VACCINATION OF BOARS WITH A GNRH VACCINE (IMPROVACÒ) AND ITS EFFECTS ON MEAT QUALITY.

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Introduction

Consumer acceptance of entire pig meat is hindered by a strong, objectionable odor in the heated meat. The compounds responsible for boar taint, androstenone and skatole, are volatile and can be reduced before slaughter, by nutritional diets, castration before weaning or immunization against gonadotrophin releasing hormone (GnRH) (Dunshea et al., 2001). Castration and immunocastration reduces androstenone and skatole levels under the threshold values to detect boar taint meat (1.0 and 0.25 µg/g, respectively). However, castration slows down the growth of pigs increasing production costs and it is debatable practice in terms of the animal's welfare. In addition, castration encourages fattening and some qualities of the fresh (water holding capacity and color) and cooked meat (cooking loss, tenderness and sensory aspects) can be affected. In this work the use of castration and GnRH vaccine (Improvac) to reduce boar taint was assessed on the basis of quality characteristics (color, total fat, cooking loss and tenderness) and acceptation of cooked pork loin steaks and heated subcutaneous fat by consumers.

Materials and Methods

Animal sampling and measurements. Forty six male (24 vaccinated and 22 surgical castrated) crossbred (Large white x Landrace) pigs of similar origin and age were slaughtered on same day according to Brazilian current legislation. Carcass were chilled under commercial conditions at 2 ± 2°C for 24 hours and sent to the Meat Technology Center pilot plant, located in Campinas, São Paulo state, for boning and sampling purposes. The subcutaneous fat *and longissimus dorsi* muscle were vacuum packaged and frozen stored at **-** 18ºC until be analyzed.

Meat quality characteristics. Meat surface color (CIE – L*a*b*) of boneless loin steaks were measured in triplicate on a freshly cut surface after 15 min bloom time at 4 to 6°C using Minolta Chroma Meter, model CR 400. A CIE D65 illuminant, 10° standard observer and an 8 mm viewing port were used. The total fat content of the loin steak muscle was determined by Soxhlet fat extraction following the standard procedures prescribed by AOAC, (1984). Cooking yield was estimated by measuring weights of individual thawed steaks before and after cooking to an internal temperature of 71ºC (Huff-Lonergan et al., 2002). Warner - Bratzler maximum shear force (WBS) was measured according to the guidelines of American Meat Science Association (AMSA, 1995) with some modifications.

Sensory evaluation of pork fat and meat. Backfat and boneless loin steaks from surgical and vaccinated pigs were used for sensory analysis. Frozen backfat samples were cut into a 2 grams pieces, placed onto glass tube (10ml) and sealed with screw lids. Before serving, the samples were warmed up and kept heated in a water bath operating at 40ºC. The frozen steaks were thawed at 4ºC and pan broiled up to core temperature of 71ºC. Before broiling, the steaks were wrapped to aluminum foil aiming to reduce loss of volatile compounds. A Consumer Acceptance (Affective) based on the methodology of Meeilgaard et al., (1999), using 238 panelists, evaluated overall opinion, on a 1 (dislike extremely) to 9 (like extremely) and a preference as well as purchase intention were carried out in the supermarket, comparing pairs of freshly cooked loin and heated fat samples obtained from castrated and Improvac® vaccinated pigs.

Statistical analysis. Data were analyzed as a completely randomized design using General Linear Model Procedure of Statistical Analysis System, SAS, 2000. Each animal was considered as an experimental unit for data analyses. The Fischer's Protected Least Significance Difference (LSD) test ($p<0.05$) was employed to test differences in the mean values between the treatments. All data are expressed as mean ± SEM.

