Sustainable solutions to animal welfare challenges

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Agenda

• Denmark
• Danish Pig Research Centre
• Danish Pig Production
  • Efficiency and costs
• Welfare
  • Current requests, EU & Denmark
  • New requests, Denmark
    • Loose nursing sows
    • Intact tails
    • Local anesthesia during castration
• Danish Product Standard
Denmark

<table>
<thead>
<tr>
<th>Description</th>
<th>Denmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate</td>
<td>Cold/reasonable</td>
</tr>
<tr>
<td>Population</td>
<td>5.6 mill.</td>
</tr>
<tr>
<td>Area</td>
<td>43,000 km²</td>
</tr>
<tr>
<td>Arable land</td>
<td>59%</td>
</tr>
</tbody>
</table>
Danish pig production

• 3,200 farm units with pigs
• 1 mio. sows → 31.6 mio. pigs
  • 17.5 mio. slaugthered in Denmark
  • 14.1 mio. pigs exported at 30 kg

(Landbrug & Fødevarer, 2018)
Pig producers in Denmark

No. of producers

- 1980: 70,000
- 1990: 30,000
- 2000: 10,000
- 2018: 1,000
SEGES
Danish Pig Research Centre

• Financed by Danish pig farmers (Production fees and royalties from our breeding system DanBred)

• ~ 150 employees
• Operate on ~ 200 commercial farms

• Responsible for research and development programmes and knowledge transfer to the Danish pig producers
Two-level advisory system

Research & Development

Danish Pig Research Centre

Direct information
(Congress, seminars, website etc.)

Advisors

DLBR
(Danish Agricultural Advisory Service)

Vet Practices

Companies
(slaughterhouses, feedstuffs, farm technology etc.)

Pig producers
## Danbred average and top 5 herds 2017
### Denmark

<table>
<thead>
<tr>
<th>Herd Rank</th>
<th>AV. Top 5</th>
<th>AV. 2017</th>
<th>AV. 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaned pigs per year per sow</td>
<td>39.8</td>
<td>33.3</td>
<td>32.2</td>
</tr>
<tr>
<td>Live-born pigs per litter</td>
<td>18.6</td>
<td>16.9</td>
<td>16.3</td>
</tr>
<tr>
<td>Weaned pigs per litter</td>
<td>17.0</td>
<td>14.6</td>
<td>14.1</td>
</tr>
<tr>
<td>Weight at weaning (kg)</td>
<td>6.4</td>
<td>6.5</td>
<td>6.6</td>
</tr>
<tr>
<td>Mortality during lactating period (%)</td>
<td>8.5</td>
<td>13.6</td>
<td>13.3</td>
</tr>
<tr>
<td>Farrowing rate (%)</td>
<td>93.5</td>
<td>89.2</td>
<td>88.6</td>
</tr>
</tbody>
</table>
Efficiency, Denmark, 2017
Weaner period (7-30 kg)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Top 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed conversion ratio, kilo per kilo gain</td>
<td>1.88</td>
<td>1.75</td>
</tr>
<tr>
<td>Post-weaning mortality, %</td>
<td>3.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Average daily gain 7-30 kg, gram per day</td>
<td>453</td>
<td>496</td>
</tr>
</tbody>
</table>
Efficiency, Denmark, 2017
Finisher Period (30-100 kg)

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Top 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily gain, g</td>
<td>971</td>
<td>1032</td>
</tr>
<tr>
<td>Feed conversion ratio, kg per kg weight gained</td>
<td>2.79</td>
<td>2.73</td>
</tr>
<tr>
<td>Average slaughter weight hot, kg</td>
<td>86.8</td>
<td>87.3</td>
</tr>
<tr>
<td>Average lean meat, %</td>
<td>60.6</td>
<td>60.8</td>
</tr>
<tr>
<td>Dead and culled, %</td>
<td>3.1</td>
<td>2.3</td>
</tr>
</tbody>
</table>
Pigs weaned per sow per year, 2017

