

IRTA

RECERCA | TECNOLOGIA
AGROALIMENTÀRIES

UAB

Comparison of meat quality parameters in surgically castrated versus vaccinated Iberian pigs



**Martinez-Macipe¹ M, Rodríguez P¹, Izquierdo M², Gispert M¹,
Manteca X³, Hernández F.I², Dalmau A¹**

¹IRTA; ²CICYTEX-La Orden; ³UAB

INTRODUCTION: Iberian pig production system



INTRODUCTION: Iberian pig production system

- Birth, usually camping + 45 days of lactation.
- 7-9 months of pasture and concentrate.
- Around 3 months of pasture and acorn (November-February: “Montanera”).



INTRODUCTION: Iberian pig production system

- Birth, usually camping + 45 days of lactation.
- 7-9 months of pasture and concentrate.
- Around 3 months of pasture and acorn (November-February: “Montanera”).
- Slaughter (around 150kg weight).
- Processing.



INTRODUCTION: The issue with fertility

Males – Boar taint
(androsthenone and skatole).

CASTRATION REQUIRED



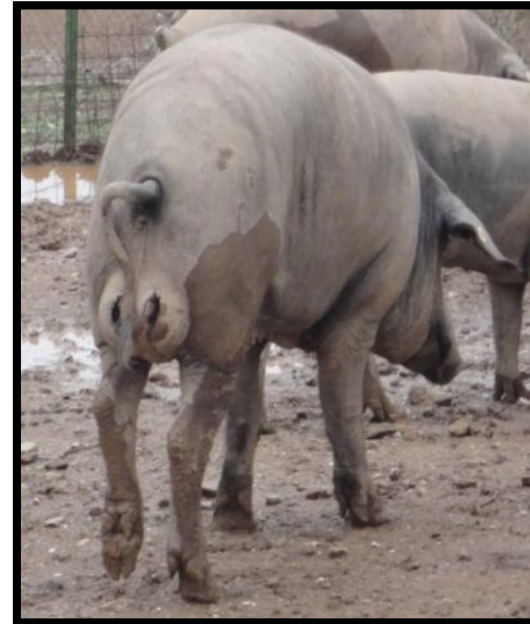
Females – Heat, wild boars
and weight.

CASTRATION PREFERRED



Iberian pig x Wild boar = “rayon”
(smaller than Iberian pig).

INTRODUCTION: Castration and Animal Welfare



INTRODUCTION: Immunocastration

- IMPROVAC: Anti GnRH immunization
 - **temporary** blocks the hypothalamus-pituitary-gonad axis
 - 2 doses separated 4 weeks to start effect
 - 3rd dose in order to maintain effect through the long system



Reduction in testes size.



Not ovulated uterus,
ovaries present.



