress – need clear guidance on ‘**sticking points’**
- **Risk of fragmented legislation** – already evident
- **Threat to animal welfare**
  - Perpetuating crates
  - Building sub-optimal alternatives

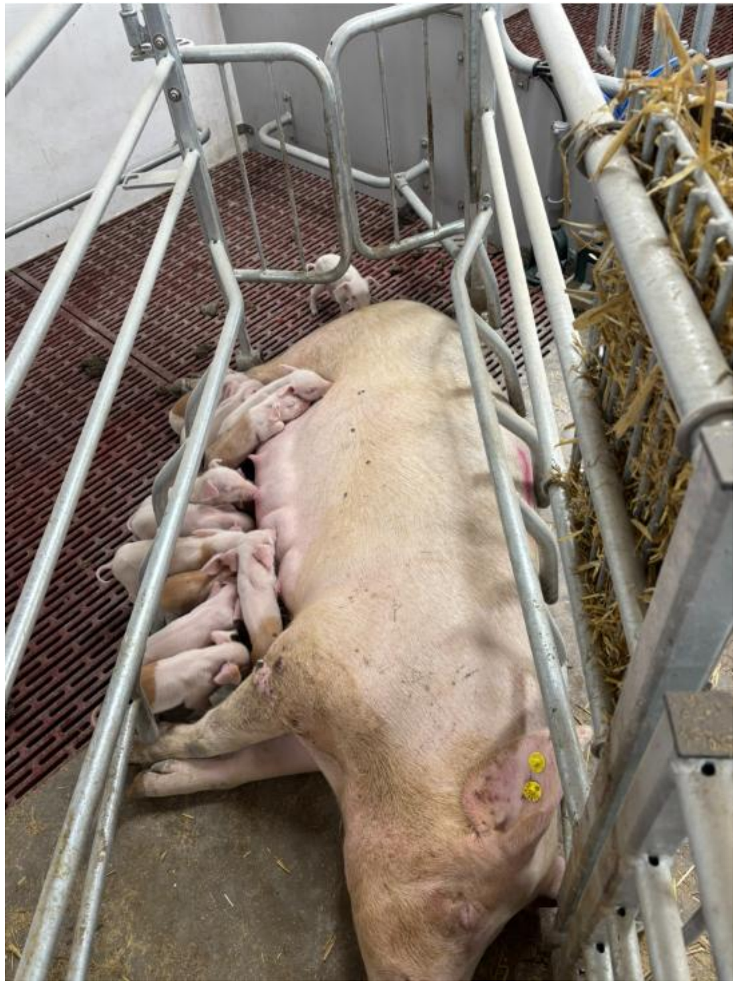
Design 1 – Space need and freedom to move

Sow

- Confined
  - Stand up and lie down
    - Minimum length of sow + 50 cm
    - Unobstructed – so not hindered by the crate
  - Stretch legs – regardless of side
- Loose
  - Turn around unhindered – at least 160 cm (half ellipsoid)
  - Stand up and lie down – at least lenght of sow + 50 cm

Piglets

- Littersize
- Access to udder – also when sow is confined and no matter is sow lies on one or the other side



SPACE?

Pen footprint (m^2)

- The **minimum** pen size should be **6.5m^2**
- A **minimum length of 250cm in at least one dimension**
- **An unobstructed turning width of at least 160 cm**

Piglet area?

- Within the 6.5m^2 pen, there is a **1.2m^2 minimum lying area** for the piglets which is inaccessible to the sow.

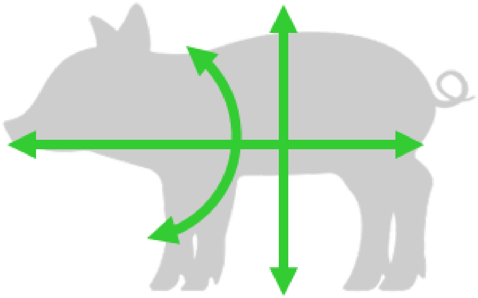
- Evidence?