Source: InterPIG 2017
Average Cost of production, 2017
- Competitive in Europe but not in the USA/Brasil

Source: InterPIG 2017
Welfare

Current requests, EU & Denmark
The transition to ’group-housing’ of Danish sows

- **1998**
  Danish legislation bans use of sow stalls for pregnant sows from four weeks after service from January 2014. New stables from 1999

- **2003**
  EU bans use of sow stalls for pregnant sows from four weeks after service from January 2013

- **2013**
  All pregnant sows group housed
• In Denmark there must be straw on the solid/drained floor – not in EU
• Sprinkling system required – not in EU
Legislation on loose sows in service, DK

- Loose housed after weaning in groups
- This applies to facilities taken into use after January 1, 2015. The requirement will apply to all January 1, 2035
- Dry sows can be housed in crates for up to three days
Rooting and manipulable materials, sows and piglets
Weaners and finishers, DK

<table>
<thead>
<tr>
<th></th>
<th>DK</th>
<th>EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slatted Floors</td>
<td>Only partly slatted</td>
<td>Allowed in most countries</td>
</tr>
<tr>
<td>Sprinkling system</td>
<td>Demand</td>
<td>No demand</td>
</tr>
</tbody>
</table>
Rooting and manipulable materials, weaners and finisher units
Hospital pens

- Cover & heating
- Cooling
- Straw or rubber mat

In Denmark there is special rules for design – not in EU
New requests, Denmark
We want to continue to improve pig welfare

• We also want to continue to produce pigs
• But welfare costs
  • Consumers have limited willingness to pay
Market driven development

- Large increase in welfare
- Large extra production cost
- Much higher price
- Limited willingness to pay
- Few animals benefit

- Increase in welfare
- Limited extra production cost
- Limited extra price
- Higher willingness to pay
- Lots of animals benefit
Attitudes of Europeans - towards Animal Welfare

35% are not ready to pay extra for animal welfare
35% are ready to pay up to 5% extra
16% are ready to pay up to 10% extra

- 35% are not ready to pay extra for animal welfare
- 35% are ready to pay up to 5% extra
- 16% are ready to pay up to 10% extra
- 5% are ready to pay up from 6-10% extra
- 4% are ready to pay up from 11-20% extra
- 2% are ready to pay more than 20% extra
- 3% indicates it depends on the price of the product
- 4% indicates don’t know

Source: Attitudes of Europeans towards Animal Welfare, Special Eurobarometer Report 42
Opinions on animal welfare in DK

• Key parameters that define good animal welfare for pigs:

63%  No unnecessary suffering
62%  Freedom to move
61%  Sufficient room for natural behaviour
61%  Good transport conditions
60%  Pigs are confident and not stressed
59%  Feed contains neither medicine nor AGP
Welfare Summit, 2014

Called by Minister of Food, Agriculture and Fisheries

Signed declaration

- Government
- Industry
- Animal rights organizations
- Retailers

Outcomes

- Improved survival rates among piglets
- Transition to loose housing of sows though all stages of production
- Alternatives to castration of piglets
- Reduction in the numbers of tail docked pigs
- Greater choice for consumers as regards pig welfare standards
New Animal Welfare label

No tail docking

Fresh straw every day

Loose sows

Maximum 8 hours of transport
### National label with three levels

<table>
<thead>
<tr>
<th>Feature</th>
<th>1 Heart</th>
<th>2 Hearts</th>
<th>3 Hearts</th>
</tr>
</thead>
<tbody>
<tr>
<td>No tail docking</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Straw as rooting material</td>
<td>X</td>
<td></td>
<td>X (On floor)</td>
</tr>
<tr>
<td>Straw as nesting material</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Loose sows</td>
<td>X</td>
<td>X (Protective rails allowed for 4 days)</td>
<td>X (Protective rails allowed for 2 days)</td>
</tr>
<tr>
<td>8 hours’ transport</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Space requirements according to standard requirements</td>
<td>X</td>
<td>+ 30 %</td>
<td>+ roughly 100 %</td>
</tr>
<tr>
<td>Weaning 28 days</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Straw in lying area</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Free-range farrowing</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Access to outdoor area</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Strategy – Danish Pig Research Centre, 2018

