Session 28

Breeding for improved animal health and welfare

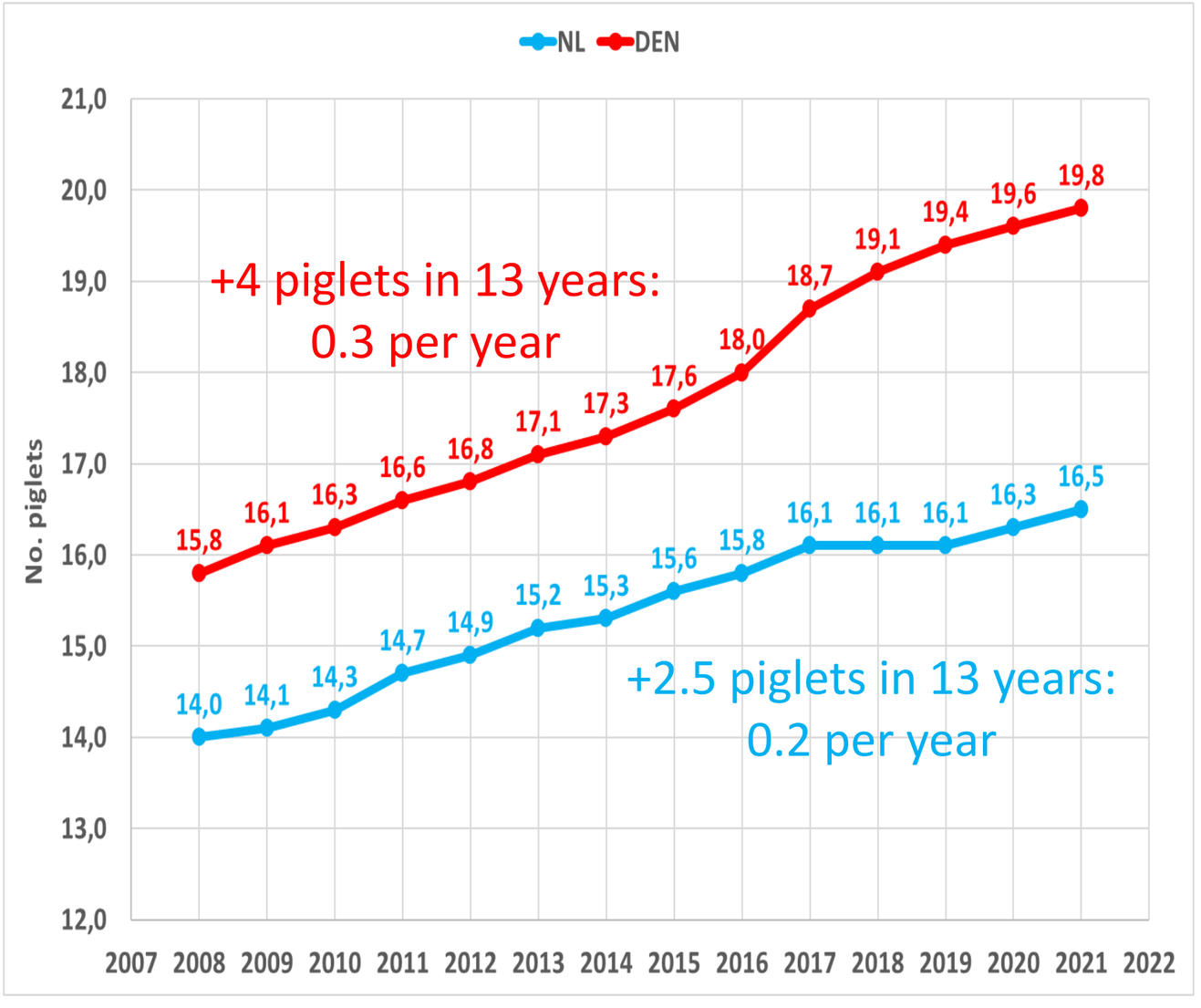
How to balance selection for litter size in pigs with survival, health and welfare

Pieter Knap, Abe Huisman, Christian Sørensen & Egbert Knol

August 2023

EAAP + WAAP + Interbull Congress 2023

Litter size is increasing



high performance potential

low resilience: small mistakes → big trouble

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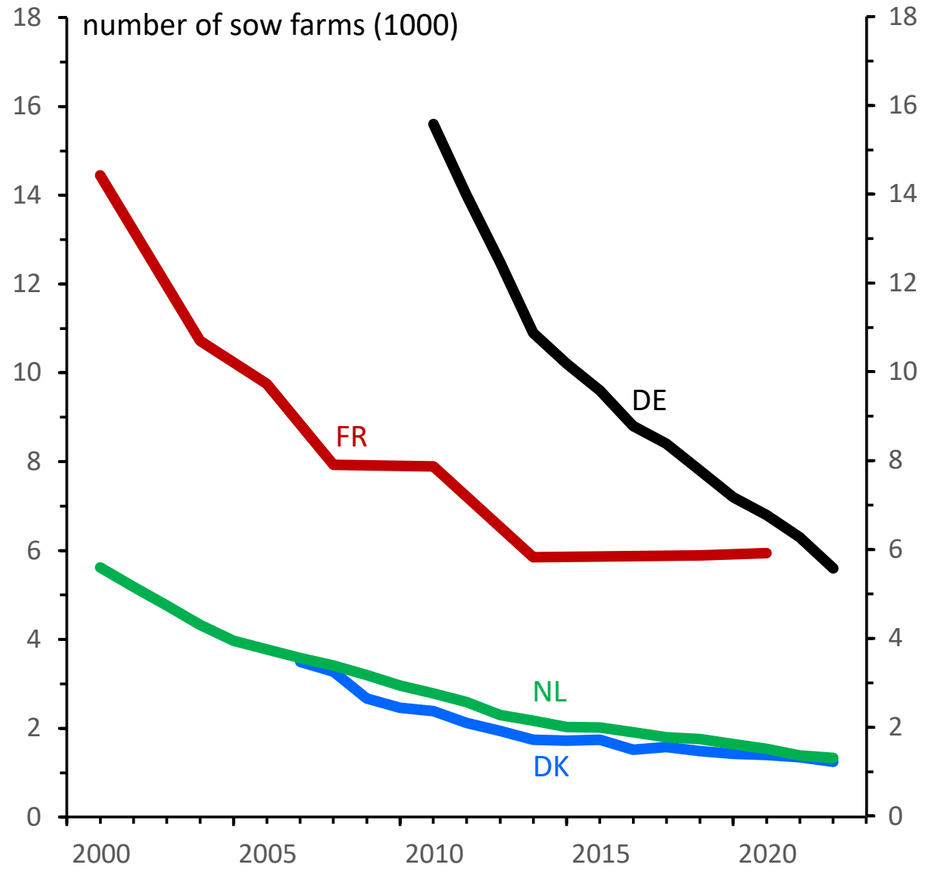
- The number of sow farms in Europe is decreasing very quickly
- Many of the less professional producers are moving out
- → More professional animal management, better technology
- Also supported by pig breeding companies
- At the same time:
  - New constraints such as group gestation, free farrowing
    → less control of the individual animal
  - More difficult to attract high-quality farm staff



www.statistikbanken.dk/HDYR07 www.schweine.net/markt/strukturdaten.html opendata.cbs.nl/statline/#/CBS/nl/dataset/80780NED www.3trois3.com/articles/evolutions-et-diversites-des-exploitations-porcines-en-france_16436

family sow farm in Europe					
year	sows	PWSY	FTE	piglets / FTE	
1984	150	20	1.5	2.000	
2024	600	33	1.0	20.000	x 10