SEGES INNOVATION

Quantity of space – Static

Basics are well known on static space

Design for your biggest sows



Design for your oldest piglets and largest litter

Latest Scientific Evidence

Year	2017	
Sows:	N = 103, ≥ parity 5	
Dimension	Ave. ± s.e.	95% percentile
Length, cm	192 (±0.6)	203
Height, cm	90 (±0.4)	96
Width, cm	43 (±0.5)	48
Depth, cm	65 (±0.6)	72

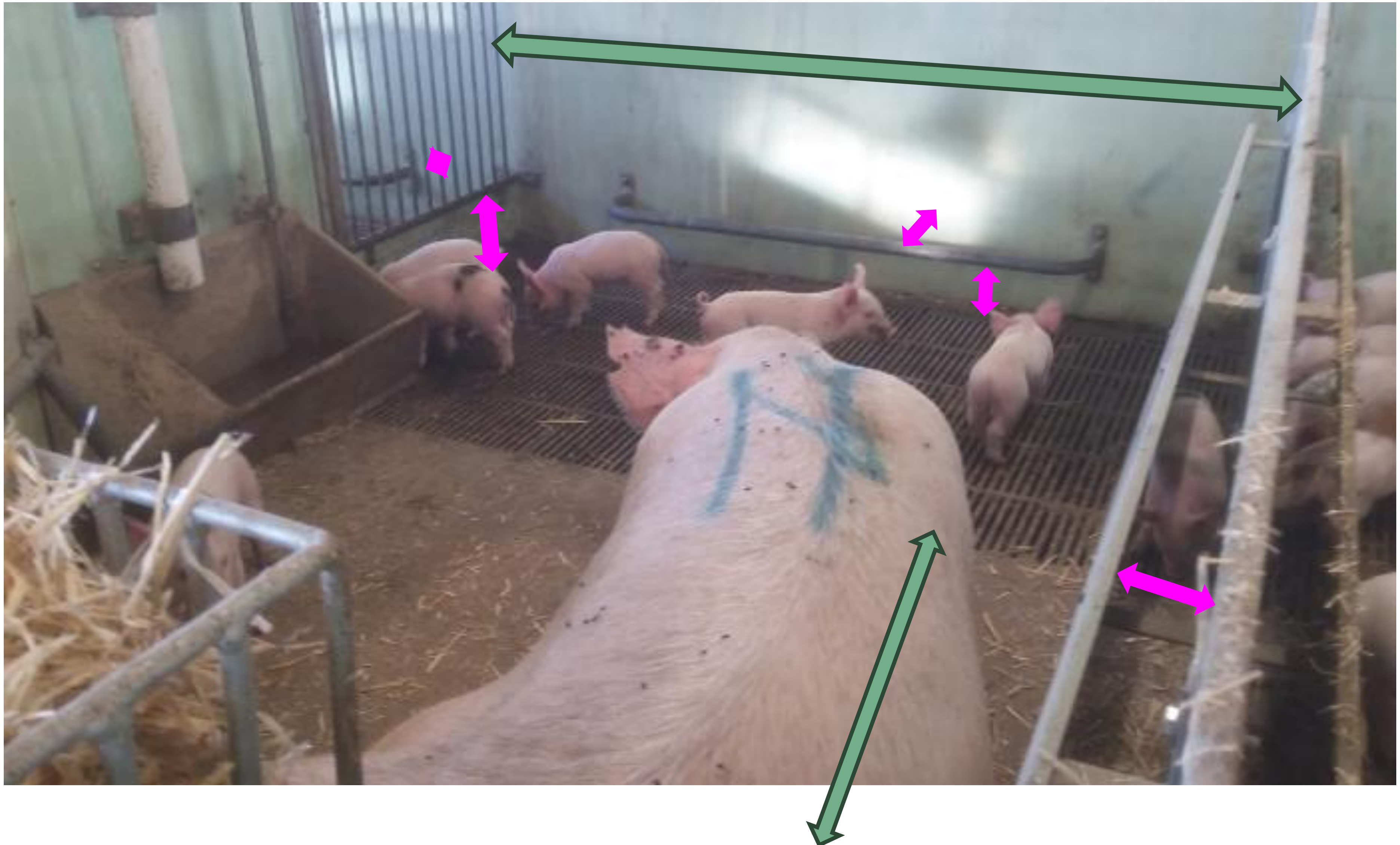
Moustsen & Nielsen, Meddelelse 1113, www.svineproduktion.dk
Nielsen et al. (2018), Livestock Science 209, 73–76.