Results and Discussion

Meat quality. Table 1 shows the results corresponding to the variables referring to meat quality from the surgical and Improvac® vaccinated pigs. Loin total fat content found in this experiment (12.67 to 14.67 g/100g) was lower (14.1 to 17.9 g/100g) than those reported by King et al., (2004). Improvac® vaccinated (T2) pigs contained 11.15% less fat ($p < 0.05$) than surgically castrates (T1). Cooking yields values of meat from surgical (T1) and Improvac® vaccinated (T2) pigs showed no statistical difference ($P > 0.05$). The castration reduces drip loss and cooking loss probably due to differences in intramuscular fat content between genders (Mottran et al., 1982). Peak Warner – Bratzler shear force values were not affected by both treatments (T1 and T2) applied in this study. Although Improvac® vaccinated (T2) pigs revealed a light softening in the meat that was not significantly as it is shown in Table 1. Statistically significance differences ($P < 0.05$) in the brightness (L*), redness (a*) and yellowness (b*) parameters were observed between treatments (T1) and (T2). Improvac® vaccinated (T2) pigs resulted a meat with lower L* and a* values but higher b*. The L* values obtained in both treatments correspond to the normal meat quality (L* values ranged from 42 to 55), according to the classification proposed by Warner, et al. (1997).

Table 1. Meat quality characteristics for both treatments groups.

Meat quality traits	T1 (surgically castrated)	T2 (Improvac® vaccinated)
Total fat (g/100g)	14.26 ± 0.79[a]	12.67 ± 0.17[b]
Cooking yields (%)	28.03 ± 0.89[a]	30,03 ± 0.67[a]
Shear force (kg)	4.22 ± 0.26[a]	4.10 ± 0.22[a]
L*	44.34 ± 3.93[a]	42.80 ± 5.54[b]
a*	4.47 ± 1.77[a]	2.37 ± 1.99[b]
b*	6.63 ± 2.08[b]	11.39 ± 4.74[a]

[ab] Within a column, lacking a common superscript letter differ, P<0.05).

Sensory evaluation. The results of the consumer acceptance and preference test are shown in Table 2. In general, the scores given for both treatments were between like slightly and like moderately. Significantly differences ($P < 0.05$) of average acceptance between T1 and T2 were found. Overall acceptance was higher in T2 meat (like moderately) than in T1 (like slightly). It was also observed that odor and taste was rated significantly better for T2. Meat nitrogen-containing compounds may be formed when the animal is left entire most of his life cycle and some of these compounds could have a variety of meat flavor, which might partially explain the increased scores for odor. As for the preference test, cooked loin steaks from Improvac® vaccinated pigs was the most preferred (66% of the testers).

Table 2. Acceptance and preference scores by an untrained panel (n=238) for both treatments.

Sensory traits	T1 (surgically castrated)	T2 (Improvac® vaccinated)
Fat odor	6,04 ± 1,95 [b]	6,75 ± 1,96[a]
Loin odor	6,57 ± 1,46 [b]	6,97 ± 1,46[a]
Loin taste	6,73 ± 1,75 [b]	7,19 ± 1,63[a]
Loin overall	7,11 ± 1,46 [b]	7,45 ± 1,52[a]
Loin preference	81 (34%)	157 (66%)

[ab] Within a line, lacking a common superscript letter differ, P<0.05).

The purchase intention of the evaluated products confirmed the results from previous applied test (preference and acceptance). The majority (74.8%) of the consumers probably (20.2%) or certainly buy (54.6%) the meat from Improvac® vaccinated (T2) pigs and 58.4% of the consumers probably (25.2%) or certainly buy (33.2%) the meat from surgically castrated (T1) pigs. The percentage of consumers that probably or certainly not buy the meat from surgically castrated (T1 = 18.5%) pigs is considered higher when compared with Improvac® vaccinated (T2 = 10.1%) one.

Conclusions

In this experiment was demonstrated that Improvac® vaccinated pigs improved some meat quality aspects evaluated. Sensory, total fat content and color were the main factors affected by immunocastration while cooking loss and instrumental tenderness had no remarkable changes. The consumers classified meat from Improvac® vaccinated pigs significantly better than surgically castrated pigs as far as acceptability, preference and purchase intention are concerned. Thus, Improvac® treatment results in production of animals with high meat quality in the carcass.

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