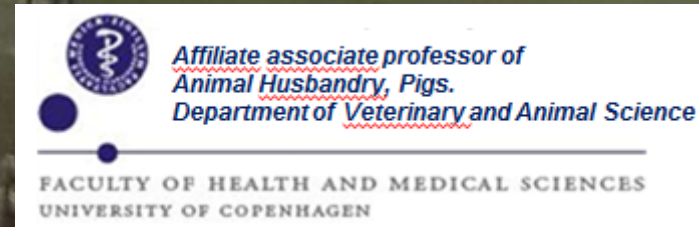


Loose housed sows

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

24th August 2022



Danish Pig Levy Fund **SEGES**
INNOVATION

Hyper-prolific high performance sows

- Selection criteria for sows have not yet taken account TC/FF
- But we 'want' sows
 - Capable of nursing piglets
 - Low input – work
 - Low input medication
 - Long and large life performance
- We expect them
 - To have uncomplicated farrowing
 - But it is a marathon – a farrowing takes 4-8 hours
 - To produce significant amounts of milk continuously
 - 16 kg/day on average -
 - To release many fertile eggs

I just gave birth to 25 liveborn piglets – took 8 hours



I'm producing 16 liter of milk every day



I'm carrying 18-32 fetuses



The future is not 'only' welfare

- it's a more sustainable pork production



Environment /
climate impact



Social responsib

- Incl. animal welfare



Business
earnings



Revision of EU animal welfare legislation.

- Why do we revise the EU animal welfare legislation?

- Science
- Scope
- Enforcement
- Level of animal welfare

- Further objective: ECI 'End the Cage Age'



- Which are the pillars of the revision?



Scientific basis (EFSA)



Better Regulation (Commission)

evidence-based and transparent EU law-making, backed up by the comprehensive involvement of stakeholders

Revision of EU animal welfare legislation.3

- Which are the Better Regulation steps?



Fitness Check of current legislation

evaluation of the existing EU animal welfare legislation



Impact Assessment

economic, social and environmental impact of policy options

Inception Impact Assessment

*provides Commission's understanding of the problem
and possible solutions*



Mandate of the subgroup

- Which is the aim of the subgroup ?



to provide technical expertise and opinions to the Commission for the improvement of pig welfare at farm
international implications of opinions to be taken into account

- In which way will the subgroup function ?



examine the Inception Impact Assessment options
identify additional options, if any
discuss possible elements of future legislation

Inception impact assessment

According to the F2F Strategy, the EU animal welfare legislation should be revised in order to meet the following general objectives:

- Ensure a higher level of animal welfare;
- Align the EU animal welfare legislation with the latest scientific evidence;
- Broaden its scope and
- Make it easier to enforce

Questions to be answered by each topic

- What is the problem to be addressed by the option?
- What is the content of the options?
- Which alternatives have been implemented?
- What are the possible main impacts?
- How to mitigate negative impacts?
- Other options to address the problem?

Significant investment - Market driven



Challenge of change – housing of lactating sows from crates to loose

- From outdoor to loose indoor or from crate to loose?
- Solid floor vs. high level of hygiene – or both?
- Large pens – large investments - few farms?
- Smaller pens – fully slatted – cheap – many farms?
- Only building once! Need to consider long term political and market situation (eg caged layers)



Critical points

Before investment

- Decision making
 - Key decisions

Daily management

- Calm handling of sows
- Use of confinement



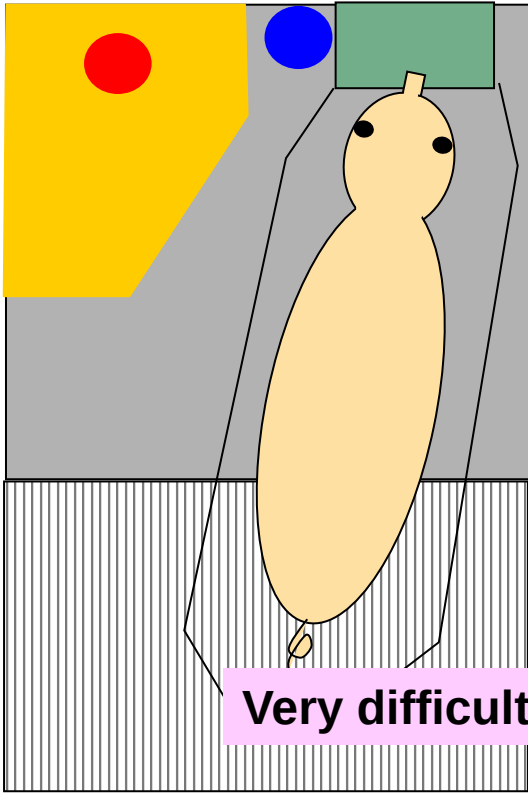
Why can't we just....

- Why not just open up the crate?
 - The sows need more space – they cannot turn around unimpeded in an open crate
 - The sows turn away from feeder (and resting areas) when dunging
- Why not just copy pen designs from Norway, Sweden or Switzerland
 - They use zero-confinement – so 'only' need to design for loose sow
 - Increased litter-size leads to increased need for management in the first few days
 - Use confinement

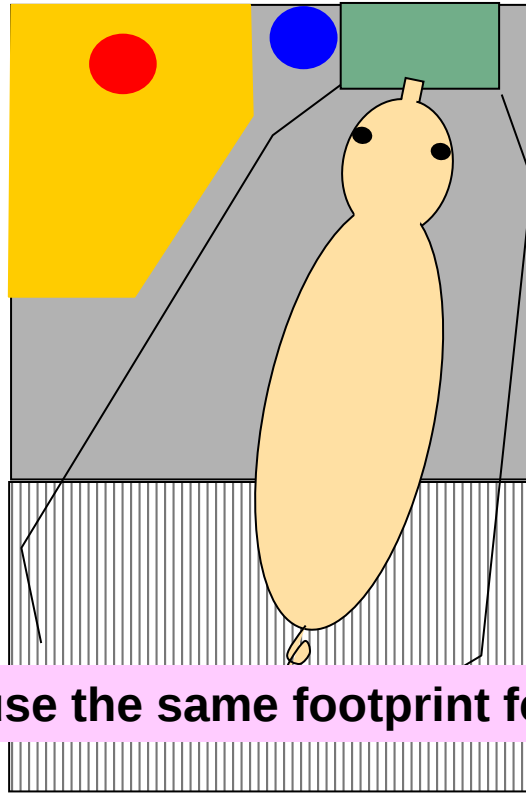
Can we prepare pens with crates?

The answer is 'no'

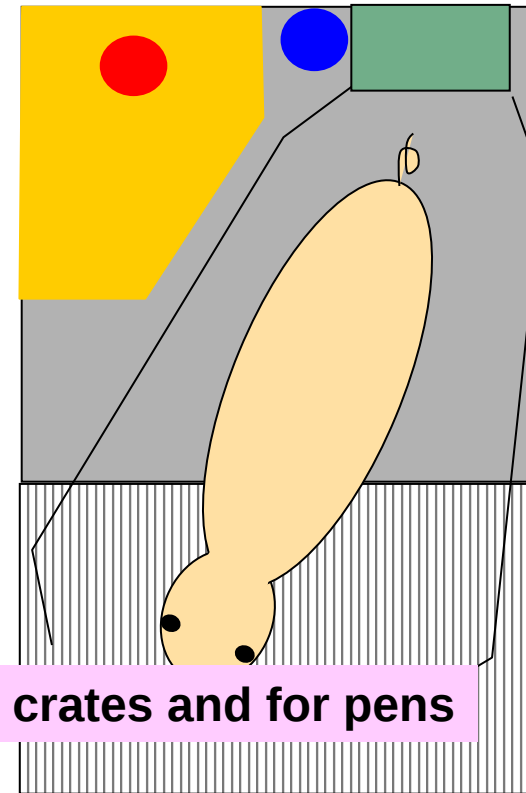
While the crate is **closed**, the sow eats and defaecates in the same position.



When the crates is **open**, the sow continues to eat at the trough.



But turns away from the trough when defaecating.



