


Improving piglet survival under organic condition

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➤ Piglet mortality

Major issue for organic production



30-35%

Towards looser housing condition


A multi-criteria approach

- Maternal ability
- Capacity of adaptation
- Behaviour of animals

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- Sow maternal ability
Major component of successful piglet production
- Sow capacity of adaptation
Maintaining production levels despite environmental changes or disturbances
- Piglet potential of survival
Influenced by dam and boar
- Sow housing
- Genetics

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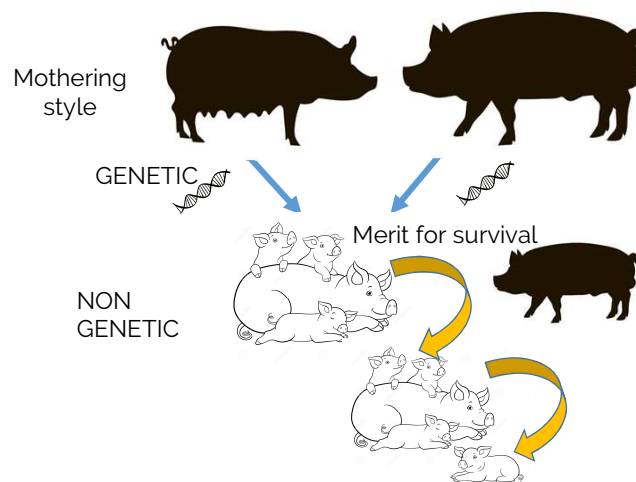
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➤ Transmission of characters



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➤ Sow maternal ability

Major component of successful piglet production

➤ Sow capacity of adaptation

Maintaining production levels despite environmental changes or disturbances

➤ Piglet potential of survival

Influenced by dam and boar

➤ Sow housing



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➤ 2018: Setting the core population

Establishment of Core population made available for physiological, behavioural, nutritional, environmental trials

Most organic pig farms use maternal lines of pigs selected under conventional conditions that are not really adapted to organic systems

Lack of targeted breeding for organic production results in relatively high piglet mortality in organic production

⇒ Research on sow and piglet adaptation to organic system



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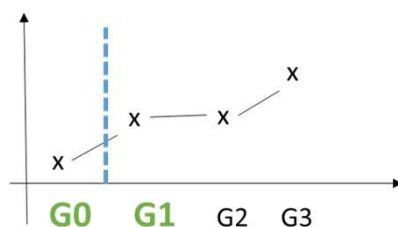
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➤ Selective breeding to improve piglet survival

Exploit genetic information (pedigree data)
Develop population: transmission of characters by descent

As a basis: selection upwards to improve piglet survival



Principle: sows inseminated over successive generations with semen from boars with a high genetic merit (breeding value) for piglet survival

Daughters from best dams chosen as future reproducers

A genetic proposal for better compliance with organic farming needs



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➤ Choice of genetics for organic condition

Large White

Drawbacks

Highly selected : high prolificacy + more excitable temperament

Advantages

Large population, thousands performance records (litter size), pedigree information traced back

Variability in maternal ability

STEP 1 : Animals with high genetic merit for piglet survival chosen as founders in the French National genetic scheme

from conventional production systems raised in in-door facilities

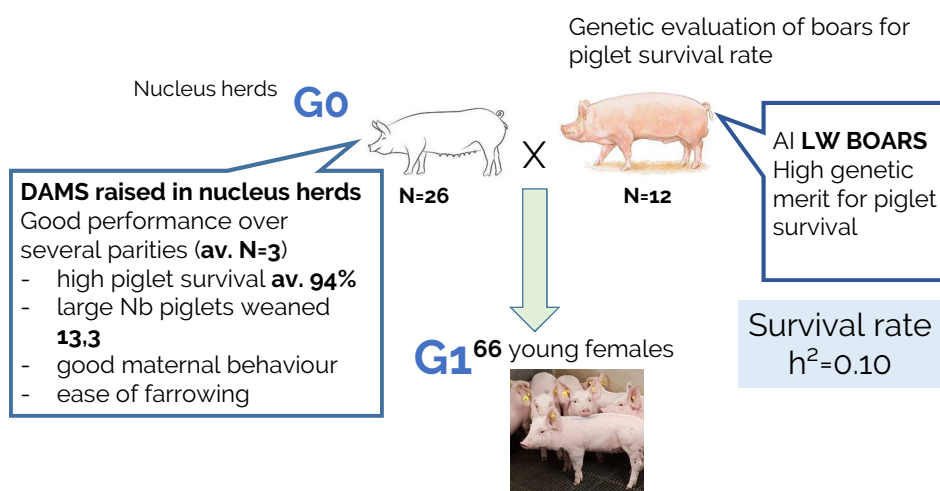


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➤ Choice of G0 dams + production young G1 females



