LAMB MEAT WITH EDIBLE COATING: SENSORY ANALYSIS AND EFFECT OF COOKING METHODS ON PHYSICAL CHARACTERISTICS

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I.   INTRODUCTION

Lamb meat consumption has been increasing in Brazil and product quality, related to food safety, sensory characteristics and convenience are important factors for consumers. Meat in traditional packaging shows short shelf life and undesirable modifications in its physicochemical and sensory characteristics. The use of edible coatings is an alternative for extending the shelf life of this product, but the effects of their use and the cooking method in the sensory quality are not known. This study aimed to study the impact of utilization of edible coatings and cooking method in the quality of vacuum packaged lamb meat.

II.   MATERIALS AND METHODS

In this study, two types of sensory analysis were performed: a difference from control test and a preference ranking test. Firstly, lamb meat (*longissimus* muscle) from animals obtained commercially were coated with solutions of zein or chitosan and submitted to a difference from control test [1], to verify if the panelists could detect a difference in the samples with these two different coatings compared to the control (no edible coating). A scale about difference (0= no difference; 1= very few difference; 2=few/moderate difference; 3=moderate difference; 4=moderate/great difference; 5=great difference; 6=very great difference) was used. Twenty-seven panelists evaluated the samples in two tests. ANOVA and means analyzed results compared by Dunnett test ($p < 0.05$). After this test, one coating was chosen and submitted to the cooking methods test. Cooking the samples were performed in three ways: 1) in a pre-heated oven NKS, model DSK 709, until de sample reach 75°C; 2) in a grill NKS, model TSK 2933, heated at 200°C for 1.5 minutes, the sample is grilled 3 minutes each side and 3) in an electric pressure cooker Mondial, model PE-29, without adding water, for 10 minutes. The final temperature was measured by a thermocouple inserted in the middle of the sample and was 75°C and 85°C (for oven and grill; electric pressure cooker respectively). Following the cooking procedures, a rank preference test [1] was applied to these samples. Thirty panelists evaluated in one session which sample was preferred more, twice, in a total of 60 results. A Friedman test was applied to obtain the results. Non-coated and coated samples were analyzed for cooking loss and shear force measurements according to the following: the same steaks (three from each treatment) of 2.5 cm thickness were weighed and cooked in a Tedesco combined oven, at 170°C until the temperature at the centre of the sample reached 70°C, controlled by a thermocouple using the FE-MUX software. Samples were then cooled to room temperature and weighed again. Cooking loss was calculated by the difference between the weights before and after cooking and expressed as a percentage. Steaks were transferred to a cooler and held for 24 hours, after which, four pieces (1 cm side) were removed per steak, in a total of 12 pieces. Peak shear force was determined on each piece perpendicular to the fiber grain using a 1.016 mm Warner Bratzler probe in a TA.XT Plus Texture Analyzer (calibration weight 10 kg). Full peak shear force was recorded and maximum shear force calculated as the average of the twelve pieces. Sensory analyses, cooking loss, and shear force results were analyzed by XLSTAT software [2].

III. RESULTS AND DISCUSSION

In the difference from control test, lamb meat coated with zein was different with an average value = 4, moderate/great difference (p<0.05) from chitosan and control samples (Figure 1). With this result, chitosan-coated lamb meat was chosen for the cooking methods test. In the rank preference test, none of the cooking procedures was chosen as the preferred (p>0.05). Results for the cooking loss and shear force are shown in Table 1. Non-coated and chitosan-coated samples did not show difference (p>0.05) for both analyses. For the cooking methods, for non-coated and chitosan-coated samples, shear force was the same for all treatments, but cooking loss was higher (p<0.05) for pressure cooker sample. Higher cooking losses can be associated with longer processing time and temperature (10 minutes and 85°C for pressure cooker vs 6 minutes and 75°C for grill and oven) [3].
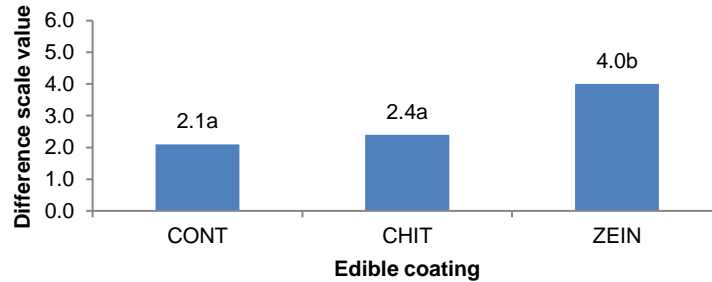

Figure 1. Difference from control results for no-coated and edible coated samples (CONT= control; CHIT= chitosan; ZEIN = zein). Scale: 0= no difference; 1= very few difference; 2=few/moderate difference; 3=moderate difference; 4=moderate/great difference; 5=great difference; 6=very great difference)

Table 1. Cooking loss and shear force of non-coated and chitosan-coated lamb meat submitted to different cooking procedures

| | Cooking Method | | | | | |
| | Oven | | Grill | | Electric pressure cooker | |
	Non coated	Chitosan-coated	Non coated	Chitosan-coated	Non coated	Chitosan-coated
Cooking loss (%)	2.05	1.88	2.20	2.14	2.12	2.05
Shear force (kgf/cm^2)	27.35[b]	24.19[b]	26.19[b]	24.91[b]	40.46[a]	40.91[a]

[a,b] Means in the same line with different letters are significantly different ($P<0.05$)

IV. CONCLUSION

The chitosan-coated lamb meat can be cooked in the oven or grill, without affecting its shear force and cooking loss.

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