

Sex neutralization of heavy pigs from Iberian Peninsula breeds: solutions and limitations

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THE BREEDS

- Alentejano (AL, in Portugal, photo 1) and Iberian (IB, in Spain, photo 2) pigs are native breeds of the Iberian peninsula. Recent studies show that both breeds are genetically related (Muñoz *et al.*, 2017).
- Although variation exists morphologically these animals are characterized by: short and jowled neck, medium length trunk and arched ribs, pointed snout and extremities are very narrow and short, with pigmented hooves of uniform colour.
- Both breeds present: low prolificacy (Charneca *et al.*, 2012; Fernandez *et al.*, 2008) and low growth rate, but compensatory and relatively high growth rate (Freitas, 1999; Daza *et al.*, 2005) during the fattening/finishing phase called “Montanera” in Portugal and “Montanera” in Spain.



Photo 1 - Alentejano breed sow



Photo 2 - Iberian breed boar

THE PRODUCTION SYSTEM AND PRODUCTS

- After weaning pigs are mostly raised in free-range system (Charneca *et al.*, 2017; Lopez-Bote, 1998)
- For the certification of high grade dry-cured products like the hams, the animals can only be slaughtered with an age of at least 14 months and a bodyweight ranging from 145-210 kg.
- During the fattening period pigs have access to acorns and grass from the Mediterranean forest usually from November to March (photo 3).
- Products from these pigs are raw meat and dry-cured products which the most famous is the “Pata Negra ham” (photos 4 and 5). Quality of the products is related to the age, weight and diet of animals (Daza *et al.*, 2007; López-Bote, 1998)

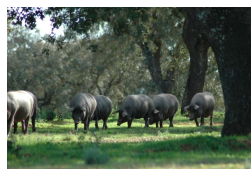


Photo 3 - Alentejano pigs during fattening period



Photo 4 and 5 - Hams in maturation process and ham slices

PRESENT SITUATION

- High age and weight at slaughter
- Usual gonadectomy of males (avoid boar taint and aggressive and sexual behaviour)
- Usual gonadectomy of females (avoid heat and mating by wild boars)
- Foreseen voluntary end of surgical castration (SC) without pain relief

OPTIONS

- SC with pain relief needs the development of a feasible and economically worthwhile procedure
- Use of Immunocastration (IC) protocols

PROBLEMS AND RISKS

- Difficulties on animals manipulation (usually - extensive raising areas, poor facilities, low manpower, etc)
- Effectiveness of IC protocols for long periods until slaughter
- Attitudes of industry towards IC males (presence of testis even if atrophied)
- Effects of IC on carcass, meat and dry-cured products characteristics (including sensorial)

THE RESULTS OF IC IN FEMALES

Low number of studies comparing SC and IC females

3 doses pre-pubertal IC of Iberian gilts have long-term successful effects (ovarian quiescence). Protocol is relatively easy to apply at farm as it allows gender mixing before immunization and doesn't include vaccination during “Montanera” (Images from: Hernández-García *et al.*, 2013)

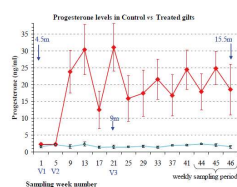


Figure 1: Serum progesterone levels (mean \pm SE) in Control vs. Treated (pre-pubertally immunocastrated) Iberian gilts. Age at start of pregnancy (from June 1 2011 to May 9 2012) is indicated by vertical arrows (n = months); V = vaccination number (3 intramuscular doses)

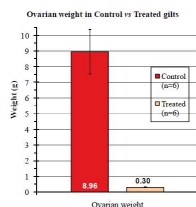


Figure 2: Post-mortem ovarian weight (bilateral means) in Control vs. Treated (pre-pubertally immunocastrated) Iberian gilts at 16 months of age. Data are means \pm SE.

