



## WP2. Task 2.3. Local feeding resources rich in agro-by products in the diets for local pig breeds

**Alternative feeding in Iberian pigs during growth period: incorporation of olive cake in a dry or wet (silage) form**

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# ✓ Production systems

- Traditional named **Montanera**: acorn and pastures on the fattening period (100-160 kg). Exploitation of **dehesa ecosystem** (oaks and cork oaks woods). Pure Iberian and crossbred with Duroc. Slaughter age: 14-16 months
- Free range named **Campo**: Pure Iberian and crossbred with Duroc. Slaughter age: 12 months
- **Intensive**: Commercial feeds. Only 50% Duroc. Slaughter age: 10 months

Total slaughters pigs 2016: 3,077,075

	Intensive	Campo	Montanera	Total
50%	61%	18%	6%	85%
Racial types: Mandatory Iberian dams				
75% IB	1%	2%	3%	6%
IB	1%	1%	7%	9%
Total	63%	20%	16%	100%

# ✓ Restricted feeding

## Growing period

Up to 100-105 kg (from 3 to 10-12 months)

Restricted feeding with commercial feeds plus natural resources if any (pasture, crops, stubble, fallow). Average daily gain: 250-350 g/day.

## Montanera

Up to 160 kg (14-16 months): acorns and pastures feeding. Average daily gain: 600-900 g/day ⇒ fat and meat quality

## Restricted feeding

Nervous, restless, noisy, always routing, ingestion of soil and small stones  
 —————> against animal welfare

**ALTERNATIVE:** Diets rich in fiber with low energy content that allows feeding close to ad libitum

Same growth rate and meat quality



Animal welfare

Use of by-products of oil agro-industry as raw material in the elaboration of commercial feeds for Montanera growing pigs

# ✓ Oil by-products



centrifugation

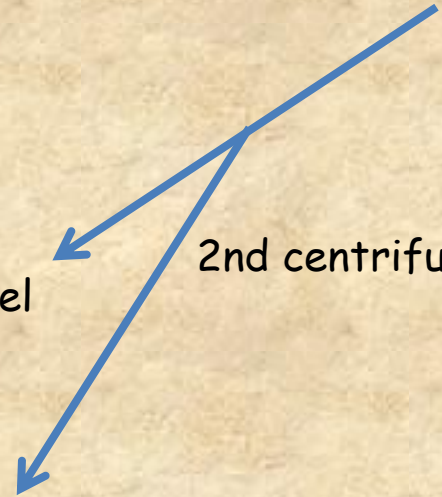


Extra virgin olive oil

**Semisolid fraction (alperujo - crude olive cake COC)**

pulp, skin, stone (72% of water)

2nd centrifugation



raw olive-kernel oil

**olive pulp (OP)**

skin, pieces of olive, stones and a small part of olive oil





Effect on growth performance and carcass traits of two diets based on olive cake in a

- Dry (Olive Pulp OP)



- Wet (Crude Olive Cake COC)



supplied during the growing period of montanera Iberian pigs



45 Iberian pigs at 6.5 months of age and 42 kg → randomly allocated in three pens (110 m<sup>2</sup>, outdoor and covered place)

pigs were controlled : amount of feed supplied daily per pen, health and general status, growth and fatness


## Diets (growing period)

- Control (CD) based on a feed formulated in order to cover the protein and energy requirements - CF
- Dry olive pulp (DD) based on a feed with a 45% of OP by-product in a pelleted form - DF
- Wet crude olive cake (WD) based on two components:
  - COC by-product in a silage form: 75% of COC and 25% of barley straw, packaged at high pressure containing 42.5% of dry matter
  - specific feed as a daily complement (WF)

- Feeds supplied in pelleted form, once a day in a restricted regimen
- COC by-product of the WD supplied *ad libitum* (silage form)

Pigs remained on these diets up 95±13.7 kg of body weight, after 191 days

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

Commercial population  animals had to be re-adjusted in several places (dehesas) according to the extent and to the availability of the acorns and grass

