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


R&D Center in Iberian Pig

University Institute for Agricultural Resources Research

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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

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### Total slaughters pigs 2016: 3,077,075

<table>
<thead>
<tr>
<th>Racial types: Mandatory Iberian dams</th>
<th>Intensive</th>
<th>Campo</th>
<th>Montanera</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>61%</td>
<td>18%</td>
<td>6%</td>
<td>85%</td>
</tr>
<tr>
<td>75% IB</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>IB</td>
<td>1%</td>
<td>1%</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td>63%</td>
<td>20%</td>
<td>16%</td>
<td>100%</td>
</tr>
</tbody>
</table>
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 rooting, 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
Objective

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 m², 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
Design

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±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

<table>
<thead>
<tr>
<th>TRAITS</th>
<th>Control (CD)</th>
<th>Dry (DD)</th>
<th>Wet (WD)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing W (kg)</td>
<td>94.53</td>
<td>89.86</td>
<td>100.10</td>
<td>0.129</td>
</tr>
<tr>
<td>( \text{ADG}_G ) (kg)</td>
<td>0.279\text{ab}</td>
<td>0.246\text{a}</td>
<td>0.305\text{b}</td>
<td>0.027</td>
</tr>
<tr>
<td>Slaughter W (kg)</td>
<td>160.2</td>
<td>164.9</td>
<td>161.4</td>
<td>0.346</td>
</tr>
<tr>
<td>( \text{ADG}_F ) (kg)</td>
<td>0.547\text{ab}</td>
<td>0.618\text{a}</td>
<td>0.529\text{b}</td>
<td>0.018</td>
</tr>
<tr>
<td>( \text{ADG}_T ) (kg)</td>
<td>0.384</td>
<td>0.391</td>
<td>0.391</td>
<td>0.851</td>
</tr>
<tr>
<td>Carcass yield (%)</td>
<td>79.18\text{a}</td>
<td>77.95\text{b}</td>
<td>79.00\text{a}</td>
<td>0.016</td>
</tr>
<tr>
<td>Ham yield (%)</td>
<td>22.04</td>
<td>21.94</td>
<td>22.34</td>
<td>0.314</td>
</tr>
<tr>
<td>Shoulder yield (%)</td>
<td>15.99</td>
<td>16.04</td>
<td>16.15</td>
<td>0.827</td>
</tr>
<tr>
<td>Loin yield (%)</td>
<td>3.20</td>
<td>3.37</td>
<td>3.16</td>
<td>0.107</td>
</tr>
</tbody>
</table>

- 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
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

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

- 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