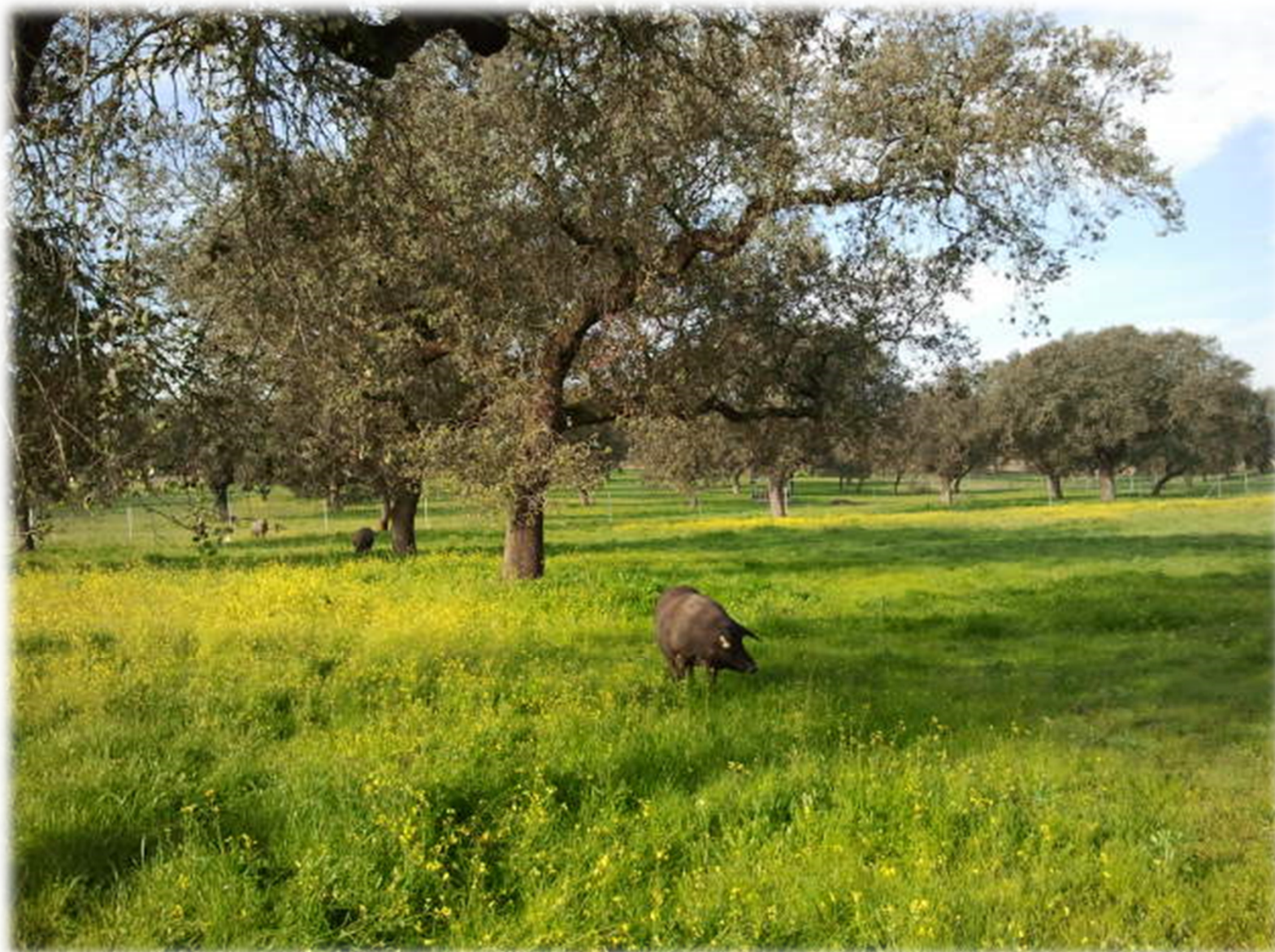
Ovulated uterus from
an entire female.

- Considered an animal friendly alternative to the surgical castration.
- The product has proven safe and effective in multiples studies.

OBJECTIVE:

The aim of our study was to compare several meat and carcass quality parameters in 37 immunocastrated (16 females and 21 males) with 38 surgically castrated (19 females and 19 males) and 8 entire Iberian female pigs.

MATERIAL AND METHODS: Extremadura Dehesa



MATERIAL AND METHODS: Iberian Pigs

Sex and fertility status	Number of animals
Castrated Males (CM)	19
Castrated Females (CF)	19
Immunocastrated Males (ICM)	21
Immunocastrated Females (ICF)	16
Entire Females (EF)	8



