

# Feed efficiency × diet interaction on acorns vs. a commercial diet in Iberian pigs

Wendy Rauw, Luis Alberto García Cortés,  
Fernando Gómez Carballar, Juan García Casco,  
Eduardo De La Serna Fito, Luis Gomez-Raya





## Iberian pigs

- *Sus mediterraneus*
- Medium-sized
- Slow growing
- Low productivity
- Early formation of fat tissue
- Low prolificacy (6-8/year)
- Conservation of ecosystem
- Fed on acorns 🐾 Dehesa, Montanera
- 11 kg acorns / oak tree
- 1 tree / kg weight gain
- Minimum 46 kg gain
- < 1 pig / ha dehesa
- 🐾 Oleic acid 40-45%





Iberian pigs

Niche market!





# Iberian pigs

## Niche market!



**Cinco Jotas Bone-In 100% Ibérico de Bellota Jamón - FREE SHIPPING!**

\$1,195.95 JM-106

★★★★★ (11)

Add to Cart



**Cinco Jotas Bone-In 100% Ibérico de Bellota Shoulder - FREE SHIPPING!**

\$549.95 JM-109

★★★★★ (9)

Add to Cart



★★★★★

*"LIFE CHANGING EXPERIENCE!!! If you are contemplating a purchase, just do it! La Tienda was very professional with quick response times, knowledge, and shipping/packaging. Highly recommended."*

— ssth0 - Vancouver, BC December 2014



★★★★★

*"Heaven in earth, I had tried different Bellota hams, 5 Jotas has no competition"*

— Esther - Americus, GA November 2014



★★★★★

*"The Ham version of Caviar"*

— HERBERT - COLUSA, CA May 2013

# Aim of the study (pilot study)

- Inclusion of feed efficiency in an Iberian pig breeding program
- Investigate whether feed efficiency can be sustained on different feed types
- Its implications for meat yield and quality

## Animal breeding scheme applied to the quality of pure Iberian montanera pigs.

- **Source:** Archivos de Zootecnia . 2018, Issue Supp1, p9-11. 3p.
- **Author(s):** Muñoz, M.; Sánchez-Esquiliche, F.; Caraballo, C.; Gómez, F.; Pariente, J. M.; Silió, L.; Rodríguez, C.; García-Casco, J. M.
- **Abstract:** Selection programs are not frequent in the extensive Iberian porcine sector. The traditional company of Iberian pig products located in Jabugo (Sierra de Huelva), Sánchez Romero Carvajal (SRC), with the collaboration and assessment of the Animal Breeding Department of INIA, is making since the year 2012 an unusual effort to develop and implement a breeding selection scheme focused on the Iberian purebred products labelled as Bellota. The animals involved in this program belong to one herd which is placed in two different farms, Montecastilla and Tejarejo (La Granada de Riotinto). 1,205 animals of known pedigree were controlled for selection of growth, body composition, meat and fat quality traits. The main registered traits were average daily gain in montanera, slaughter and carcass weight and weight of premium cuts (ham, shoulders and loins). Besides, backfat fatty acid profile and quality traits as intramuscular fat percentage, color, thawing and cooking water loss and shear force were measured in loin as quality traits. Breeding values for these traits were estimated using an Animal model. Genetic predictions for maternal traits (number of piglets born alive and litter weight at weaning) were performed also using Animal models. Data from 5,134 litters born in 88 batches of 1456 dams and 22 sires were used. This information allowed estimating heritability and genetic correlation as well as to build a combined index for each trait weighting the breeding values by their corresponding economic values. In addition to this, molecular genetic studies on some of the traits cited above are also being implemented. These studies will allow increasing the efficiency of the conventional selection program in the future.