Strategic focus areas related to animal welfare:
1. Farrowing pens to loose nursing sows
2. Risk assessment tool and tail docking
3. Local anesthesia prior to castration
4. Piglet mortality
Loose lactating sows
Challenges!!

- Piglet mortality
- Solid floor – fully slatted floor?
- Larger pens?
- Pen design?
Farrowing unit – loose sows

Two kinds of pen design

SWAP = Sow Welfare and Piglet protection

FF = Freedom farrowing
Number of pens for loose lactating sows
Product test of ten different pen designs

• 10 commercial pen designs
• One year – 60 sows per design
• Designs were promising
  • No design was perfect
  • Two thirds of the marks
    • ‘good’ or ‘very good’
    • no design received ‘good’ or ‘very good’ for all criteria

Promising – but not there yet

• Need for continuous development
• Litter size increase
  • More space needed for piglets both in creep area and safe zones
Tails
Legislation
Tail docking

Majority of pigs are tail docked
• Only half the tail must be docked
Pigs raised without tail docking

Free range Organic "Two hearts" "One heart" (All in SEGES)

Source: Danish Crown
### Intact tails
Estimated extra costs (7-110 kg)

<table>
<thead>
<tr>
<th>Item</th>
<th>€ per pig</th>
</tr>
</thead>
<tbody>
<tr>
<td>More area, 20 pct.</td>
<td>2.5</td>
</tr>
<tr>
<td>Extra hospital pens</td>
<td>0.3</td>
</tr>
<tr>
<td>Straw dispenser</td>
<td>0.8</td>
</tr>
<tr>
<td>Extra maintenance</td>
<td>0.5</td>
</tr>
<tr>
<td>Extra work</td>
<td>2.3</td>
</tr>
<tr>
<td>Extra feed</td>
<td>0.1</td>
</tr>
<tr>
<td>Increased mortality</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Source: Pig Research Centre
# Tails
Risk factors and scientific evidence

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Good evidence (research based)</th>
<th>Epidemiological evidence</th>
<th>Unclear evidence/ little effect</th>
<th>Needs further research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manipulable materials</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stocking density</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>✔ (weaners)*</td>
<td></td>
</tr>
<tr>
<td>Early life experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeder space</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Disease</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Breed</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Heritability</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>

(D'Eath et al. 2014)
The ways forward

Access to resources (reducing risks)?
• Feeding principle (liquid vs dry feeding, meal feeding vs ad libitum)
• Effect of eating spaces
• Clean solid floor → more litter material
• Water

Indirect genetic effects
• Selection for breeding characteristics

Intact tails – in 6-8 standard herds
• Competitiveness and animal welfare
Intact tails – all in Standard herds

- Initial herd visit
- Health and system check
- Intact tails 1-2 weekly batches
- Break 18 weeks
- Intact tails 6-8 weekly batches
- Break 18 weeks
- Intact tails all pigs
Tail docking, it is necessary?

New regulations: “pigs are not tail docked regularly”

1. Written documentation, January 1, 2019
2. Complete risk assessment, April 1, 2019
### Risk assessment - If all answers = ‘no’

<table>
<thead>
<tr>
<th></th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there factors relating to water/water supply, that cause problems in the herd?</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Are there factors relating to feed or feeding strategy, that cause problems in the herd?</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Are there factors relating to climate/thermal environment, that cause problems in the herd?</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Are there factors relating to rooting and enrichment material, that cause problems in the herd?</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Are there factors relating to health, that cause problems in the herd?</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Are there factors relating to management and tail biting, that cause problems in the herd?</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Risk assessment - If one or more answers = ‘yes’