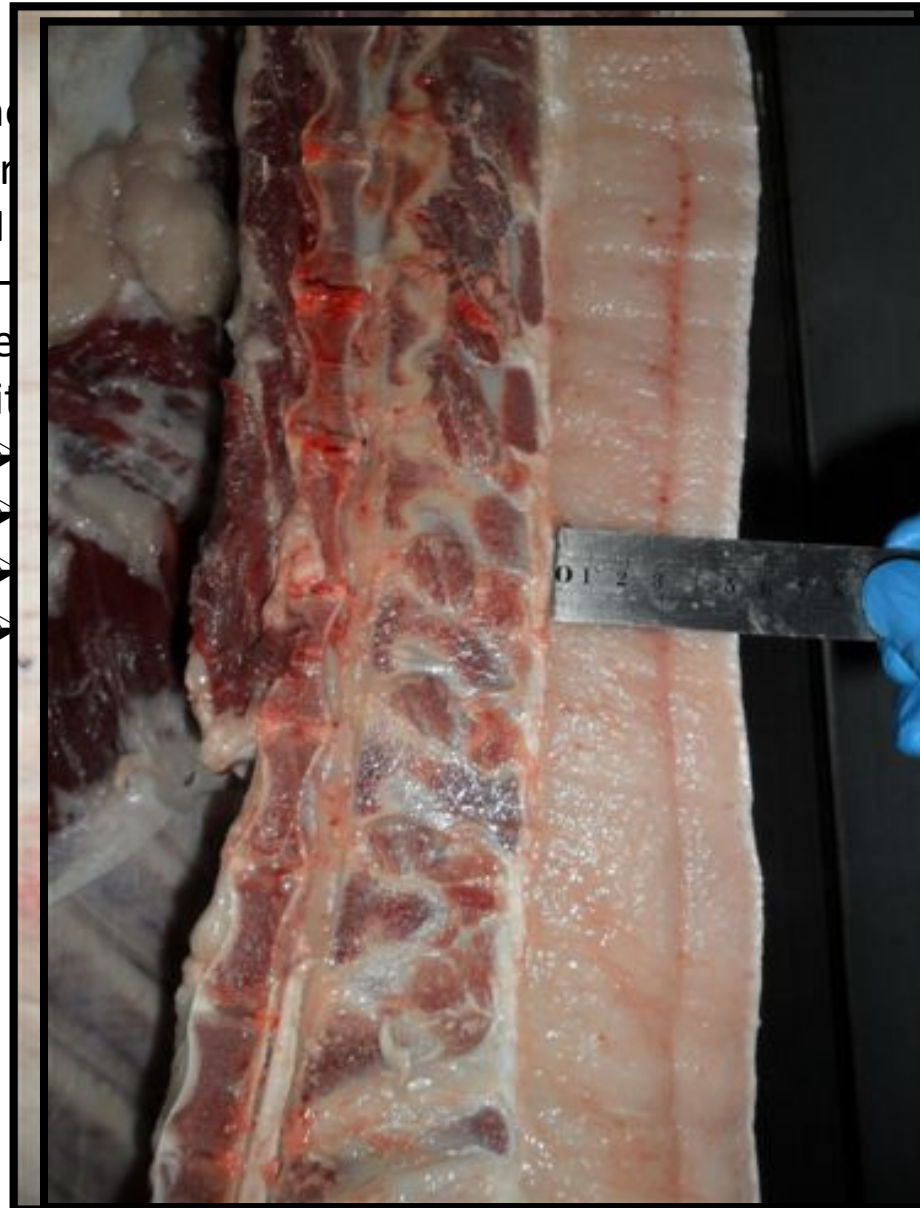
MATERIAL AND METHODS: Vaccination and slaughter

- 2 mL of IMPROVAC® intramuscularly at the neck region
- Vaccination at 11, 12 and 14 months old.
- All animals were slaughtered at a local slaughterhouse in 4 different days.
- Live weight was recorded at their arrival ($155.7 \pm 8,4$ kg).
- They were electrically stunned before being exsanguinated.