Challenges:

- Time available per individual pig has dramatically decreased; pigs must become more self-reliant
- Reduce need for cross-fostering:
  - **more** teats than piglets born
  - more uniformity in litter size
- If **fewer** teats than piglets born: more labour, rescue decks, motherless rearing – against societal opinion
- Group gestation & free farrowing allow more natural behaviour
- Behaviour to conspecifics and to farm staff will become more important

- The number of sow farms in Europe is decreasing very quickly
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- At the same time:
  - New constraints such as group gestation, free farrowing
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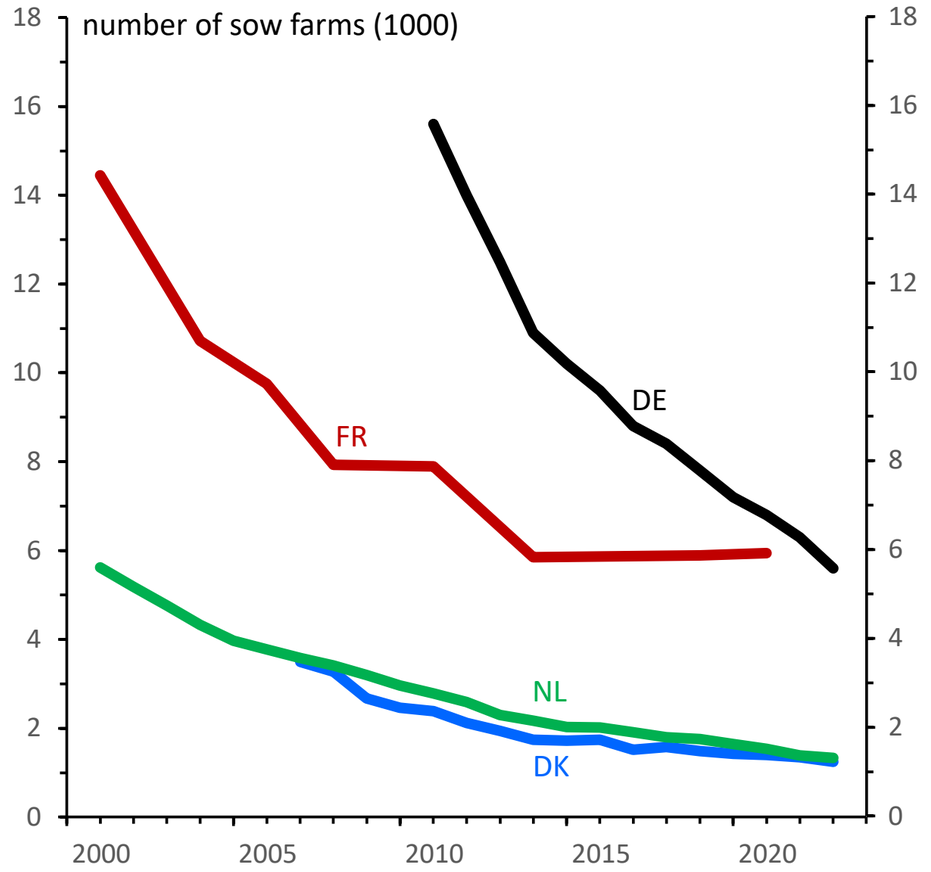
  - More difficult to attract high-quality farm staff
- Requires a more resilient / self-reliant pig



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With a supportive environment, strong performance is easy – also for vulnerable genotypes

upload.wikimedia.org/wikipedia/commons/d/d7/A83_aux_Essarts_%28vue_2%2C_13_septembre_2015%2C_%C3%89duarel%29.jpg encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcTlWyZ4eBumaYreblQ_5xZFPWmX4TIsZiorkZvUn5yHjZmKioHO

More challenging environments require more resilient genotypes – **with** strong performance potential

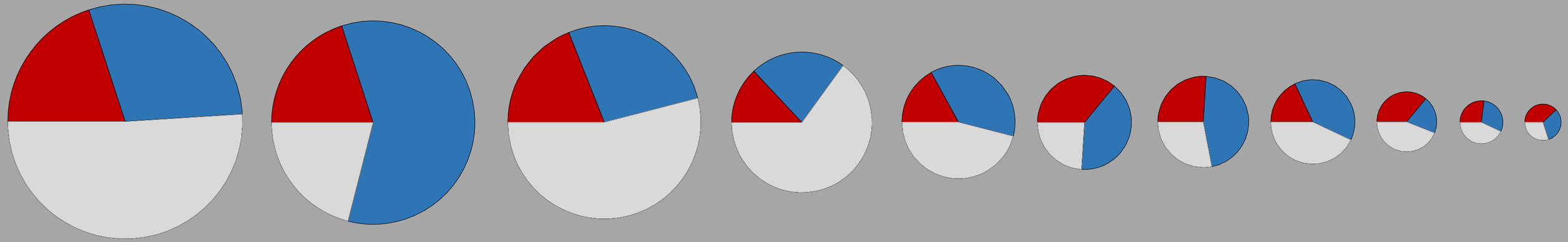
www.turismocanica.com/2018/05/what-country-has-the-best-and-worst-roads-in-central-america

So, we try to breed this

not this

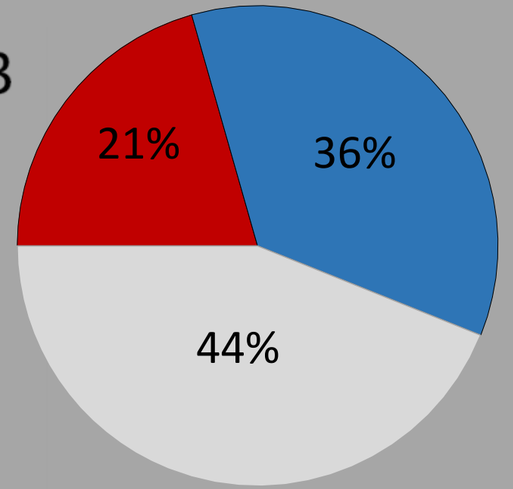
and not this

practicalmotoring.com.au/car-advice/how-to-tow-a-caravan-or-camper-trailer-off-road encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcTqqUIPLJ7HUZX0Qc3i8dFjHex6NWWu5IN_UA1HMYiNJB7zIHqS superclassics.eu/wp-content/uploads/2023/05/Citroen-2CV-AZ-195703-1200x750.jpg



Breeding goal composition of 11 maternal breeding programs, 2022-2023

- **Litter size & weaning-mating interval**
- **Piglet survival, birth weight & teat number**
- Other traits (e.g. feed efficiency)
- Area of each pie: $\sqrt{\text{market share in Europe}}$
- Total: 80 % of European pig production



weighted average

Knap, Knol, Sørensen, Huisman, Van der Spek, Zak, Granados, Lewis (2023) doi.org/10.3389/fanim.2023.1218175