	Age	
Dimensions (cm)	< 1 week (n = 42)	3 weeks (n = 65)
Length	31.3	44
Height	17.8	24.5
Width	7.3	11.5
Depth	8	12.5
Piglet weight (kg)	1.4	5
Space/piglet (m^2)	0.02	0.06

Total area (m^2) required: space at maximum piglet age & number housed within the pen

+ new data from Smith and Ramirez 2021

Dimensions – pen equipment



Sows:
Dunging
Lying
Thermoregulate
…

Piglets:
Shoulder width
Safety zones
…..

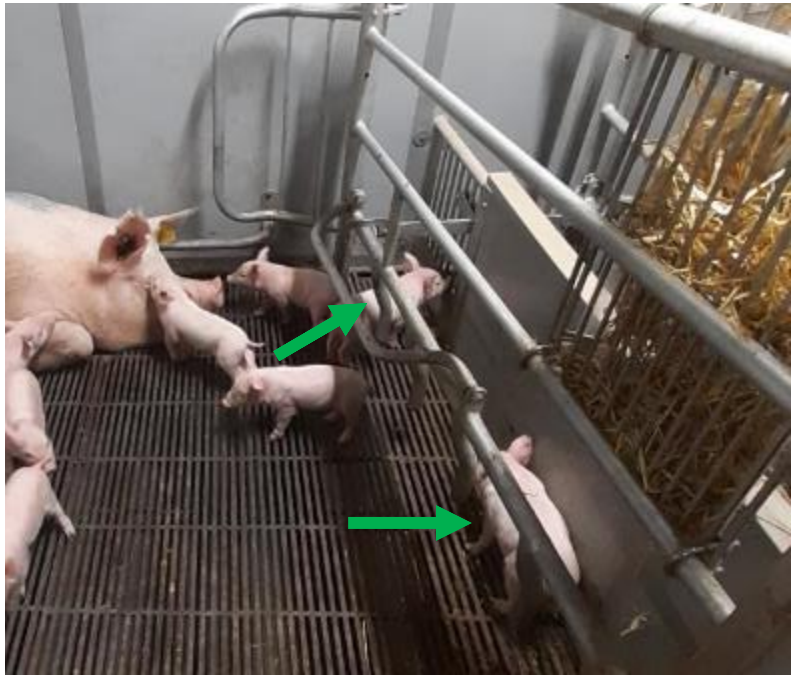
SEGES INNOVATION

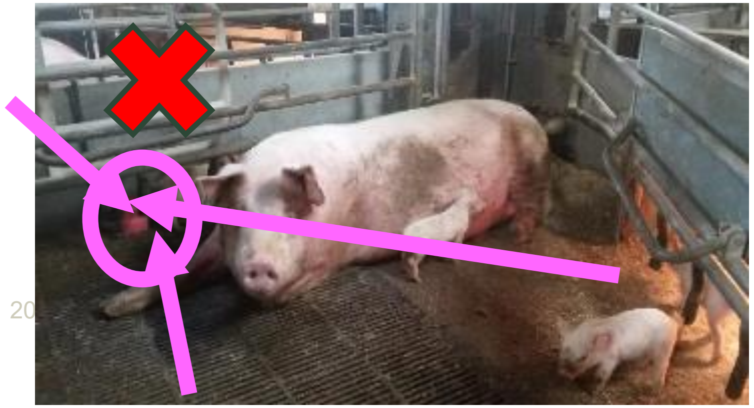
Space – temporary confinement and loose

SEGES INNOVATION

‘Ideal’ pen size - space for piglets

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





‘Ideal’ pen size – space for the sow

- Sows’ dimensions
  - Minimum

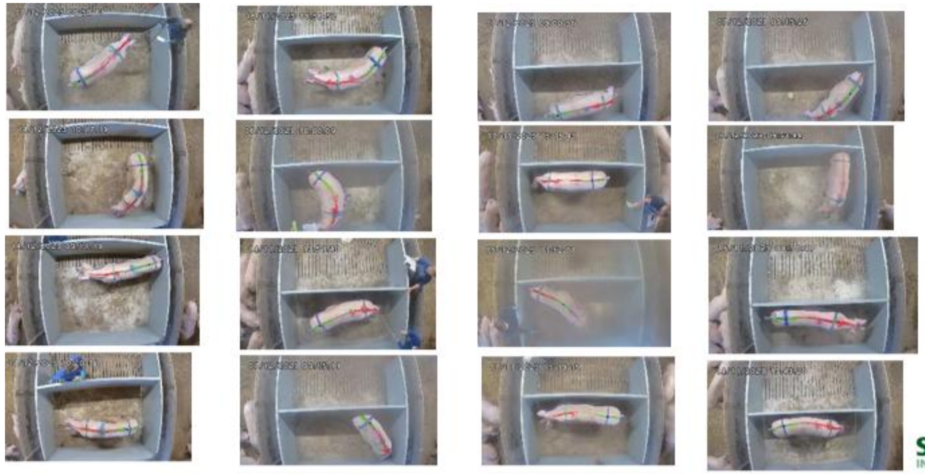
- Planar width – turning space
  - Minimum
  - Ease of movement