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Founders from the French Large White population

GO

6 selection herds
3 cohorts arrived by Feb and June 2019

PORGANIC

Arrival of young **G1** females

Océan Atlantique

46°N

G0 G1 G2 G3

➤ 24 pairs of G1 sisters evaluated
inseminated with the same boar

90 % free **B**

Temporary crating
N=24

100 % free **L**

N=24

Impact of housing around farrowing

Study of the first 3 litters of each sow, each raised in a given environment

Parity 1: insemination with **Pietrain** boars, crated from entrance in farrowing unit to L4, litter equalisation by adoption

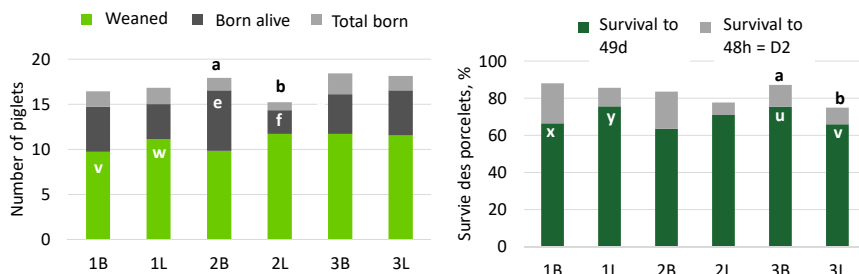
Parities 2 and 3: insemination with **Large White** boars, crated from 4 days after entrance to L4, no adoption

Boar semen + parity ...effects

D4-D21 all sows free, i.e., loose-housed
D21-D49 in addition, access to a small yard

Late first AI : 340 d of age
Weaning : 49 d

➤ Numerical performance = f (parity and housing)



Prolificity increases between the 1st and 3rd litter

Number of weaned piglets is sometimes quite low (<10)
 Loose-housed sows wean more piglets in parity 1 but the difference disappears afterwards
 Substantial losses during lactation
 Survival of crossbred litters not higher than that of purebred litters (D2)



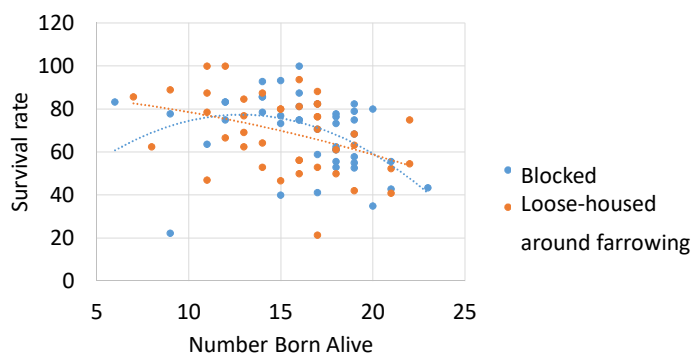
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➤ Litter survival rate

As a function of nb of piglets raised – parities 2 and 3



Great variability between sows for the same prolificacy
 decrease beyond 17 piglets

Related to the number of functional teats, sow capacity to produce colostrum and milk



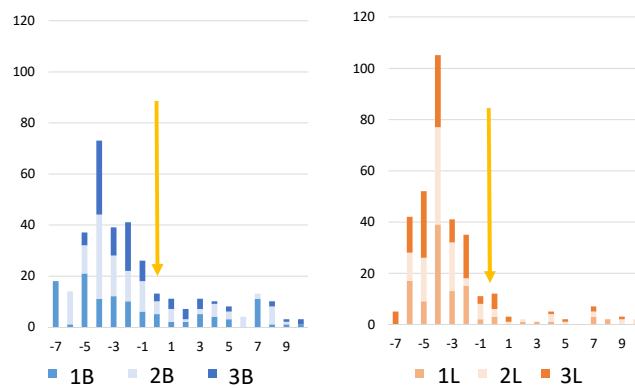
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➤ Piglet mortality