Our challenge is to offer solutions

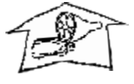
- Producer
- Pig
- People

Producer challenges

Profitability

Labour

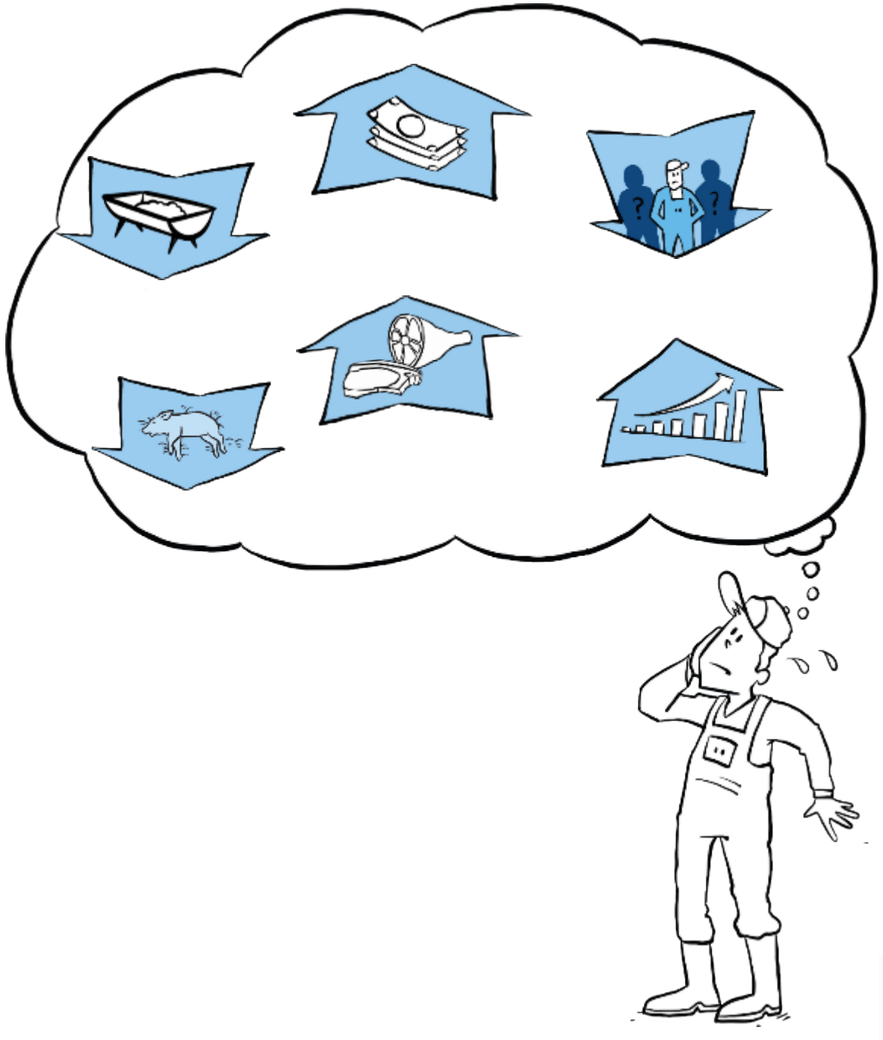
Productivity

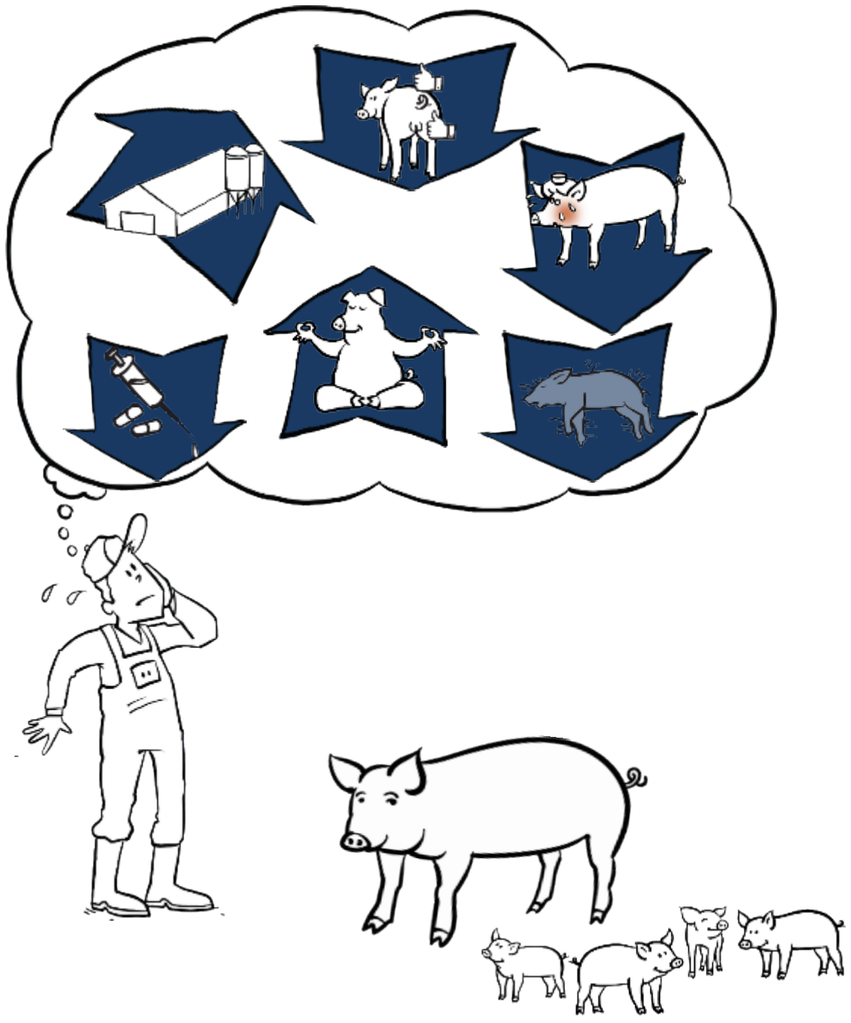


Meat value

Mortality

Feed cost





Pig challenges

- Housing
- Treatments
- Animal stress
- Social behaviour
- Antibiotics
- Mortality

