

# CHEMICAL, MICROBIOLOGICAL AND SENSORY CHARACTERISTICS OF SAUCISSON MADE WITH STARTER CULTURE AND BIOPRESERVATIVE.

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## Background

The Spanish saucisson ("salchichón") is a food produced by the hurdles technology being implicated the five factors following: nitrite and salt as preservatives, decreased of Eh, competitive lactic flora, and lowered pH and aw (Leistner, 1987). Lactic acid bacteria (LAB) produces the reduction of pH and gives place to the appearance of some metabolites with antimicrobial action (lactic acid, hydrogen peroxide and bacteriocines) (Daeschel, 1989). Also the addition of starter cultures or bio-preservatives to these meat products try to accelerate the proteolysis and lipolysis to intensify the development of the aroma and flavour.

## Objectives

The aim of study is follow the evolution of some physico-chemical and microbiological parameters in saucisson made with starter culture addition (*Lactobacillus sakei*, *Staphylococcus xylosus* and *Staphylococcus carnosus*, 1/1/1) and with a biopreservative (culture of *Propionibacterium shermanii* and then pasteurised) during ripening as well as their sensorial quality.

## Methods

A set of batches of Spanish "salchichón" was produced and analysed in some chemical and microbiological parameters as described elsewhere (Mata et al., 2001). Sensory analysis of samples was carried out at 30 days of ripening.

## Results and discussion

Tables 1 and 2 show the physico-chemical and microbiological parameters studied. All the analysed saucissons completed the quality for "Extra" category. Significant differences were not appreciated ( $p > 0.05$ ) in most of the chemical and physico-chemical parameters to exception of the pH and lactic acid content. For the microbiological parameters, the samples with starter culture and those with biopreservative added showed a significantly higher lactobacilli counts ( $p < 0.001$ ) and significantly smaller Enterobacteriaceae that the control batch. In the same way, the saucissons added with starter culture presented micrococci and staphylococci counts significantly higher ( $p < 0.001$ ) and significantly smaller of Enterobacteriaceae ( $p < 0.001$ ) that those added with the biopreservative. Figure 1 shows the mean scores of the sensorial attributes for the saucissons batches analysed. The differences observed among the different batches are only significant ( $p < 0.05$ ) for the attributes: general acceptability, juiciness and smell intensity.

Table 1. Average values and standard deviations for moisture, NaCl (g/100g dry sample), lactic acid (mmol/100 g dry sample), pH, Aw, NPN (% of TN, index of TBA (mg MA/kg) and nitrite (ppm NaNO<sub>2</sub>/100 g dry sample), in the saucisson batches throughout ripening.

Parameter	Batch	Days of ripening					
		0	2	9	16	23	30
Moisture	A	61.17±2.32	61.13±0.75	56.11±3.02	50.78±2.89	43.61±2.73	36.93±1.21
	B	59.79±2.82	60.40±1.30	59.12±1.04	54.01±1.03	47.81±0.69	40.63±0.97
	C	61.37±0.86	61.91±0.76	55.80±1.97	49.71±2.01	45.35±0.51	38.06±0.73
Lactic Acid	A	3.47±0.37	4.75±0.15	4.81±0.40	5.21±0.26	4.02±0.85	4.24±0.36
	B	3.03±0.37	4.77±0.38	4.99±0.38	5.23±0.28	4.90±0.30	4.75±0.30
	C	3.42±0.14	6.30±0.29	6.05±0.38	6.44±0.12	5.44±0.54	4.70±0.36
NaCl	A	5.05±0.51	5.22±0.36	5.10±0.27	5.38±0.28	5.31±0.30	4.98±0.21
	B	4.27±0.47	4.72±1.07	5.22±0.61	5.20±0.14	5.56±0.26	5.20±0.91
	C	4.60±0.87	5.18±0.45	5.30±0.28	4.94±0.44	5.35±0.43	5.13±0.29
pH	A	6.05±0.15	5.53±0.32	5.26±0.14	5.16±0.10	5.41±0.19	5.37±0.12
	B	6.23±0.24	5.63±0.18	5.40±0.07	5.16±0.06	5.61±0.07	5.53±0.11
	C	6.05±0.17	5.24±0.16	5.20±0.06	5.24±0.06	5.47±0.23	5.50±0.30
a <sub>w</sub>	A	0.975±0.003	0.973±0.003	0.965±0.005	0.950±0.008	0.942±0.007	0.928±0.007
	B	0.980±0.004	0.971±0.003	0.965±0.002	0.960±0.007	0.956±0.005	0.936±0.003
	C	0.982±0.002	0.968±0.003	0.960±0.007	0.949±0.010	0.942±0.005	0.928±0.007
NPN	A	6.05 ± 0.56	5.93 ± 0.18	6.31 ± 0.29	6.95 ± 0.21	7.30 ± 0.40	7.50 ± 0.29
	B	6.17 ± 0.58	6.00 ± 0.30	6.02 ± 0.32	6.40 ± 0.23	6.68 ± 0.18	7.56 ± 0.34
	C	5.51 ± 0.41	5.66 ± 0.55	6.68 ± 0.65	7.33 ± 0.27	7.46 ± 0.22	7.94 ± 0.16
TBA	A	0.28 ± 0.12	0.34 ± 0.15	0.44 ± 0.21	0.68 ± 0.38	0.76 ± 0.49	0.78 ± 0.67
	B	0.19 ± 0.02	0.24 ± 0.04	0.32 ± 0.06	0.49 ± 0.08	0.64 ± 0.09	0.70 ± 0.10
	C	0.25 ± 0.05	0.35 ± 0.13	0.49 ± 0.30	0.61 ± 0.45	0.76 ± 0.55	0.90 ± 0.66
Nitrite	A	104.63 ± 10.03	26.41 ± 4.92	2.46 ± 1.17	4.46 ± 2.14	4.54 ± 2.37	3.31 ± 1.13
	B	113.88 ± 16.65	22.38 ± 9.57	4.61 ± 1.55	6.05 ± 0.81	4.79 ± 0.83	5.12 ± 1.99
	C	110.69 ± 17.58	25.24 ± 10.63	4.07 ± 1.43	5.45 ± 1.36	4.84 ± 1.79	4.12 ± 1.42

