Proven welfare and resilience in organic pig production

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The POWER team

AARHUS UNIVERSITY BOKU CENTRE FOR FREE RANGE LIVESTOCK crea Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria FiBL INRAE RI. SE Research Institute of Sweden THÜNEN WAGENINGEN UNIVERSITY & RESEARCH

Aim

To support the development of a variety of **resilient** and **competitive** organic pig production systems across Europe with low **ecological footprints** and high **animal welfare**

Focus – animal groups and systems

Piglets → Weaners → Growing pigs → Finishing pigs

Birth — Weaning — Slaughtering

Combined housing and free-range systems




1. Piglets and weaners

Piglets → **Weaners** → Growing pigs → Finishing pigs

Birth — Weaning — Slaughtering

Improvement of piglet survival and piglet health/growth

- Focus on the piglets and the sow

Innovations investigated
Piglet survival

Genetic selection

Farrowing pen size

Piglet nest design

Photos: S. Ferchaud (INRAE), H. Vermeer (WUR), K. Heidbüchel (TI-OL)

Innovations investigated
Piglet health and growth

Iron status and injection alternatives

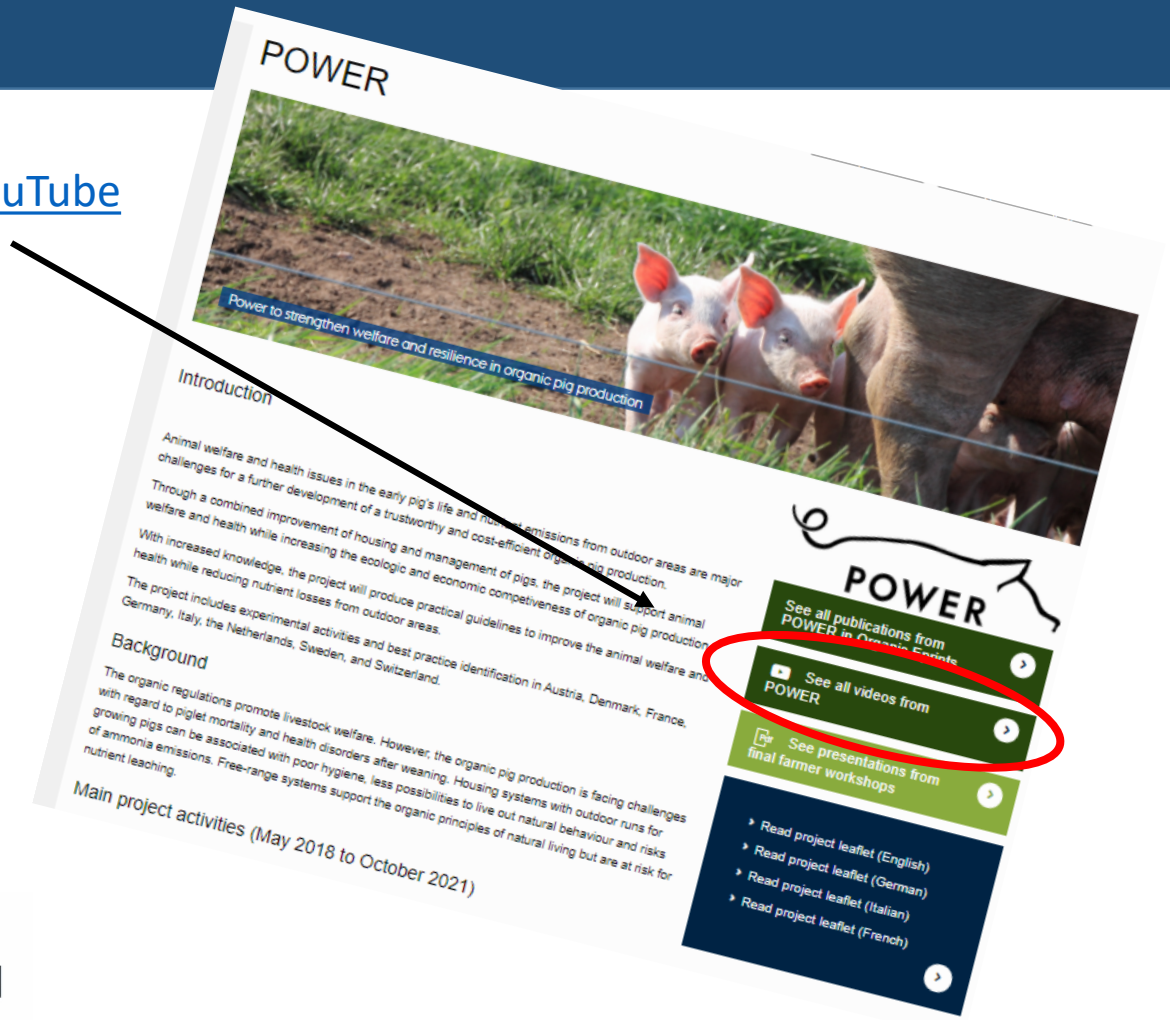
Forest litter probiotics

Extended lactation and lactational oestrus

Photos: E. Merlot (INRAE), D. Bochicchio (CREA-ZA), M. Hestbjerg (www.hestbjerg.dk)

Project findings - use of piglet nest and piglet nest design

[Nutzung des Ferkelnests in den ersten Lebenstagen - YouTube]



THÜNEN

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Project findings - Iron status and injection alternatives

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Specificity of organic farming

- Iron supplementation
  - Rarely practiced in free-range farms
  - Frequently practiced indoors

What is the iron status of piglets in free-range and indoor organic farms?