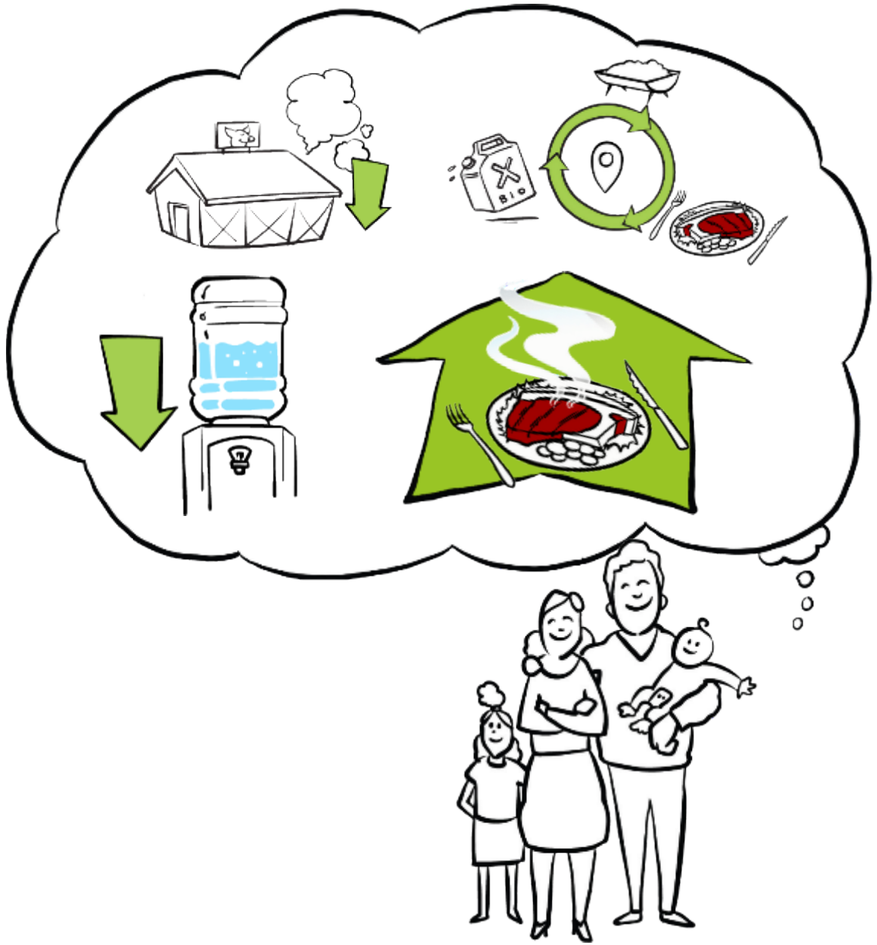
People challenges

Greenhouse gases
Manure

Food – feed – fuel

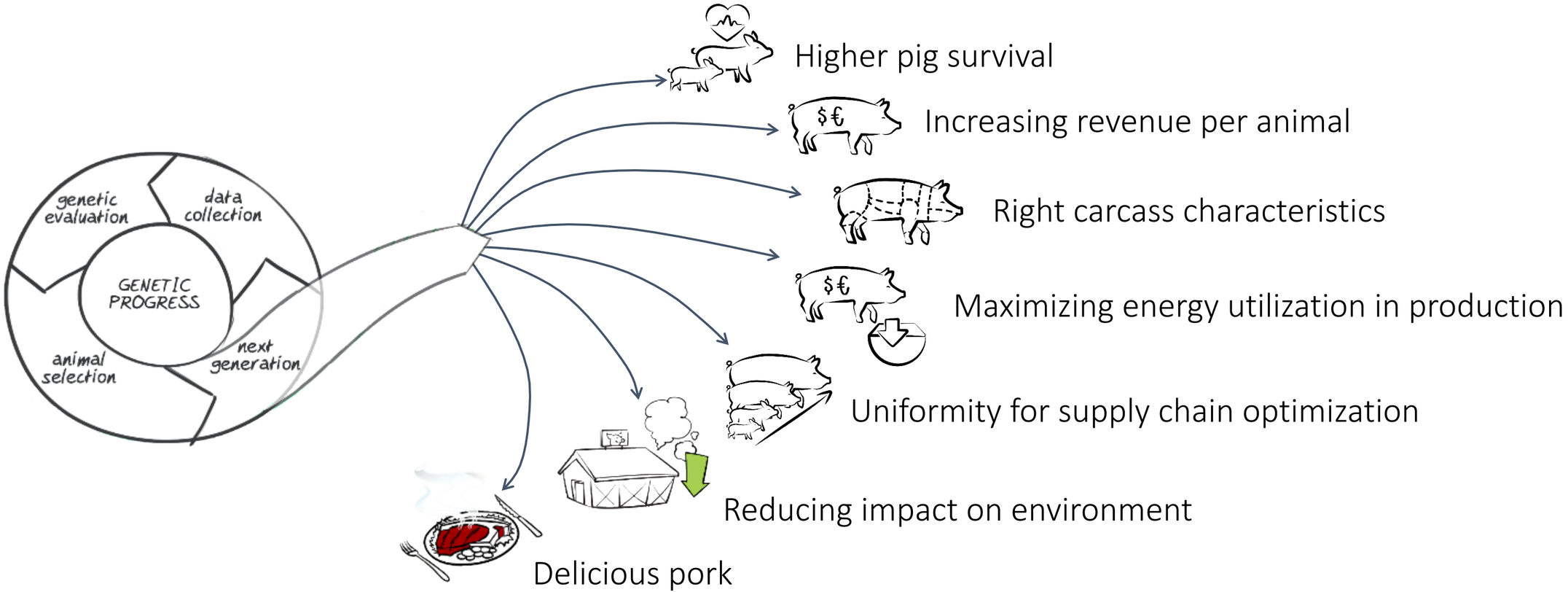
Water scarcity

Meat quality



HENDRIX GENETICS

Genetics provide numerous solutions



HENDRIX GENETICS

Health & welfare, sow & piglet

Piglet:

- Proper gestation length, proper birth weight, uniform litter

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Genetic and phenotypic time trends of litter size, piglet mortality, and birth weight in pigs

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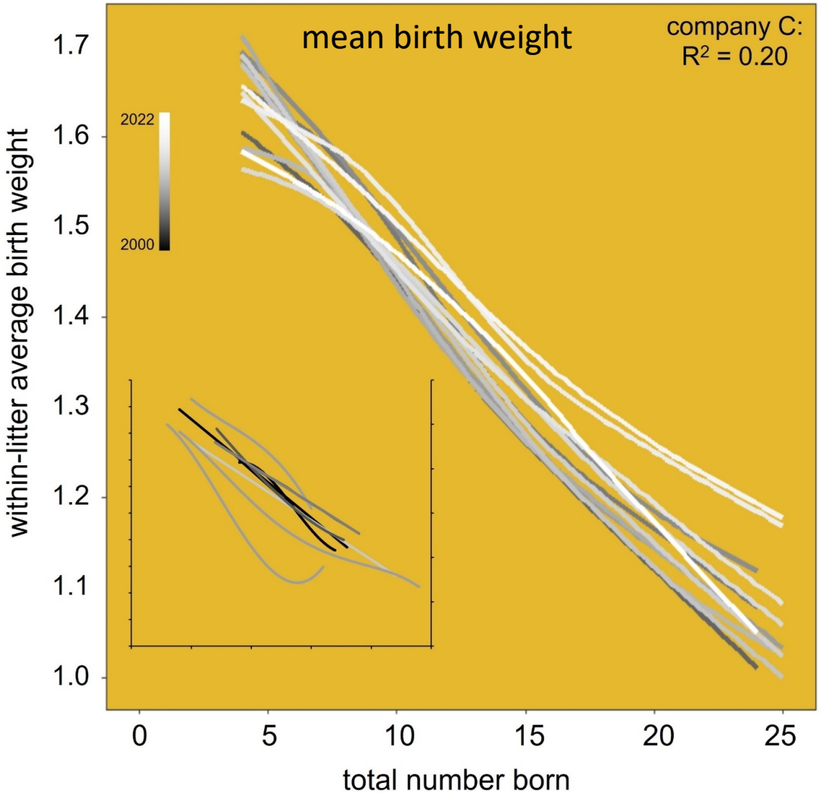
Phenotypic trends: birth weight vs litter size



proper birthweight

uniform litter

uniform litter

Knap, Knol, Sørensen, Huisman, Van der Spek, Zak, Granados, Lewis (2023) doi.org/10.3389/fanim.2023.1218175

