EFFECT OF THE ADDITION OF DIFFERENT ACID LACTIC SALTS IN THE PRESERVATION OF SLICED COOKED HAM

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INTRODUCTION

Shelf-life of meat and meat products is one of the major concern to meat industry. It could be extended using individual and combinations of organic acids or their salts such as sodium lactate (Brewer *et al.*, 1991). Sodium and potassium salts of L (+) lactic acid have been described as showing certain interesting properties: natural preservatives, control of certain pathogens, slight antioxidant effect, flavour enhancement, improving water holding capacity and a positive effect on colour and texture (Cubiña, 1995). The aim of this study was to examine the effect of the addition of PURASAL S/SP 60 (Sodium salt of natural L (+) lactic acid) and PURASAL LITE (Sodium/potassium salt mixture of natural L (+) lactic acid) in brine on the preservation of sliced cooked ham from a physico-chemical, micro-biological and sensory point of view.

METHODOLOGY

In a commercial slaughterhouse 20 pig carcasses were selected according to the pH in the *Semimembranosus* muscle at 45 minutes *post mortem* . Only those with a pH higher than 6.0 were retained. At 24 h *post mortem* a further selection was carried out according to the pH in the *Semimembranosus* and *Biceps femoris* muscles. In this way 12 normal carcasses (pH <6.0) were chosen obtaining both hams from each of them. Hams were divided into three batches. In order to minimise the possible effect of the initial microbiological quality of the different animals each lot had 50% of common meat. All the hams were deboned and trimmed ready to be injected (30% of injection). The final composition of each of the three different brine mixtures used is shown in Table 1. Once injected the hams were minced in a 12 mm mincer and stuffed into 150 mm impermeable plastic casings. They were cooked in a stream oven using a stepped-temperature procedure until an internal temperature of 66 ºC. The pieces were cooled 24 h a 4 ºC. 2 mm-thick slices were obtained from central part of each piece and then were vacuum packed using ULTRAVAC 85 FP (Sacoliva, S.L.) bags with an oxygen permeability of 8 cc/m^2/24h at 4 ºC and 80 % RH. The samples were stored at 4 ºC for 2 weeks and then at 8 ºC for 10 more weeks.
The analysis carried out were the following:
1.- Physico-chemical: water activity (A_w), pH, instrumental colour, amount of exuded liquid. Samples were taken at 0, 2, 3, 4, 5, 6, 8 and 12 weeks of storage time.
2.- Microbiologycal: Psychrophylic microorganisms, Lactic acid bacteria, Enterobacteria, Faecal streptococci. Samples were taken at 0, 2, 3, 4, 5, 6, 8 and 12 weeks of preservation time.
3.- Sensory analysis: Quantitative Descriptive Analysis was carried out by a panel of 6 trained tasters. The quantification of descriptors was done by using a non-structured scale from 0 to 10 points, where zero indicated absence and 10 maximum intensity. Samples were taken at 0, 2, 4, 6, 8 and 12 weeks of preservation time. The sensory profile consisted of 12 descriptors grouped in 4 blocks:
a) Visual attributes assessed before opening the packet (freshness, edibility and gas production).
b) Visual and olfactory attributes noticed as the packed was opened (sour smell, colour intensity and internal sour smell).
c) Flavour attributes (umami, flavour intensity, off-flavour and saltiness).
d) Non oral texture attributes (viscosity of liquid exuded and cohesion of the slice).