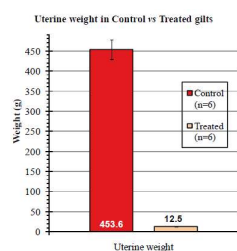


Figure 3: Post-mortem, bilateral uterine horn weight in Control vs. Treated (pre-pubertally immunocastrated) Iberian gilts at 16 months of age. Data are means \pm SE.



Figure 4: Representative ovaries (on same scale) of Treated (pre-pubertally immunocastrated) and Control Iberian gilts at 16 months of age. All Treated gilts had immature ovaries, of very small size, smooth surface, and lacking visible follicles (score 0). All Control gilts had mature, cyclic ovaries (score 3), in this case in luteal phase.

THE RESULTS OF IC IN MALES

In most cases, for intensive pig production, a 2 doses protocol is effective until slaughter (Zamaraskaia and Rasmussen, 2015). The extended effects of IC (Zamaraskaia *et al.*, 2008) up to 22 weeks after 2nd administration, are not enough to assure immunization in heavy Iberian males.

Although some 3 doses protocols can have variable efficacy (as shown in Hernandez-García *et al.*, 2018; Late immunocastrated Control Group), in the same study an optimized 3 doses protocol for IB pigs has been developed.



Representative testes of EM (Entire Males: 2 pigs, red tag) and fully-immunocastrated L-ICM (Late Immunocastrated Males: 15 pigs, orange tag), the latter showing atrophy and degeneration (brown and marbling). (Hernández-García *et al.*, 2017).

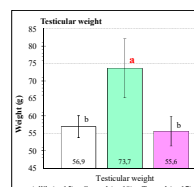
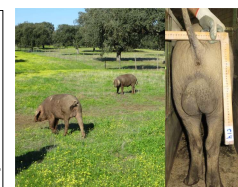


Figure 6: Testicular weight (bilateral mean) weight in acorn-fed Control and Treated Iberian pigs (16 months old) and ad libitum concentrated-fed Iberian x Duroc pigs (13 months old; AdLib group). Treatment: short-term ad libitum feeding period before montanera. Means (\pm SE) with different letters differ ($p < 0.05$). Data from Hernández-García *et al.*, 2018.



Immunocastrated male at the beginning of montanera (left) compared with entire male of the same age (right). Pictures from CICYTEX studies (F.I. Hernández-García, 2016, unpublished).

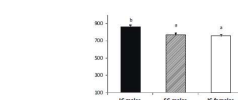


Figure 8: Average weight gain of Iberian pigs through the reproductive period. Control with different letters differ significantly ($p < 0.05$). IC and IC+ refer to Iberian or negatively castrated pigs respectively.

Higher growth rate of IC males vs SC males (Sequier *et al.*, 2017)

Overall, the effects on IC males carcasses and meat traits are limited but some effects are described:

Possible effects on meat colour and drip loss of IC males at 100Kg (Nieto *et al.*, 2017)

IC males with leaner carcasses, less intramuscular fat, higher shear force and rancidity than SC males (Martinez-Macipe *et al.*, 2016)

Some studies on fresh products from IC males (e.g. García-Gudiño *et al.*, 2017)

No studies on dry-cured products (including sensorial)

TAKE HOME MESSAGES

SEXUAL NEUTRALIZATION IS NEEDED IN ALENTEJANO AND IBERIAN PIGS

THE ABSENCE OF POSSIBLE DETRIMENTAL EFFECTS OF IMMUNOCASTRATION OF FEMALES ARE MORE “CLEAR” THAN IN MALES

NO STUDIES ARE AVAILABLE ON THE IMMUNOCASTRATION EFFECTS ON DRY-CURED PRODUCTS QUALITY

NO STUDIES ARE AVAILABLE ON ALENTEJANO BREED ANIMALS AND ONLY FEW EXIST ON CONSUMERS ACCEPTANCE OF IMMUNOCASTRATED ANIMALS PRODUCTS

Information: all literature used in this poster can be requested to the correspondent author. The Iberian breed boar photo was kindly provided by AECERIBER.

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