Iron status of piglets in outdoor and indoor organic farms

Farms of the great west of France
18-30 piglets per farm
42 days of age (weaning)

10 indoor farms

11 outdoor farms

Iron status of piglets in outdoor and indoor organic farms

Farms of the great west of France
18-30 piglets per farm
42 days of age (weaning)

10 indoor farms

11 outdoor farms

Indoors

Satisfactory iron status

with a minimal 200 mg iron injection

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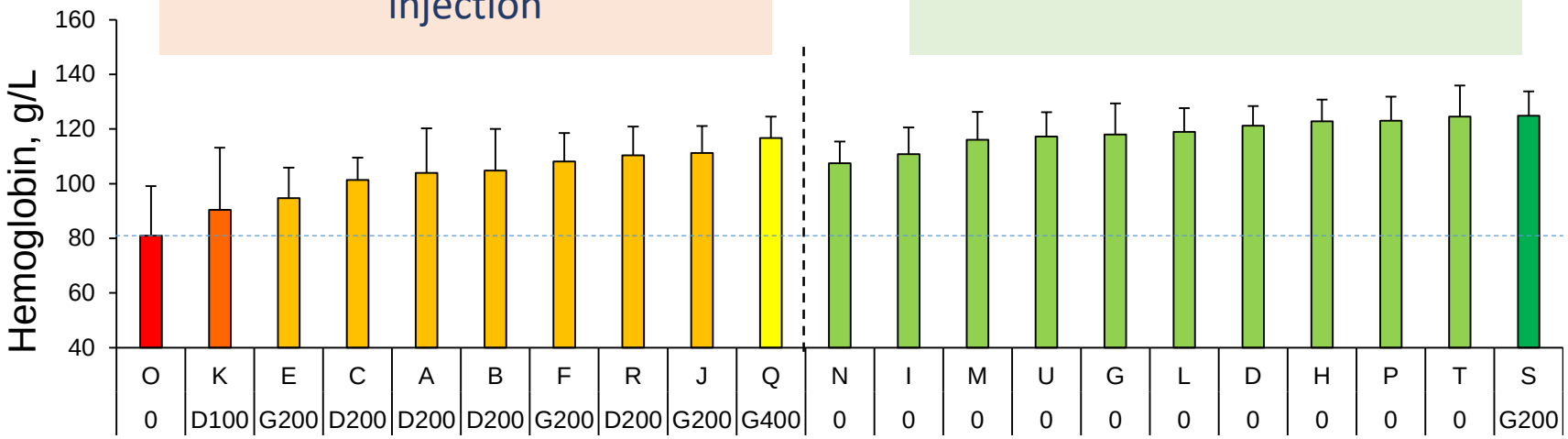
Outdoors

Satisfactory iron status

Without iron supplementation



Dose of injectable iron (D: dextran, G: Gleptoferon)

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Recommendations: how to provide for the iron needs of piglets?

Outdoors

Iron supplied by the soil

No need for iron supplementation

Unless low bioavailability of iron in the soil

Indoors

Necessary supplementation

200 mg iron per injection

Or oral paste or powder distributed on peat

Need for efficient alternatives to injectable iron

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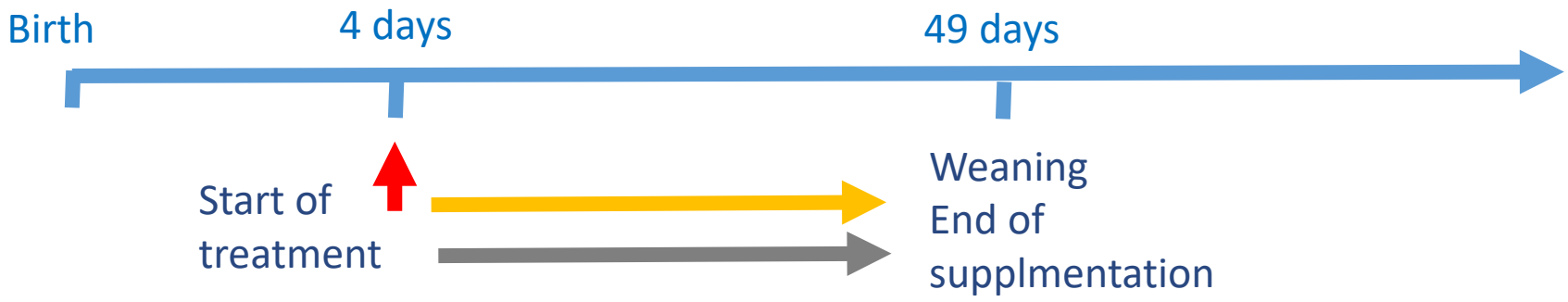
Innovation tested: could the consumption of soil or peat replace the injection of iron?

100 mg dextran iron at 4 days N=48

Soil from 4 to 49 days N=43

Peat from 4 to 49 days (Briere black peat) N=42



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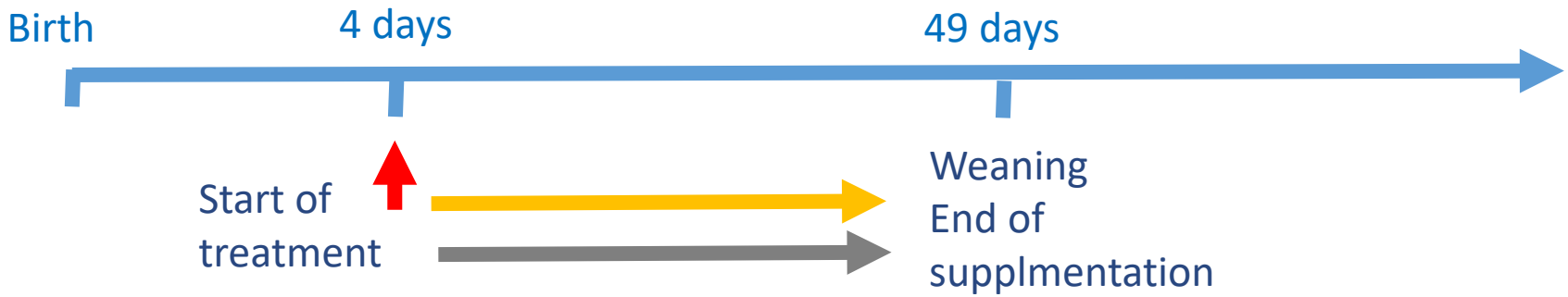

