

Effect of salt content on physicochemical, colour and textural traits during the manufacture of dry-cured “lacón”

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Abstract-The aim of this study was to analyze the effect of salt levels during salting stage on physicochemical, weight loss, colour and texture traits of dry cured “lacón”. Three different salts content levels were used in salting stage: 0.75, 1 and 1.25 days/kg. 102 days were applied to elaborate the product with a temperature of 12 °C in the dry ripening stage. As the processing period increased, moisture, luminosity, yellowness and cooking losses decreased, in the three groups, whereas weight loss, salt content, redness and shear force increased. The physicochemical traits most affected by salt content at the end of process, were luminosity, salt level and shear force obtained higher values in 1.25 days/kg group.

Keywords: dry-cured “lacón”, salt content, shear force, colour

I. INTRODUCTION

Dry-cured “lacón” is a traditional raw-cured meat product made in the NW of Spain, from the foreleg of the pig cut at the shoulder blade-humerus joint, following manufacturing processes similar to those used in the production of dry-cured ham. In the autonomous region of Galicia (NW Spain) the product is recognised as a Geographically Protected Identity (G.P.I.) (Official Journal of the European Communities, 2001).

Previous studies on dry-cured “lacón” have mainly concerned the biochemical and sensory characterisation of the final product (Veiga, Cobos, Ros, & Diaz 2003) and investigation of the biochemical changes (Lorenzo, García Fontán, Franco, & Carballo, 2008) and microbiological characteristics (Lorenzo, García Fontán, Cachaldora, Franco, & Carballo 2010) that take place during the manufacturing process.

The chemical characteristics of the product, especially colour and texture are important factors in the process of selection and consumption of dry-cured products. Dry-cured ham quality is strongly affected by texture properties, which are mainly determined by the technological parameters and the characteristics of the raw material (Guerrero, Gou, & Arnau, 1999). Colour is an important quality characteristic that contributes to the sensorial acceptability of the product by consumers.

On the other hand, salting is one of the key steps in the stage in dry-cured product processing; salt is bacteriostatic agent that contributes to the typical salty taste of dry-cured meat products and influences the development of proteolysis phenomena (Arnau, Guerrero, & Sarraga, 1998). This stage affects texture and colour traits of dry-cured meat product such as ham (Flores, Barat, Aristoy, Peris, Grau, & Toldra, 2006).

There is no information about the colour and textural characteristics in the different stages of “lacón” manufacture and at the end of process; hence the aim of this study was to describe the evolution of colour and textural traits of dry-cured “lacón” during the elaboration process.

II. MATERIALS AND METHODS

II.1. Elaboration of dry-cured “lacón” and sample collection

In order to carry out this study three batches of “lacón” were manufactured. Each batch consisted of four “lacón” pieces that in the fresh stage weighted 4 kg each. The first batch was salted during 3 days (0.75 days/kg), second during 4 days (1 day/kg) and the last during 5 days (1.25 days/kg) being the temperature of the salting room between 2 and 5 °C and the relative humidity (RH) between 80 and 90 %. After the salting stage, the pieces were taken from the pile, brushed, washed and transferred to a post-salting room where they stayed for 14 days at a 2-5 °C and 85-90% RH. After the post-salting stage, the pieces were transferred to a room at 12 °C and 74-78% RH where a drying ripening process took place for 84 days. For weight loss determination, in each batch, samples were taken from fresh pieces, after the end

of salting, after 7 and 14 days of post-salting and after 7, 14, 28, 56 and 84 days of drying ripening. A smaller number of sampling points were used for the rest of determinations: fresh, after 14 days after post salting and after 28 and 84 days after drying ripening. Each sample consisted of one whole “lacón” piece.

II.2. Analytical methods

Semimenbranosus muscle was used for colour determination and textural properties whereas the rest of the piece was skinned and deboned and finally minced in a high-capacity mincer to determine the rest of measurements. Weight loss was measured by gravimetric difference in each sampling point. Moisture and total chlorides were quantified according to the ISO recommended standards 1442:1997 (ISO, 1997) and Carpentier-Vohlard official method (ISO 1841-1:1996) respectively. A portable colorimeter (Konica Minolta CR-400) was used to measure meat colour in the CIELAB space (CIE 1978). (lightness, L*; redness, a*; yellowness, b* (CIE 1978). Samples were cooked placing vacuum package bags in a water bath with automatic temperature control until reached internal temperature of 70 °C, controlled by thermocouples. After cooking, samples were cooled at room temperature, placing vacuum package bags in a circulatory water bath set at 18 °C during a period of 30 minutes and percentage cooking loss was recorded. All samples were cut perpendicular to the muscle fibre direction at a crosshead speed of 3.33 mm/s in a texture Analyzer TA.XT.plus of Stable Micro Systems. Maximum shear force (MØller, 1980) necessary to cut the sample were obtained.

III. RESULTS AND DISCUSSION

Figure 1 shows the evolution of the moisture content and weight loss (a), NaCl and luminosity (b), redness and yellowness (c) maximum shear force and cooking loss (d) in the interior of the pieces during “lacón” batches manufacture for different salting times.

Moisture content decreased linearly as processing time increased reaching a final mean value of 49.5 g/100g. This value was similar to that showed in dry-cured “lacón” (Marra, Salgado, Prieto, & Carballo, 1999) and slightly higher than those observed at the end of the ripening process of Spanish Serrano ham (Huerta, Hernández, Guamis, & Hernández, 1988). On the contrary, total weight loss increased as processing period increased. There were no important differences in moisture content and weight loss among three salt addition levels during the process and at the end of curing.