Very difficult to use the same footprint for crates and for pens

The sow is/will be loose most or all of the time

Farrowing crate
– confined sows



Farrowing pen
– loose sows



Use temporary confinement –
BUT in a pen designed for
a loose sow

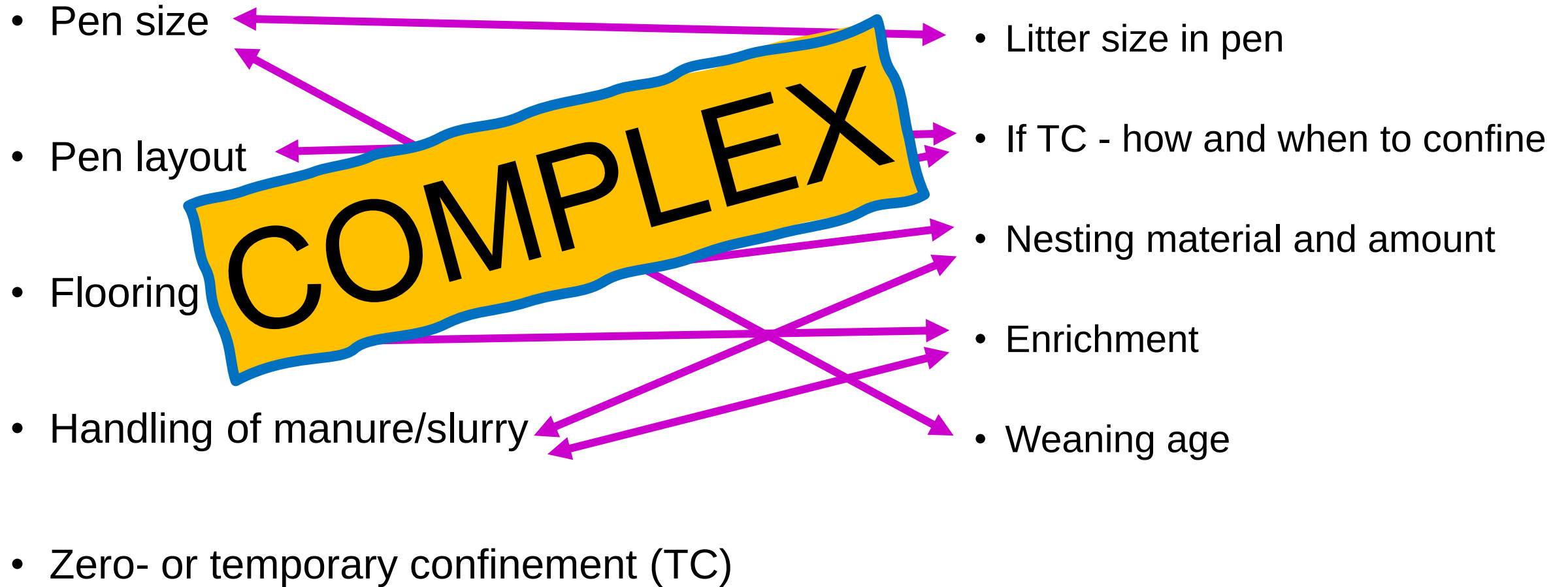
Options or alternatives

- Zero-confinement (free farrowing)
 - Common in countries with legislative enforcement
 - Used in research such as the UMB-pen and PigSAFE
- Temporary confinement (free lactation)
 - Accepted in countries with up-coming legislative enforcement
- Two categories of pens
 - Designed for loose sows – with an option to confine
 - SWAP; ProDromi;
 - Farrowing crate that can be opened



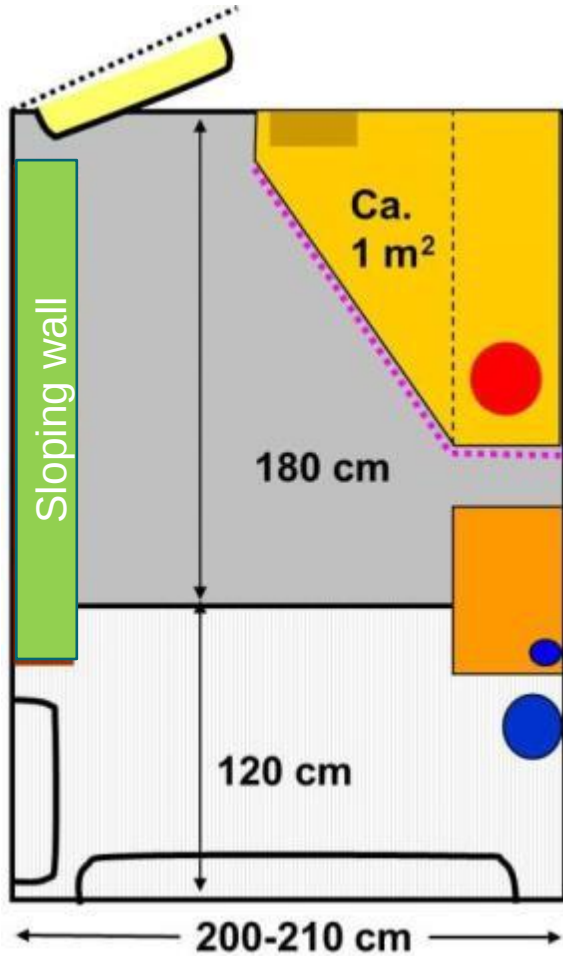
Initial key decisions

Other key decisions



Free farrowing

- Initially - Pen meeting needs of sow, piglet, caretakers



1. Creep area adjacent to the pathway

- Piglets are checked everyday
 - Safety
 - Fast
 - Limit risk of disease transfer

2. Sow-resting area next to creep

- The sows choose to lie next to creep
 - Partly solid floor – at least in Denmark
 - Reduce environmental impact
 - Partly solid floor is cheaper than aircleaners etc
 - Warmth – dry floors before farrowing – and piglet survival
 - Keep nestbuilding- and rooting material in pen – not in slurry

3. The sow walks away (turns away) from feeding area, when defaecating



Three commercial herds

- Ok small scale
- Three herds – results

Piglet mortality, expressed as numbers, in crates and pens in Herds A, B and C.

White bars=mortality before litter equalisation, Black bars=mortality after litter equalisation. P-value for herd × housing interactions: mortality before equalisation: $P = 0.107$; mortality after equalisation: $P = 0.031$. Black bars with different superscripts differ ($P < 0.05$).

Animal (2014), 8:1, pp 113–120

Piglet survival

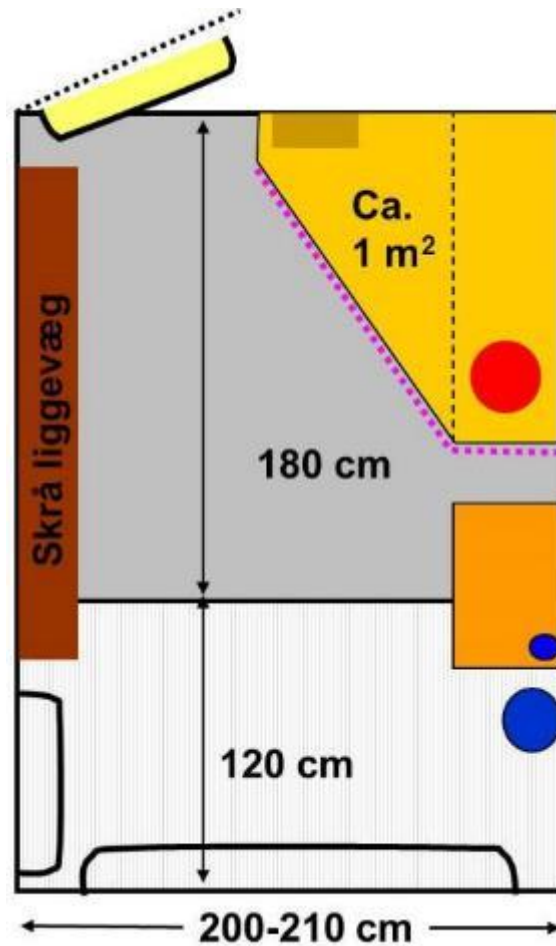
- Sow versus pig welfare
- ‘Killer’ sows
 - ~50% of the loose sows are ‘Killers’
 - ~20% of the sows in crates
- Identification of ‘Killer’ sows
 - Need to find them in time to save the piglets
 - Research-fishing-expedition (5 to 10 years??)
 - How many will we find?
 - Likely intervention = crate (50% of the sows?)



