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SENSORY QUALITY OF MEAT FROM LAMBS FED DIETS CONTAINING HEMP SEED OIL

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I. INTRODUCTION

Meat sensory quality plays a pivotal role in determining consumer acceptance and repeat purchases. A variety of oils have been used to alter the dietary energy and influence the fatty acid composition and sensory quality of lamb meat. In most cases, oil supplementation in lamb finishing diets has resulted in rancid off-flavours [1,2,3] and increased tenderness [4,5] in meat. To mitigate rancid off-flavours while improving the overall lamb meat quality, the use of oils with a balance of essential polyunsaturated fatty acids (PUFA) and antioxidant bioactive compounds could be desirable. Among the potential alternatives is hemp seed oil (HSO), which contains large quantities of diverse PUFA, including linoleic, alpha-linolenic, stearidonic, and gamma-linolenic acids [7,8,9]. Furthermore, it contains significant quantities of several antioxidant bioactive compounds such as polyphenols, cannabinoids, tocopherols (i.e., α, β, γ and δ), terpenes and carotenoids [6,8,9]. Thus, the objective of this study was to evaluate the sensory quality of lamb meat from animals fed finisher diets containing HSO. It was hypothesised that supplementing HSO in lamb finishing diets improves the flavour, aroma, tenderness, and overall acceptability of lamb meat.

II. MATERIALS AND METHODS

A total of 40, 3-month-old Dohne Merino lambs with an average weight of 26 ± 2 kg were individually housed and allocated to four treatment diets: 0% (control), 2.5% (25 g/kg) canola oil (positive control), 2.5% (25 g/kg), and 5% (50 g/kg) HSO replacing maize (1:1 substitution) in a completely randomized design (n=10). The contents of the basal diet in g/kg included yellow maize (425.9), lucerne hay (120.0), barley (94.8), wheat straw (80.0), canola oilcake meal (73.4), wheat bran (72.2), molasses syrup (57.0), aminomax soya oilcake (47.9), feed lime (15.2), sheep premix (7.0), ammonium sulfate (3.4), coarse salt (3.1). The diet was formulated to meet the nutritional requirements for growing lambs [12]. Animals were given feed and water *ad libitum* for 42 days, after a 14-day adaptation period. At the end of the trial, lambs were slaughtered, and right *Longissimus thoracis et lumborum* (LTL) samples were collected for sensory analysis and stored at -20°C.

On evaluation day, loins were thawed in a 20°C water bath, oven-roasted at 163°C until reaching 71°C internal temperature, cooled for 15 minutes, blot-dried, deboned, cut into cubicles, and wrapped in foil. Samples were reheated at 70°C for 10 minutes, covered with petri dish lids, and placed in mugs in a 60°C water bath before each session. The LT was used for training, and the LL for testing. Training included 8 sessions over 4 days, with 2 sessions per day and a 10-minute break. Reference standards were used during training to familiarize panellists with sensory attributes. An eleven-member trained panel was used to evaluate the samples in 10 sessions over five days, with four loins per session, served in a randomized order. The panellist's testing booths (76 cm wide × 51 cm depth) had neutral-coloured walls, furniture, and standard lighting (700–800 lx), and were equipped with computers running Compusense five® software (Compusense, Guelph, Canada). The scale used by the panellists ranged from 0 to 100, where 0 indicated none and 100 indicated prominent. The data obtained was tested for normality using PROC UNIVARIATE and analysed using PROC MIXED with diet as the fixed factor, and session and panel as random factors.

III. RESULTS AND DISCUSSION

The inclusion of oil in the diet did not affect ($P > 0.05$) the sensory profile of lamb (Table 1). While HSO was expected to have a distinct flavour and aroma, at low concentrations, its flavour profile might not have been strong enough to create noticeable differences in lamb meat. Likewise, canola oil is known for being relatively neutral in flavour, so as expected, its presence did not significantly alter the sensory quality of lamb meat [10]. Furthermore, the maize-based basal diet might have masked the effect of the oils on sensory quality as reported previously [11,13]. The findings show that HSO can be included up to 5% in maize-based lamb finisher diets without altering the sensory quality of meat.

IV. CONCLUSIONS

The inclusion of HSO in lamb finisher diets, up to 5%, did not affect eating quality, indicating its potential as a feed ingredient without negatively impacting meat sensory attributes. Additionally, HSO is rich in PUFA and possesses antioxidant properties, which may enhance the composition and shelf life of lamb meat. Further studies to assess

the effect of using HSO in lamb finisher diets on meat oxidative stability and consumer acceptance could be valuable.

Table 1: Effect of oil-enriched feeds on the descriptive sensory of feed-lot lamb

	Attributes	Oil inclusion (%)				P value
		NON-OIL	CAN 2.5	HSO 2.5	HSO 5	
AROMA	Lamb meat	61.3±1.96	60.8±2.18	60.5±2.06	60.9±2.56	0.900
	Lamb fat	22.4±1.01	23.0±1.38	22.4±0.64	23.0±0.73	0.294
	Sweet-associated	24.1±0.97	24.2±1.27	24.0±1.03	23.8±0.91	0.819
	Savoury	25.9±1.45	25.9±1.70	25.9±1.35	25.9±1.48	0.999
	Herbaceous	22.5±2.04	23.5±1.25	23.5±1.74	23.0±1.30	0.488
PALATE	Lamb meat	69.0±3.15	69.8±2.48	69.4±1.04	69.4±2.19	0.904
	Lamb fat	25.3 ±1.38	26.5±1.00	25.7±1.78	26.3±1.80	0.322
	Sweet-associated	24.2±1.27	24.3±1.28	24.2±0.80	24.5±1.45	0.953
	Savoury	28.8±1.65	29.2±1.84	28.7±0.94	29.0±1.22	0.898
	Herbaceous	21.3 ±1.63	21.9±2.01	21.8±2.22	21.7±2.46	0.923
TEXTURE	Sustained juiciness	72.6±4.51	71.9±4.12	71.5±4.08	71.4±4.11	0.914
	Tenderness	73.0±3.93	72.8±3.57	72.1±5.60	72.9±4.48	0.970

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