MATERIAL AND METHODS: Carcass measurements

- Measurements
 - Carcass weight
 - pH
 - pH (pH₄)
 - Weight
 - Width



membranosus

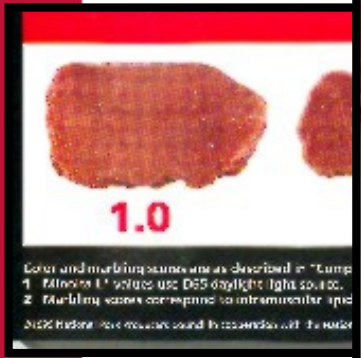
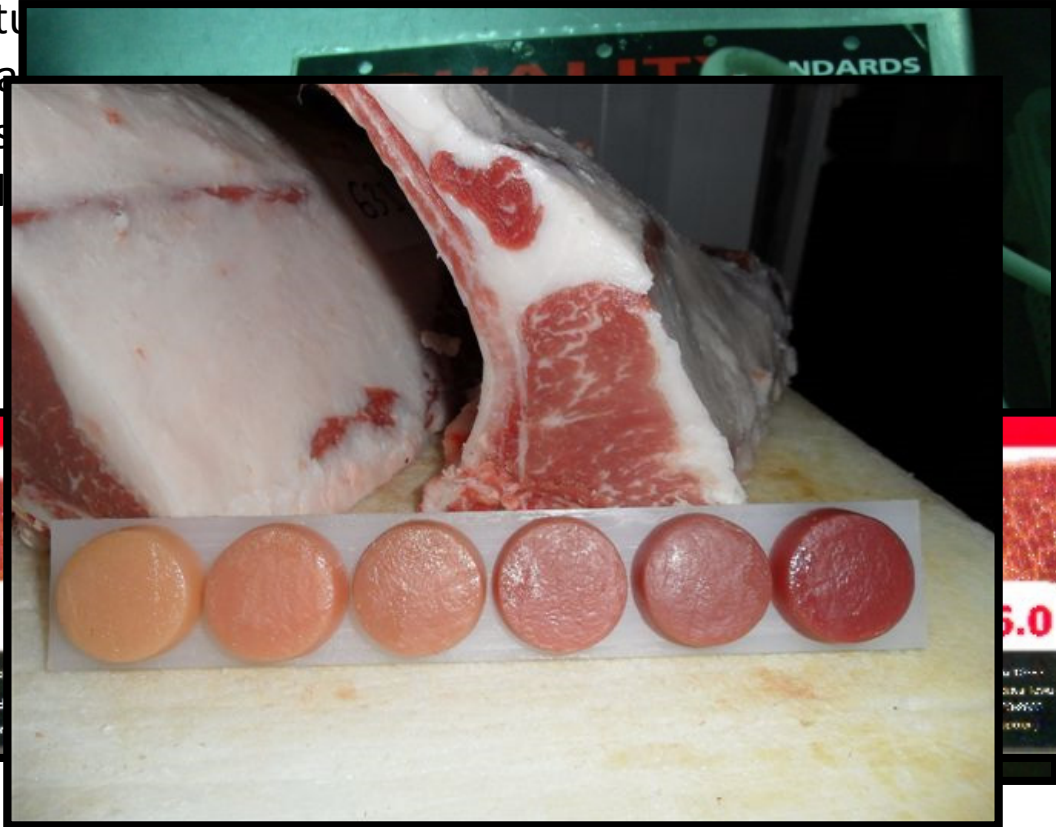
luteus medius.

luteus medius.

MATERIAL AND METHODS: Meat quality

- Measurements 24 hours post-mortem:
 - % of intramuscular fat (IMF).
 - Texture
 - pH a
 - mus
 - Eval

-
-
-



...osis (pHuSM)

...PC) – Marbling.
...ta Chromameter



MATERIAL AND METHODS: Statistical analysis

- Males and females were studied separately.
- SAS software (9.2).
- First analysis of variance of the different variables with PROC mixed.
- Tukey's test to compare mean values of all the parameters studied.

RESULTS: Males

Least squares means of carcass characteristics of castrated (CM) vs immunocastrated (ICM) males.

VARIABLE	CM	ICM	P-VALUE
Live weight, kg	156.1	156.5	0.8905
Carcass weight, kg	122.8	119.8	<0.0001
Killing out, %	78.67	76.55	<0.0001
Carcass lenght, cm	80.2	82.0	0.0017
Loin area, cm ²	12.50	13.97	0.2795
MLOIN, mm	47.2	41.7	0.0117
GDUC, mm	53.0	49.5	0.0783
ESP1C, mm	78.3	65.1	0.0001
ZP muscle, mm	57.7	65.2	0.0001
Shoulder , %	9.2	9.3	0.8074
Loin, %	5.5	4.1	0.4139
Ham, %	12.3	12.6	0.0058

MLOIN: minimum fat over the *gluteus medius*; GDUC: dorsal fat at the level of the last rib; ESP1C: fat at the level of the first rib; ZP muscle: Muscle thickness at the level of *gluteus medius*.

RESULTS: Males

Least squares means of meat quality characteristics of castrated (CM) vs immunocastrated (ICM) males.

VARIABLE	CM	ICM	P-VALUE
pH45LT	6.60	6.68	0.1653
pH45SM	6.70	6.69	0.9031
pHuLT	5.79	5.64	0.0007
pHuSM	5.81	5.65	0.0101
EJC	3.8	3.9	0.6383
L*	41.1	42.3	0.1308
a*	12.8	13.3	0.2997
b*	1.7	2.0	0.3709
Marbling: NPPC	5.2	3.9	0.0248
IMF (%)	9.05	6.97	0.0419
Shear force, kg	4.28	5.08	0.0391

pH45LT: pH at *longissimus thoracis* 45 minutes p.m.; pH45SM: pH at *semimembranosus* 45 minutes p.m.; pHuSM: pH at *semimembranosus* 24 hours p.m.; pHuLT: pH at *longissimus thoracis* 24 hours p.m.; EJC: japanese scale colour; L*,a*,b*: colour with the Minolta Chromameter; Marbling: NPPC (national pork producers council); IMF: intramuscular fat *with Foodscan*, Shear force (texture) with INSTRON 5543.