Impact of confinement?

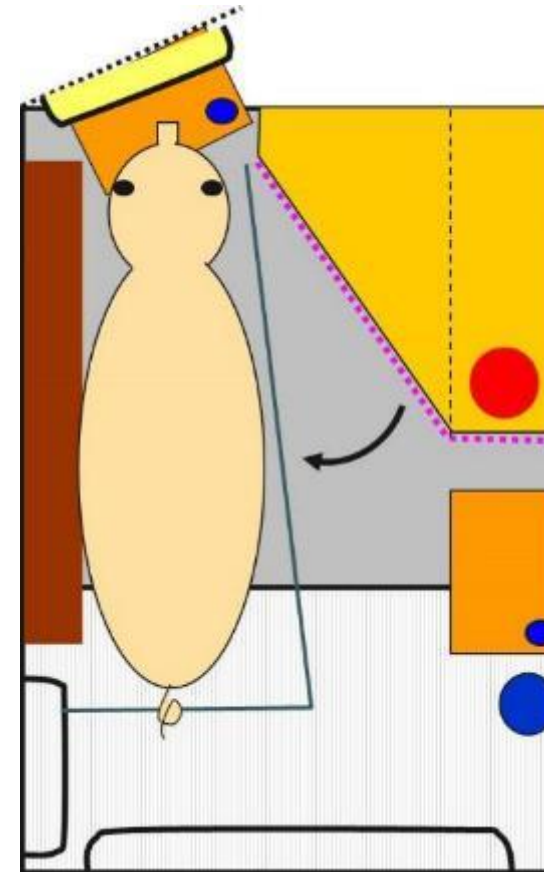
Two pen designs

FF = Free Farrowing



AU/DAWS/PRC +

SWAP = Sow Welfare And Piglet protection



UCPH/PRC



SEGES
INNOVATION

Two designs



Impact of SWAP on sow movement?



- Before farrowing – nest building period
 - No difference in duration of nest building period
 - No difference in duration of nest building per hour
- After farrowing
 - The sows were lying lateral majority of the time
 - >110 minuts out of 120 minuts observed (4 x daily)

No difference between loose and confined
- in pens designed for loose housed sows



Hales et al., 2014

Impact of swap on salivacortisol-level (stresshormon)?



Hales et al., 2014

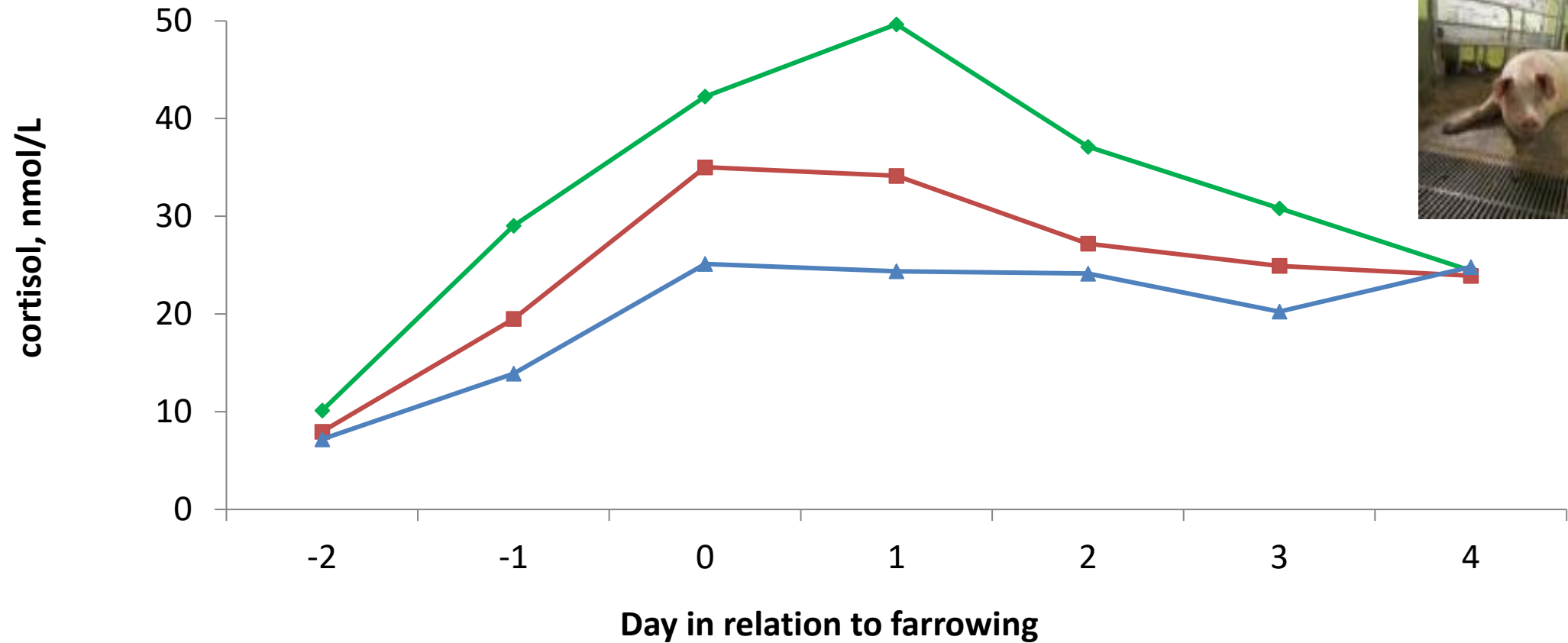


Cortisol

LC: Loose-Confined: Loose D114 gest until finished farrow then confined day 4 post farrowing

LL: Loose-Loose: Loose D114 gest until day 4 post farrowing

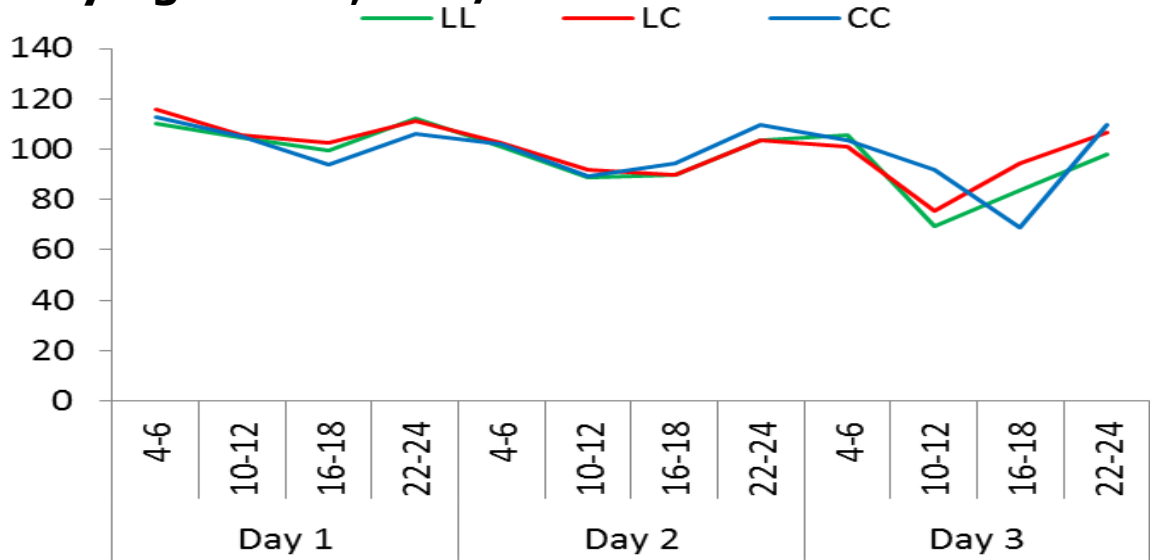
CC: Confined-confined: Confined D114 gest until day 4 post farrowing



