Effect of vaccination against gonadotropin-releasing hormone (GnRH) in heavy male pigs for Italian typical dry-cured ham production

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**Abstract**

The aim of this study was to evaluate immunocastration (vaccination against GnRH using Improvac® vaccine), as an alternative to surgical castration in heavy male pigs (average live weight 165 ± 10 kg), used in the production of Italian typical dry-cured ham. A total of 60 Landrace × Large White male pigs were assigned to three groups of 20 units, including one group of surgically castrated (SC), and two of immunocastrated pigs, with two (IC2) or three (IC3) vaccine treatments, respectively. The groups were compared for green ham traits, processing weight losses, chemo-physical, and sensory properties of dry-cured hams. While IC3 were not different (P > 0.05) from SC group, IC2 hams were found to differ (P < 0.05) both from SC and IC3 groups in ham traits, final weight losses, texture and sensory boar taint in finished hams. Therefore, vaccination with three doses could be taken into account to control boar taint in the manufacturing of typical Italian dry-cured ham.

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1. Introduction

Growing attention to animal welfare issues and prospects for new rules to limit the practice of surgical castration of male pigs have encouraged the search for more welfare-friendly treatments, still keeping the unpleasant boar taint under control. Vaccination against GnRH, also known as immunocastration, consists of immunizing boars against a synthetic analogue of GnRH coupled to a large carrier protein (Improvac® vaccine) and results in production of antibodies against GnRH, with testis regression and reduction in synthesis and accumulation of steroid hormones, including boar taint-causing androstenone (Batorek, Čandek-Potokar, Bonneau, & Van Milgen, 2012; Font i Furnols et al., 2012; Zamaratskaia et al., 2008). The androstenone decrease is paralleled by reduction in faecal-like smelling skatole (Babol, Squires, & Lundström, 1999; Zamaratskaia, Zlabek, Kopstad, & Andresen, 2012), although boar taint reduction in vaccinated male pigs has been reported to be more tied to androstenone than skatole inhibition (Batorek et al., 2012). According to the aforementioned investigations, two vaccinations were needed for a full response in pigs: the first was aimed at priming the animal immune system, while the second was applied when the pigs approached their sexual maturity, witnessed by aggressive social behaviour against other males and development of sexual attitude.

The effects of male pig immunocastration have been investigated by measurements of carcass traits, meat quality parameters, fat composition (Dunshea et al., 2001; Font i Furnols et al., 2012; Fuchs et al., 2009) and panel (Pearce et al., 2008) and consumer testing (Font i Furnols et al., 2008). When evaluated for traits that are key to meat processing, vaccinated pigs have shown lower backfat thickness, higher percentage of lean meat, and heavier hams than in surgically castrated pigs, with no significant differences in meat qualities (Batorek et al., 2012; Font i Furnols et al., 2012).

Some investigators have demonstrated that immunocastration of pigs reduces the incidence of boar taint in cooked loins (Aluwé et al., 2012), dry cured loins and shoulders (Gamero-Negrín, Sánchez del Pulgar, & García, 2015) and Spanish dried hams (Font i Furnols et al., 2012).

No study so far has dealt with Italian typical dry-cured hams, which are made from pigs slaughtered at 9–10 months of age and 160–170 kg live weight (Della Casa et al., 2010; Lo Fiego, Santoro, Macchioni, & De Leonibus, 2005). Contents of boar taint causing androstenone and skatole increase with age (Zamaratskaia et al., 2012), and their concentration in fat depots of immunocastrated pigs, though low, is higher than in surgically castrated pigs (Batorek et al., 2012). If the undesired boar taint should linger in vaccinated meat, it could be especially detrimental in these pigs, slaughtered in their full adulthood, hence more susceptible to the onset of boar taint. To control boar taint, the last vaccination should take place six to four weeks before slaughter (Dunshea et al., 2001). The effectiveness of the vaccination treatment was reported “reversible” by vaccine producer. However, this raised concerns among Italian heavy pig breeders who questioned about the appropriate vaccination scheme to be adopted with these long-living pigs, for which a longer time would be allowed between the first and second dose. On the other hand, if the vaccine would be administered with