## Material and methods

- 30 Iberian pigs
- 19-Nov 2018 to 31-Jan 2019 (~482-553 d)

3 Periods:

P1_Conc:	30 days	4 kg / day
P2_Acorn:	21 days	8 kg / day
P3_Mont:	18 days	montanera+ 4 kg / animal

→ Weight, backfat thickness, infrared thermography,  
hair cortisol (33/196 ng/g), meat yield and quality

**Composition:** intramuscular lipid, protein, humidity

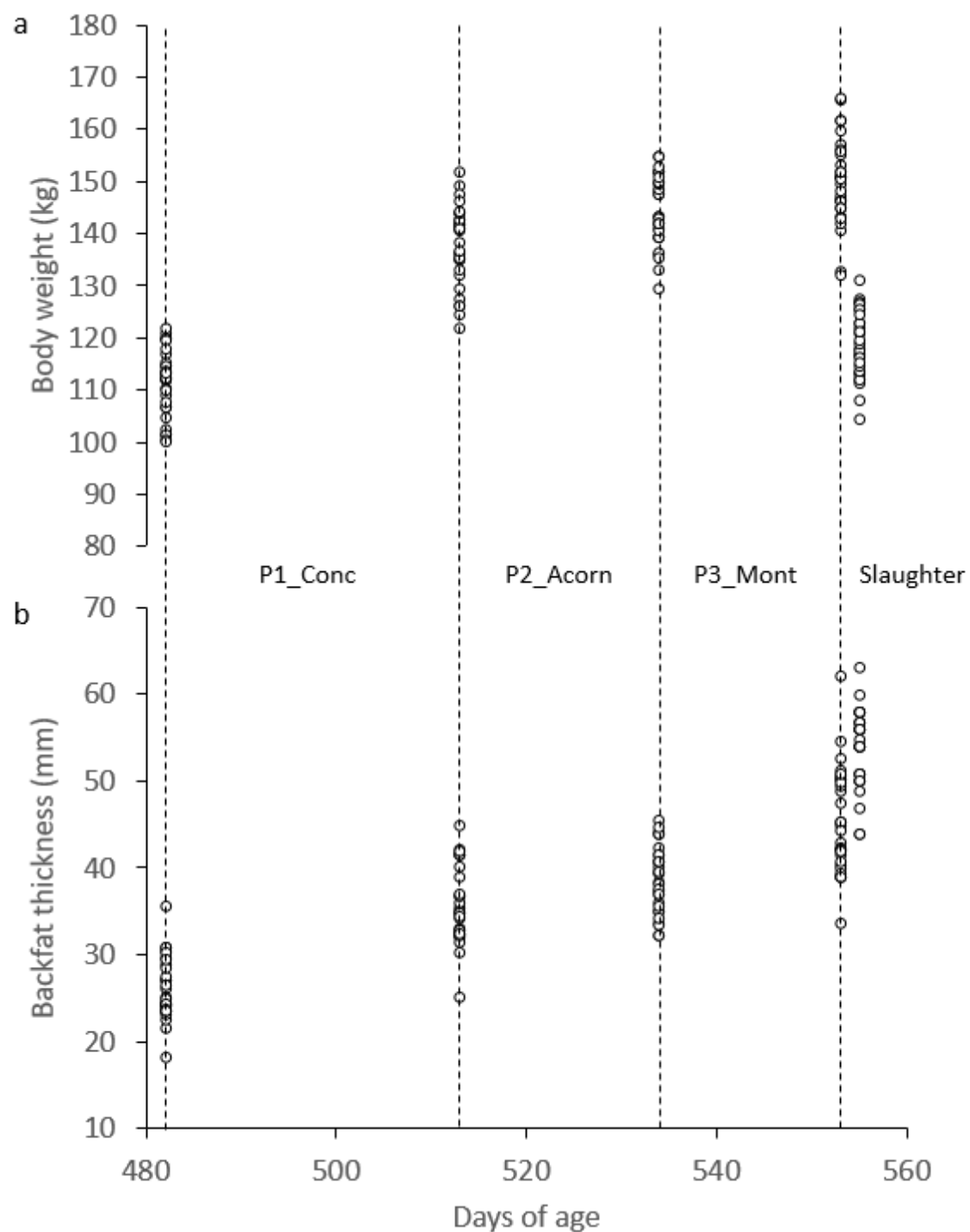
**Color:** a\*, b\*, L\*, mioglobine

**Tenderness:** Compression, Shear force (Warner Bratzler) raw/cooked

**Juiciness:** Centrifugal loss, Purge%, Cooking loss







	Body weight gain (g/d)	Fat gain (mm/d)
Conc	875	0.313
Acorn	321	0.150
Mont	299	0.352
Total	552	0.275