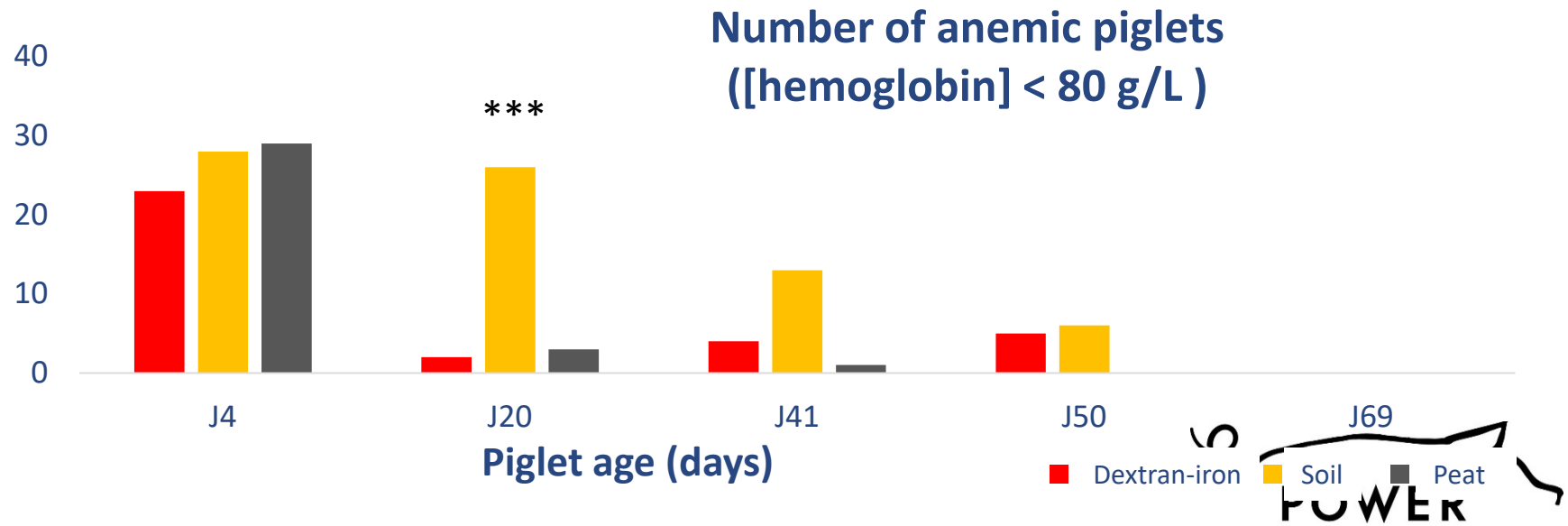

Project findings – Extended lactation

[POWER - YouTube]

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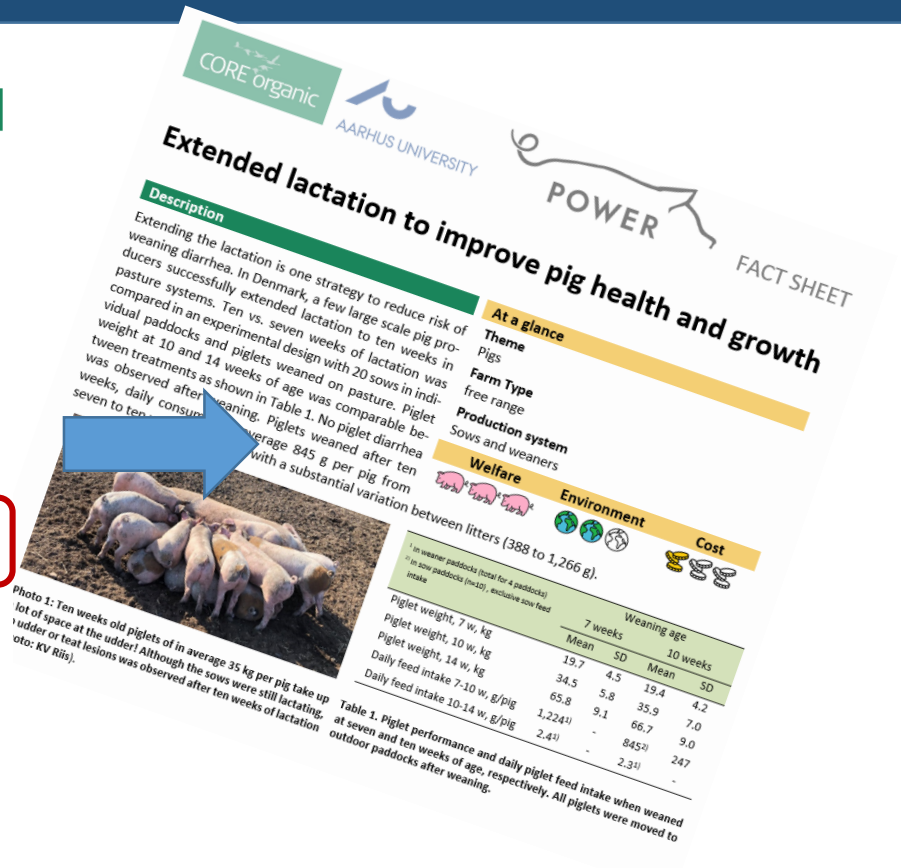
See more (soon) at the website

Recommendations / Requirements

- Weaning at 10 weeks is a good strategy if a high piglet feed intake can be achieved before weaning
- Weaning at seven or ten weeks of age seem to be equally suitable strategies to obtain good piglet health and very high piglet growth rates until 14 weeks of age if piglets stay in an outdoor environment after weaning
- Piglet feeding *before* weaning: Access from two weeks of age, locate piglet feed dispensers close to the hut, use dispensers of sufficient space to allow several pigs to eat simultaneously, and provide shelter to dispensers to protect the pigs from rain and wind when eating
- Piglet feeding *after* weaning: Mix pre- and post weaning feed mixtures the first few days after weaning to avoid abrupt change in feed
- If breeding/insemination is not possible before weaning, keep lactating sows in single paddocks and without boar contact to reduce risk of lactational oestrus
- In pasture concepts, increase paddock size, move huts and feeders regulary and reduce sow feed protein content at the end of lactation when the milk production is declining to reduce risk of nutrient losses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FACT SHEET

Extended lactation to improve pig health and growth

Description

Extending the lactation is one strategy to reduce risk of weaning diarrhea. In Denmark, a few large scale pig producers successfully extended lactation to ten weeks in pasture systems. Ten vs. seven weeks of lactation was compared in an experimental design with 20 sows in individual paddocks and piglets weaned on pasture. Piglet weight at 10 and 14 weeks of age was comparable between treatments as shown in Table 1. No piglet diarrhea was observed after weaning. Piglets weaned after ten weeks, daily consumed an average 845 g per pig from seven to ten with a substantial variation between litters (388 to 1,266 g).