Planar width of 153 cm
Planar area of 3.17 m²

considered necessary to allow unobstructed turning for sows with the 95-percentile weight.

Needs further research

Quantity of space – Dynamic



Latest Scientific Evidence

- Lying, thermoregulating, suckling (*Nielsen et al. 2018*)
- Getting up and lying down, movement (sow length + 0.50m – *Moustsen & Duus, 2006*)
- TURNING?
  - **Do sows need their body length to turn unhindered?** (2m?)

- Latest evidence (Moustsen et al. 2025 under review)
  - Late pregnant sows (2-5+ parity) recorded turning in a pen 2.60m x (1.2-2.2m)
  - Automated analysis
    - Complete/incomplete turns, time
  - Hinderance?

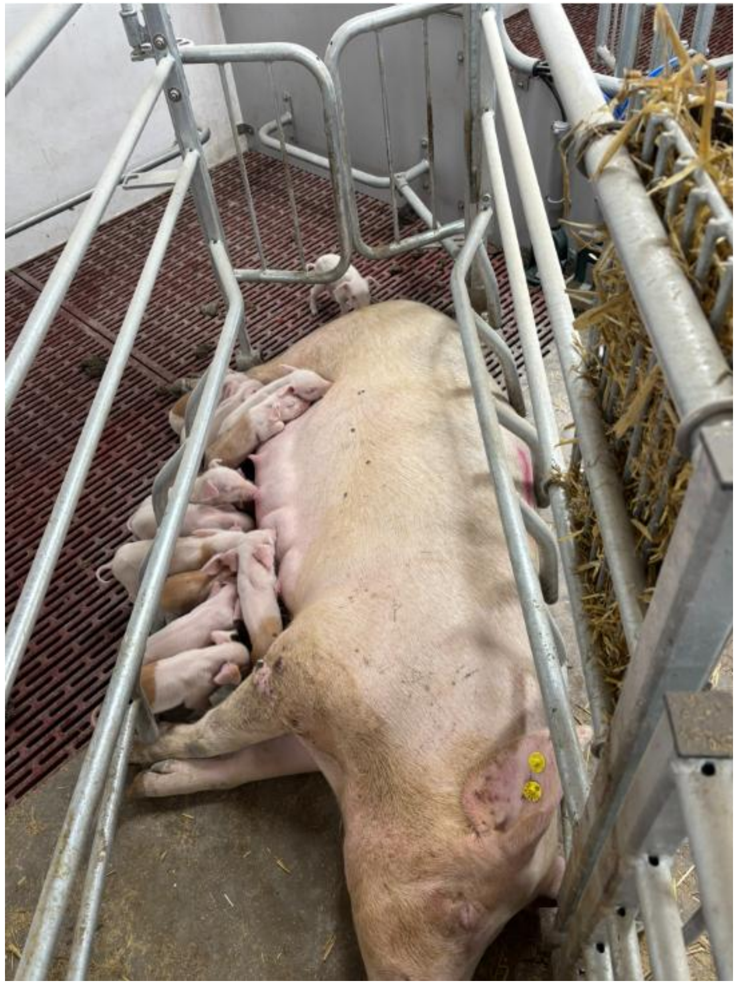
- **Conclusions and recommendations?**
  - Sows can turn unhindered at less than their own body length
  - 1.2m too tight, **1.6m better, 1.8+m best**

