

THE USE OF BY-PRODUCTS FROM TOMATO, GRAPE AND OLIVE OIL INDUSTRIES IN EWE'S FEED AFFECT ORGANOLEPTIC CHARACTERISTICS OF LAMB

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Abstract – By-products from the tomato, grape and olive oil industries have been used in the feed of ewes during lactation, and the organoleptic quality of the suckling lambs has been assessed by a trained taste panel. The use of tomato and grape by-products increases lamb and flavour intensity. Olive cake by-products reduce the flavour persistence, whereas the use of grape by-products reduces juiciness and increases livery flavour. Due to the young animals use, sensory scores have been low.

Key Words – ewe's diet, meat, sensory.

I. INTRODUCTION

Although there are several factors to be considered when by-products are included in the animal ration, such as the amount to be incorporated in the feed, the consistency of the nutrient content or the moisture and chemical content, their use can reduce the cost of feeding as well as help solving the problem of their disposal with beneficial environmental consequences.

In this work we have focused in the by-products of the tomato, grape and olive oil industries. Grape pomace is the main residue generated by the wine industry, consisting of grape seeds, skin and pulp, and could be interesting because of the presence of a wide range of polyphenols. In this regard, winemaking by-products have been associated with effective antioxidant activity in lamb meat [1]. It is well known that the seeds and peel residues of tomato contain a great variety of biologically active substances, principally lycopene [2], a powerful antioxidant. The olive cake is the solid by-product from the olive oil industry. This by-product has been tested in sheep and lambs with a moderate success [3] because of the high residual fat. The composition of the fat of suckling lambs is influenced by the composition of the ration consumed by the ewes [4]. Therefore, the aim of this study was to assess the organoleptic quality of the meat from lambs whose mothers had by-products from tomato, grape or olive oil industries in the ration during the suckling period.

II. MATERIALS AND METHODS

Four groups of pregnant Merino ewes were assigned to each of the studied diets: Control, Tomato, Grape and Oil cake. Those male lambs coming from single birth were kept in the experiment. From each group, a total of 7-8 lambs per group were kept suckling with their mothers. Lambs were also provided with concentrate and straw ad libitum. They were unweaned in the day of slaughtering with 56.2 ± 7.2 days old and 8.5 ± 1.6 kg cold carcass weight. After 24 h in the abattoir, the muscle longissimus lumborum from both sides was obtained, vacuum packaged, kept at $4\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ and frozen until analyzed. The vacuum-sealed samples were thawed at $4\text{ }^{\circ}\text{C}$ for 24 h before assessments. The whole loin was wrapped in aluminium foil and cooked in a double-plate grill at $200\text{ }^{\circ}\text{C}$ until the internal temperature was $70\text{ }^{\circ}\text{C}$. Once cooked, the muscle was cut into eight portions, wrapped in aluminum foil and marked with a random 3-digit code. To avoid the possible effects of the order of presentation and first-order carry-over effects, the samples were presented to panelists in different orders. Panelists assessed in an unstructured 10-cm anchor scale 10 attributes, with a balanced incomplete block design with three samples per plate. A General Linear Model (GLM) was performed with treatment and session effects including the mean per animal for each attribute. The differences between treatments were assessed with a Duncan test.

III. RESULTS AND DISCUSSION

Results are showed in Table 1. Ewe's diet composition has been of special relevance when performed with tomato and grape by-products, because both have increased lamb and odour intensity keeping longer the persistence of the flavour, in comparison with the olive cake. Other authors also have showed more favourable lamb odour when the diet is supplemented with polyphenols [5, 6], probably for its antioxidant properties. Animals from the grape group also showed the lowest juiciness and highest livery flavour. The incorporation of olive cake in the ewe's diet reduces the persistence of flavour, maybe related to its higher monounsaturated fatty acids that would deposit in the muscle [7] that would reduce the amount of volatiles after cooking [8]. In general, the organoleptic scores were low due to the young age of the animals.

Table 1. Organoleptic characteristics (0, none-100, high perception) of lamb meat from four different ewe's ration composition

	Ingredients in the ewe's diet				RMSE	P value
	Control	Tomato	Grape	Olive cake		
Lamb odour	46.1 ab	52.1 a	52.6 a	43.1 b	8.7	0.007
Tenderness	54.2	46.1	47.3	48.7	10.6	0.089
Juiciness	49.8 a	45.0 ab	41.4 b	45.5 ab	6.9	0.006
Residue	42.0	46.5	47.8	42.2	10.9	0.270
Lamb flavour	40.1 b	45.6 a	47.1 a	39.0 b	6.6	0.002
Grass flavour	10.1	11.2	13.6	9.6	4.7	0.110
Acid flavour	15.7	12.5	15.5	12.5	4.7	0.357
Livery flavour	26.5 b	28.7 ab	32.9 a	24.0 b	6.3	0.008
Metallic flavour	32.9	34.2	31.3	29.4	7.5	0.453
Flavour persistence	38.7 a	38.3 a	41.4 a	34.1 b	5.1	0.013

IV. CONCLUSION

Tomato, grape and olive cake by-products can be used in the diet of ewe's during lactation, affecting in different ways the organoleptic quality of the meat of the suckling lamb.

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