At a glance

Theme: Pigs
Farm Type: free range
Production system: Sows and weaners
Welfare
Environment
Cost

Photo 1: Ten weeks old piglets of in average 35 kg per pig take up lot of space at the udder! Although the sows were still lactating, udder or teat lesions was observed after ten weeks of lactation (photo: KV Riis).

	Weaning age			
	7 weeks		10 weeks	
	Mean	SD	Mean	SD
Piglet weight, 7 w, kg	19.7	4.5	19.4	4.2
Piglet weight, 10 w, kg	34.5	5.8	35.9	7.0
Piglet weight, 14 w, kg	65.8	9.1	66.7	9.0
Daily feed intake 7-10 w, g/pig	1,224[1)]	-	845[2)]	247
Daily feed intake 10-14 w, g/pig	2,4[1)]	-	2,3[1)]	-

Table 1. Piglet performance and daily piglet feed intake when weaned at seven and ten weeks of age, respectively. All piglets were moved to outdoor paddocks after weaning.

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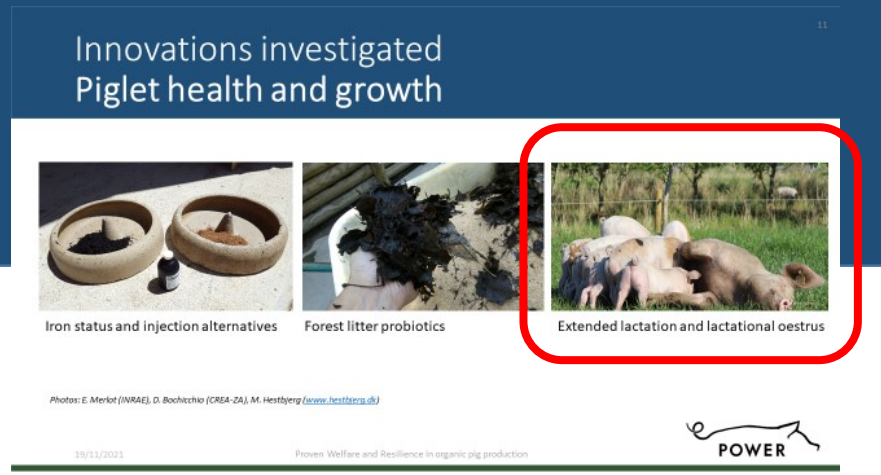
Lactational oestrus



Danish organic sow herds – increased lactation period

	2013	2020
Laktationsperiode/kuld, dage	51,5	58,7
Fravænnede grise/kuld	11,0	12,5
Fravænningsvægt, kg	14	16
Spildfoderdage	19,5	15,3
Kuld/årsso	1,95	1,92
Fravænnede grise/årsso	21,5	24,0

Christiansen, 2021. Grundlag for den beregnede notering for økologiske smågrise – oktober 2021

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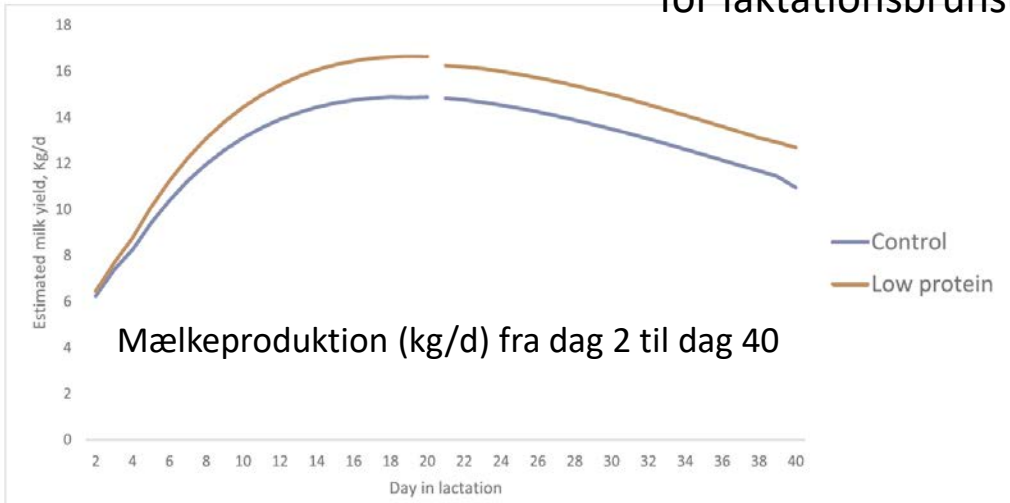
Stigende risiko (eller chance!) for laktationsbrunst



Mælkeproduktion (kg/d) fra dag 2 til dag 40

Eskildsen et al., 2020

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Factors stimulating lactational oestrus

- Late weaning (low milk production)
- Boar contact
- Grouping
- High sow feed intake
- Age
- High rank
- Intermittent suckling (separation)
- Stimuli-rich environments
- Season (Dec->Feb)

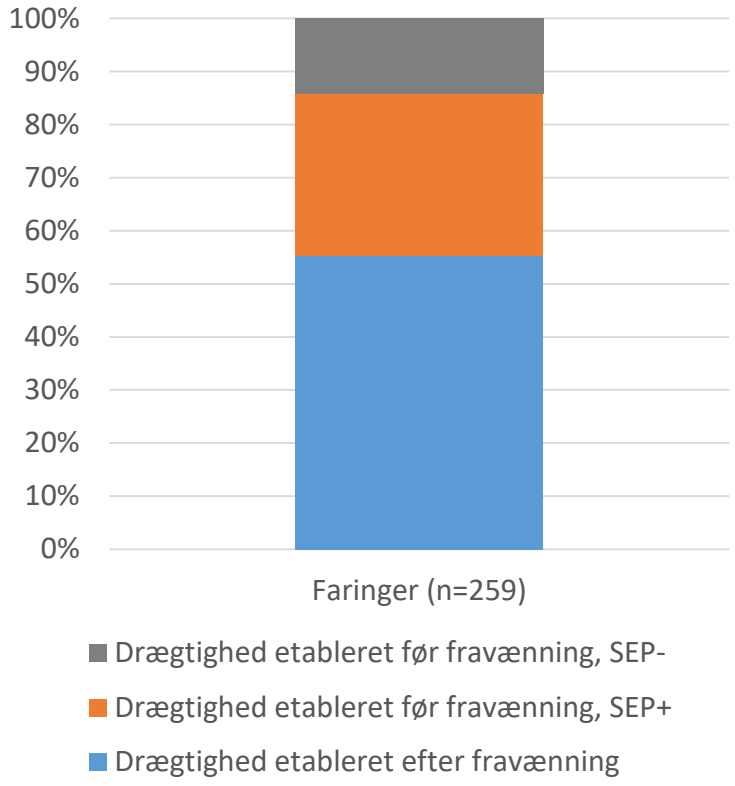
Kongsted & Hermansen, 2009: Induction of lactational estrus in organic piglet production. Theriogenology 72: 1188-1194
Van Wettere et al., 2019. Controlling lactation oestrus: The Frontier for breeding herd management. Molecular Reproduction Development 84: 883-896