RESULTS: Immunocastrated Males Versus Castrated Males

- Lighter but longer carcass.
- Reduced KO%.
- Less subcutaneous fat.
- Higher muscle thickness.
- More % of ham.
- Lower pH 24 hours post-mortem.
- Lower marbling (NPPC) values.
- Less Intramuscular Fat.
- Higher Shear Force value.

RESULTS: Females

Least squares means for carcass characteristics of castrated (CF) versus immunocastrated (ICF) and entire (EF) females.

VARIABLE	CF	ICF	EF	P-VALUE
Live weight, kg	152.9	157.2	158.6	0.1394
Carcass weight, kg	121.4	123.4	126.2	0.0946
Killing out, %	79.4 ^{ab}	78.5 ^b	79.6 ^a	0.0236
Carcass length, cm	79.5	80.7	80.7	0.4828
Loin area, cm ²	11.86 ^a	13.80 ^b	11.36 ^{ab}	0.0499
MLOIN, mm	50.2	48.3	50.9	0.4757
GDUC, mm	56.6	54	57.9	0.2973
ESP1C, mm	79.9	76	85.4	0.0657
ZP muscle, mm	58.2	60.8	56	0.0553
Shoulder, %	8.4 ^a	8.9 ^b	9.0 ^{ab}	0.0139
Loin, %	3.5 ^a	3.8 ^b	4.0 ^{ab}	0.0030
Ham, %	12.3	12.7	12.8	0.4477

MLOIN: minimum fat over the *gluteus medius*; GDUC: dorsal fat at the level of the last rib; ESP1C: fat at the level of the first rib; ZP: Muscle thickness at the level of *gluteus medius*.

RESULTS: Females

Least squares means for meat quality characteristics of castrated (CF) versus immunocastrated (ICF) and entire (EF) females.

VARIABLE	CF	ICF	EF	P-VALUE
pH45LT	6.46	6.60	6.69	0.1313
pH45SM	6.61	6.66	6.60	0.7834
pHuLT	5.75	5.75	5.70	0.4476
pHuSM	5.75	5.75	5.67	0.3092
EJC	3.9	3.9	4.4	0.1606
L*	42	41.0	40.7	0.5140
a*	13.2	12.7	13.8	0.3570
b*	1.9	1.4	1.6	0.5815
Marbling: NPPC	4.9	3.9	4.0	0.2919
IMF (%)	9.5	8.4	7.7	0.9652
Shear force, kg	4.7	4.6	4.9	0.8488

pH45LT: pH at *longissimus thoracis* 45 minutes p.m.; pH45SM: pH at *semimembranosus* 45 minutes p.m.; pHuSM: pH at *semimembranosus* 24 hours p.m.; pHuLT: pH at *longissimus thoracis* 24 hours p.m.; EJC: japanese scale colour; L*,a*,b*: colour with the Minolta Chromameter; Marbling: NPPC (national pork producers council); IMF: intramuscular fat *with Foodscan*, Shear force (texture) with INSTRON 5543.

RESULTS: Females

- Immunocastrated females bigger loin area and higher % of shoulder and loin than castrated ones.
- Immunocastrated females lower KO% than entire ones.

DISCUSSION:

Males: Immunocastrated animals lead to leaner carcasses than castrated animals → Consumer acceptance studies required.
Feeding type (Ventanas et al, 2007) and age at the beginning of the fattening period (Daza et al, 2007) influence the meat quality.

Females: Reproductive status doesn't affect meat quality, only pieces size → Izquierdo et al, 2013 concluded that intact and immunocastrated females had bigger hams and loins than castrated females.

Farmer's point of view: **management** and **economical** improvement.

Animal welfare:

→ Immunocastration: less painful, less severe infection's risk (EFSA, 2004).
→ Entire females (if possible) for a better animal-friendly recognition (Dalmau et al, 2011).

CONCLUSION:

- ✓ As **vaccination** may change some meat quality parameters **in males**, it has to be **considered** when deciding the type of castration in these specific fat breeds.
- ✓ Our results suggest that **immunocastration** is a good alternative to surgical castration for **females** and thus, **could be introduced** in the system as a more animal-friendly management measure.
- ✓ **Entire females** can give very similar products to castrated or immunocastred females. They **could be used** in areas where wild boar's presence is not a problem.

THANKS FOR YOUR ATTENTION!



QUESTIONS?