

# MORPHOLOGICAL, COMPOSITIONAL AND MECHANICAL CHARACTERISTICS OF BELLIES FROM IMMUNOCASTRATED AND INTACT MALE PIGS

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## I. OBJECTIVES

Firmness or softness of bellies is an important quality characteristic because it is related to fat quality, processing difficulties, and visual appearance. It depends on intrinsic and extrinsic production factors. Non-castration versus castration can affect fat content and composition and, consequently, firmness. There are few studies in which the effect of immunocastration over the quality of the bellies is studied, and it is worthwhile to study this effect when comparing to bellies from intact male pigs. The aim of the present work was to determine the effect of the non-castration versus the immunocastration of pigs on the morphological, compositional, and mechanical (firmness) characteristics of bellies.

## II. MATERIALS AND METHODS

A total of 17 bellies were used from intact male (EM) and 13 from immunocastrated (IM) pigs fed the same diet. Bellies were cut using as a reference anatomical points of the carcass and weighted. Length and width were measured in the central part. Fat content was measured with dual X-ray equipment. Firmness was determined by means of the flop distance and angle measured skin-side up and skin-side down using the bar-suspension method. The height of each belly was measured skin-side up in the center of the dorsal side. Then the skin was stretched with tweezers until the base of the belly gets up and the height was measured. The difference between these 2 heights is calculated as a measure of firmness in terms of fat separation. Subjective firmness was also measured by 2 trained technicians, applying pressure with a finger, using a 5-point scale from 1 (very firm) to 5 (very soft). Analysis of variance was performed with SAS software (version 9.4; SAS Institute Inc., Cary, NC) including the castration condition (non-castrated and immunocastrated) as fixed effect.

## III. RESULTS

No significant differences in bellies' weight, width, and thickness were found between IM and EM. The length was significantly ( $P < 0.05$ ) higher in IM than EM bellies. As expected, fatness was higher in IM than EM since IM pigs behave as surgically castrated after the second dose of the immunocastration vaccine. Flop distance and angle, both skin-side up and skin-side down, were significantly higher in bellies from IM than those from EM, indicating that IM bellies were firmer. This was also confirmed with significantly lower measure of fat separation and subjective firmness value in the center of the cranial side of the bellies.

|                             | Intact males | Immunocastrated | RMSE  | P-value |
|-----------------------------|--------------|-----------------|-------|---------|
| n                           | 17           | 13              |       |         |
| Weight (kg)                 | 44           | 4.7             | 0.56  | 0.204   |
| Width (cm)                  | 24.0         | 23.6            | 1.34  | 0.494   |
| Length (cm)                 | 42.1         | 45.9            | 2.57  | 0.001   |
| Thickness <sup>1</sup> (cm) | 3.9          | 3.7             | 0.57  | 0.322   |
| Fat (%)                     | 29.3         | 33.9            | 4.29  | 0.008   |
| Flop distance (cm)          |              |                 |       |         |
| Skin-side up                | 13.9         | 18.8            | 4.88  | 0.010   |
| Skin-side down              | 16.2         | 22.5            | 6.28  | 0.011   |
| Flop angle (°)              |              |                 |       |         |
| Skin-side up                | 38.5         | 48.3            | 12.32 | 0.040   |
| Skin-side down              | 45.6         | 59.8            | 18.25 | 0.044   |
| Firmness <sup>2</sup>       |              |                 |       |         |
| Fat separation (cm)         | 2.0          | 1.5             | 0.45  | 0.013   |
| Pressure <sup>3</sup>       | 4.3          | 3.6             | 0.57  | 0.005   |

<sup>1</sup>Measured in the center of the dorsal side

<sup>2</sup>Measured in the center of the cranial side

<sup>3</sup>5-point scale from livery firm to 5:very soft

#### IV. CONCLUSION

Firmness of the bellies is affected by the castration condition of the animals. In this sense, bellies from IM pigs are firmer and fattier than those from EM pigs. More work is needed to determine the effect of immunocastration on fat composition.

Keywords: fat content, firmness, flop angle, flop distance