Commercial farm

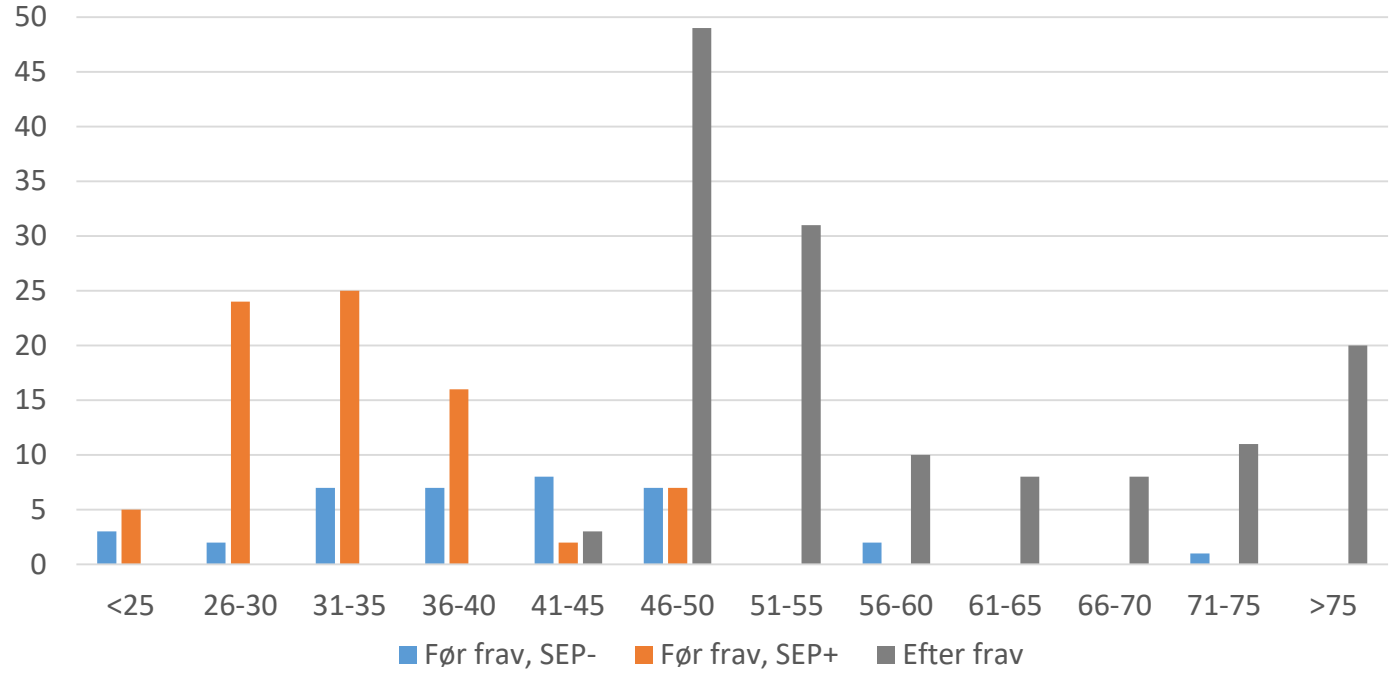
- Outdoor production
- Weaned after seven weeks
- Short term separation (approx. 2/3 of all sows)
- Sows moved indoor overnight in groups and with boar contact
- The sows coming into lactational oestrus are inseminated on a wagon with the boar in a pen at one end of the wagon

When are the pregnancies established?

Almost 50 % of all pregnancies established *before* weaning



Timing of "establishment of pregnancy"



Is it problematic to separate sow and piglets short-term after four weeks?

- Frequency of nursings decreases gradually from 3-4 weeks

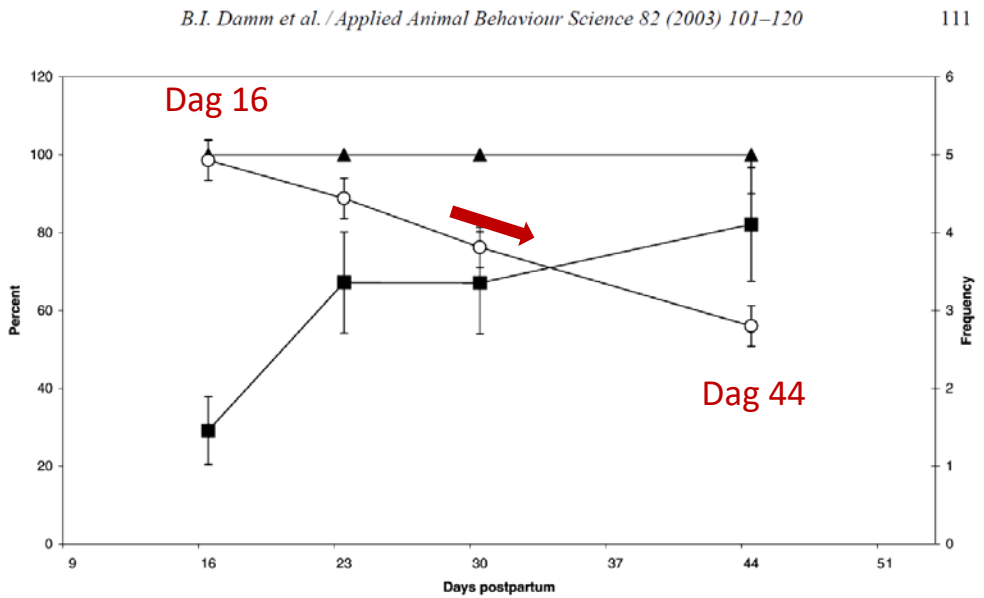


Fig. 2. Nursing behaviour from 16 to 44 days postpartum. Percentage of sow-terminated (▲) and piglet-initiated (■) nursings (both left axis) and frequency of nursings per 4 h observation period (○) (right axis) are shown. The variables are given as means with S.E. except for sow-terminated nursings, which is given as medians and interquantile ranges.

