

Identification of feeding behaviour patterns related with the optimization of pig efficiency

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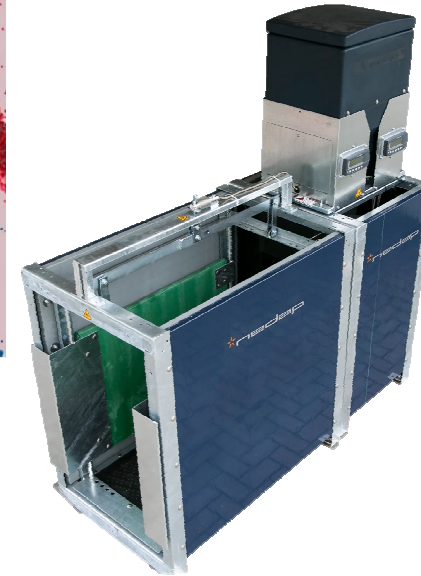
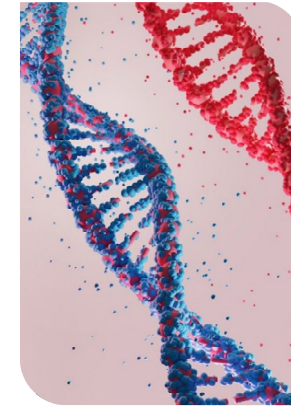


Lleida, 26th October 2023



Uso de técnicas genómicas para la mejora de la eficiencia y calidad de carne en cerdos cruzados

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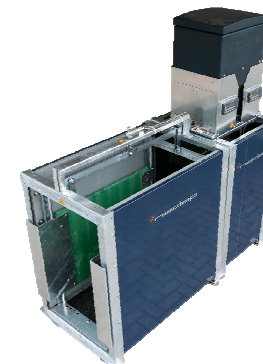
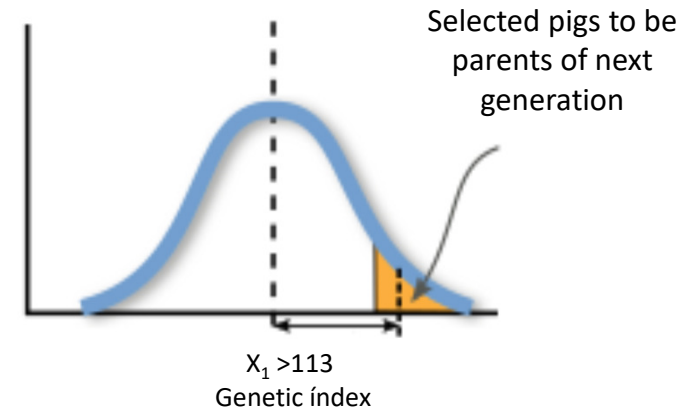
BATALLÉ

LLEIDA TECH

ARTIFICIAL INTELLIGENCE & OPTIMIZATION CONGRESS

Objective

- Genetic improvement of Feed Efficiency in pigs
- How?
 - Direct selection for conversion rate of feed to meat (FCR)
 - Indirect selection using other traits → Feed Behaviour traits (FBT)
- Why FCR?
 - FCR is the most important economic index in pig production (feeding costs represents ~72% of pig production costs)



- Use of **Pig Performance Testing** stations from Nedap Velos
between 90 to 165 days of age (approx. 40 to 120 kg liveweight)



18 feeding stations → 1000 pigs / year

Pig identification by RFID tags

918.749 records from 1.688 young boars

Trait	Unit	Mean	h2	HPD95%	Rg with FCR
Feed Conversion Rate (FCR)	Kg feed/ kg pig	2.07	0.40	[0.25, 0.53]	---
Feeding Rate (FR)	g/min	36.9	0.50	[0.37, 0.65]	+0.30
Time per Day (TPD)	min/day	51.25	0.59	[0.47, 0.72]	~0
Time per Visit (TPV)	s/visit	420.1	0.47	[0.36, 0.57]	~0
Nr Visits per Day (NVD)	Visits/day	7.76	0.59	[0.45, 0.73]	-0.24
Feed per Visit (FPV)	g/visit	259.7	0.44	[0.32, 0.56]	+0.44
Daily Feed Intake (DFI)	Kg/day	1.87	0.46	[0.33, 0.60]	+0.62