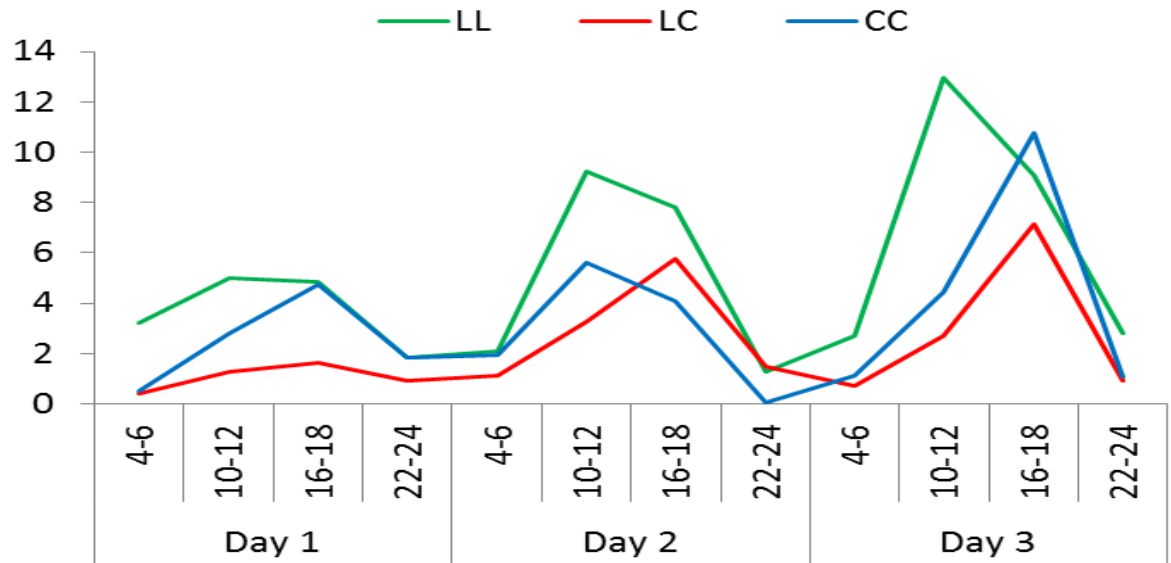
Sows postures



Lying lateral, min/interval

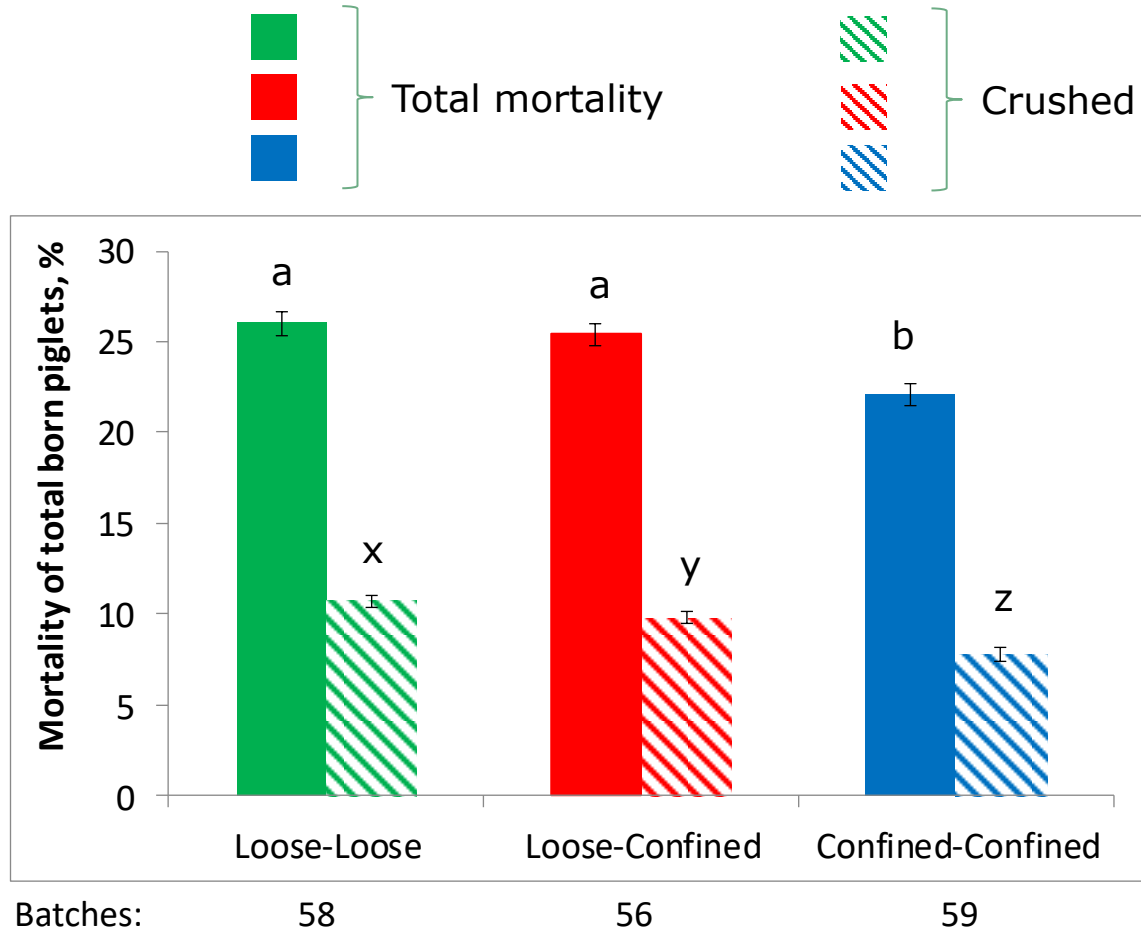


Standing, min/interval



Hales, 2015

Piglet mortality - impact of confinement



Hales, 2015

Farrowing unit – loose sows

- Two kinds of pen design

SWAP = Sow Welfare and Piglet protection



FF = Freedom farrowing



Decisions before building and running afterwards

- Key decisions
- Once you've build – conditions are given - live with it....and optimize within conditions
- Start with successful implementation of higher welfare initiatives
 - Understanding:
 - What do pigs do
 - When do they do it
 - Why do they do it
 - How do they do it
 - ...



Initial key decisions

‘Irreversible’ decisions

- Pen size
- Pen layout
- Flooring
- Handling of manure/slurry
- *Zero- or temporary confinement (TC)*

Other key decisions

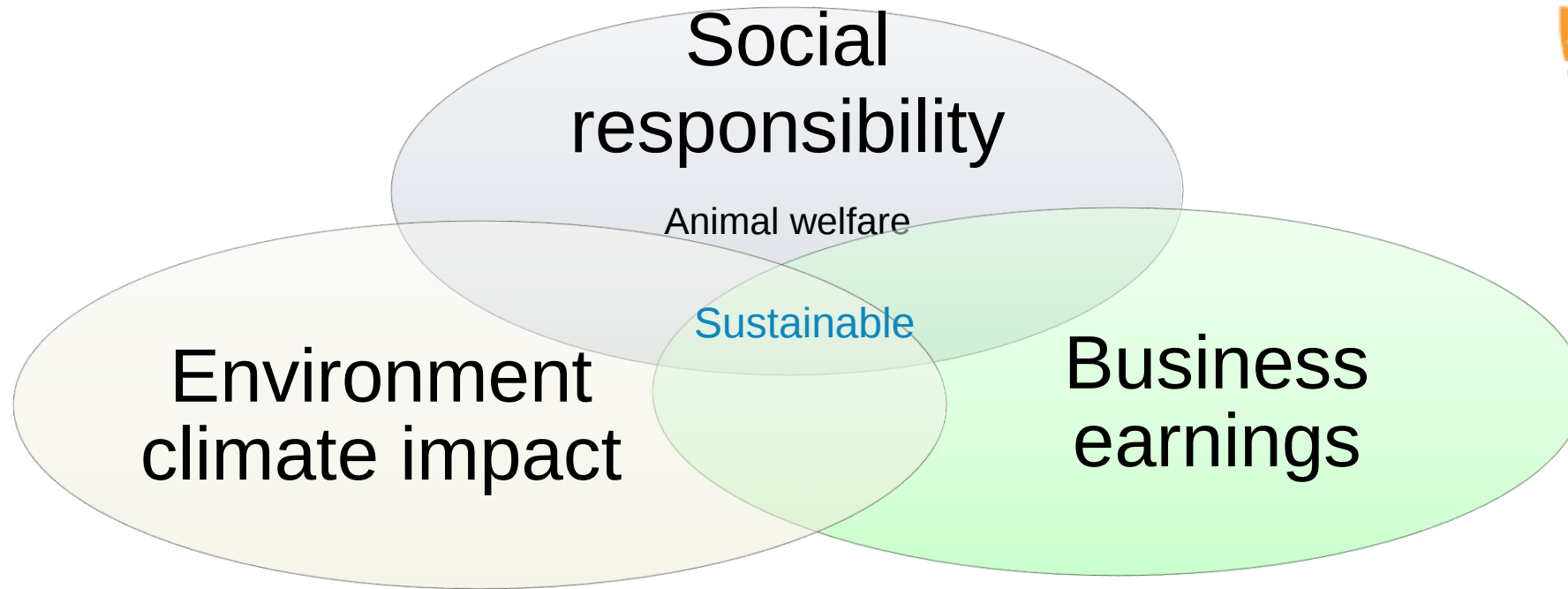
- Litter size in pen
- If TC - how and when to confine
- Nesting material and amount
- Enrichment
- Weaning age