Health & welfare, sow & piglet

Piglet:

- Proper gestation length, proper birth weight, uniform litter
- Proper farrowing duration: born in time to get enough colostrum

Larger litters

→ longer farrowing duration

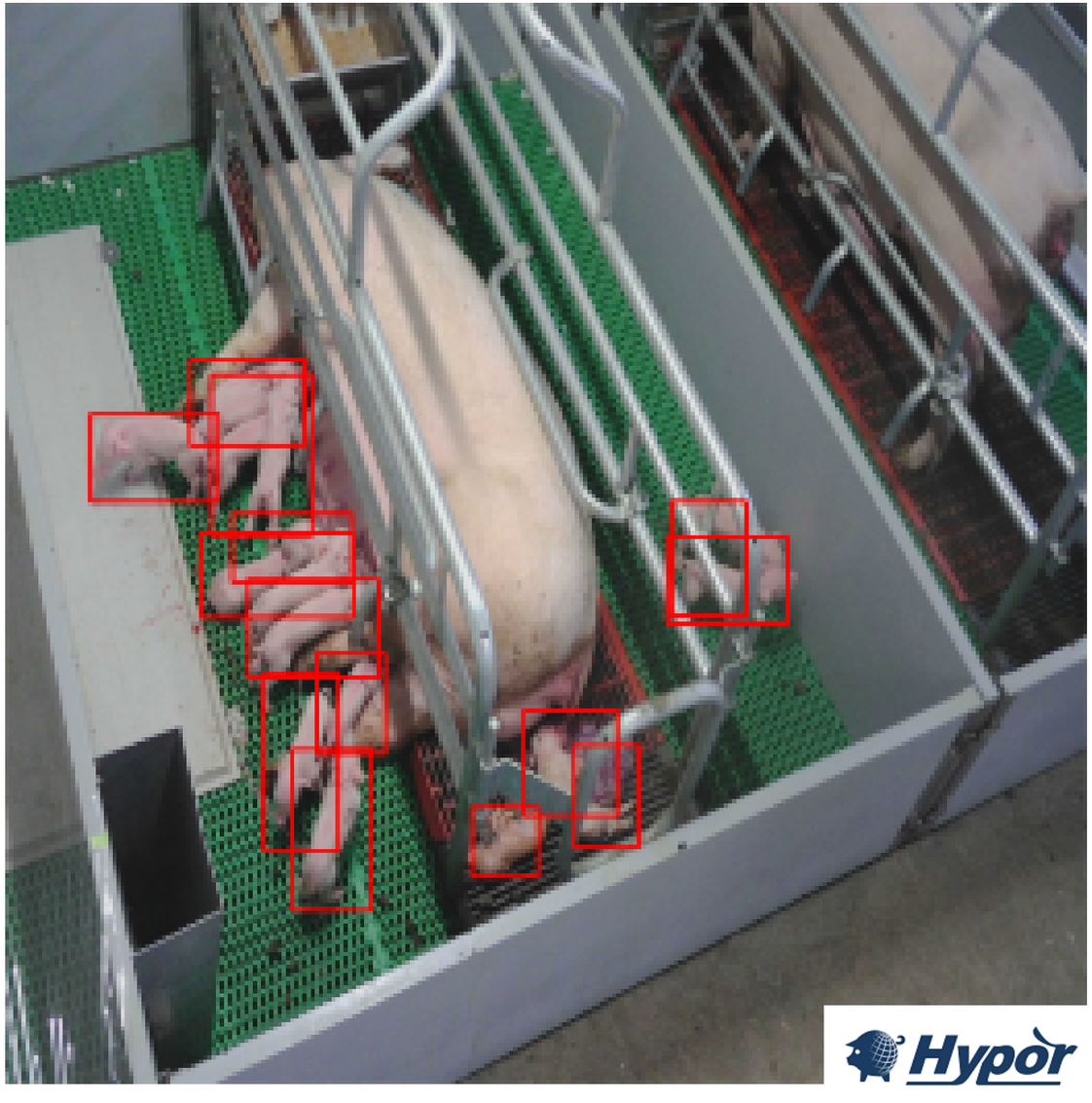
- more stillborn piglets
- more difficult for the sow

Antagonisms, again...