Is it problematic to separate sow and piglets short-term after four weeks?

- Frequency of nursings decreases gradually from 3-4 weeks
- Solid piglet feed intakes increases gradually from 3 weeks

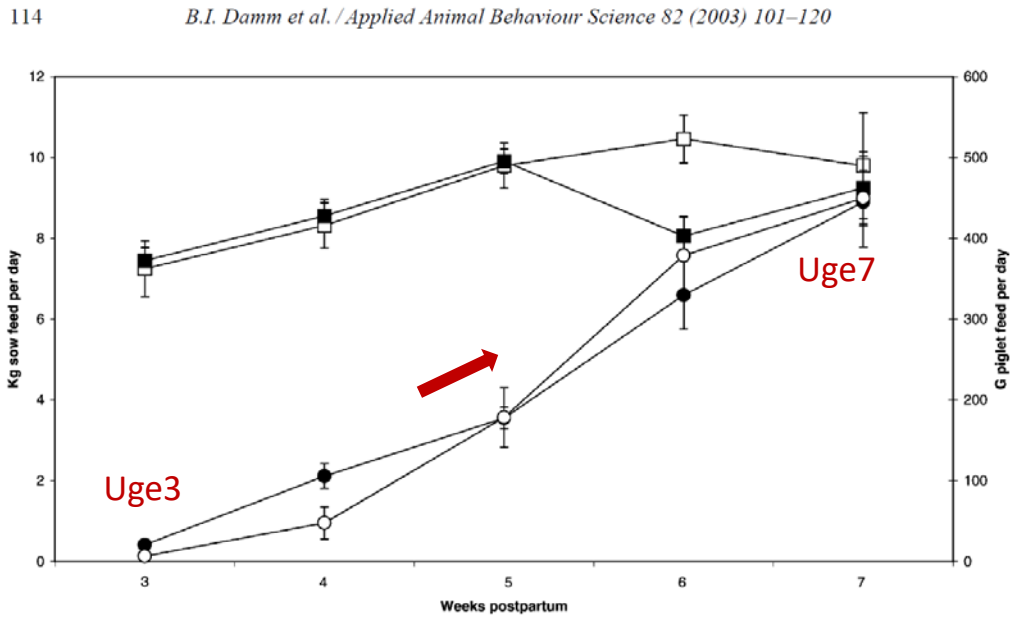


Fig. 5. Sow and piglet feed consumption from the third to seventh week postpartum. Feed consumption, grouped according to sow treatment with sow consumption (infected (■); control (□)), is shown on the left axis; and piglet consumption (infected mothers (●); control mothers (○)) is shown on the right axis. The variables are given as means with S.E.

Is it problematic to separate sow and piglets short-term after four weeks?

- Frequency of nursings decreases gradually from 3-4 weeks
- Solid piglet feed intakes increases gradually from 3 weeks
- But what about the piglet behaviour while they are separated?

Bushnell
Bushnell 2019/02/05 03:08:13


Kortvarig aktivitet, ca. kl. kl. 23, 00, 06, 07 ->
indtil soen dukker op ca. kl. 07:30

2. Growing/finishing pigs

Piglets → Weaners → **Growing pigs** → **Finishing pigs**

Birth — Weaning — Slaughtering

Improvement of the pigs' possibility to perform natural behavior while improving pen hygiene ($NH_3\downarrow$) **in housing systems**

- Focus on the outdoor run

Project findings – a review of the literature

How to design outdoor runs to fulfill the pig's behavioural needs/improve hygiene

- Introducing **additional resources** like rooting areas and showers may increase the attractiveness -> more pigs outside
- Good opportunities to divide the outdoor run into **different functional areas** for activities -> exploration, thermoregulation and elimination
- This may not only improve animal welfare but also **reduce risk of ammonia emission**

Review : Design matters - A **legislative**, **ethological** and **environmental** perspective on concrete outdoor runs for organic growing-finishing pigs

H.M. Vermeer[1a], C. Wimmler[2a], C. Leeb[2], E. Salomon[3], H. M-L. Andersen[4]

Submitted to Animals January 2021

Outdoor run – Innovations investigated in experimental designs

Rooting area

Roughage

Shower

Daily scraping
Ammonia emission

Photos: L.D. Jensen (CFF), C. Wimmler (BOKU), Eva Salomon (RISE)

Rooting area

- Two different rooting materials: soil vs. wood chips (DK):
- Compost with or without feed pellets (CH):

Roughage

- Indoor vs. outdoor location (DK, AT)
- Effect of novelty (changing between clover-grass and whole-seed silage) (DK)

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Shower

- Compared different shower durations (10 min vs 30 min per hour) (AT, CH)

Enrichment of outdoor runs - concluding remarks

- The “enrichment” increased the use of the outdoor run
- Frequent use of the “enrichment”
- The showers reduced skin-surface temperature and lateral lying = indicators of heat stress
- No clear effects on soiling* and hygiene but the “enrichment” make it easier for the pigs to divide the outdoor run into various functional areas
- *Soiling tended to be lower in pens with showers in the outdoor run

Daily scraping

- Effect of daily scraping the “toilet-part” of the outdoor run on ammonia emission (S)
- The “toilet area” had up to 84 times higher ammonia-emission than the dry area
- Scraping the “toilet area” decreased ammonia-emission (up to 17 times lower)

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3. Combined systems

Piglets → Weaners → Growing pigs → Finishing pigs

Birth — Weaning — Slaughtering

Combined housing and free-range systems




Identification / evaluation of best practice / innovative concepts

Stakeholder inputs

120 stakeholders across Europe

	Housing	Free-ranging
	Large diversity in group size, roofing, provision of roughage etc. between countries!	Under pressure in many European countries
+	Controlled housing climate, individual handling of pigs (fairly) easy, possible to collect manure for use in the crop rotation	Robust animals, lower infection rates, good opportunities to perform natural behavior, low investment costs, high consumer acceptance
÷	Limited opportunity to perform natural behavior (e.g. rooting), poor hygiene/high risk of ammonia emission from outdoor runs, high investment costs	Heavy workload, (often) no premium price, risk of nutrient leaching, and concerns about biosecurity (ASF)

How to combine to have “the best of both worlds”?