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

- *Common EU minimum standards*
- *First movers not to be burdened if keeping sows loose during lactation – eg regarding m^2-min.*



SEGES INNOVATION

Design 2 – Choice of material and equipment - nestbuilding, flooring, heatsource

- 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 floot
- Slurrysystem and –pit – depends on pen layout

WelFarmers

SEGES INNOVATION

Design 3 – Access to feed and water

- 80% of sowmilk is water…..abundant access to water
  - Also when other pigs drink – or washing or mixing or…

- Feeding at floorlevel
- Frequent feeding – experience from some trials and practice

Experiences and research 1 – 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 – take up more space

SEGES INNOVATION

Experience and research 2 – 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 hours*
- Equalsided
  - Fully drained /-slatted
- Rectangular
  - Possible to have partly solid floor (reducec pit and slurry surface)

SEGES INNOVATION

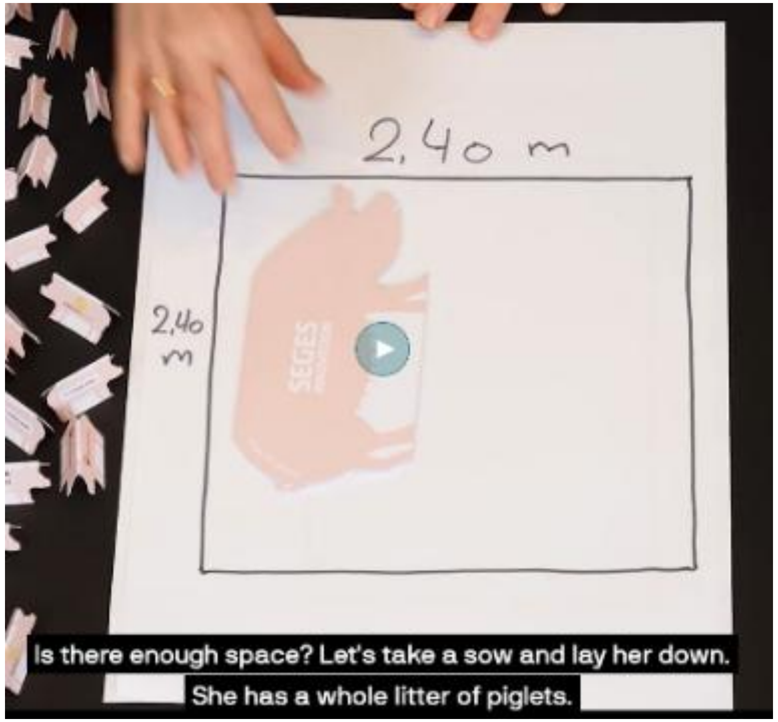
Experience and research 3 – What to expect regarding piglet mortality?

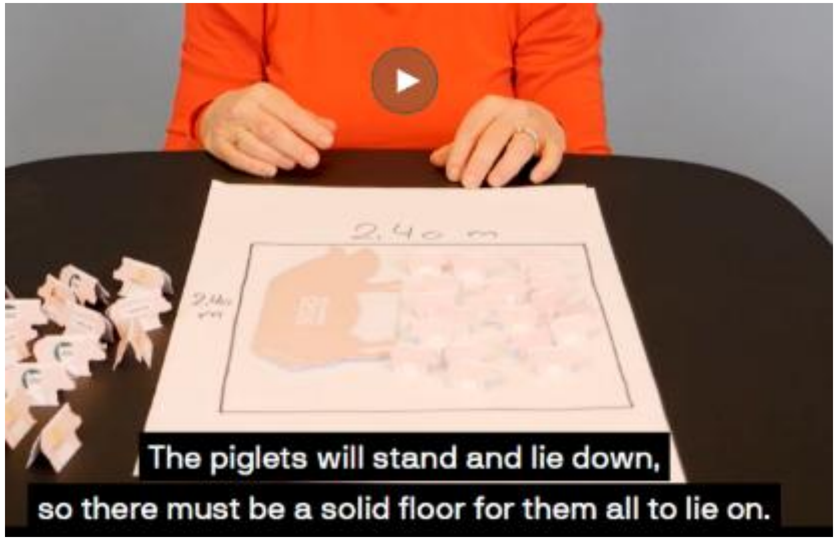
- Most herds – increase
  - Loose sow
    - Sow and piglet ‘share’ pen space – increased risk of crushing
  - More attendance towards
    - Healthy sows
    - Full (not hungry) piglets
    - Climate (creep and pen)
- Transition
- ERFA-group

