An alternative to restricted feeding in Iberian pigs using an agro-industrial by-product of olive oil

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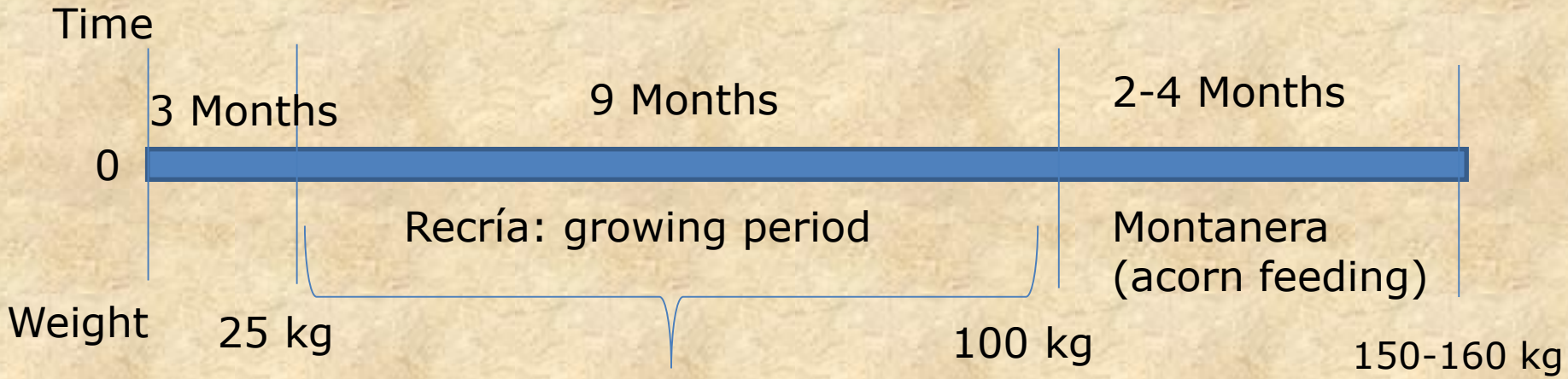
Background

Standard Quality for the Iberian pig products (RD 4/2014)

Rules and requirements for

- Breed: pure Iberian and crossbred with Duroc
- Handling and feeding: weights, ages, fattening diets…

Example: **montanera's** pigs fatted **only with acorn**



AVD = 277 g

Objective

How growth can be controlled?

Limiting daily energy intake

Traditional

Management: normal diet supplied in small quantity

Alternative

Low energy concentration diet

How do we achieve it?

High fiber agro-industrial byproduct

Material and methods: diets

TREASURE

Control (CD)

Commercial feeds

Restricted

Olive → Grinding → Shake → Centrifugation → Olive oil

Centrifugation → Alperujo: Pulp, skin, bone and water

Byproduct 1 Wet Without processing

Alperujo: Pulp, skin, bone and water → Destoned → Bone

Destoned → Pulp, skin, water → 2nd oil extraction → Oil

2nd oil extraction → Pulp with some oil, skin and some bone → Drying → Skin removal → Pulp with part of oil, part of skin and some bone

Byproduct 2 Dry Processed

Skin with part of pulp with oil and some bone

Wet crude olive cake (WD)

Wet Crude Olive Cake + Straw

Silage | *Ad Libitum*

+

Feeds | *Restricted*

Dry olive pulp (DD)