Three batches according to the body weight

Pigs remained on fat period until slaughter with  $162 \pm 8.8$  kg, after 118 days





# ✓ Results

Comparisons between Control (CD), dry olive pulp (DD) and wet crude olive cake (WD) experimental diets. Growth and carcass traits

TRAITS	Control (CD)	Dry (DD)	Wet (WD)	p-value
→ Growing W (kg)	94.53	89.86	100.10	0.129
ADG <sub>G</sub> (kg)	0.279 <sup>ab</sup>	0.246 <sup>a</sup>	0.305 <sup>b</sup>	0.027
→ Slaughter W (kg)	160.2	164.9	161.4	0.346
ADG <sub>F</sub> (kg)	0.547 <sup>ab</sup>	0.618 <sup>a</sup>	0.529 <sup>b</sup>	0.018
→ ADG <sub>T</sub> (kg)	0.384	0.391	0.391	0.851
Carcass yield (%)	79.18 <sup>a</sup>	77.95 <sup>b</sup>	79.00 <sup>a</sup>	0.016
→ Ham yield (%)	22.04	21.94	22.34	0.314
→ Shoulder yield (%)	15.99	16.04	16.15	0.827
→ Loin yield (%)	3.20	3.37	3.16	0.107

- No significant differences between DIETS for most of the traits
- Higher ADG during the growing period for Wet than for Dry
- Higher ADG during the fattening period for Dry than Wet
- Compensation in total ADG (no significant differences)
- Lower carcass yield for Dry Diet



# ✓ Remarks

Spanish Standard Quality Rule of Iberian Products → montanera Iberian pigs  
 → weight 92 - 115 kg at the end of growing

Furthermore after fattening period: minimum slaughter age of 14 months with gain higher than 45 kg in not less than 60 days

Animals Wet Diet → highest GW (but not exceeding 115 kg) and ADG greater than Dry Diet during growing period

Dry Diet pigs did not reach minimum GW of 92 kg → probably due to difficulties to fix a proper restricted ration along the growing period

Differences were compensated at the end of the fattening period

Animals fed under Dry Diet → lower carcass → excessive development of part of the digestive tract in a particular period of the experiment with less severe restriction

There were not differences in yield of premium cuts

Animal welfare not measured but direct observations in the field: animals with silage available all the time (wet diet) feel satiated and more calm compared with CD and DD, with behaviour less noisy and nervous at the moment of the daily meal supplementation

# ✓ Other results (quality traits)

Comparisons between Control (CD), dry olive pulp (DD) and wet crude olive cake (WD) experimental diets. Growth and carcass traits

Variable	Control (CD)	Dry (DD)	Wet (WD)	p-value
Thaw loss (%)	7.05	6.43	5.28	0.051
Cook loss (%)	23.15	24.10	22.07	0.076
Tenderness (F <sub>max</sub> W-B, kg)	3.78	4.22	3.84	0.453
Luminosity L*	43.53 <sup>a</sup>	40.89 <sup>ab</sup>	40.61 <sup>b</sup>	0.032
Redness a*	8.95 <sup>b</sup>	10.96 <sup>a</sup>	10.46 <sup>a</sup>	0.000
Yellowness b*	6.39	6.28	6.22	0.852
Hue (H)	35.51 <sup>a</sup>	29.83 <sup>b</sup>	30.76 <sup>b</sup>	0.001
Chroma (C)	11.03 <sup>b</sup>	12.65 <sup>a</sup>	12.19 <sup>a</sup>	0.000

- ✓ incorporation of crude olive cake (wet form) in the diet of Iberian pigs during the growing period is advisable
- ✓ addition of crude olive cake to the diet in a form of silage seems to be more advantageous than in a dry form since it can be supplied *ad libitum*
- ✓ animals with silage available look satiated and more calm, less noisy and nervous. Positive effect for animal welfare?
- ✓ further studies analysing the effect of olive cake on meat quality and the cost of the supplementation in silage form should be carried out





**Vielen Dank für Ihre Aufmerksamkeit**

