SODIUM LACTATE IN RAW SAUSAGE

Nelcindo Nascimento Terra, Roseni Abreu, Leadir Lucy Martins Fries, Liana G. Milani, Carlos R. Valente.
Departamento de Tecnologia e Ciência dos Alimentos, Universidade Federal de Santa Maria, Santa Maria -RS -Brazil - 97105-900

INTRODUCTION

Raw sausage when maintained under refrigeration it has a shorter shelf life, because its great amount of free water facilitates a faster microbial growth.

Sodium lactate has been used in meat products preservation, because it difficults the development of microorganisms. Many studies has emphasized the effect of sodium lactate on cooked ham (Anon, 1988), cooked meat (Papadopoulos et al., 1991), raw sausages (Brewer et al., 1991) sausages (Bacus and Bontenbal, 1991) and products elaborated with chicken meat (Burik and Koos, 1990), increasing its shelf life.

The objectives of the present work was to determine the effect of sodium lactate in the preservation of raw sausages maintained under refrigeration (+5 °C) or freezing (-18 °C). Although it seems a redundancy to add sodium lactate in a frozen product, this work seek to follow any color change in the raw sausage since there is a theoretical possibility that the intense cold could determine the opening of the mioglobina ring with the consequent undesirable color.

MATERIAL AND METHODS

Three departures of raw sausages were elaborated according to the formulation used by a meat industry located close to Santa Maria's Federal University. All the three departures differed on the amount of sodium lactate added (Syntheses of Brazil). The treatments were 0.0 (control), 2.0 and 4.0 % of sodium lactate added. Half of these samples were stored under refrigeration (+5 °C) and the other half under freezing (-18 °C). The samples were analysed weekly and submitted to the pH determination, peroxide index (Koniecko, 1979), water activity (Quast and Teixeira Neto, 1975), total viable count for aerobic mesophillic (Diliello, 1982) and psycrophillic microrganismos (Mossel and Garcia, 1985) and sensorial analysis. The sensorial analysis was performed, every week, by six technicians of the Department of Food Technology and Science at Santa Maria's Federal University and a scale from 1,0 to 9,0 was used to evaluate the product color, flavor, taste and texture. The value 9,0 represented a product showing total acceptability and 1,0 it represented a completely unacceptable product. For the sensorial analysis the raw sausages were cooked in an oven, at 220 °C, wrapped in an aluminum foil. The experimental design was random blocks, with at least four repetitions. Duncan's test was performed to compare the average of the samples .

RESULTS

Peroxide index of the raw sausage fat stored under refrigeration and freezing at each week of storage.

STORAGE (weeks)	REFRIGERATION			FREEZING		
	RC	R 2%	R 4%	FC	F 2%	F 4%
01	0.95	0.90	0.92	0.84	0.89	0.97
02	1.59	1.23	0.98	0.84	0.89	0.97
03	1.83	1.62	1.00	0.93	0.90	0.99
04	2.00	1.84	1.50	0.95	0.91	0.99
05	2.42	2.13	1.52	1.23	0.91	0.99
06	----	----	----	1.36	0.93	0.99
07	----	----	----	1.41	0.95	0.99
08	----	----	----	1.66	0.98	0.99
09	----	----	----	1.80	1.05	1.02
10	----	----	----	1.92	1.08	1.12
11	----	----	----	1.94	1.10	1.18
12	----	----	----	1.98	1.15	1.20
13	----	----	----	2.72	1.29	1.22

RC = Refrigerated raw sausage control
R 2% = Refrigerated raw sausage + 2% sodium lactate
R 4% = Refrigerated raw sausage + 2% sodium lactate
FC = Frozen raw sausage control
F 2% = Frozen raw sausage + 2% sodium lactate
F 4% = Frozen raw sausage + 2% sodium lactate.

Water activity of the raw sausages with and without sodium lactate, refrigerated and frozen during 13 weeks of storage.

STORAGE (weeks)	REFRIGERATION			FREEZING		
	RC	R 2%	R 4%	FC	F 2%	F 4%
01	> 0.98	0.95	0.93	> 0.98	0.95	0.94
02	> 0.98	0.95	0.93	> 0.98	0.95	0.94
03	> 0.98	0.95	0.93	> 0.98	0.95	0.94
04	> 0.98	0.95	0.93	> 0.98	0.95	0.93
05	> 0.98	0.95	0.93	> 0.98	0.95	0.93
06	----	----	----	> 0.98	0.95	0.93
07	----	----	----	> 0.98	0.95	0.93
08	----	----	----	> 0.98	0.95	0.93
09	----	----	----	> 0.98	0.95	0.93
10	----	----	----	> 0.98	0.95	0.93
11	----	----	----	> 0.98	0.95	0.93
12	----	----	----	> 0.98	0.95	0.93
13	----	----	----	> 0.98	0.95	0.93

RC = Refrigerated raw sausage control
R 2% = Refrigerated raw sausage + 2% sodium lactate
R 4% = Refrigerated raw sausage + 2% sodium lactate
FC = Frozen raw sausage control
F 2% = Frozen raw sausage + 2% sodium lactate
F 4% = Frozen raw sausage + 2% sodium lactate.

Relative sensorial analysis at the first, second, fourth, fifth, and at thirteenth week of storage.