Dry Olive Pulp **45 %** + Wheat Soy Straw Additives

Feeds | *Restricted*

Material and methods: growing and fat periods

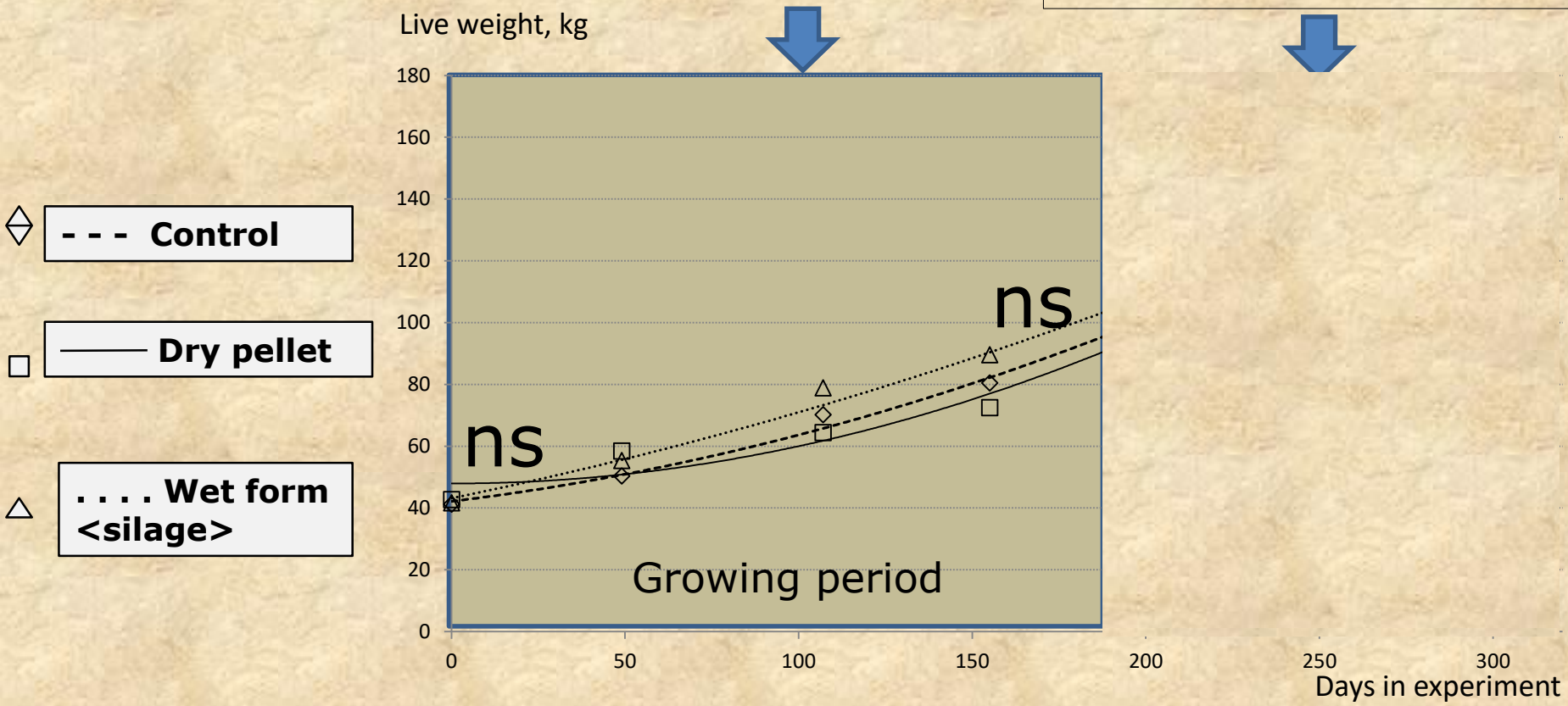
45 Iberian pigs

15 Control (CD)

15 Wet crude olive cake (WD)

15 Dry olive pulp (DD)

montanera based on the *ad libitum* intake of acorns and grass



42 kg ⟷ 191 days ⟷ 95 kg ⟷ 119 days ⟷ 162 kg

Material and methods: analysed traits

Production

Growing W
ADG$_G$
Slaughter W
ADG$_F$
ADG$_T$
Carcass yield
Hams, shoulders and loins yields

Meat quality traits

Longissimus dorsi:

Water-holding capacity:
- thaw loss
- cook loss
- centrifuge force loss

Tenderness (Fmax W-B)
Color (L*, a*, b*, hue chroma)
Myoglobine concentration
Marbling
Intramuscular Fat (loin and ham)
Fatty acid profile IMF

Backfat:

Fatty acid profile after
- growing period
- slaughter

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Results

Growth: Restricted feeding and monitoring diet

⟶ no effect on final weight of byproduct diets

Carcass traits: no affected by diets

Intakes (group measurement) an economic overview

		Consume kg / day	Cent €/kg	Cent €/ kg lw
Control	Comm. Feeds	1.41	23.8	120.3
Dry	Comm. Feeds	1.90	16.1	119.0
Wet	Comm. Feeds	1.33	28.5	241.3
	Silage	3.00 *	12.0	

Dry byproduct diet is almost equal than control diet

Wet byproduct diet is more than twice expensive than other two diets

But no commercial prices for ensilage (specific elaboration for the trial)