Depending on the time difference from the release of the blocked sows



Litter size aligned with sow capacity of investment at different times



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➤ Piglet Mortality

dead piglets were collected, weighed and externally examined and classified as

- piglets dying from sow aggression : bite wounds
- weak piglets : lighter weight than at the previous measurement
- crushed piglets : tongue hanging out of the mouth, flattened body
- other causes



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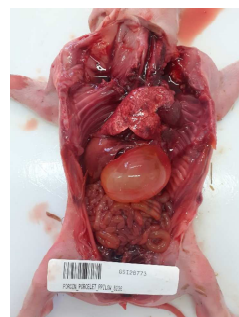
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➤ Piglet Necropsy

- Stillborn: lung flotation test
- Crushing: Subcutaneous oedema, lacerations and/or internal and/or external fracture(s)
- Starvation: Prominent spine and ribs with little or no abdominal subcutaneous fat combined with low stomach and intestinal milk content
- Physiological maturity
BMI, PI, ratio head length/BL
liver weight/ BW **Canario et al. 2016**



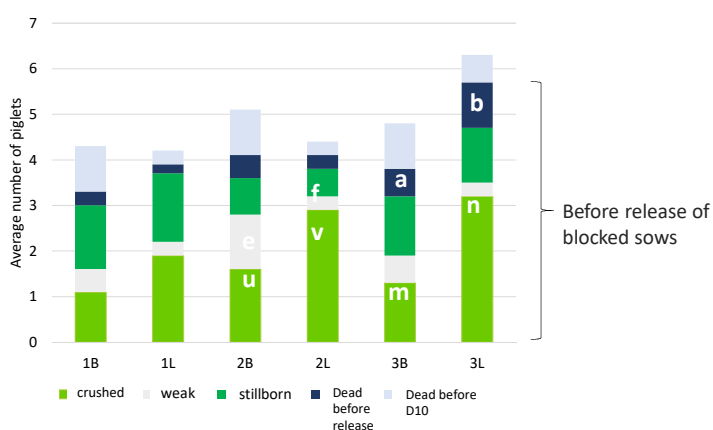
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➤ Piglet mortality

Analysis according to different causes of mortality



Majority of losses in early lactation
Greater losses in parity 3 by crushing in free sows than crated sows



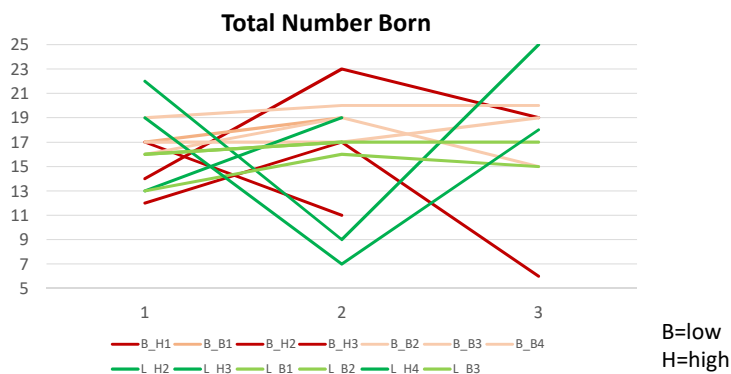
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➤ Performance stability accross parities

An asset for sustainability in farming



Intra-population extremes

Advantage to be given to sows that maintain a good production level in the long term



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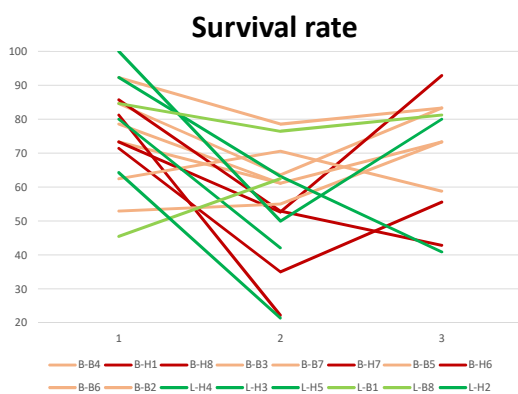
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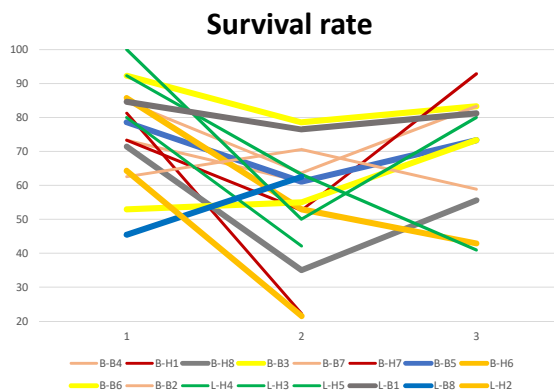
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➤ Performance stability across parities
An asset for sustainability in farming