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Innovative concepts evaluated

DK (mobile concept)

I (agroforestry)

CH (mobile concept)

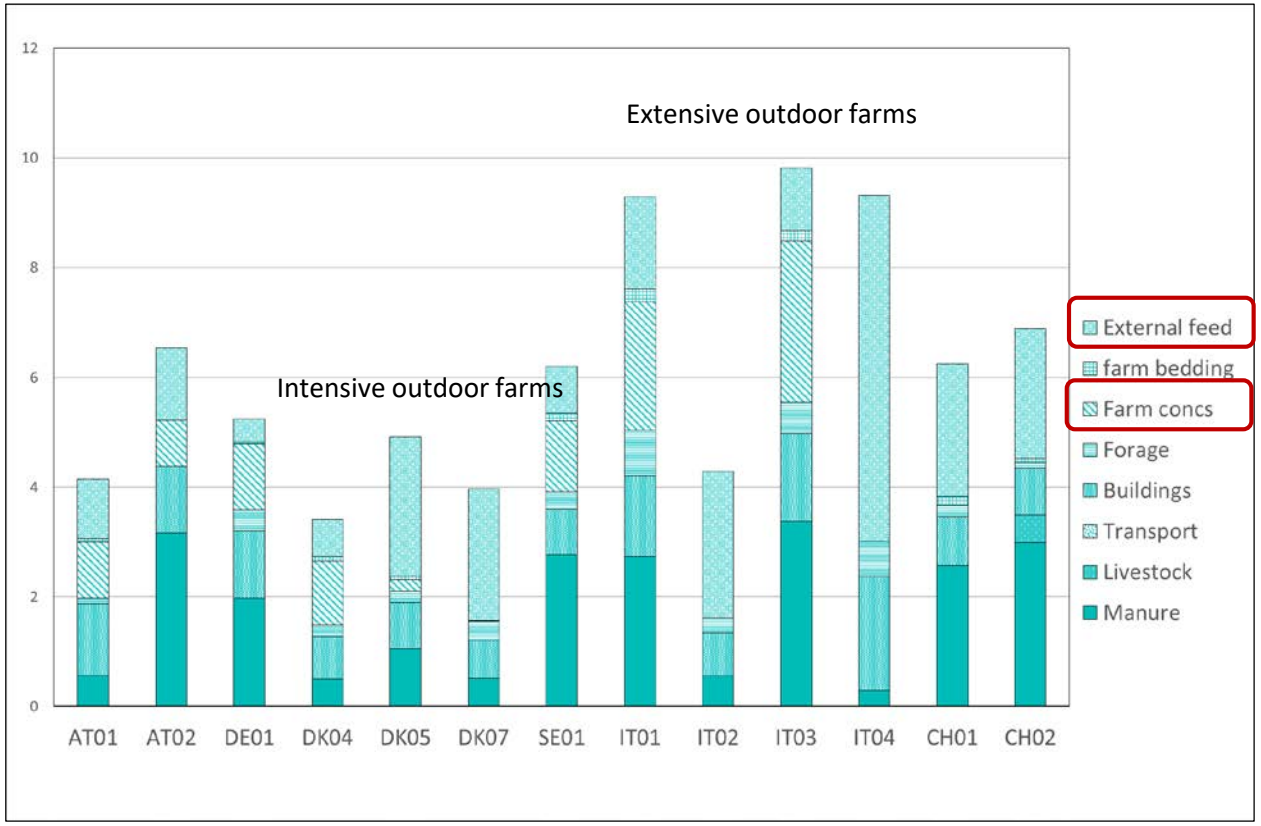
Innovative pasture systems from Denmark and Italy - YouTube

Sau Karavan - Bodenschonende Schweinehaltung auf Dauergrünland (CORE Organic POWER) - YouTube

Photos: AG Kongsted (AU), B. Früh (FiBL), D. Bochicchio (CREA-ZA)

Overall assessment - environment

Greenhouse gases (GWP100) per kg weaned piglet (~13kg)



Sow herds: Huge variation!