SEGES INNOVATION

Decision support tool

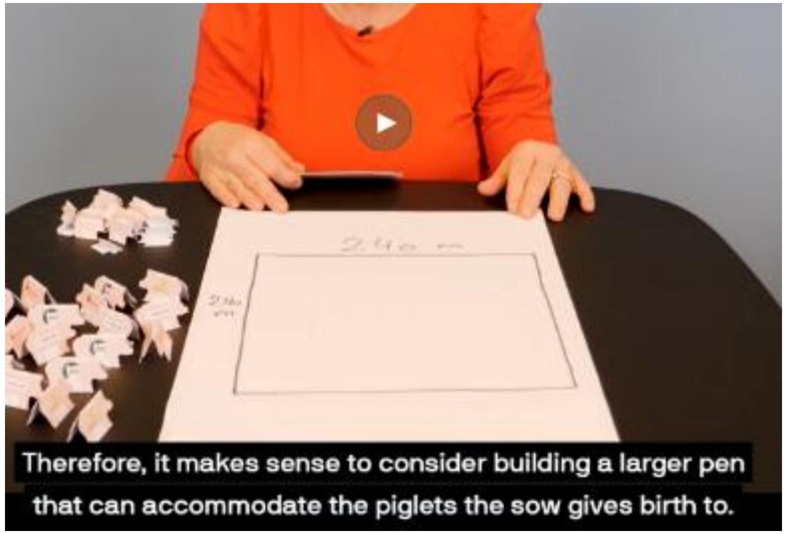
- Is the design criteria meeting the needs of the sow, piglets and caretakers?





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

Video – with English subtitles



WelFarmers

Area and pen dimensions – welfare and environment

Equalsided – fully slatted:

Solution **under** floor

Rectangular pen – option for partly solid floor:

Solution ***above*** floor

Critical points

- Investment
  - Design for a loose sow
    - Acknowledge key decisions and complexity
  - Ensure space for piglets
  - Include three pillars of sustainability
- Daily management
  - Calm handling
  - Optimize
    - Mindset