# Results

Higher weight = Fatter

Higher body weight gain  $\neq$  More fat gain

	BFT0	BFT1	BFT2	BFT3
<b>BW0</b>	0.51775	0.46556	0.52507	0.36361
	0.0034	0.0095	0.0029	0.0482
	30	30	30	30
<b>BW1</b>	0.507	0.37564	0.49678	0.36271
	0.0042	0.0408	0.0052	0.0488
	30	30	30	30
<b>BW2</b>	0.45579	0.4011	0.61712	0.39107
	0.0114	0.028	0.0003	0.0326
	30	30	30	30
<b>BW3</b>	0.31275	0.22159	0.47812	0.32222
	0.0924	0.2393	0.0075	0.0825
	30	30	30	30

	BWG1	BWG2	BWG3
<b>BFG1</b>	-0.20254	0.23419	-0.13755
	0.2831	0.2129	0.4686
	30	30	30
<b>BFG2</b>	0.18199	0.24466	0.20861
	0.3358	0.1926	0.2686
	30	30	30
<b>BFG3</b>	0.0594	-0.17181	0.0447
	0.7552	0.364	0.8145
	30	30	30



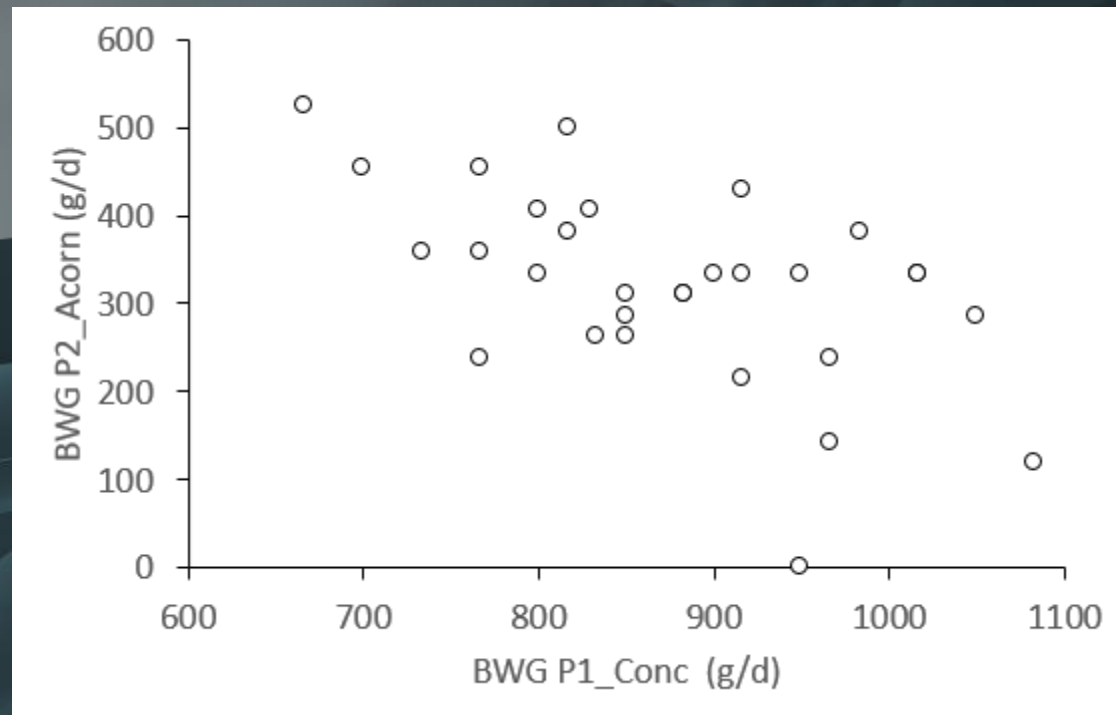
# Results

Higher BW gain Concentrate = less BW gain acorn  
 = more BW gain montanera

More fat gain Concentrate = less fat gain acorn

	BWG1	BWG2	BWG3
BWG1	1	-0.55242 0.0015	0.4295 0.0179
	30	30	30
BWG2	-0.55242 0.0015	1	-0.1723 0.3626
	30	30	30
BWG3	0.4295 0.0179	-0.1723 0.3626	1
	30	30	30

