Durvillaea antarctica and agar powder: new ingredients in the diet of meat lambs.

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I. INTRODUCTION

In the coming decades, the demand for animal protein will not be able to be covered by current production systems, so it is necessary to evaluate new strategies that involve greater intensification, but that are also sustainable and environmentally friendly [1]. In this context, the use of alternative feeds and materials to feed production animals is a focus of interest for the scientific community. *Durvillaea antarctica* is a brown seaweed that inhabits the southern hemisphere, which has recently been described and contains numerous nutritional elements [2]. Agar is a powder produced from red algae and is used to produce *in vitro* cultures of different plant species and microorganisms, but once used, it is disposed of as conventional waste. It has been reported that sheep in some island areas eat seaweed as a dietary supplement, without affecting their health or metabolism [3], so this study sought to evaluate the use of *Durvillaea antarctica* meal and agar in the diet of fattening lambs and its impact on the weight and overall quality of their carcasses.

II. MATERIALS AND METHODS

This study is endorsed by the Scientific Ethical Committee of the Universidad de La Frontera. Temuco, Chile. Two groups of lambs weighing 21.52 kg (n=20) and 15.65 kg (n=20), respectively, were housed and acclimatized for 15 days. Then, they were separated into modules. In the first module, one group (n=10) was selected as a control and a second group was fed 5% agar powder meal based on dry matter intake (n=10). In a second module, one group was selected as a control (n=10) and the other group was fed 5% *Durvillaea antarctica meal* (n=10) on a dry matter intake basis. The weight and health of the animals was monitored weekly. The design of the experiment was based on the work of Tripathi & Karim [4]. After 9 weeks the animals were slaughtered at the local slaughterhouse and the carcasses were taken to the laboratory in a 4°C refrigerated truck. The pH was measured 24 h *post mortem* on the *Longissimus* dorsi muscle *with* a pH meter by puncture (IQ150, IQ, Scientific Instruments, USA) and the color was measured with a colorimeter (CR-10 color-reader, Konica Minolta, Japan).

III. RESULTS AND DISCUSSION

The preliminary results of this study indicate that in general the animals fed 5% seaweed meal or agar powder did not present a different weight in relation to the respective control groups (Table 1). This study approached with caution the inclusion of both alternative raw materials since the literature suggests not to exceed 10% of inclusion of elements such as algae and by-products because they can generate alterations in the digestibility and health of the animals. Meat pH and color are key aspects highly related to meat quality and the 5% inclusion of *Durvillaea antarctica* and agar powder did not significantly affect these parameters, so we assume that these types of raw materials for feeding ruminants do not have negative effects on post-mortem carcass quality or meat quality traits, so they could be used as an alternative to feed of vegetable origin, which are increasingly scarce and whose production is not very environmentally friendly.

Table 1 – Effect of the inclusion of 5% agar powder and *Durvillaea antarctica* meal on live weight, pH

and color of lamb meat.

	Treatment		
	Control ± SD	A. powder ± SD	p value
Live weight initial	16.22 ± 1.92	15.08 ± 1.90	0.05
Live weight final	18.66 ± 3.72	19.40 ± 3.57	0.73
pH	5.67 ± 0.09	5.70 ± 0.08	0.05
Color			
a*	18.32 ± 2.27	18.97 ± 2.26	0.49
b*	12.73 ± 1.50	14.17 ± 1.70	0.37
c*	22.34 ± 2.54	23.67 ± 2.60	0.49
L*	42.11 ± 2.65	45.31 ± 3.22	0.81

	Treatment		
	Control ± SD	***D. A* meal ± SD**	p value
Live weight initial	20.22 ± 5.14	20.71 ± 4.35	0.05
Live weight final	29.33 ± 7.47	31.45 ± 5.96	0.48
pH*	5.57 ± 0.05	5.68 ± 0.09	0.00
Color*			
a*	13.89 ± 1.45	12.41 ± 1.86	0.05
b*	11.89 ± 0.63	10.77 ± 1.03	0.01
c*	18.29 ± 1.16	16.48 ± 1.74	0.03
L*	40.70 ± 3.31	41.18 ± 4.27	0.92

*The pH and color were measured on the *Longissimus* dorsi muscle. D.A meal: *Durvillaea antarctica* meal. The Mann-Whitney U test was used to evaluate differences between groups. Values are expressed as means ± standard deviation.

IV. CONCLUSION

The inclusion of agar powder and *Durvillaea antarctica* meal in the sheep diet does not seem to have negative effects on animal health or carcass quality. However, it is necessary to evaluate other aspects related to the physicochemical characteristics of the meat such as the fatty acid profile and proximal composition, which could have been modified due to the nutrients present mainly in the marine algae.

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