Most efficient pigs

have low feeding rate (eat slowly)

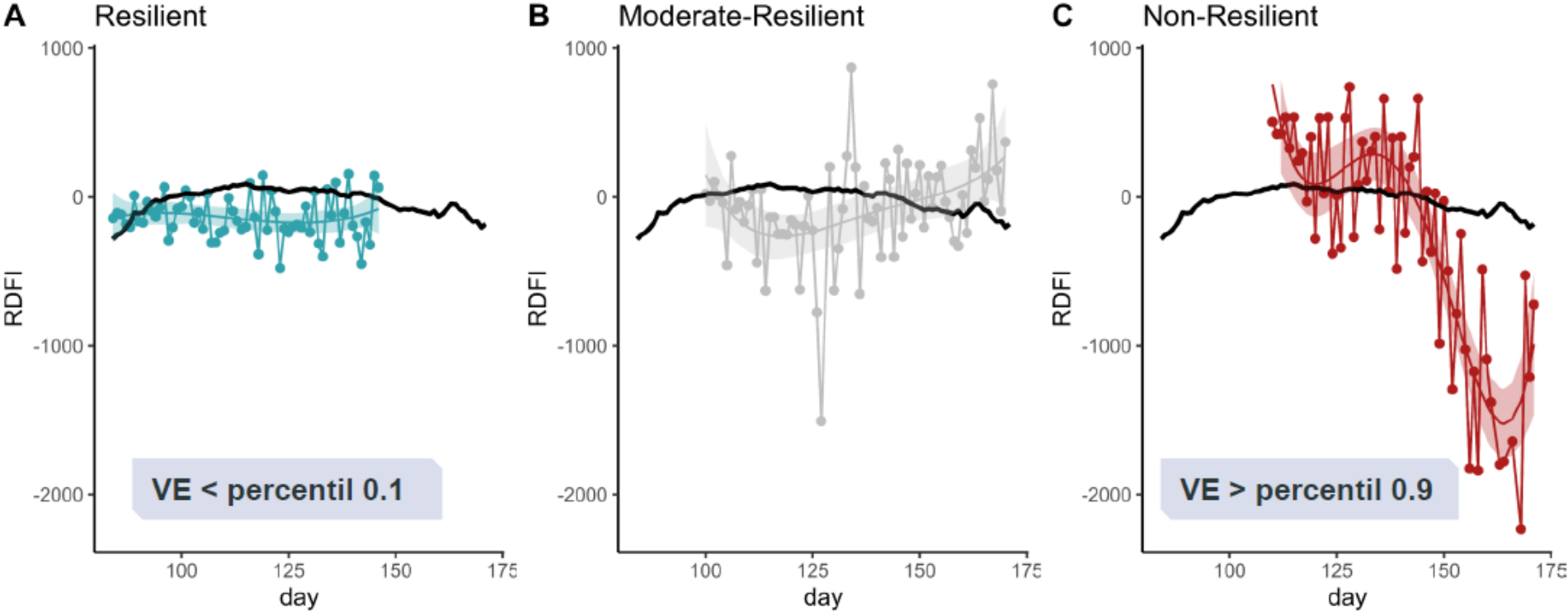
have more visits per day to the feeder

eat less feed per visit

Studying the VE of daily feed intake as a reliable indicator of resilience in Pietrain pigs

Deviations from expected patterns

Poppe et al. (2021)



Resilience classified with VE

RESULTS

h^2 for VE = 0.28 ± 0.06

High genetic correlation with FCR and RFI

Bivariate model:

$$(1) VE \sim \mu + Za + e$$

$$(2) FET \sim Xb + b_1*IA + b_2*FA + Za + Zc + e$$

b_1*IA ; Covariate for initial age

b_2*FA ; Covariate for final age

Zc ; Contemporary group (Pen and Feeder)

