Effect of slaughter weight on carcass and meat quality and fatty acid composition of subcutaneous fat from Porc Negre Mallorquí (Majorcan Black Pig)

EAAP Barcelona
24-08-09

Session 9. Local breeds: what future? 2. Farming systems and products

J. Gonzalez[1], J. Jaume[2], M. Gispert[1], J. Tibau[3] and M.A. Oliver[1]

[1]IRTA-Food Technology, 17121 Monells, Spain

[2]IBABSA, 07198 Son Ferriol, Spain

[3]IRTA-Porcine Testing Centre, 17121 Monells, Spain

ibabsa
Balearic Institute of Animal Biology

Govern de les Illes Balears
Conselleria d'Agricultura i Pesca

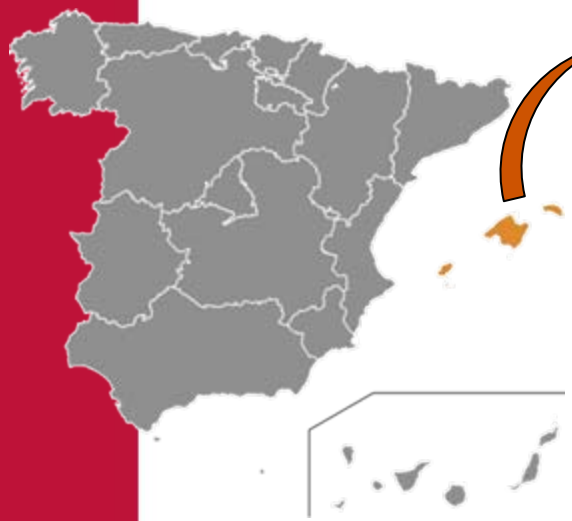
IRTA
RESEARCH & TECHNOLOGY
FOOD & AGRICULTURE

Generalitat de Catalunya
Government of Catalonia

IRTA

Introduction

- Majorcan Black Pig is an autochthonous breed from Mallorca, reared in extensive conditions, with free access to outdoor pasture
- Geographic confinement → Environment adaptation → Optimal use of natural resources → Sustainability of production system by self-sufficiency



Introduction

- Pig population was reduced by
  - Islamic domination
  - Porcine pest
  - Intensification of pig production systems
  - Migration from livestock to tourism and services
- Breed catalogued as endangered breed in 1997
- 1200 sows and 120 boars in 2008
- Selection program of breed conservation to reduce inbreeding and to conserve morphological traits

IRTA

ibabsa

Introduction

- Carcass and meat from pure breed animals slaughtered at heavy weight are used to produce *Sobrassada de Mallorca de Porc Negre*.
- It is a spreadable fermented sausage.
- Protected Geographical Indication (PGI) specifies using pure breed animals.
- Piglets of MBP (6-12 kg) are also consumed as roasted meat, called *Porcella de Porc Negre*.

Objectives

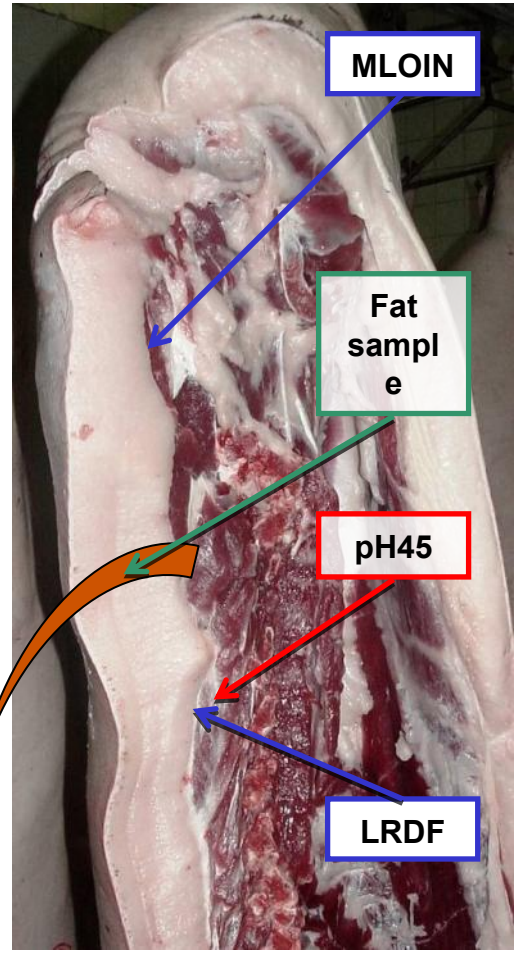
- The aim of this study was to characterize carcass, meat and fat quality in Majorcan Black Pig, and to assess if slaughtering animals at different live weight has an effect on them.