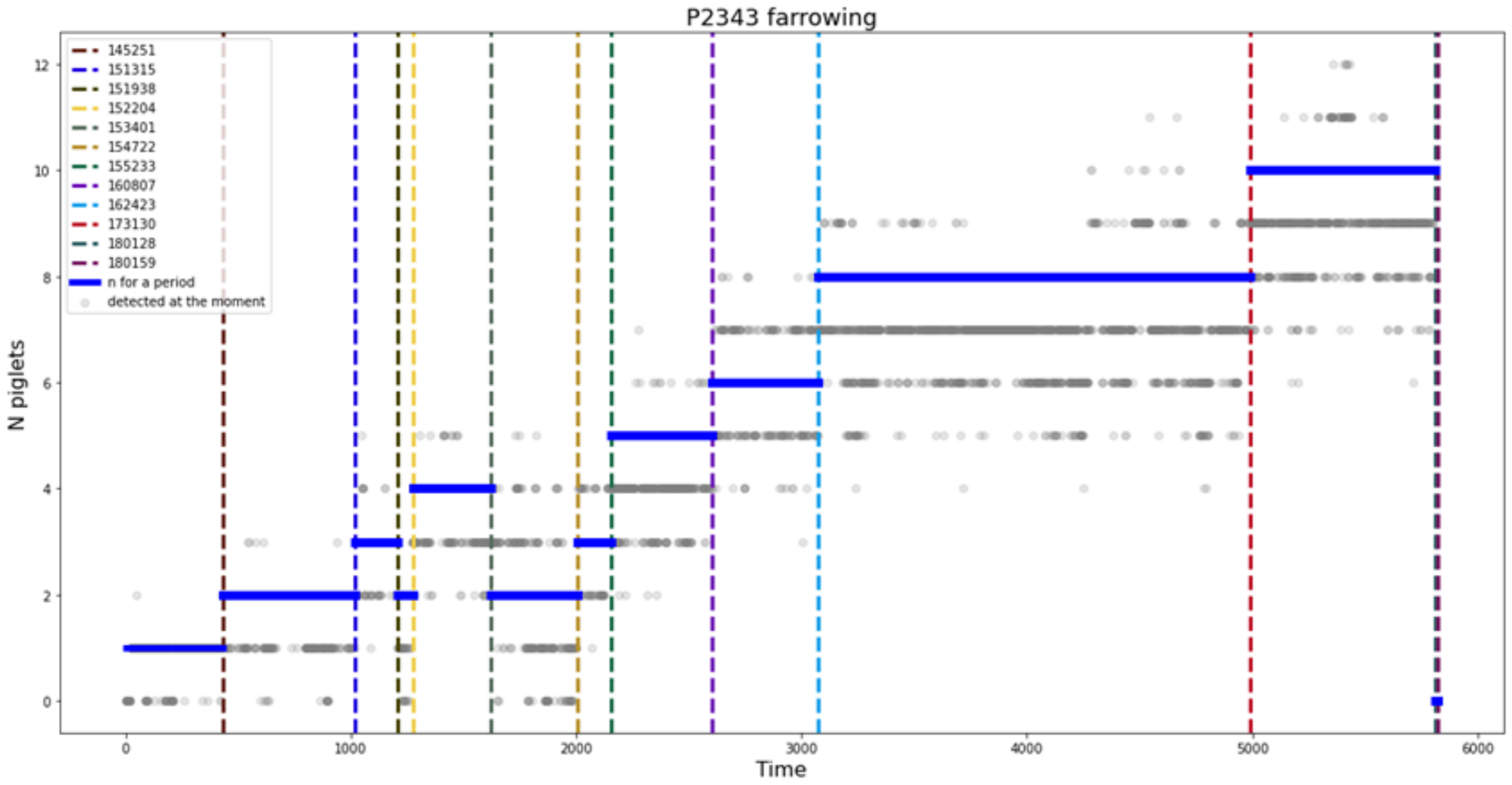
Capture data on the farrowing process

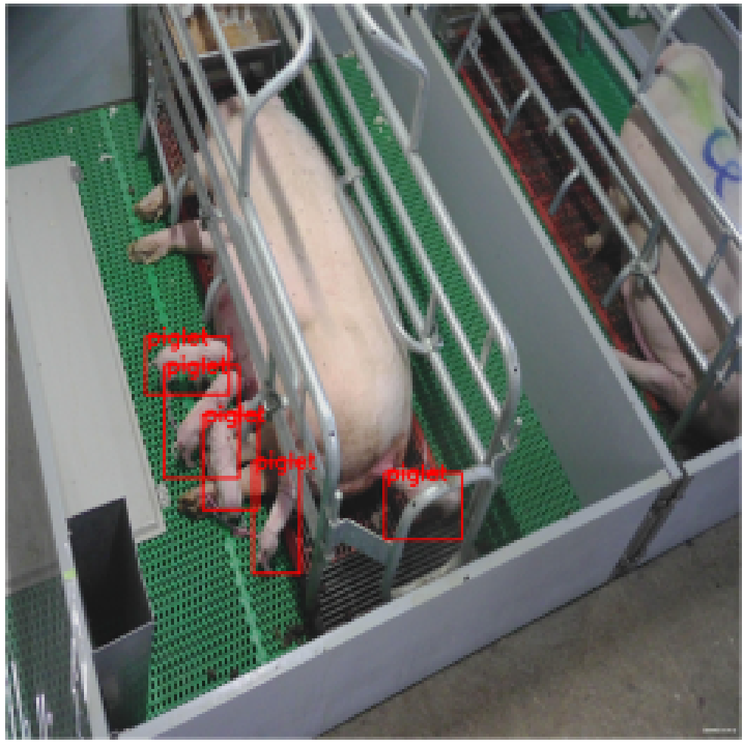
- length
- interval between piglets
- etc

Identify sows able to farrow without hiccups



Monitoring the farrowing process





Hypor

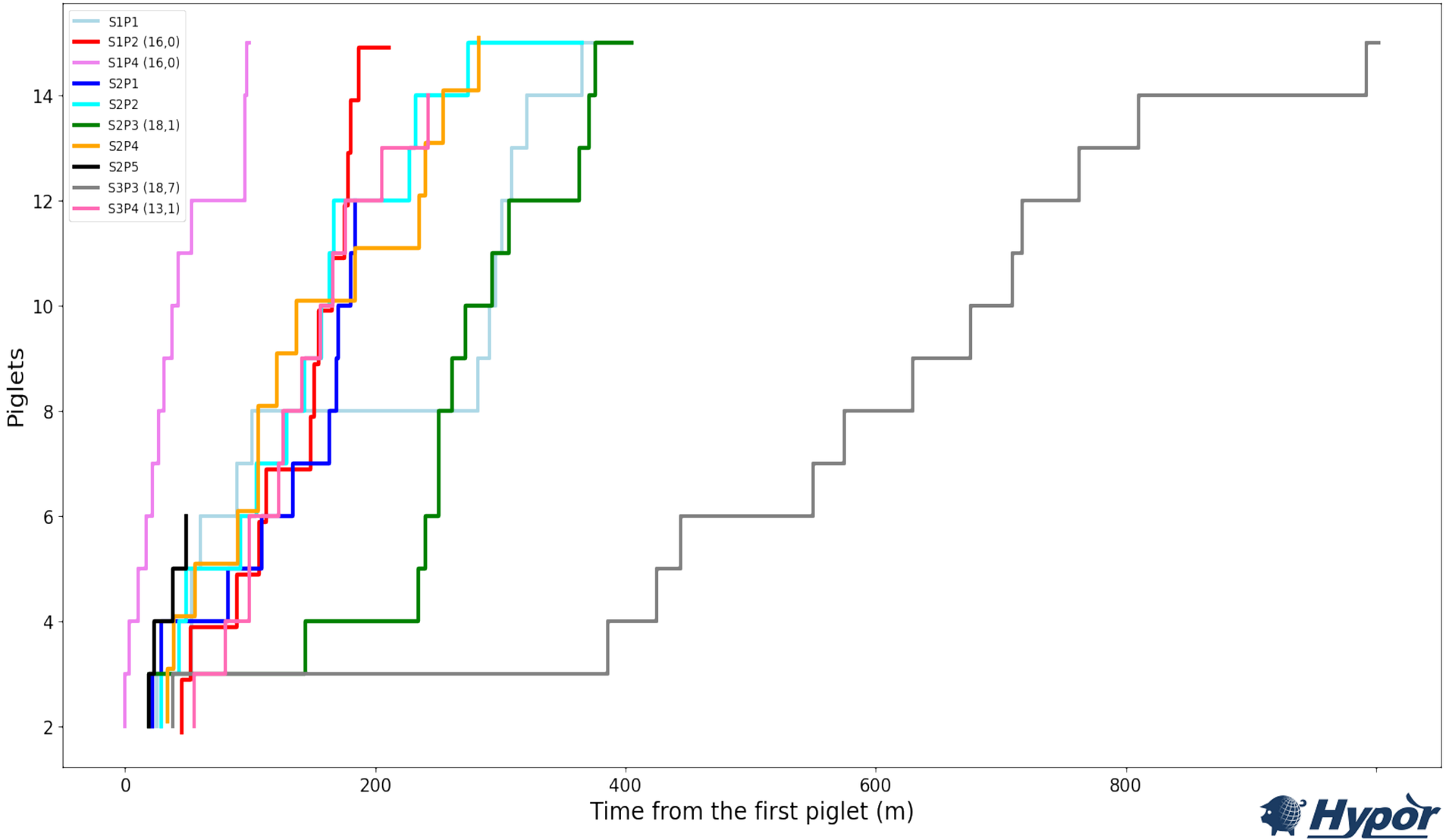
The condensed farrowing processes of 10 sows

Good news:

- there is variation
- it can be captured

→ Scope for novel breeding goal traits

Towards more self-reliant sows

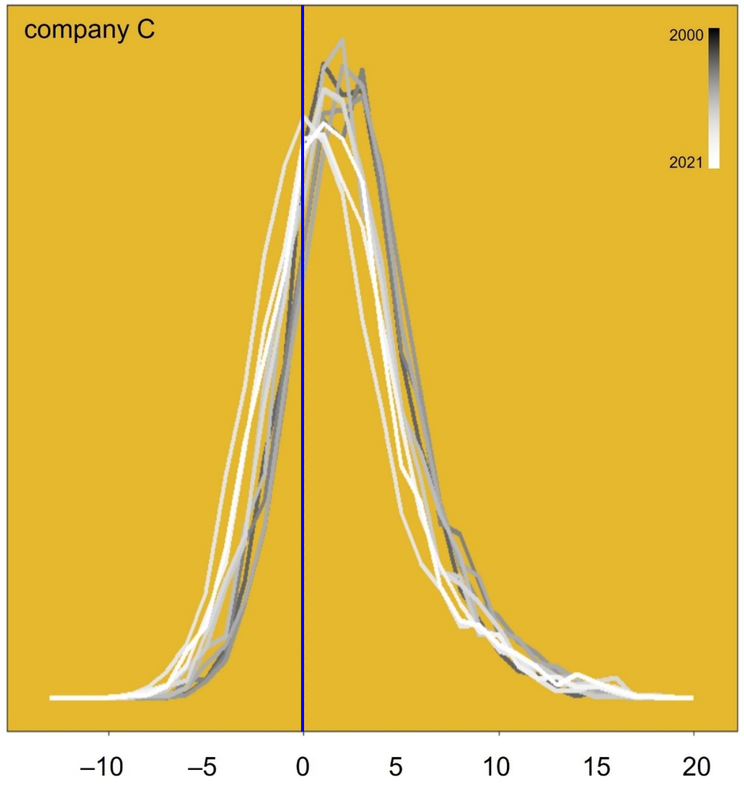


Health & welfare, sow & piglet

Piglet:

- Proper gestation length, proper birth weight, uniform litter
- Proper farrowing duration: born in time to get enough colostrum
- Colostrum storage
- **Its own teat**, enough milk

Phenotypic trends: teat number, litter size & piglet mortality



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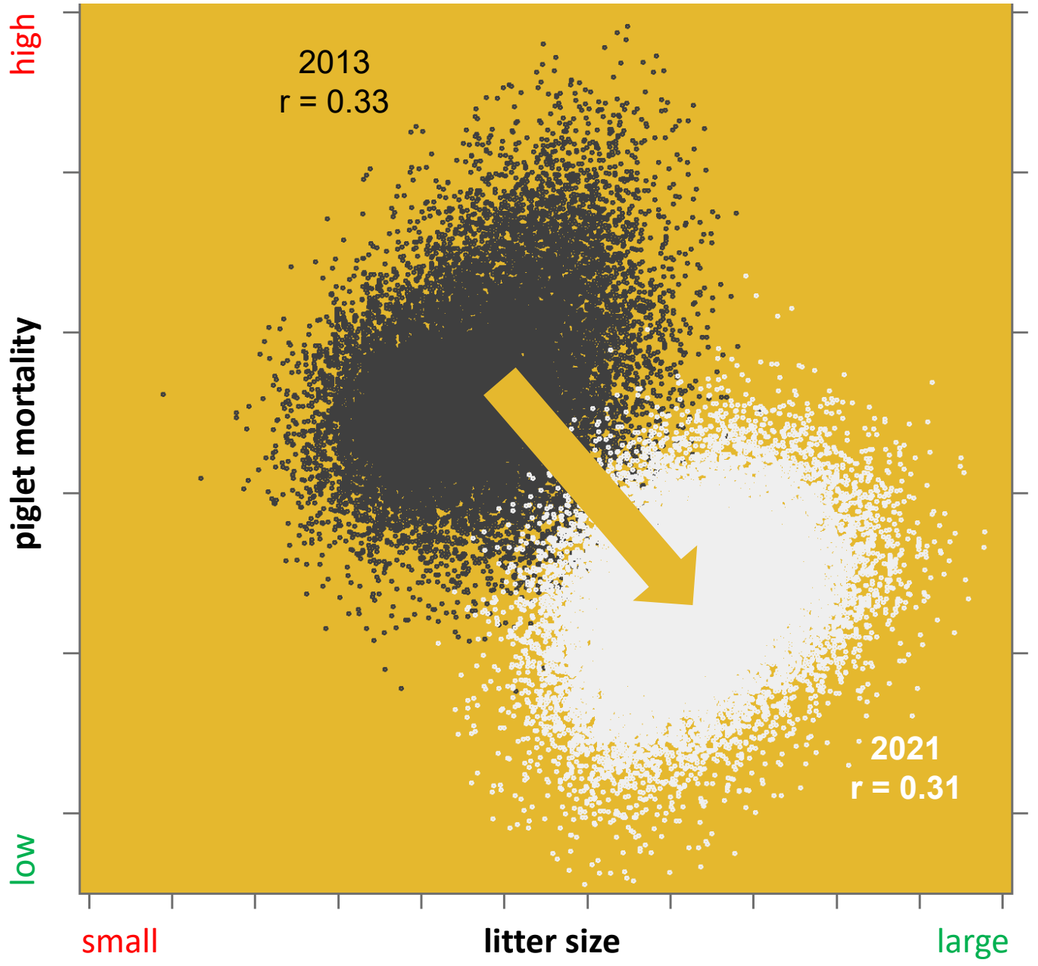
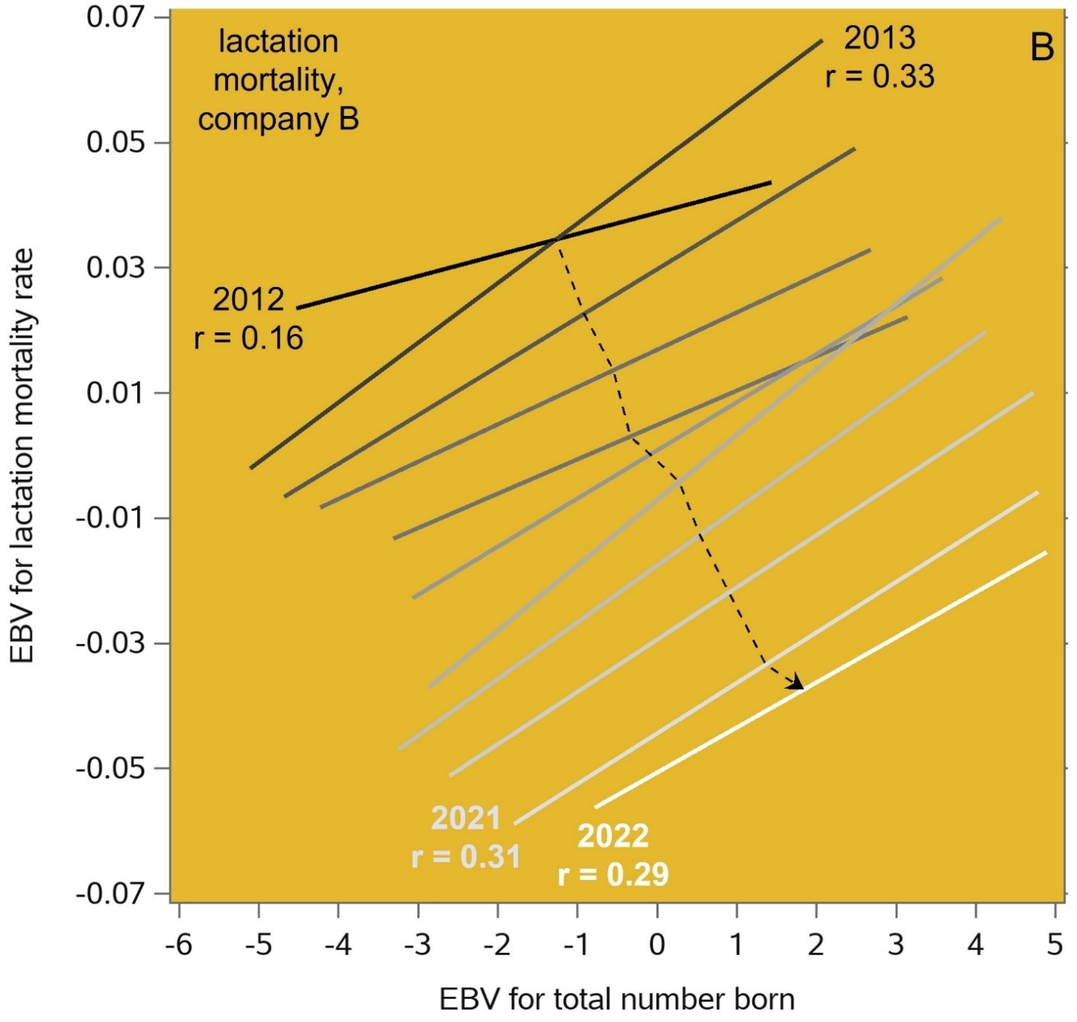
- **Its own teat**, enough milk
- Communication with the sow