Variation between sisters

Unstability within environment ●

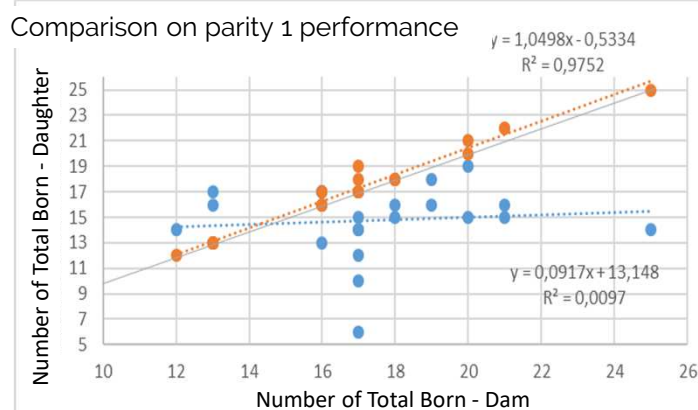


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➤ Dam-daughter performance



Relationship differs between the 2 groups genetically similar



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> Sow behaviour : key factor for improvement?

observations on farm

Description

Reaction on entering the lodge

Maternal behaviour

- Reaction of the sow to the first entry of a caretaker into the pen after farrowing

Reaction of the sow when weighing piglets D1: separation test on removal of the litter on return of the piglets



Items: Posture / Change of posture / Vocalizations / Mobility / Attention - Protection towards piglets / Exploratory behaviour / Difficulty of intervention



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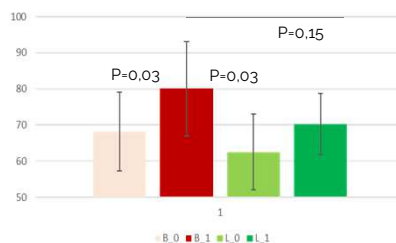
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> Sow behaviour : key factor for improvement?

Return after separation

Maternal attitude towards piglets B: 36,4% vs L : 69,6% P=0.05

Survival rate = f(housing x behaviour)



Temporary crated sows showing maternal behaviour at D1 have a higher piglet survival rate until weaning



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> Sow behaviour : key factor for improvement?

Activity overall indicator of maternal behaviour + health status

Canario, EAAP 2020



Bonneau et al., 2021

Exploiting intra-population variability

The sow builds a nest pre-farrowing, is calm during the farrowing process, then gradually returns to a normal level of activity, establishes the mother-young bond

Artificial intelligence for the fine study of characters



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2021

> Perspective

Several protocols – data to be analysed

General management of the population **A Prunier**
L Canario
Precise determination of causes of mortality in early lactation ⇒ necropsy
Crossfostering highly limited and guidelines for managing supernumerary piglets

Assessment of sow investment in the raising of its progeny

Sow maternal behaviour **L Canario**
Reaction to separation from progeny, on-farm notations + video analyses

Sow stress at farrowing piglet maturity **E Merlot**
Cortisol kinetics (saliva) – metabolites levels (blood)

Human-animal relationship **C Tallet**
Reaction of sows and piglets towards human approach + video analyses

Piglet social interactions **C Clouard**
video analyses



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> Conclusions

More tedious implementation of core pop than expected:

- Young females purchased rather than their mothers
- 3 cohorts: Advantage: greater genetic diversity
- Difficulty on G1 P1 : brand new facility + iron tests (diarrhea)

Adjustments on P3:

Limiting increase of litter size (not too high EBV for Nb born alive)

Genetics: Crossbred litters did not perform better than LW purebred

Possible interactions of genetics with the environment

LW sows chosen for G2 are promising for Improving piglet survival

Select on relevant features -> LW suitable for organic production



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> Conclusions

Piglet losses in organic systems are high and difficult to manage through good practices

Recording piglet causes of death

Observing sow behavior to facilitate their management

Record performance and pedigree information

Specific breeding goal



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Housing must promote expression of natural behaviours

Work to improve piglet welfare has to increase

Compromise between performance – health and welfare

Genetics: interesting lever

Thank you for your attention

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