Effect of vegetable by-product-based feeding on beef carcass quality

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Objectives: The meat sector has been recently affected by a considerable drop in consumption being one of the main reasons the growing concern of people on the impact of animal production in the environment and animal welfare. This was perceived locally in Spain within the Protected Geographical Indication (PGI) meat label: the PGI Ternera de Navarra. In order to improve the feeding options produced locally, it was proposed to include the vegetable byproducts generated in the agri-food industry of the Ebro Valley region in the rations of fattening calves as a raw material. Besides, these are materials that are generated in large quantities, around 120,000 - 150,000 tons/year, by the Ebro Valley agri-food industry, meaning a real management problem due to the volume it represents and the few recovery options available. The innovation pretends to demonstrate aspects related to the healthy proper- ties presented by vegetable by-products when used in fattening feedlots. In short, by demonstrating this research line, the research hopes to provide greater added value to the process and the product, in search of healthy properties in the meat, which represents a responsible, profitable and sustainable cycle, improving the level of customer satisfaction and the image of the sector, thus helping to promote the consumption of beef. Finally, the objective of the study lies in the demonstration that the mentioned innovative feeding did not reveal differences in carcass beef quality when comparing it with a conventional feeding diet.

Materials and Methods: Regarding the animal material, 23 entire young bulls, reared under the PGI Ternera de Navarra, were used in this study. 12 animals were fed with the diet based on vegetable by-products whereas for the remainders a conventional fattening feed was supplied. Regarding the former, it was composed by 53.08 % concentrated feed, 37.4 % of vegetable by-products, 5.45 % beet pulp and 4.07 % straw whereas the later it was characterized by 90 % concentrated feed and 10 % straw. Once the fattening period determined by the mentioned PGI in the EEC 1483/2004 elapsed (slaughter age 13 months), the animals were transported the day before slaughter to an EU-Commercial Abattoir in compliance with the current European Community of Animal Welfare in transport EEC 93/119/1993. Already at the slaughterhouse, carcasses were classified according to European grading system EEC 1308/2013. Then carcass conformation was evaluated using an 18-point scale, and fatness was scored using a 15-point scale. 24 hours post-mortem, pH, backfat thickness and color, both in muscle latissimus dorsi (LTD) and fat, were recorded. Measurements were recorded from the left half of each carcass with a Crison GLP 22, a Powerfix® electronic digital caliper Z22855 and a Minol- ta CR400, respectively. Then, an analysis of the variance (ANOVA) was done for the 5 parameters with the IBM SPSS Statistics 27 software.

Results and Discussion: As for the obtained results, no significant differences from a statistical point of view were reported (p-value ≤ 0.05). For instance, pH and backfat thickness presented p-values of 0.491 and 0.232, respectively. Similar values for pH were acquired by Altarriba et al. (2005). In this line, fat and muscle color coordinates L*, a* and b* did not show dissimilarities for both feeding systems. Carcass conformation and fatness scores registered lower p-values when compared to the remaining variables. On average, carcass conformation showed a slightly lower score, 10.750 points ("U" on the EUscale), for the vegetable by-products- based diet meanwhile the conventional fed reported 11.364 points ("U" on the EU-scale), being this value very similar to the one reported by Blanco et al. (2009). Hence, the p-value stands at 0.266. Considering the later criterion, a tendency (p-value ≤ 0.10) was reported among the diets. The carcasses of the animals fed with a vegetable by-products-based diet recorded a lower fatness score, 4.250 ± 0.866 in average ("2-" on the EU-scale), in contrast to the conventional ones, 4.909 ± 0.701 ("2" on the EU-scale). This fact results in a p-value of 0.059.

Conclusions: Sustainable feeding systems based on vegetable by-products demonstrated a good performance in beef carcass quality when compared to conventional diets. Therefore, vegetable by-products from the agri-food industry are interesting raw materials for animal nutrition. In addition, by including these ingredients in the daily diet of livestock, the amount and dependence on other ingredients in the diet is reduced, being also an efficient circularity tool.

References:

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