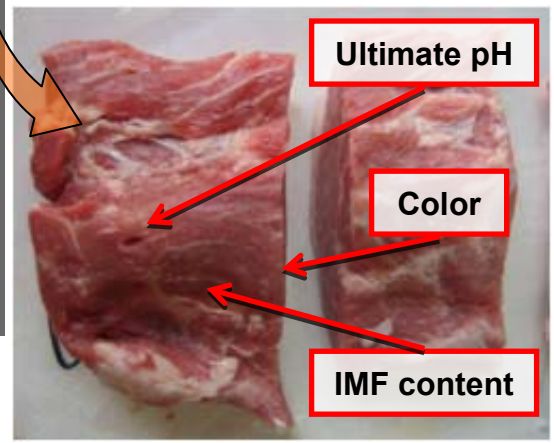
IRTA

ibabsa

Material and methods

- **Animals**
  - 28 MBP females split in two groups:
    - (18) Light slaughter weight (85-120 kg)
    - (10) Heavy slaughter weight (125-185 kg)
  - Same feeding regime based on barley, peas, beans and grass.
- **Carcass quality**
  - MLOIN: minimum fat and skin thickness over the *Gluteus medius* muscle
  - LRDF: dorsal fat thickness at last rib level
- **Meat quality**
  - pH 45 min. p.m. in *L. thoracis*
  - Ultimate pH at 24 h p.m. in *L. lumborum*
  - Objective colour – Minolta illum. C
    - L*; a*; b*
  - Intramuscular fat – triglycerides (Near Infrared Transmittance)
- **Fat quality**
  - Determination of fatty acid profile in back fat using Gas Cromatography





IRTA

Statistical analysis

- **Software**

  Statistical Analysis System (SAS, 2001)

- **Procedure**

  General linear model

- **Model**

$Y_{ij}=$

Y_{ij}

μ :

WE

(i =

ε_{ij}

Sig

Results – Carcass and meat quality

Effect of slaughter weight on carcass and meat quality. Mean, S.E. and statistical analysis.

	Light 85-120 kg (N = 18)	Heavy 125-185 kg (N = 10)	
	Mean ± S.E.	Mean ± S.E.	Sign. level
Live weight (kg)	100.0 ± 3.30	152.4 ± 4.66	***
Carcass weight (kg)	72.6 ± 2.87	122.3 ± 4.05	***
MLOIN (mm)	42.3 ± 1.85	61.1 ± 2.62	***
LRDF (mm)	42.4 ± 2.44	68.7 ± 3.46	***
pH45	5.68 ± 0.069	5.88 ± 0.098	n.s.
Ultimate pH	5.39 ± 0.039	5.97 ± 0.056	***
L*	51.53 ± 0.684	42.92 ± 0.968	***
IMF (%)	7.02 ± 0.397	9.02 ± 0.561	**

MLOIN: minimum fat and skin thickness over the *Gluteus medius* muscle;
LRDF: dorsal fat thickness at last rib level; IMF: Intramuscular fat .
n.s.: $p>0.05$; **: $p<0.01$; ***: $p<0.001$

Results – Fat quality

Effect of slaughter weight on fatty acid profile in back fat. Mean, S.E. and statistical analysis.

(%)	Light 85-120 kg (N = 18) Mean ± S.E.	Heavy 125-185 kg (N = 10) Mean ± S.E.	Sign. level
C16:0	24.0 ± 0.20	24.9 ± 0.28	*
C18:0	11.2 ± 0.16	12.1 ± 0.23	**
C18:1cis-9	47.5 ± 0.27	45.9 ± 0.39	**
C18:2n-6	8.7 ± 0.19	9.0 ± 0.26	n.s.
C18:3n-3	0.67 ± 0.016	0.80 ± 0.023	***
n6	9.6 ± 0.20	9.9 ± 0.28	n.s.
n3	0.93 ± 0.026	1.12 ± 0.036	***
Σn6/Σn3	10.3 ± 0.16	8.8 ± 0.23	***
18:2/18:3	12.9 ± 0.17	11.3 ± 0.25	***
SFA	37.7 ± 0.33	39.3 ± 0.47	**
MUFA	51.8 ± 0.28	49.7 ± 0.40	***
PUFA	10.5 ± 0.22	11.0 ± 0.31	n.s.
PUFA/SFA	0.28 ± 0.007	0.28 ± 0.010	n.s.
A.I.[a]	0.48 ± 0.007	0.51 ± 0.010	*
T.I.[b]	1.09 ± 0.016	1.16 ± 0.023	*

Healthy human diet

- **Σn6/Σn3 < 4.0**
- **PUFA/SFA > 0.4**

n.s.: p>0.05; *: p<0.05; **: p<0.01; ***: p<0.001

[a]Atherogenic index [C12:0+(4·C14:0)+C16:0]/ [(n-3+n-6)+MUFA]

[b]Thrombogenic index (C14:0+C16:0+C18:0)/ [(0.5·MUFA)+(0.5·n-6)+(3·n-3)+(n-3/n-6)]

IRTA

ibabsa

Conclusions and perspectives 1/2

- Results had shown that carcass quality was highly affected by slaughter weight. Light animals presented back fat thickness notably lower.
- Slaughter weight had an important effect on technological meat quality, specially in ultimate pH, lightness and intramuscular fat content.
- High levels of intramuscular fat were presented in both slaughter weight categories, allowing meat from light animals to match industry demands.
- Slaughter weight had an effect on fatty acid composition in back fat, but probably not enough to modify the technological fat quality.
- Slaughter weight had an effect on nutritional fat quality.
- Data from this study is on a preliminary level. Further studies are needed to complete carcass and meat quality characterization of Majorcan Black Pig.

Conclusions and perspectives 2/2

- New pork product concepts alternative to Sobrassada are needed to be developed. This will permit a better adaptation of producers to market changes and matching consumer demands.
- Improvements in production system and in ante-mortem conditions should be necessary to obtain adequate carcass and technological meat quality, and therefore better meat products.
- Apart from sensory quality, meat and meat products from MBP have an added value related to their particular production system and to a cultural and regional tradition.

Acknowledgements

- Majorcan Black Pig Producers Association (ARPNMS)
- Government of Balearic Islands
- Technical staff from IRTA and IBABSA

IRTA

ibabsa


Thank you for your attention!