A: Control; B: Biopreservative; C: Starter culture.

## Pertinent literature

- Daeschel, M.A. (1989). Antimicrobial substances from lactic acid bacteria for use as food preservatives. *Food Technology*, **43**, 164-167.
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- Mata, C., Ferreira, J., Fernández-Salguero, J. y Gómez, R. (2001). Elaboración de salchichones con cultivos iniciadores y bioconservadores. Características químicas y microbiológicas. *Eurocarne*, **11**, 61-70.

Table 2. Log counts of different microbial groups in saucisson during ripening.

		Days of ripening					
		0	2	9	16	23	30
Total viable	A	6.66±0.09	7.58±0.17	7.96±0.32	8.20±0.33	8.11±0.46	8.02±0.50
	B	6.66±0.20	8.25±0.14	8.36±0.15	8.50±0.07	8.19±0.10	8.13±0.05
	C	6.73±0.07	8.74±0.11	9.00±0.24	9.07±0.42	8.80±0.41	8.93±0.54
Enterobacteriaceae	A	5.15±0.40	4.33±0.14	3.58±0.40	3.35±0.30	3.30±0.42	2.93±0.37
	B	5.07±0.30	4.62±0.32	4.12±0.05	4.34±0.33	3.33±0.42	3.11±0.33
	C	4.55±0.38	3.45±0.19	3.49±0.11	3.27±0.36	2.71±0.45	1.69±0.52
Lactic acid Bacteria	A	4.53±0.17	7.29±0.98	7.72±0.54	8.13±0.61	7.45±1.54	7.34±0.84
	B	5.78±0.76	8.01±0.44	7.92±0.48	7.81±0.58	8.16±0.34	7.93±0.53
	C	6.32±0.22	8.90±0.12	8.92±0.31	8.65±0.11	8.61±0.34	8.37±0.23
Micrococcaceae	A	4.34±0.12	5.86±0.75	6.55±0.63	6.76±0.63	6.75±0.70	6.52±0.49
	B	5.28±0.32	5.28±0.37	5.96±0.12	6.17±0.65	6.14±0.69	6.36±0.62
	C	6.20±0.59	5.79±0.32	6.23±0.41	6.85±0.65	6.88±0.94	7.04±0.33
Staphylococcus	A	3.92±0.36	5.06±0.26	5.21±0.63	6.01±0.55	5.73±0.73	6.19±0.71
	B	4.69±0.40	5.17±0.63	5.72±0.88	5.54±0.87	5.72±0.40	5.73±0.34
	C	4.73±0.30	5.40±0.06	6.23±0.44	6.99±0.62	7.11±0.82	7.01±0.79

A: Control; B: Biopreservative; C: Starter culture.

Figure 1. Sensory analysis in the saucisson at 30 days of ripening. For each attribute, process with the same letter are not significantly different ( $p < 0.05$ ). Control (▨), biopreservative (▤) and starter culture (■).