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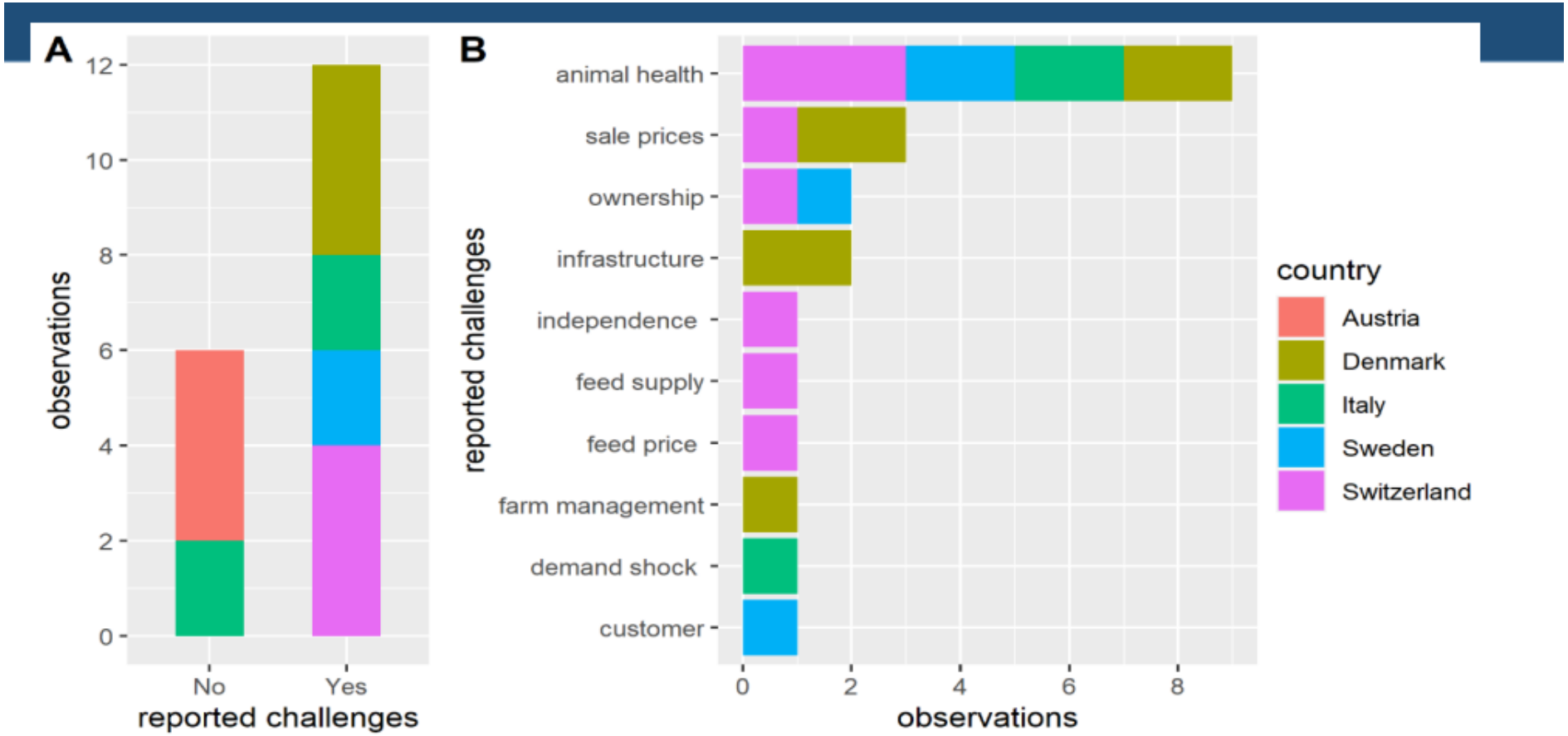
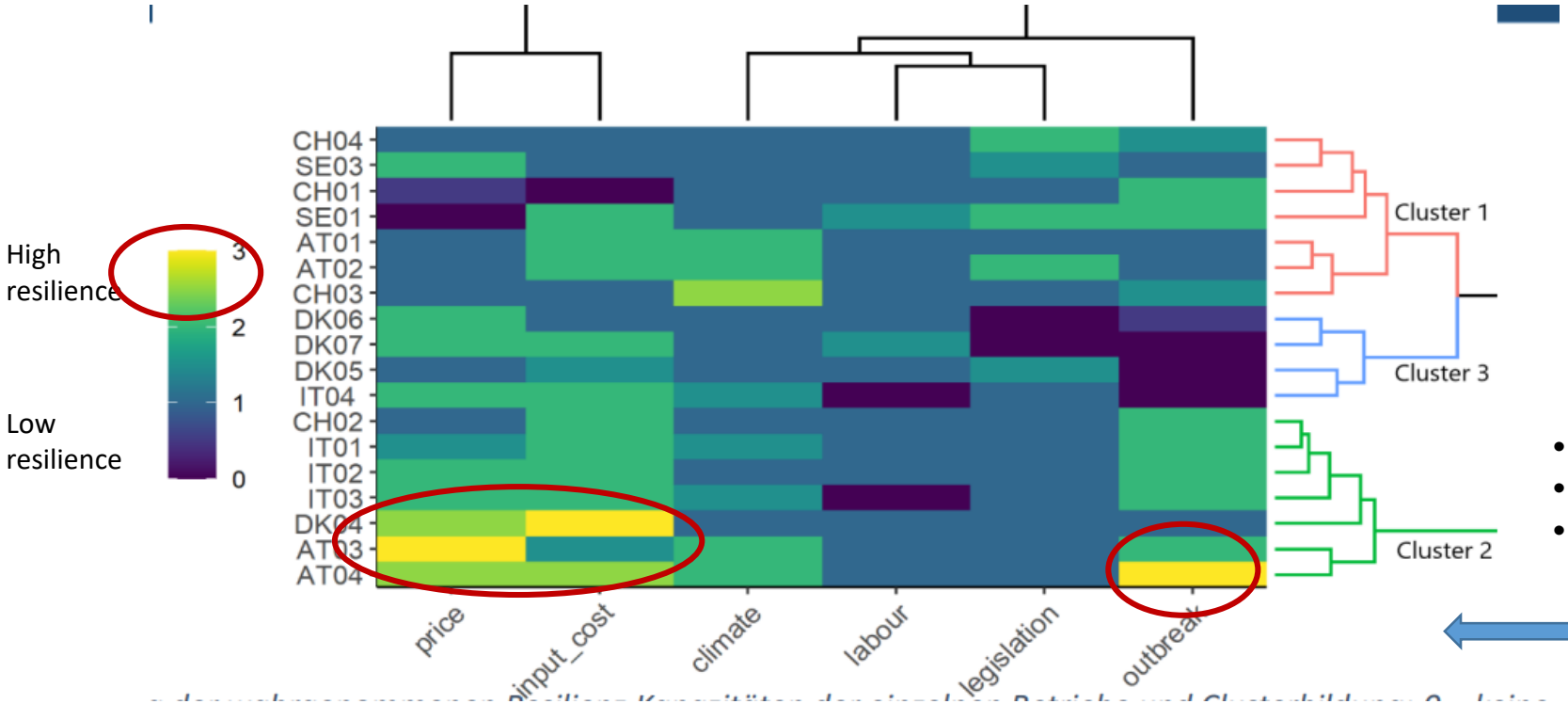
Overall assessment – resilience
Reported challenges

Ability to cope with stressors



Overall assessment – (perceived) resilience

"If you experience a challenge, how resilient is your system"



- Low animal density
- High feed self-supply
- Diversified production (not only pork)

Predefined challenges/stressors

Organic pig production
We need to keep on moving forward…

- To improve **intact** pigs' possibility to perform **natural behavior** in **sustainable** concepts
  - No castration/tail docking
  - Extended lactation
  - Pasture access - e.g. in mobile and agroforestry concepts
  - Local feed sources - not competing with human nutrition**!**
- To increase **diversity** from farm to fork to meet diverse consumer segments
- To support the development of new organic systems and practices realising the **pig's organic potential/role**

http://www.byensnetvaerk.dk/da-dk/arrangementer/2019/skovtårnet-ved-gisselfeld.aspx

Thank you!

Videos and presentations from farmer workshops (and soon fact sheets) available at the POWER website

https://projects.au.dk/coreorganiccofund/core-organic-cofund-projects/power/

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