	BFG1	BFG2	BFG3
BFG1	1	-0.53202 0.0025	-0.08836 0.6424
	30	30	30
BFG2	-0.53202 0.0025	1	-0.14451 0.4461
	30	30	30
BFG3	-0.08836 0.6424	-0.14451 0.4461	1
	30	30	30



# Results

Carcass weight: 119 kg  
Dressing%: 79.1%  
Backfat: 54 mm  
Ham: 10.6 kg – 8.88%  
Shoulder: 7.18 kg – 6.02%  
Loin: 1.70 kg – 1.43%

	Dressing%	Carcass	Fat	Ham	Ham%	Shoulder	Shoulder%	Loin	Loin%
BWG1	-0.31768	0.48247	0.0741	0.4786	0.25497	0.44715	0.19671	0.26737	-0.00335
	0.0871	0.0069	0.6972	0.0086	0.1819	0.0194	0.3254	0.1532	0.986
BWG2	0.12879	-0.22215	-0.07829	-0.14362	0.05132	-0.29261	-0.19657	-0.10202	0.0259
	0.4976	0.238	0.6809	0.4573	0.7915	0.1386	0.3257	0.5917	0.8919
BWG3	-0.65113	0.39421	-0.08636	0.54493	0.45082	0.49779	0.31671	0.2979	0.09313
	<.0001	0.0311	0.65	0.0022	0.0141	0.0082	0.1075	0.1099	0.6245



# Results

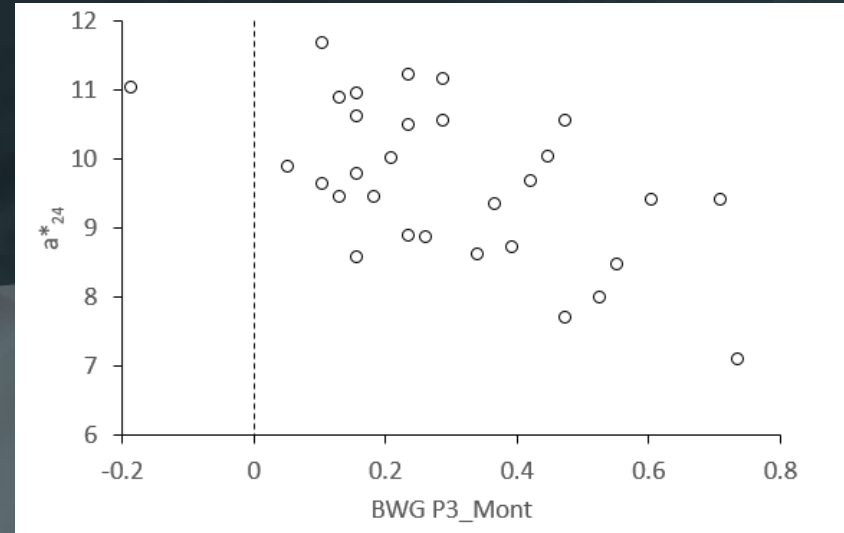
Weight gain ↑ = Carcass weight ↑

Ham% ↑ 👍

Dressing% ↓ 👎

Cooking Loss ↓ 👍?

a\* / Mioglobine ↓ 👎



	Concentrate	Acorns	Montanera	Total
Carcass	0.48**		0.39*	0.46**
Dressing%	-0.32†		-0.65***	-0.59***
Ham%			0.44*	0.49**
CookingLoss			-0.50**	-0.49**
a*			-0.57***	-0.59***
Mioglobine			-0.41*	-0.39*

Extensive production: a\* ↑ (activity, oxidative muscle)