Sow:

- Opportunity to express farrowing behaviour and nest-building
- Options to move between farrowing consecutive piglets
- Allowing or refusing piglets to suckle
- Communication with piglets, also when in the nest (visibility)
- Feed: quality, quantity, intake capacity

Genetic trends: piglet mortality vs litter size





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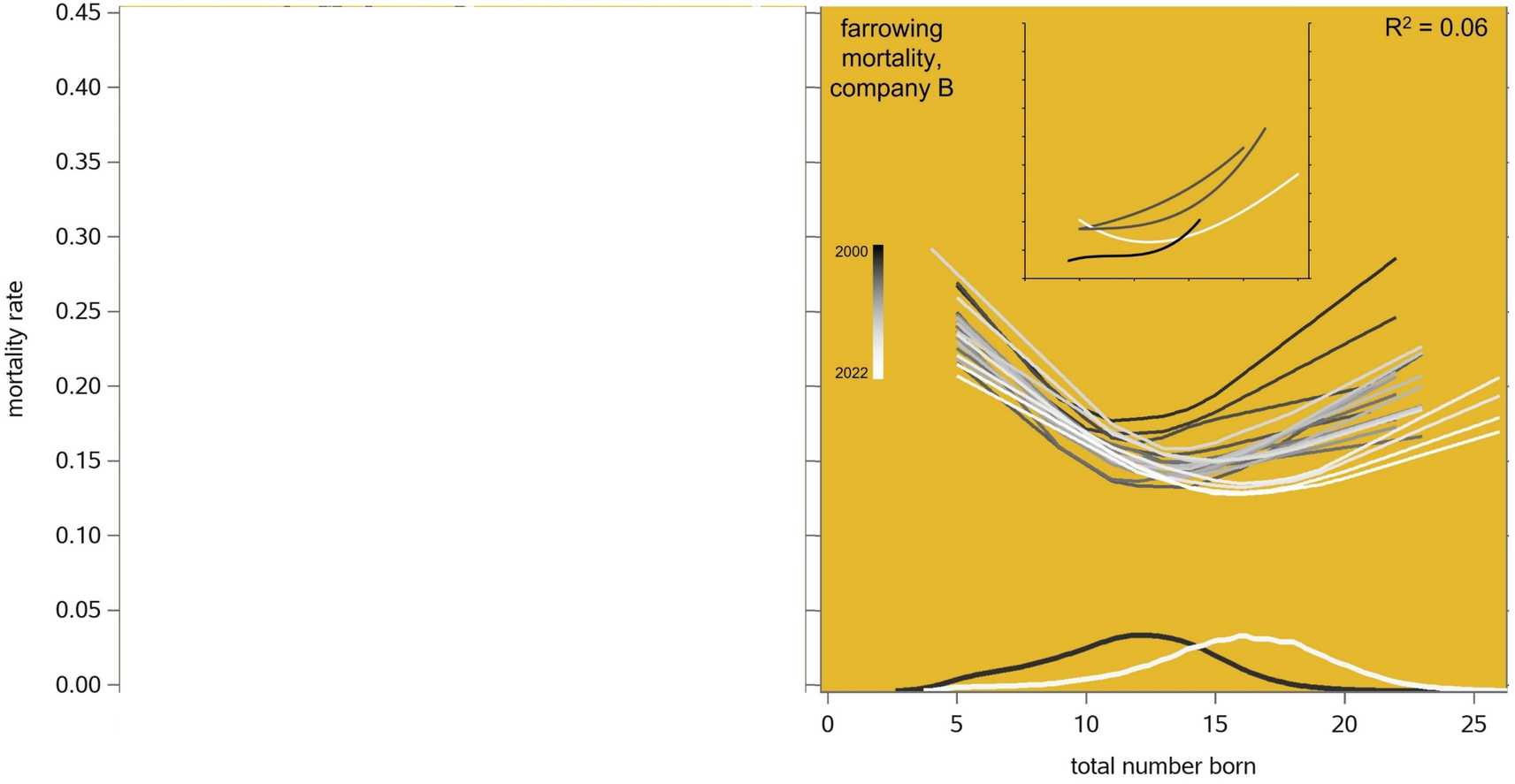

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Session 28

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How to balance selection for litter size in pigs with survival, health and welfare

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August 2023

EAAP + WAAP + Interbull Congress 2023

For discussion

1. Having heard this presentation: where does pig breeding go wrong ?

2. Larger litter size, in terms of **Survival,** pig breeding can (and does)...
   a. ...maintain birth weight by increasing litter weight
   b. ...increase litter uniformity
   c. ...keep piglet development at a healthy level, before and after birth
   d. ...increase number of teats

So, where is the harm ?

For discussion

3. Larger litter size in terms of **Health**:
    a. Each *piglet* can have normal development in utero and post-partum
    b. Every *piglet* can have its own teat (on average), and proper colostrum intake
    c. Proper cross-fostering reduces spread of disease; uniform litter size reduces the need for cross-fostering
    d. The *sow* needs to increase her milk production to accommodate her piglets, compensated by an increased feed intake

Is the harm similar as in dairy cattle – increased metabolic load on the sow?

2. Larger litter size, in terms of **Survival**:

Pig breeding can (and does)...

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