Options or alternatives

- Zero-confinement (free farrowing)
 - Common in countries with legislative enforcement
 - Used in research such as the UMB-pen and PigSAFE
- Temporary confinement (free lactation)
 - Accepted in countries with up-coming legislative enforcement
- Two categories of pens
 - Designed for loose sows – with an option to confine
 - SWAP; ProDromi;
 - *Farrowing crate that can be opened*



A more sustainable Danish pork production



From animal welfare to sustainability

'We' want

- Space
- Cleanliness
- Low input labour
- Healthy piglets

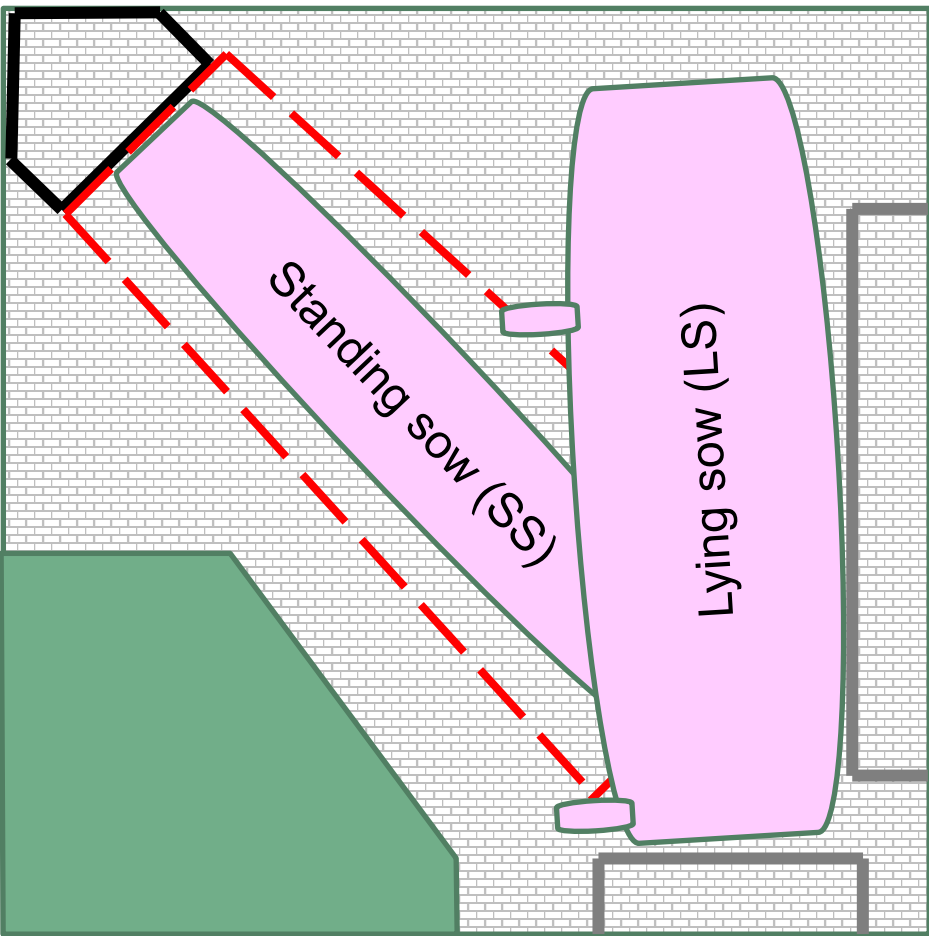
'However:

- Space
 - Larger surfaces - increase emissions
- Cleanliness
 - If slatted floor – increase emissions
- Low input labour
 - If slatted floor – increase emissions
- Healthy piglets
 - If slatted floor – increase emissions

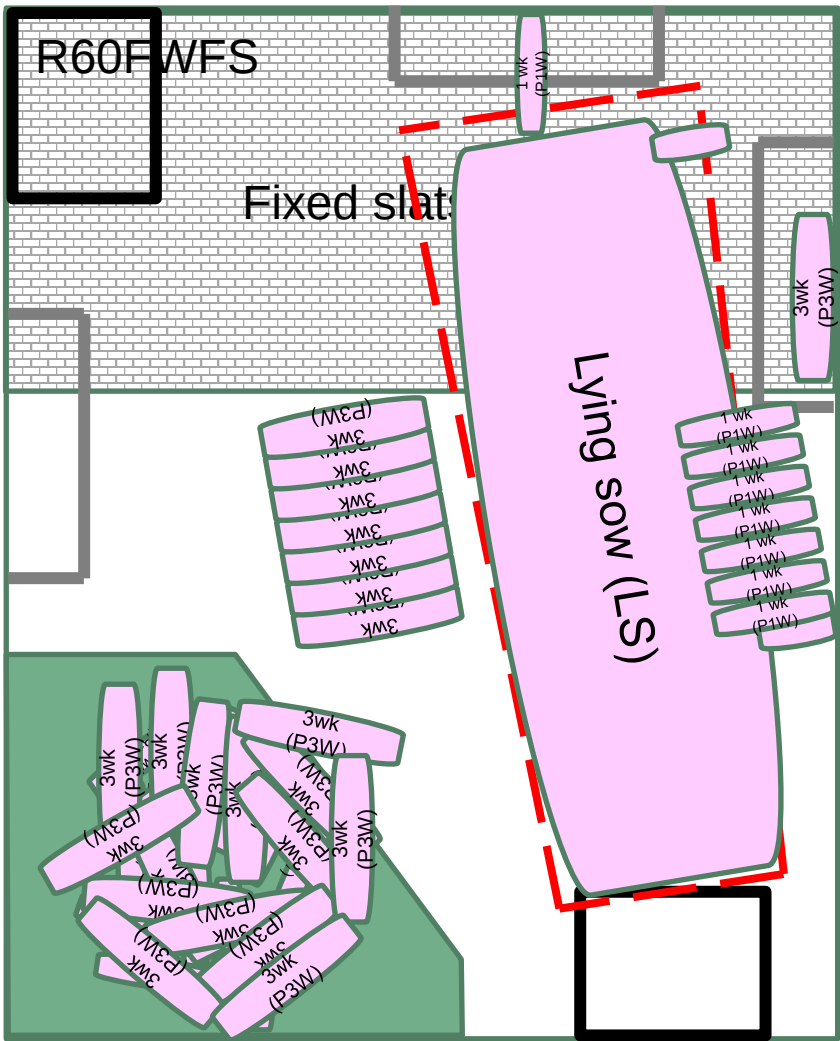
Space – dilemma between space for welfare and risk of emissions

- Austria
 - 5.5 m²/sow
- Germany
 - 6.5 m²/sow
- It's not as simple
 - Is there a perfect size?
 - Key decisions
 - Solid or partly slatted floor?
- Examples
 - Square pens (equal sided)
 - Fully slatted floor
 - Rectangular pens
 - Dimensions – pen
 - Fixed width
 - Fixed length
 - Fixed ratio width/length
 - Dimensions flooring (solid / slatted)
 - Within each of the above designs
 - Fixed ratio solid/slatted floor
 - Fixed depth of slats of 100 cm
 - Fixed depth of solid of 200 cm

