PURIFIED LIGNIN IN LAMB FEED AND ITS EFFECTS ON PERFORMANCE, CARCASS AND MEAT QUALITY

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I. INTRODUCTION

Kraft lignin is a by-product of the alkaline hydrolysis of wood in the papermaking process. This lignin contains phenolic fragments that have antioxidant activity in humans [1]. In its purified form, lignin has different biological effects from native lignin and does not present digestive limitations in ruminants and monogastric animals because it is composed of low molecular weight phenolics (125 to 155 g/mol) [2]. Kraft lignin in the diet of lambs (12.5 g/kgDM) exerted no protective effect on the rumen wall mucosa nor a positive effect on performance but increased the activity of peroxidases, indicating antioxidant activity [3].Kraft lignin can be beneficial in increasing feed conversion and animal performance, however, its use in animal nutrition needs more studies to be fully understood [4]. This study aimed to establish the best concentration of purified Kraft lignin in the diet of lambs in the finishing phase.

II. MATERIALS AND METHODS

A total of 32 lambs from industrial crossbreeding, with an average body weight of 20 kg and an approximate age of 60 days, were fed 65 days of a diet with 85% concentrate and 15% hay with 0, 6, 12 or 18 g/kg DM of purified Kraft lignin, respectively treatments L0, L6, L12 and L18. The animals were weighed in the morning every 13 days of feeding using an electronic scale. After slaughter, carcass weight was measured, as well as carcass yield, pH, temperature, loin eye area, fat thickness, TBARS, and meat from commercial cuts. The experimental design was a randomized block design with eight animals per treatment, and the statistical analysis was carried out using the SAS program, and the means were compared using the Tukey test with a probability of 5%.

III. RESULTS AND DISCUSSION

The inclusion of purified Kraft lignin in the concentrations of 6, 12 and 18 g/kg of DM had no effect on body weight, average daily weight gain, feed conversion and dry matter consumption. Furthermore, there were no changes in carcass quality parameters, hot carcass weight, cold carcass weight, hot carcass yield and cold carcass yield, loin eye area, pH and temperature (at 30 minutes and 24 hours after slaughter) and TBARS (Table 1). Also, there were no changes in the commercial cuts (Table 2). Under the conditions of this study and at the concentrations used, purified Kraft lignin did not affect performance characteristics, carcass except the fat thickness, and meat quality parameters.

Table 1 – Carcass parameters of lambs fed different amounts of purified Kraft lignin

	Treatment						
	L0	L6	L12	L18	SEM	Means	*P*-value
Hot carcass weight, kg	20.35	19.68	19.20	19.50	2.30	19.68	0.7842
Cold carcass weight, kg	19.84	19.13	18.69	19.01	2.26	19.17	0.7768
Hot carcass yield, kg	46.50	46.25	46.38	46.25	0.02	46.34	0.9936

Cold carcass yield, kg	45.25	44.75	45.00	45.00	0.02	45.00	0.9677
Subcutaneous fat, mm	1.85a	1.57b	1.40 b	1.44b	0.05	1.57	0.0340
Loin eye area, cm^2	15.47	13.91	14.52	14.05	1.82	14.56	0.3910
pH, 30 min	5.86	6.13	6.13	6.18	0.538	6.07	0.6395
T°C, 30 min	32.99	32.64	33.36	32.75	1.70	32.93	0.8361
pH, 24 hours	5.58	5.54	5.61	5.63	0.13	5.59	0.5272
T °C, 24 hours	6.05	7.46	6.80	6.11	1.48	6.61	0.2101
TBARS, µg malondialdehyde/kg	0.16	0.16	0.11	0.14	0.09	0.14	0.7096

Parameters in each row with P > 0.05 are not different. Treatments means with the same letter are no different P > 0.05.

Table 2 – Commercial carcass cuts from lambs fed different amounts of purified Kraft lignin

Meat cuts	Treatment				SEM	Means	*P*-value
	L0	L6	L12	L18			
Shank, kg	3.17	3.05	2.95	3.07	0.42	3.06	0.7738
Loin, kg	0.93	0.94	0.85	0.92	0.23	0.91	0.8575
Rib and neck, kg	4.33	4.07	3.84	3.95	0.56	4.05	0.3515
Shoulder, kg	1.79	1.79	1.77	1.78	0.22	1.78	0.9979

Parameters in each row with P > 0.05 are not different.

IV. CONCLUSION

Under the conditions of this study and at the concentrations used, purified Kraft lignin had no effect on performance, carcass characteristics and meat quality parameters when added to finishing diets of lambs, except for a slight reduction in fat thickness. Therefore, the use of this type of lignin is not recommended for feeding lambs on this type of diet, but studies with low energy diets should be carried out.

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