<table>
<thead>
<tr>
<th>Are there factors relating to water/water supply, that cause problems in the herd?</th>
<th>yes</th>
<th>no</th>
</tr>
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<td></td>
<td>X</td>
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<td></td>
</tr>
<tr>
<td>Action plan: chr xxxx, location « langgaard »</td>
<td>No. 1</td>
<td></td>
</tr>
<tr>
<td>Aim: Optimize water supply</td>
<td>Current situation: Water nipples in 3 sections placed too high; Water pressure not checked for a while – assumed too low, but unknown; Previous attempts to eliminate boils unsuccessful, by a different approach</td>
<td></td>
</tr>
<tr>
<td>Date: April 10, 2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>Who</td>
<td>When</td>
</tr>
<tr>
<td>Nipples in sections 3, 5 and 7 must be lowered to 25 cm above trough</td>
<td>Jens-Erik</td>
<td>As pens are emptied and washed, in week 19, 21 and 23</td>
</tr>
<tr>
<td>Check output of all water nipple valves for an 8-week period (empty facility) – every Tuesday for 8 weeks – during different times of a day</td>
<td>Pia</td>
<td>Weeks 16-23</td>
</tr>
<tr>
<td>Contact new company, plan meeting to solve problem</td>
<td>Hans</td>
<td>Call in week 16 and agree on a timeframe for installation, Goal: ‘no boils’ in the entire facility by week 36</td>
</tr>
</tbody>
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---

**Action plan: chr xxxx, location « langgaard »**

- **Aim:** Optimize water supply
- **Current situation:**
  - Water nipples in 3 sections placed too high;
  - Water pressure not checked for a while – assumed too low, but unknown;
  - Previous attempts to eliminate boils unsuccessful, by a different approach
- **Date:** April 10, 2019

**Action Plan Details:**

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The castration problem

DK – Local anastasia
From 01/01 2019 used in all sow units
Ongoing research

Castration

Local anaesthesia | General anaesthesia

Entire male production

RIGHT WAY

Gender sorted semen

Immuno castration
The Danish pig industry’s initiative

Danish legislation:
From 1 January 2018, farmers were allowed to give a local anaesthesia to piglets prior to castration, if they have completed a course

Industry initiative:
From 1 January 2019, The use of local anaesthesia will be introduced as a requirement in the Danish pig producers quality assurance program DANISH Product Standard
SAFE AND PAIN-FREE CASTRATION IN 6 STEPS
Different approaches

Hand-held

Castration bar

Castration bench
Organising routines

- Iron
- Baycox
- Ear tagging
- Painkiller
- Vaccination
- Tails
Costs

Local anaesthesia  0,7 euro
Castration incl. pain relief  1,3 euro
Total cost pr. male pig  2,0 euro
What do we do now - status activities?

- Selection of fathers/boars with low/high boar taint
- Concept test “male pigs without taint”
  - Selection of fathers/boars combined with feeding and management
- Life span animal welfare male pigs/castration
- EU cooperation project **immunocastration**
- Sexing of semen still not possible!
  - We are monitoring the development in Canada
DANISH Product Standard

Scope
• Since 2007
• Production of Danish pigs
• Approx. 3,000 audits per year

Aim
• Assurance and documentation that all Danish pig farms comply with Danish legislation and industry agreements
• Focus on animal welfare, food safety and traceability

Accreditation
• The scheme is accredited to EN17065
• Audit – at least every three years (UK Contract every year)
• Third party – partly ‘unannounced’ (20% 'unannounced' with up to 48 hours warning)
Key areas

Around 160 check points covering:

- Traceability
- Feed
- Health and use of medicine
- Animal welfare
- Housing and equipment
- Management
- Delivery of pigs

Deviations from the standard can result in withdrawal of certificate.
THE END – time for questions