TREAT-MENT	COLOR	FLAVOR	TASTE	TEXT-URE	TOTAL ACCEPTABI-LITY
			1st WEEK		
RC	7.33 c	7.41 b	7.12 ab	7.08 b	7.24b
R 2%	7.16 c	7.41 b	6.95 b	8.16 a	7.43 ab
R 4%	7.33 c	7.50 ab	7.66 a	7.08 b	7.39 ab
FC	7.58 b	7.66 ab	7.24 ab	7.24 ab	7.43 ab
F 2%	7.74 b	7.83 a	7.20 ab	7.66 ab	7.61 a
F 4%	8.08 a	7.66 ab	7.29 ab	7.58 ab	7.65 a
			2nd WEEK		
RC	7.33 c	7.41 b	7.41cd	7.33bc	7.37 c
R 2%	8.00 b	8.08 a	7.91 b	7.66 b	7.91 b
R 4%	7.24 c	7.83 b	7.24 d	7.16 c	7.37 c
FC	8.49 a	7.83 b	8.24 a	8.00 a	8.14 a
F 2%	8.08 b	8.00 a	7.66bc	7.50 b	7.81 b
F 4%	8.16 ab	8.08 b	7.58c	7.58 b	7.85 b
			4th WEEK		
RC	6.25 c	7.24 c	6.91 c	7.33 b	6.93 c
R 2%	7.83ab	8.41 a	8.24 a	7.66ab	8.04 a
R 4%	8.00 a	7.91b	7.74 b	8.00 a	7.91 a
FC	6.50 c	6.16 d	5.50 e	5.91 d	6.02d
F 2%	6.24 c	6.16 d	5.83 d	6.08 c	6.08 d
F 4%	7.5 b	7.24 c	7.08 c	7.24 b	7.27 b
			5th WEEK		
RC	8.58 a	8.33 a	8.41 a	8.16 a	8.37 a
R 2%	8.58 a	7.74 b	8.50 a	7.91 a	8.18 b
R 4%	8.41 b	7.91ab	8.00 b	8.16 a	8.12 b
			13th WEEK		
RC	7.41 b	7.83 a	7.66ab	7.66 a	7.64 b
R 2%	7.58 b	7.50 b	7.41 b	6.91 a	7.35 c
R 4%	8.00 a	8.08 a	7.91 a	7.41 a	7.85a

Microbiological analysis of the raw sausages refrigerated (RC), with 2% of sodium lactate (R 2%) and with 4% of sodium lactate (R 4%).

STORAGE (weeks)	TOTAL COUNT (UFC/g)			PSYCROTROPHIC (UFC/g)		
	RC	R 2%	R 4%	RC	R 2%	R 4%
01	$2.0X10^4$	$9.0X10^4$	$6.2X10^4$	$1.3X10^4$	$7.0X10^3$	$1.2X10^4$
02	$1.2X10^5$	$1.0X10^5$	$1.0X10^5$	$2.6X10^5$	$9.0X10^3$	$2.5X10^4$
03	$3.2X10^7$	$3.2X10^5$	$1.5X10^5$	----*	$8.0X10^4$	$3.8X10^4$
04	$6.0X10^7$	$5.0X10^5$	$3.0X10^5$		$3.0X10^5$	$5.0X10^4$
05	$1.2X10^8$	$1.2X10^6$	$8.0X10^5$	----*	----*	$1.0X10^5$

----* Uncountable

RC = Refrigerated raw sausage control

R 2% = Refrigerated raw sausage + 2% sodium lactate

R 4% = Refrigerated raw sausage + 2% sodium lactate

Microbiological behavior of raw sausage maintained under freezing.

STORAGE (weeks)	TOTAL COUNT (UFC/g)			PSYCROTROPHIC (UFC/g)		
	FC	F 2%	F 4%	FC	F 2%	F 4%
01	$5.0X10^3$	$6.2X10^4$	$8.4X10^3$	$1.4X10^4$	$1.9X10^4$	$5.2X10^3$
13	$6.5X10^5$	$1.4X10^5$	$1.3X10^4$	----*	----*	$3.8X10^4$

----* Uncountable

FC = Frozen raw sausage control

F 2% = Frozen raw sausage + 2% sodium lactate

F 4% = Frozen raw sausage + 2% sodium lactate.

CONCLUSIONS

- As the sodium lactate hindered the growth of the microbial flora, it increased the shelf life of the raw sausage;
- The reduction of the microbial flora showed a certain parallelism with the amount of sodium lactate added to the meat dough;
- The small reduction on water activity doesn't explain the preservative effect of sodium lactate;
- Sodium lactate reduced the speed of lipid oxidation in raw sausage refrigerated as well as for frozen raw sausages;
- Sodium lactate increased the acceptability of the raw sausages by improving its sensorial qualities.

REFERENCE

BACUS, J. & BONTEBAL, E. (1991) Controlling *Listeria*. **Meat Poultry**, 37: 64-65.

BREWER, M.S.; McKEITH, F.; MARTIN, S.E.; DALLMIER, A. W. & MEYER, J. (1991) Sodium lactate effects on shelf-life, sensory and physical characteristics of fresh pork sausage. **J. Food Sci.** 56:1176-1178.

BURIK, A.M. & ROSS, J.T. (1990) Natrimlactat in fleischproducten. **Fleischwirtsch**. 70:1266-1268.

DILIELLO, L.R. **Methods in food and dairy microbiology**. Westport. Avi Publishing Company, Inc., 142 p.

KONIECKO, E. (1979) **Handbook for meat chemists**. Wayne. Avery Publishing Group Inc., 143p.

PAPADOPOULOS, L. S.; MILLER, R.R.; ACUFFE, G.R.; ZAIT, C.E. & PROSS, H. R. (1991) Effect of sodium lactate on microbial and chemical composition of cooked meat during storage. **J. Food Sci.** 56: 341-347.

QUAST, D. & NETO, R. O.T. (1975) **Atividade de água em alguns alimentos de teor intermediário de umidade.** Coletânea do ITAL. 6: 203-232.

TERRA, N.N. & BRUM, M.A.R. (1988): **Carne e seus derivados: técnicas de controle de qualidade**. Nobel. São Paulo, São Paulo, 121p.