The amount of NaCl inside the “lacón” pieces is expressed as g/100 g of total solids and its values increased during salting and post-salting stages, reaching mean values around 16 g/100 g of TS at the end of post-salting stage and remaining relatively constant until the end of the manufacture process in the batches manufactured with 3 and 4 days/kg in salt. The final NaCl content was 6.5 g/100 g higher in the batches that were salted for 5 days than the ones above mentioned. This final mean value was higher than to those previously reported in dry cured “lacón” that was elaborated in the same conditions by (Garrido, Gómez, Franco, & Carballo, 2009). In contrast, it was identical to found by Marra et al., 1999. However, these values remain in the upper extreme range of those observed by other authors in different dry-cured meat products made from entire pieces (Monin et al., 1997).

A decrease of L* occurs during the first two steps (salting and post-salting). After, these period L* maintained a constant value reaching the highest value of 35.4 in the 4 days salting group. Yellowness followed the same evolution as luminosity did whereas redness tended to increase during elaborating process.

Texture properties are very important for this product, because normally it is usually cut in steaks of 3-4 cm and it is consumed after being cooked. In this aspect, we have not found any data in the literature about shear force or other textural traits. Shear force increased as elaborated time increased for the three salting level groups. Differences were not significant until the 46 first days of processing among three salting level groups, although this level had an important effect on maximum final shear force as we can notice in Figure 1 (d), reaching a final value of 216 kg/cm². Cooking loss decreased during storage in all cases. We found a decrease of around 60% in cooking loss compared to initial stage.

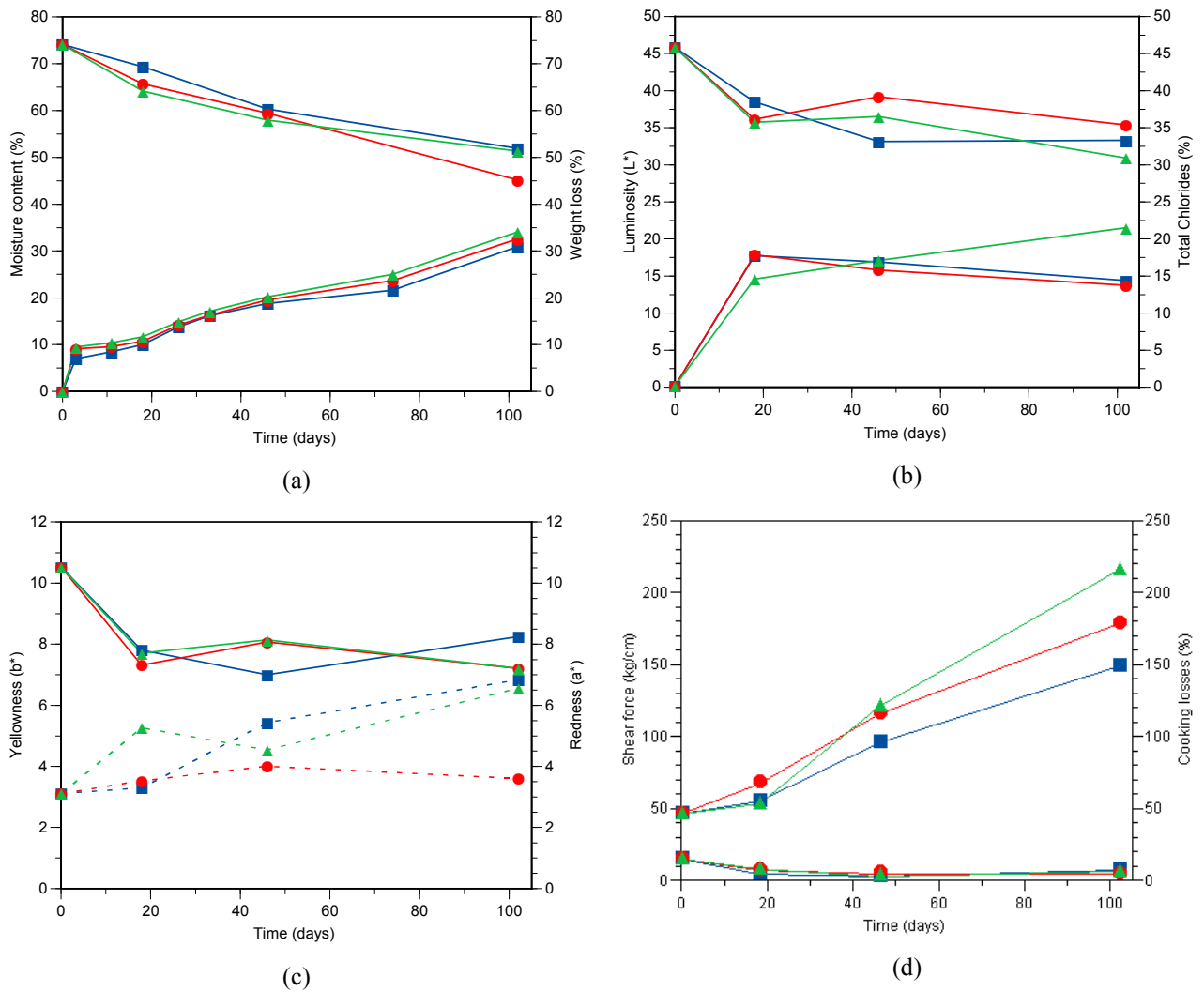


Figure 1. Changes in moisture content and weight loss (a), NaCl and luminosity (b), redness and yellowness (c) maximum shear force and cooking loss (d) during the manufacture of dry-cured “lacón”. Effect of salting time (■=3, ●=4, ▲=5).

IV. CONCLUSIONS

The results of this study indicated that salt content in salting stage and time of elaboration of “lacón” dry-cured affected physicochemical traits, especially luminosity and shear force. This information could be very useful to the industry allowing modifying the salting process in order to improve quality in the final product.

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