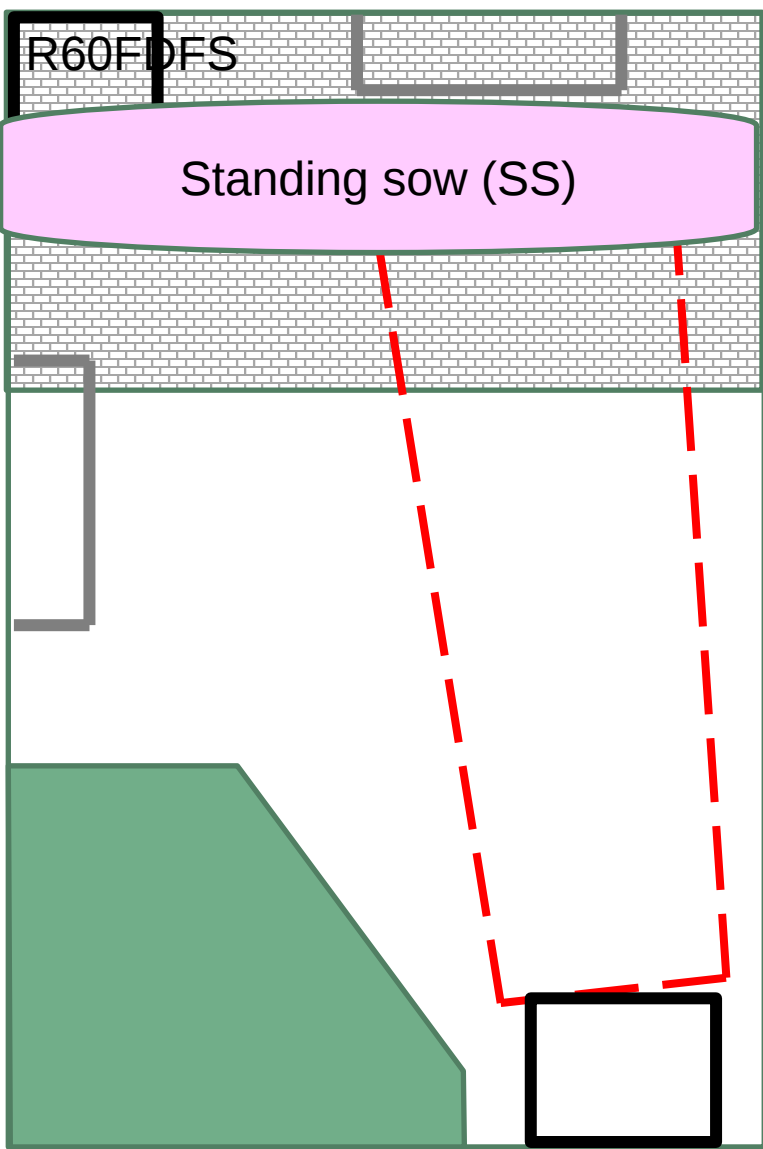
How different can 6 m²-pens be?



Square
S60 / 245*245



Rectangular – width (220 cm)
273*220



Rectangular – depth (300 cm)
300*200

‘Ideal’ pen size (1)

- Sows’ dimensions



Nielsen et al., 2018

- Planar width – turning space



Planar width of 153 cm

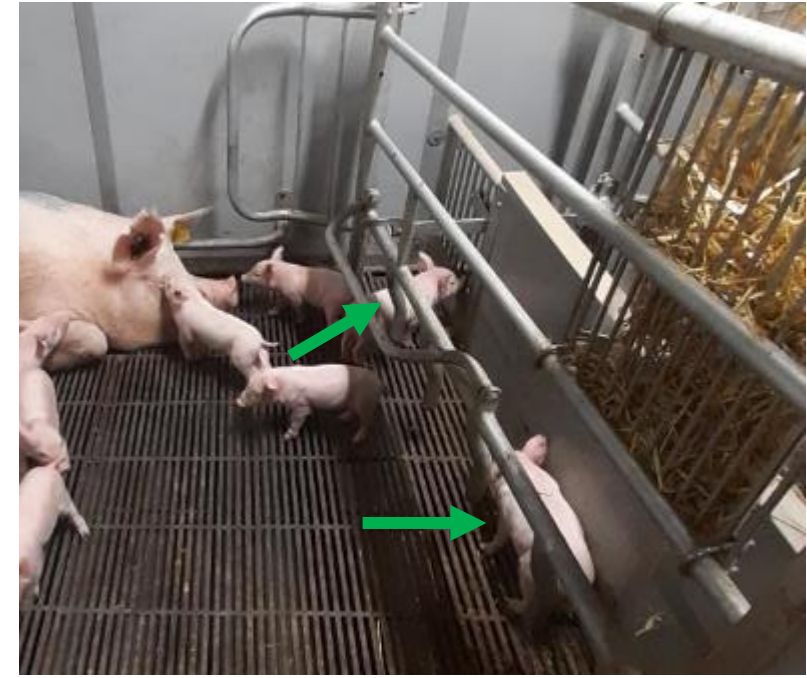
Planar area of 3.17 m²

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

Needs further research

‘Ideal’ pen size (2)

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



Pen layout (1)

- First decision regarding design
 - Creep area along passageway
 - Safety
 - Efficiency
 - Reduce risk of transferring diseases
 - Easy access

[FFL21 : Change experiences by a Danish farmer \(openagrar.de\)](https://openagrar.de)



<https://www.freefarrowing.org/research/references/freedom-in-farrowing-and-lactation-2021-ffl21/>

Overcoming barriers, facilitating change



Virtual Workshop August 12th-13th 2021

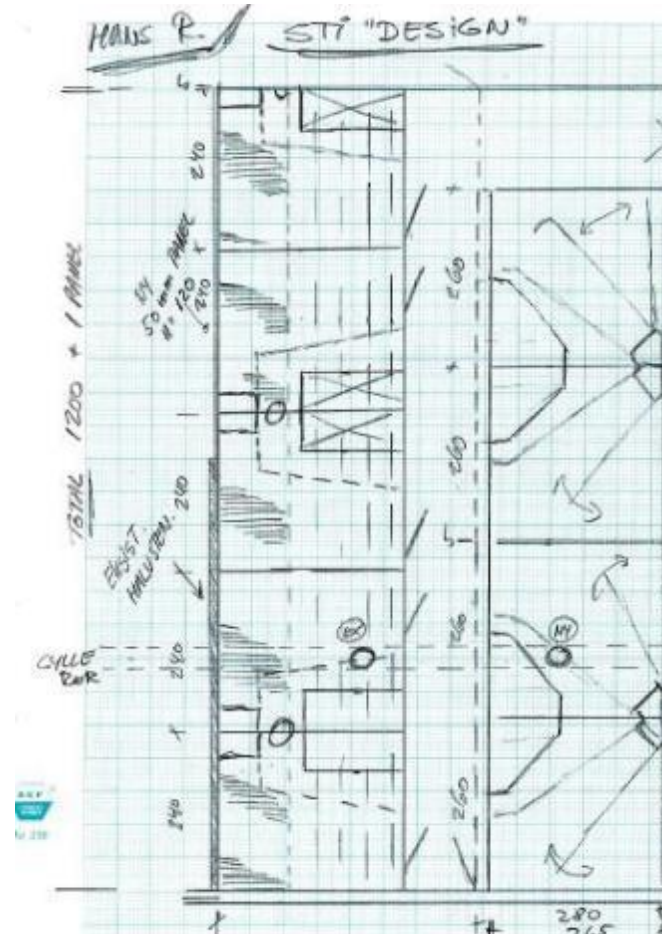
As part of the [Free Farrowing series of workshops](#), a virtual event (organized by FLI, SEGES, SRUC and Vetmeduni Vienna) was held over two days.

