Entire male effect on the rate of destructured zones of pork ham

Antoine Vautier, Eric Gault, Pierrick Girard

IFIP, France

Objectives: Since the 1st of January 2022, piglets castration is not allowed in France except under anesthetic and analgesic. There is no general agreement about alternative solutions and pig producers can make a choice between entire male production, immuno- castration or castration under anesthesic. Talking about meat quality and except the strongly investigated impact of entire male production on boar taint, the rate of destructured zones (PSE-like zones) observed on raw hams has not been studied for entire male production. Whereas gender has been recently found to have a significant effect on the rate of the defect (+50% for female com- pared to castrated male [1]), the specific effect of entire male production is a fair question.

Materials and Methods: In spite of building a time-consuming protocol in an experimental farm (approximately 1400 pigs to test a +/- 50% effect), we decided to measure the gender effect on the destructured zone frequency directly in a slaughterhouse, at the end of the ham deboning line, on a randomly selected population. Increasing the number of observations is an efficient way to cancel out the strong farm effect on the meat quality level (ultimate pH and destructured zone rate), assuming that hams from female car- cass could be considered as the control group. To that end, 18 days of online grading has been performed in a slaughterhouse, leading to a total number of 10925 individual observations on deboned and trimmed topsides of pork hams. The CSB-Jamboflash® de- vice, recently developed according to the IFIP vision-based prototype [2] was used to measure the destructured defect on the deboning line. This device use an automatic algorithm to select a small area of the *semimembranosus* muscle and give a prediction of the destructured defect grading from the RGB signal. With this system, the robustness of the defect grading was optimized com- pared to subjective evaluation whose accuracy could be difficult to maintain all day long. Subjective grading was nevertheless per- formed by a unique operator [3] on the sub-population of topsides showing suspicious aspect. Gender determination was performed on bone-in hams focusing primary on the presence and the size of the prostate gland, and secondary on the amount of subcutaneous fat covering the *gracilis* muscle. The traceability of gender was maintained during the deboning process by using color labels that were automatically detected by the CSB-Jamboflash® software in order to link the destructured zone grading to gender for each top- side.

Results and Discussion: After removing several batches of consecutive hams (>100) with the same gender from the data set (no con- trol group within the batch), gender and destructured zone grading were recorded on 10125 hams (5296 females, 2528 castrated males and 2301 entire males). The overall defect rate (CSB-Jamboflash® score above 2,5 or class 3+4 of the IFIP scale) was low (11,3%) but can be explained by the pH sorting applied on 40% of the hams by the slaughterhouse, excluding pH value under 5,60. In fact, low ultimate pH is known to be an important risk factor for the defect [1]. The gender effect on the average CSBJamboflash® score is significant (p.=0,036), with higher score for entire male and female compared to castrated ($1,65_a$ vs $1,66_a$ vs $1,61_b$, respectively). This means a 12,5% defect rate for entire male, 11,7% for female and 9,5% for castrated (Chi-2 p value = 0,002). The comparison between the device's score and the IFIP scale subjective grading led to great overall accuracy (4,1% of error) but unbalance error with 17,1% of false negative and 2,6% of false positive.

Conclusion: Moving from pig production with castrated males to entire males production could lead to a +32,4 % rise in the rate of destructured zone in the male population. That means an overall +14,5% increase in the production system (male and female). This meat quality concern has to be taken in account when opting for an alternative practice to simple castration. This kind of experiment should also be performed with immunocastrated pigs to have a clear overview of the effect of any practice available.

Acknowledgements: This communication is based on a project which received a subsidy from INAPORC and the Ministry of Agriculture. Authors thanks Gâtine Viandes slaughterhouse (La Guerche, France) for their help in this work.

References:

1. Schwob S., Vautier A, Lhommeau T. 2018. Etude génétique du défaut jambon déstructuré. Les Cahiers de l'IFIP, vo.5, n°2.
2. Vautier A., Monziols M., Lhommeau T., Gault E. 2016. Prediction of PSE-like zones, ultimate pH and cooking yield by computer image analysis of deboned hams. 62nd International Congress of Meat Science and Technology, Bangkok, Thailand.
3. IFIP. 2005. Grille de notation du défaut « déstructuré » des muscles de la cuisse de porc.

Key words: Pork, Meat quality, Entire male, Vision system