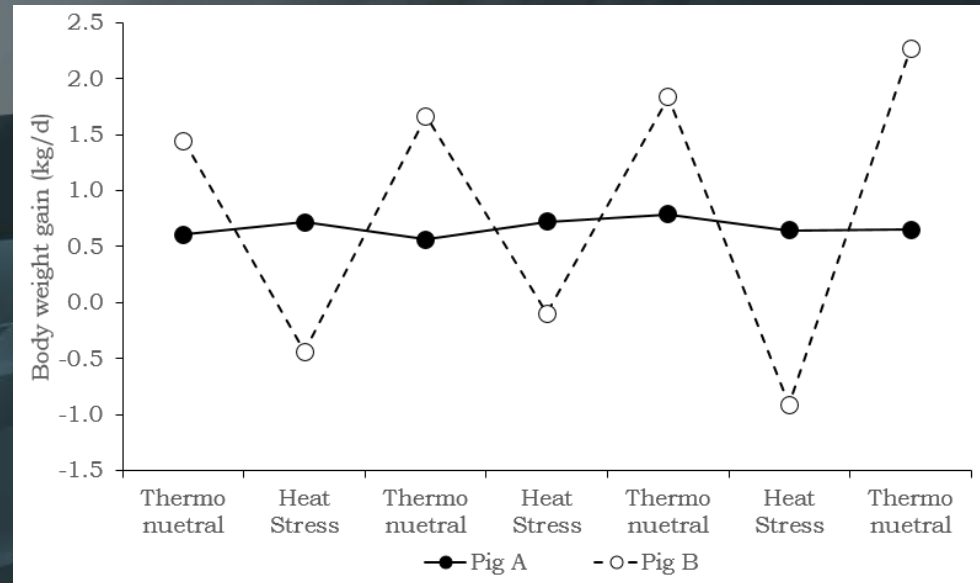
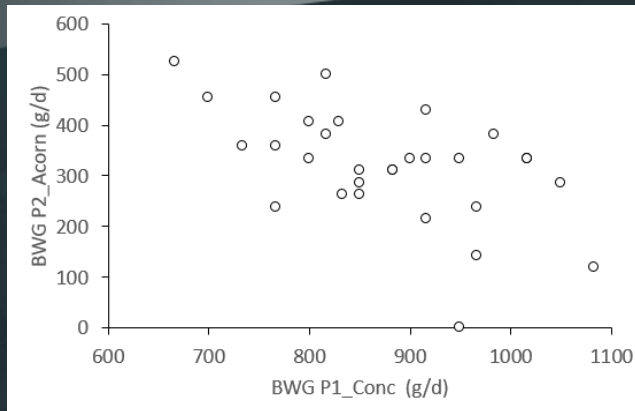
# Conclusions

Correlation BWG concentrate with BWG bellota  $r = -0.55$ .

Similar feed, different periods (age) = not always related.

But: this is *negative*

Animals with higher production need better feed or produce less in (nutritionally) stressful conditions

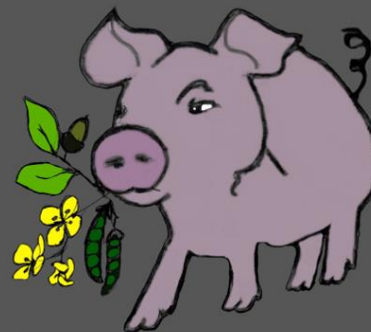




# ACKNOWLEDGEMENTS

## Project goals of ERA-NET SusPig

- Evaluate if improved **feed efficiency (FE)** can be sustained with **climate change** and with more reliance on **local feed resources** and feedstuff co-products.
- Evaluate **environmental, social and economic impacts** of this strategy.
- Design **new pig production systems** with regard to environmental and social aspects and their tradeoffs.



SUSPIG

[WWW.SUSPIG-ERA.NET](http://WWW.SUSPIG-ERA.NET)



Scan me

## Project Partners

Wendy Rauw, INIA, Spain  
Lotta Rydhmer, SLU, Sweden  
Ilias Kyriazakis, Newcastle University, UK  
Margareth Øverland, NMBU, Norway  
Hélène Gilbert, INRA, France  
Jack Dekkers, Iowa State University, USA  
Susanne Hermes, University of New England, Australia  
Alban Bouquet, IFIP, France  
Emilio Gómez Izquierdo, ITACYL, Spain