SEGES
INNOVATION

Limited number (e.g. five-ten pens) or full scale – pros and cons

2010-2015

- Limited numbers – pros
 - Get experience
 - Develop and optimize
 - Limited investment
- Limited numbers - cons
 - Ventilation etc
 - Management
 - Sows



2015-

- Full scale – pros
 - Optimize management
 - Sows accustome
 - Stockpeople accustome
- Full scale - cons
 - 'Irreversible'
 - Large investment

Be aware of the pros and cons of the way you start up with loose housing

Confinement

- Temporary confinement – take the best of both loose and confined
 - Loose – natural behaviour, access to udder,
 - Confined – lower piglet mortality, safe work conditions
- Before farrowing - loose
 - No piglets at risk, active nest seeking and nestbuilding
 - Quiet/calm the last couple of hours
- During farrowing - confined
 - Ensure access to udder when confined
 - Recent review
 - ‘Lower’ mortality with TC than FF
 - ‘Higher’ mortality with TC than permanent C
- After a few days – loose again
 - Awareness when opening

Ref:

<https://doi.org/10.3389/fvets.2022.811810>

Daily management

- Calm calm calm
- Not just in farrowing unit
- Include 'calmness' in layout
 - Sections
 - Less pens per section
 - Creep alongside passageway
- Include 'calmness' in daily routines
 - Handling of sows and piglets



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

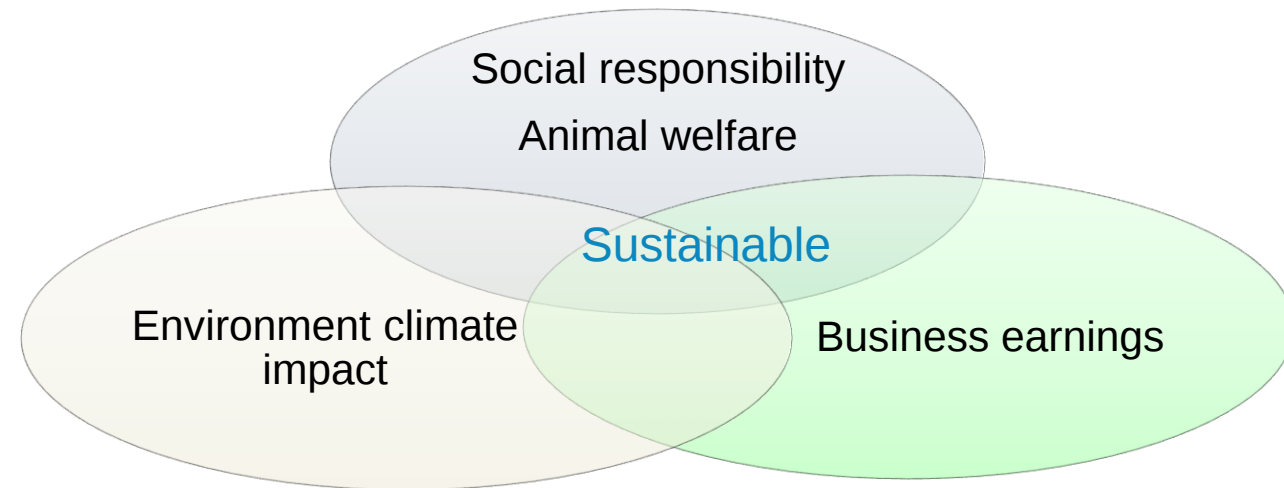


Critical points

- Loose housing – with an option to confine
- In respect of the three pillars of sustainability
- Science based
- Work together – across borders



Overcoming barriers, facilitating change



Future

- Reflections
 - German legislation
 - End the Cage Age Initiative
 - EU?
- Challenges
 - Sustainability
 - Competitiveness
- Opportunities
 - Increased milk production
 - Large litters
 - Licence to produce





LUH@SEGES.DK

Loose housed gestating sows

- Legislative requirements
 - All sows are loose housed in groups
 - No later than 4 wks post service and until 7 days bf farrowing
 - If sick, injured or aggressive – the sow must be/can be housed individually (loose) (at least 1.3 sqm per sow)
- Space per sow

Groupsize		
0 – 17 sows: ¹⁾	2,80 m ² pr. sow 2,20 m ² pr. sow 2,00 m ² pr. sow	for the first 4 sows for the following 6 sows for the following 7 sows
18 – 39 sows:	2,25 m ² pr. sow	
More than 39 sows:	2,025 m ² pr. sow	

[Read more: Regler for dyrevelfærd \(svineproduktion.dk\)](http://svineproduktion.dk)



Loose housed gestating sows

- Recommendations
 - Individual feeding
 - Stable groups (no mixing) (15-60 sows)
 - Optimized design (functional areas – resting – eating – dunging)
 - Design depends on feeding system (ESF, eating-stalls, wet-feed (liquid feed in trough...))
 - Non-slippery flooring
 - Surveillance
 - Easy to separate sick or injured sows from the group

Group-housing after service



- Critical period d 10-25 after service
- Individual feeding otherwise reduced litter size
 - Electronic sow feeding
 - Free access stalls



Electronic sow feeding



- Individual feed ration
- Managed and controlled feed ration
- Large degree of flexibility
- Competition while waiting for feed
 - Focus on the gates
 - Focus on feeding curves and strategy
 - Start the feeding “day” in the night

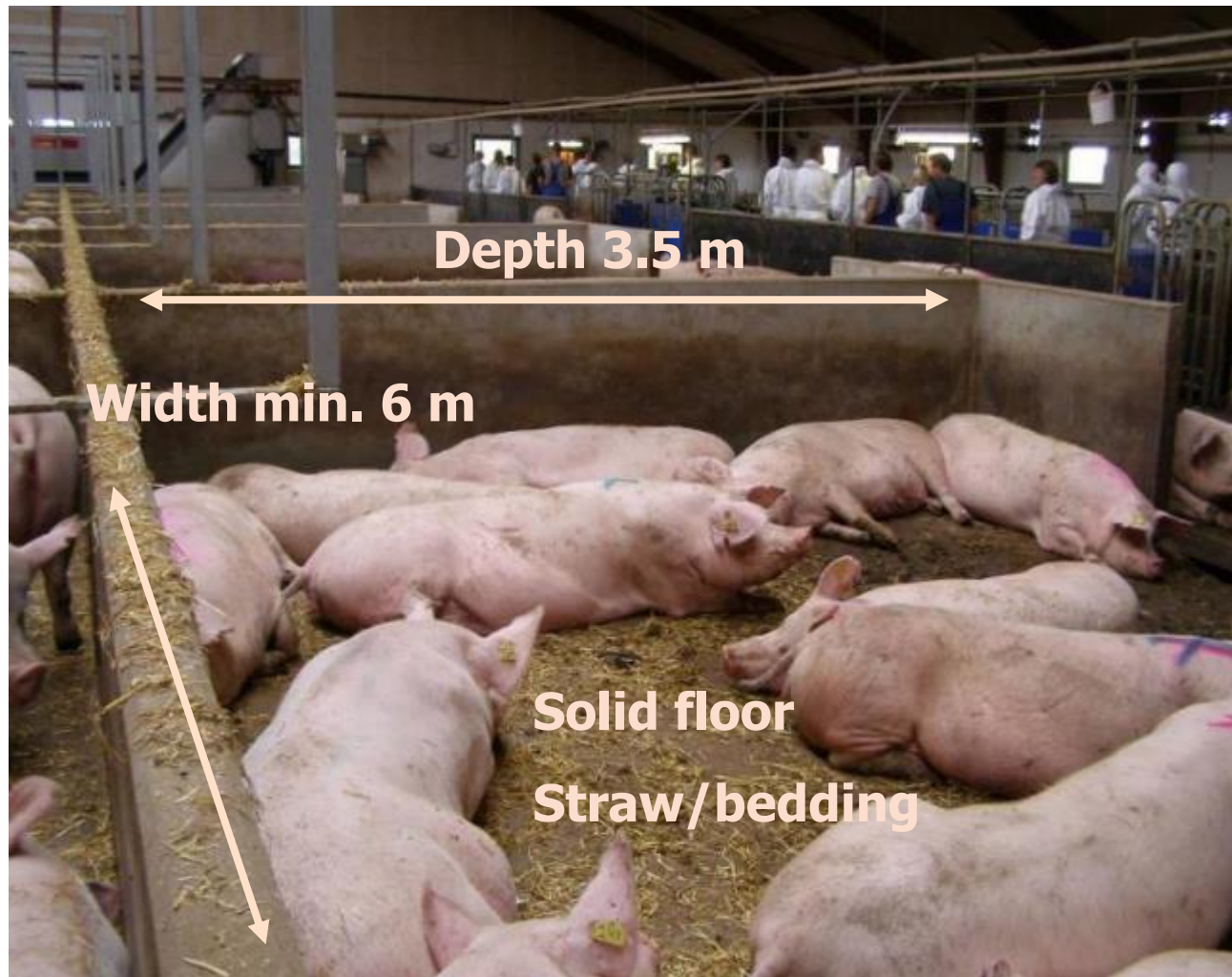
Recommended number of sows per feeding station