Results

Quality traits:

Traits:	Mean			SEM	*p-value*
	Control	Dry	Wet		
Thaw Loss	6.43^{ab}	7.05^{a}	5.28^{b}	0.296	0.051
Cook Loss	24.10	23.15	22.07	0.429	0.076
Centrifugal Force Loss	32.88^{a}	30.40^{ab}	29.02^{b}	0.640	0.016
Shear Force (kg)	4.22	3.78	3.84	0.162	0.453
CIELab - L*	40.89^{ab}	43.53^{a}	40.61^{b}	0.487	0.032
CIELab - a*	10.96^{a}	8.95^{b}	10.46^{a}	0.196	0.000
CIELab - b*	6.28	6.39	6.22	0.124	0.852
Marbling	2.69	2.72	2.73	0.116	0.984
Myoglobin	1.93^{ab}	1.68^{b}	2.00^{a}	0.062	0.031

- ✓ Dry olive pulp-based diets may have a negative impact on meat quality, specifically referring to colour attributes
- ✓ Olive-based silage *ad-libitum* diets may have positive influence over meat water-holding capacity

Results

Quality traits: fatty acid profile

Growth	Control	Dry	Wet	Lote R
C16:0	24.27	22.30	21.70	0.003
C18:0	11.39	**8.88**	10.75	0.000
C18:1	46.64	**49.01**	**48.19**	0.037
C18:2	**9.43**	11.89	11.05	0.000
Σ SAT	37.71	**33.12**	34.43	0.001
Σ MONO	51.08	53.03	52.35	0.117
Σ POLI	11.21	13.85	13.22	0.000

Fattening	Control	Dry	Wet	p
C16:0	19.60	18.94	19.27	0.196
C16:1	2.25	2.15	2.05	0.414
C18:0	8.40	**7.71**	8.61	0.006
C18:1	55.44	**56.55**	55.41	0.020
C18:2	**8.72**	9.22	9.09	0.303
Σ SAT	29.73	**28.32**	29.59	0.043
Σ MONO	59.72	60.60	59.50	0.093
Σ POLI	10.55	11.08	10.91	0.437

Diets

	C	Dry	Wet Silage	Wet Feeds
C16:0	19.5	12.6	13.9	17.5
C18:0	6.92	3.9	3.7	3.8
C18:1	36.1	**59.1**	**66.0**	25.5
C18:2	31.0	19.3	11.5	46.2
Intake	1.41	**1.90**	**3.0**	1.33

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Results

Quality traits: **intramuscular fat (IMF)** and total and neutral lipids (IMF)

	Control	Dry	Wet
IMF loin	5.84	5.42	5.91

	TOTAL			NEUTRAL		
	Control	Dry	Wet	Control	Dry	Wet
C16:0	23.83	24.38	23.91	23.25	23.63	23.07
C16:1	3.89	3.92	3.92	3.98	4.08	4.15
C18:0	10.47	10.57	10.54	9.84	10.02	9.81
C18:1 (n-9)	52.69	52.45	52.06	54.71	54.40	54.32
C18:2 (n-6)	4.72	4.45	5.05	3.30	3.15	3.70
Σ SAT	36.23	36.86	36.41	35.28	35.78	35.15
Σ MONO	57.61	57.39	57.05	60.24	59.94	60.03
Σ POLI	6.16	5.75	6.54	4.48	4.27	4.82

Not significant

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Conclusions

- ✓ A proper feed management along growing period with olive byproduct diets could reach similar productive results than traditional feeding in the growing period
- ✓ But the difference in intakes and in prices of the experimental diets mean that only dry form can be economically competitive
- ✓ Experimental diets during growing period do not produce large changes in meat quality after being subjected to a final montanera-fattening period, except for color attributes with the Dry Diet

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Conclusions

- ✓ Silage of olive byproducts can be a very interesting alternative to avoid the negative effects of prolonged restricted feeding for animal welfare:

> Animals with silage available all the time (wet diet):
> feel satiated and more calm, less noisy and nervous

Only an economic evaluation of animal welfare of Wet Diet (silage) can compensate its higher price

Olive byproduct could be a suitable strategy as a new raw material in the Iberian pork feed chain in Iberian pig with rationed nutrition

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Thank you for your attention

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