More resilient animals
are more efficient

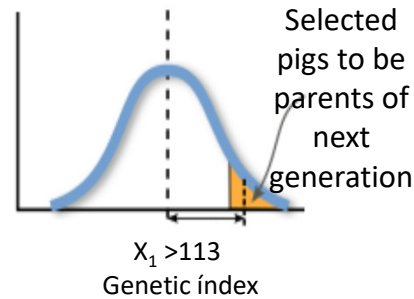
0.71 ± 0.09 FCR

0.63 ± 0.10 RFI

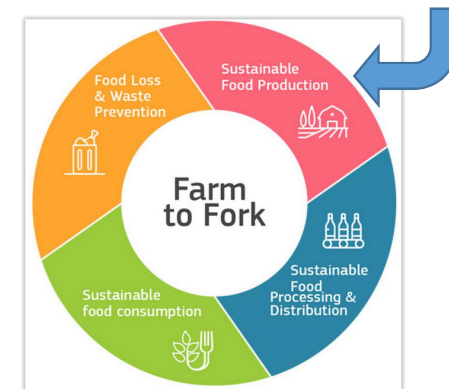
-0.41 ± 0.14 RG

Conclusions

- FBT are highly heritable
- FBT are correlated genetically with FCR
- We can increase the response to selection for FCR using FBT → improvement of efficiency of pig production



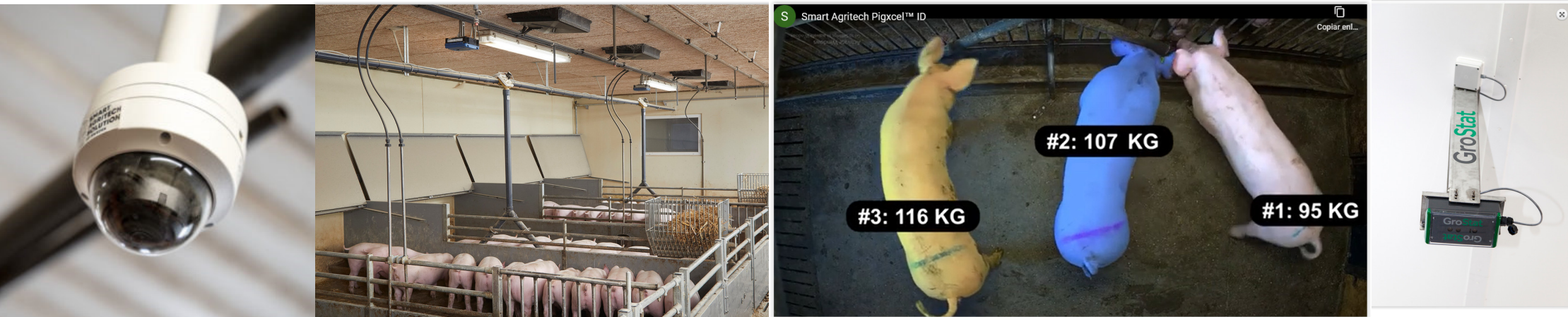
**Genetic added value
X
9.000 offspring per year**



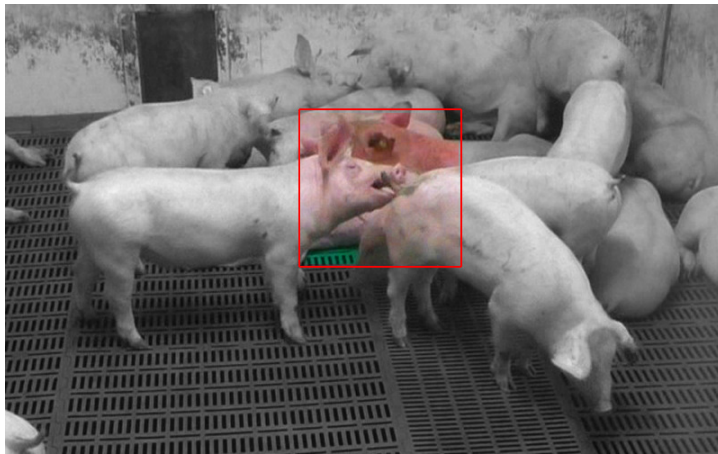
Current challenges for AI in pig production (I)

Intelligent cameras with good balance between weight & FBT prediction ability and price → For production farms

→ *Several solutions in the market, most of them only for liveweight prediction*



Current challenges of AI in pig production (II)



- Prototype Systems for detection of tail biting:

- 1) <https://www.dilepix.com/fr/performances-elevages/porcs/caudophagie>
- 2) <https://www.itlscotland.co.uk/copy-2-of-qboxanalysis>

→ Today: predicts the probability of aggression in the whole batch or pen, don't easily identify the pig responsible of the tail bite (attacker pig)

Thank you for your attention!