SEGES INNOVATION

Future

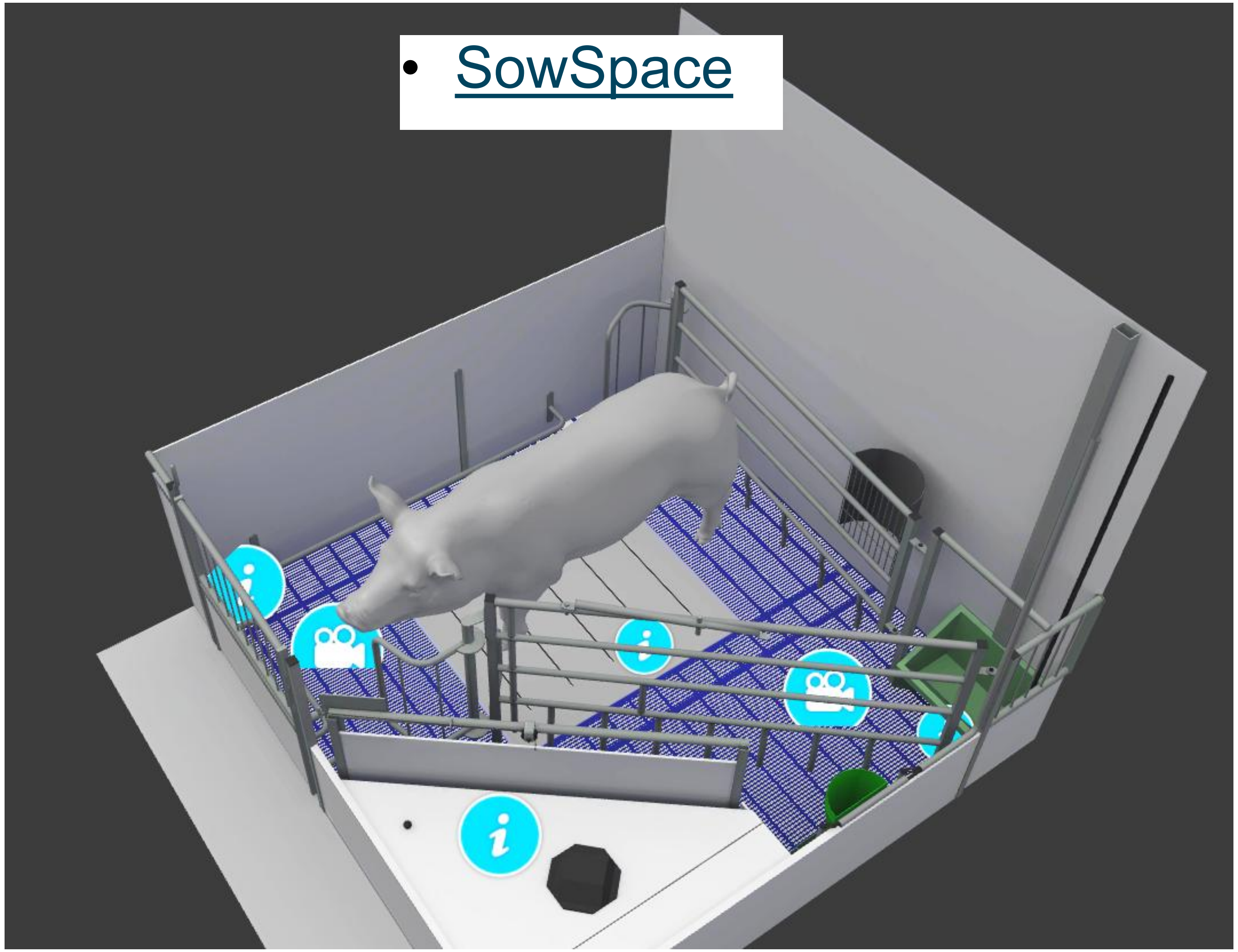
- Reflections
  - Danish legislation
  - German legislation
  - End the Cage Age Initiative
  - EU?

- Challenges
  - Sustainability
  - Competitiveness

- Opportunities
  - Increased milk production
  - Large litters
  - Licence to produce

SEGES
INNOVATION

Future housing of lactating sows



To improve sow welfare - sows are to be loose housed in all of Europe

- **Pens need to be significantly larger**
- **Slatted area need to be significant larger**
- **Emissions are higher**

SEGES INNOVATION

More information can be found in eg:

Baxter et al (2025)
End the Cage Age…

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*

frontiers in Veterinary Science

REVIEW
published: 17 March 2022
doi: 10.3389/fvets.2022.811810

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 Animal Science, Prague, Czechia, [3] Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Prague, Czechia, [4] SEGES Danish Pig Research Centre, Copenhagen, Denmark, [5] Animal Behaviour and Welfare, Animal and Veterinary Sciences Group, Scotland's Rural College, Edinburgh, United Kingdom, [6] School of Natural and

frontiers | Frontiers in Veterinary Science

TYPE Review
PUBLISHED 14 November 2022
DOI 10.3389/fvets.2022.998192

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

Moustsen et al (2025)
Sows turn unhindered…

SEGES
INNOVATION

Coming….

Loose lactating sows

How to ensure best conditions?

Loose lactating sows

Because we want to ensure best conditions for sows, piglets and pig caretakers

- ….

SEGES INNOVATION

Acknowledgments

- Dr. Emma Baxter, SRUC
- Emerita Professor Sandra Edwards
- Professor Laura Boyle, Teagasc

- SEGES Innovation and the pigs

SEGES INNOVATION