RESULTS AND DISCUSSION

1.- Physico-chemical analysis.
The addition of both types of lactate caused a decrease in water activity respect to the control lot since sodium and potassium lactates are capable of linking free water when they are added to meat products (Papadopoulos *et al.*, 1991a, O'Connor *et al.*, 1993).
There was a marked decrease in pH in the final sampling time (84 days of preservation) in all the batches. However, the control batch was the most affected. This pH decline was probably due to the activity of some of the microorganisms in the product itself which seems to indicate a bacteriostatic effect of the different types of lactate applied. This results were in concordance with Papadopoulos *et al.* (1991b), Papadopoulos *et al.* (1991c), Brewer *et al.* (1991), Egbert *et al.* (1992), O'Connor *et al.* (1993).
The control sample displayed a lighter colour than the two other batches from the first sampling session. In the same way it was affected by storage time, probably as a result of the decrease in the pH level producing an overall loss of intensity or a higher L value. In cooked products lactates act as antioxidant (Nnanna *et al.*, 1994), which results in a better colour stability of product (Cubiña, 1995). This also could be the reason for the different evolution of lightness observed between control and treatment batches during the storage time.
2.- Microbiological analysis.
There were no important differences in Enterobacteriaceae or Streptococci, but in the control samples an increase in Lactic and Psychrophyllic bacteria was observed as storage time increased (after 56 days of storage). O'Connor *et al.* (1993) also found that sodium lactate addition significantly delayed microbial growth on ground pork samples by lengthening the lag phase of microbial growth. The highest microbiological count in control batch was responsible for the quicker decrease in pH (Brewer *et al.*, 1991, Gou *et al.*, 1997)

which could explain the differences in colour and liquid exuded detected in this lot. Significant differences between batches with Purasal S/SP 60 and Purasal Lite were not detected ($p > 0.05$).

3.- Sensory analysis.

Sensory descriptors were affected by the storage time, especially the control batch (Figure 1 and 2). A loss of freshness and edibility was observed in all the batches being significantly larger in the control batch. A greater gas production in the control batch was also detected. The batch treated with Purasal Lite tended to display the best overall level of sensorial preservation, though it was not different in any of these attributes respect to Purasal S/SP 60. Flavour attributes remained constant throughout the storage period except for the off-flavour in the control batch, which increased markedly in the last sampling session. The batches with lactate were saltier and had a stronger umami taste as well as a greater intensity of flavour. Brewer *et al.* (1991) also found that sodium lactate was capable to enhance salty taste in fresh pork sausage.The control batch displayed an important increase of viscosity of the liquid exuded over time, which is probably due to their greater bacteria activity.

Salts of lactate could be useful in increasing shelf-life of sliced cooked ham. However, NaCl amount should be adjusted in order to obtain the desired level of saltiness.

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Table 1. Composition of each different brine mixtures.

	NaCl	Dextrose	$NaNO_3$	Sodium Ascorbat	$Na_5P_3O_7$	$Na_4P_2O_7$	K-carragenin	Purasal S/SP 60	Purasal Lite	H_2O
Control	17	10	0.15	0.5	4	1.5	4	0	0	30
Purasal S/SP 60	17	10	0.15	0.5	4	1.5	4	30	0	0
Purasal Lite	17	10	0.15	0.5	4	1.5	4	0	30	0

Figure 1. Sensory attributes at 0 days of preservation.

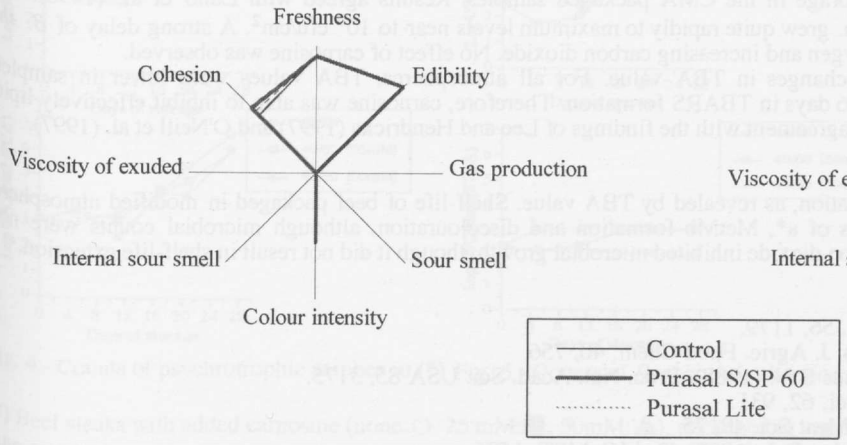

Figure 2. Sensory attributes at 84 days of preservation.