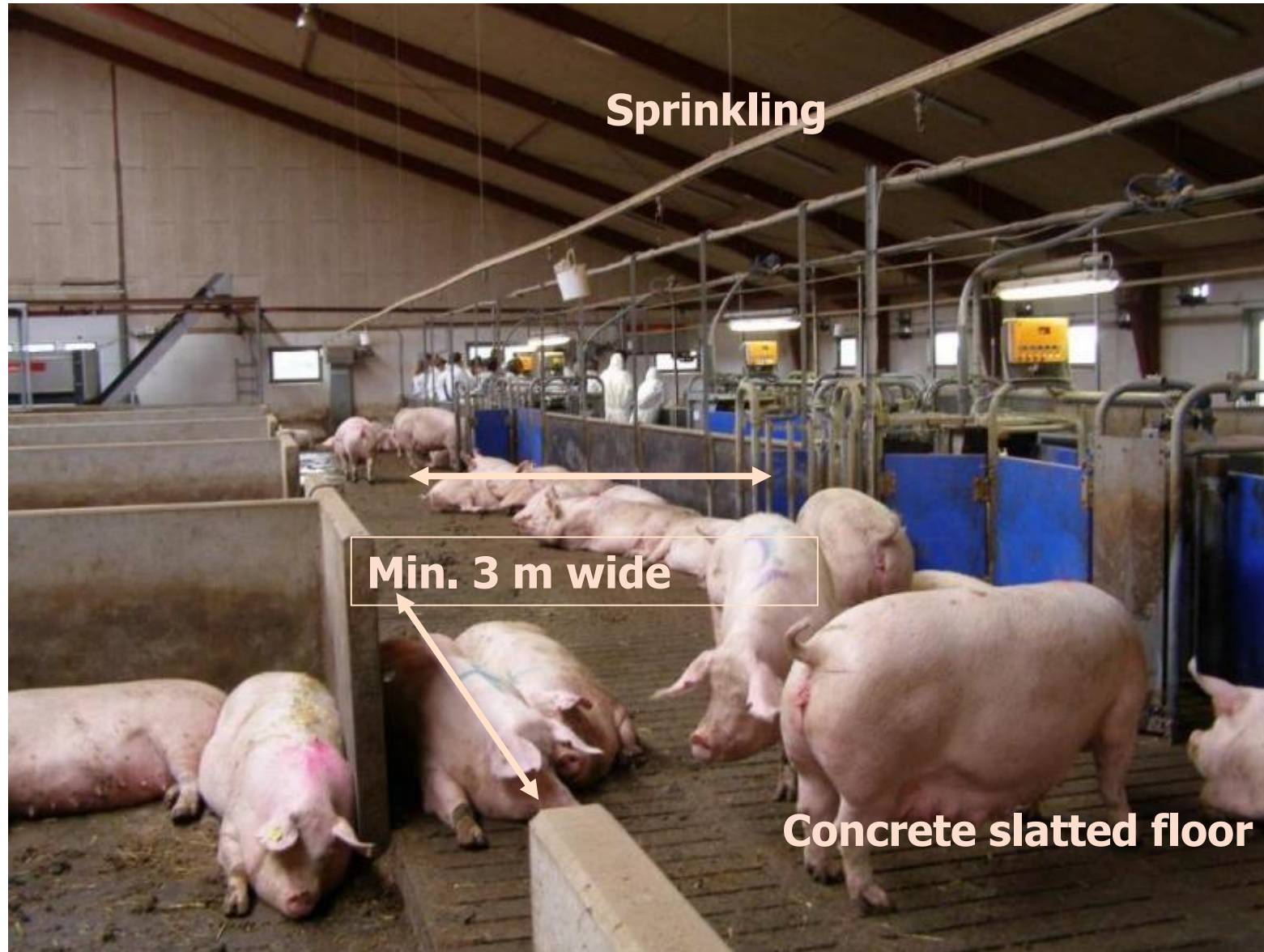
- All sows must eat their daily ration within 14-16 hours
- Gestating sows (one station)
 - 55 sows
- Gestating sows (several stations/pen)
 - 65 sows
- Gilt pen (40-50 gilts)
- Training pen (30 gilts)



Dimension of lying area



Dimension of activity area



Laying behaviour - clean lying area





Training to use ESF

- Young gilts (before service)
- 3-4 weeks
- Training station
- Ear tags
- Left-over list
- Pen designed as the gestation pen



Free access feeding stalls

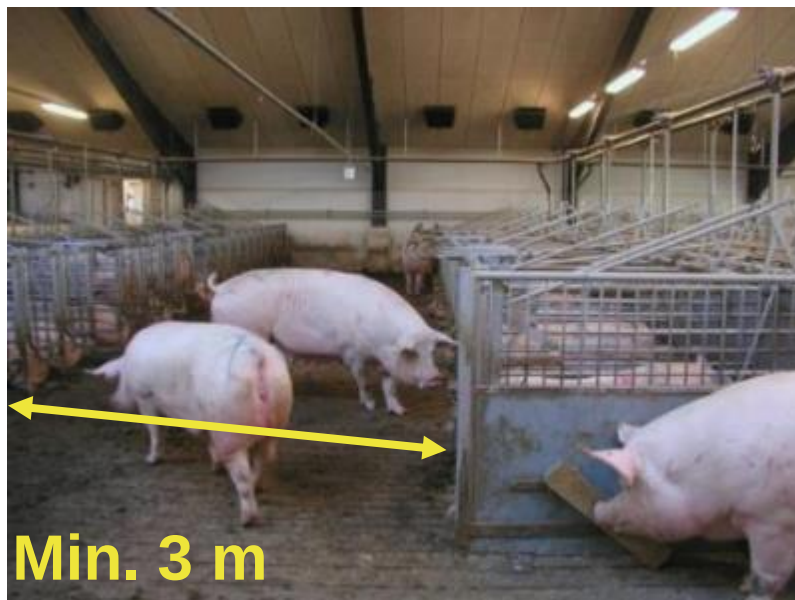


- Simultaneous feeding
- “Individual feed ration”
- Management and control of feed ration
- Requires a large area





Dimension of activity area



Min. 3 m

L-pen



Min. 3 m

T-pen

Group housing 4 weeks after service



- Critical period is over
- Management of condition while sows are in stalls
- Floor feeding and liquid feeding in long troughs also possible

Managing body condition - competition for feed



- Sorting of the batch into four groups:
 - Gilts
 - Thin sows
 - Normal sows
 - Fat sows



Floor feeding



- One daily feeding
- Scatter the feed
 - 1.3 m²/sow
 - Two pipelines
- 0.9 FE/kg
- Meal feed takes longer to eat



Liquid feeding in long troughs



- Min. 55 cm trough space per sow
- Feed must spread quickly
- One daily feeding or two feedings within approx. 15 minutes
- All/both troughs must fill "at the same time"
- Challenge the firms!

extra place units



Daily inspection essential



Focus on which sows that are eating
But it is difficult to check for leg problems...!

Hospital pens and treatment



5 – 10 pct. hospital place-units
Bedding



Discuss the medical treatment
with the vet
80 pct. of the sows can return
from hospital pen back to
production!

Housing of hyper-prolific high performance sows



I just gave
birth to 25
liveborn piglets
– took 8 hours



I'm carrying
18-32
fetuses



I'm
producing
16 liter of
milk every
day