

P-02-11

Effect of green tea and rosemary extracts on shelf-life of salted lamb patties. (#180)

Juan B. Franco¹, Carolina Realini², Antonella Goyeneche³, Carolina De los Santos⁵, Camila Horta³, Rafael Delpiazzo¹¹ Facultad de Veterinaria, Departamento de Salud en los Sistemas Pecuarios, Paysandú, Uruguay; ² CENUR Litoral Norte, Polo de Producción Ovina, Paysandú, Uruguay; ³ CENUR Litoral Norte, Departamento de Tecnología de Alimentos, Paysandú, Uruguay; ⁴ Facultad de Veterinaria, Departamento de Salud en los Sistemas Pecuarios, Paysandú, Uruguay; ⁵ Facultad de Veterinaria, Paysandú, Uruguay

Introduction

Meat processing like grinding damages muscle cell membranes facilitating the interaction of the unsaturated lipids with pro-oxidants, leading to accelerated lipid oxidation. Lamb meat used for processed products usually contains a significant proportion of polyunsaturated fatty acids, which oxidize easily (Wood et. al, 1999). Current focus is on antioxidants extracted from natural sources such as rosemary, cherry, sage, green tea, among others that are rich in phenolic acids, tocopherols, anthocyanins, flavonoids, that can inhibit lipid oxidation. The objective of this work was to study the effect of the addition of green tea and rosemary extracts on lipid oxidation of salted lamb patties.

Methods

Twenty lambs were slaughtered with an average live weight of 35 ± 6 kg. Shoulders were boned-out, trimmed, cut into pieces and minced through a 5 mm plate using a conventional mincer (Gesame, S.L., Barcelona, Spain). Minced lamb (15% fat) was divided into three batches, mixed with NaCl (to a final concentration of 2%) and antioxidants added as follows: 1) Control (no extract added), 2) 400 ppm of Green Tea (GUARDIAN TM 20S, DANISCO) extract added and 3) 800 ppm of Rosemary (GUARDIAN TM 75, DANISCO) extract added. Patties were packed individually using styrofoam trays and overwrapped with oxygen permeable film and were displayed for 9 days in a refrigerated cabinet ($2 \pm 1^\circ\text{C}$) without light source. Lipid oxidation was determined in triplicate by measuring 2-thiobarbituric acid reactive substances (Jo & Ahn, 1998) at 0, 3, 6 and 9 days of display.

A random plot design with a factorial arrangement of treatments was used. An analysis of variance was performed using the MIXED procedure of the statistical package SAS version 9.1 (SAS Institute, Cary, NC). Significant differences between means were identified by Tukey's test

Results

There was a significant interaction between days of display and treatment effect. At day 0 there were no differences between the treatments with values lower than 1.5 mg of MDA/ kg of meat.

Table 1. Effect of addition of Rosemary and Green Tea extracts on TBARS (mg of MDA/kg of meat) values.

Treatment	Control	Rosemary	Green Tea	P
	5.32 ^x ± 0,22	1.56 ^y ± 0,22	1.07 ^y ± 0,22	0.0001
Days				
0	1.46 ^{cx} ± 0,43	0.60 ^{bx} ± 0,43	0.81 ^{ax} ± 0,43	0.0001
3	4.85 ^{bx} ± 0,43	1.62 ^{ab} ± 0,43	0.85 ^{ay} ± 0,43	0.0001
6	9.07 ^{ax} ± 0,43	2.73 ^{ay} ± 0,43	1.77 ^{ay} ± 0,43	0.0001
9	5.91 ^{bx} ± 0,43	1.28 ^{ab} ± 0,43	0.82 ^{ay} ± 0,43	0.0001

^{x,y} Treatment effect: means within rows with uncommon superscript letters are significantly different ($P < 0.0001$).

1. Display time effect: means within columns with uncommon superscript letters are significantly different ($P < 0.0001$).

While for days 3, 6 and 9 the treatments with green tea and rosemary extracts maintained lower TBARS levels compared to the control without differences in lipid oxidation levels between the 2 types of extracts. The addition of green tea and rosemary extracts maintained low levels of lipid oxidation (< 2.73 mg of MDA/Kg). Rancidity in sheep meat can be detected when values are higher than 4.4 mg of MDA / kg (Soldatou et.al, 2009), indicating that without the addition of antioxidants rancidity may develop from 3 days of display.

Conclusion

Addition of 400 ppm of green tea extract and 800 ppm of rosemary extract were highly effective in reducing lipid oxidation of salted lamb patties and prolonging their shelf-life.

References

- Jo, C., & Ahn, D. U. (1998). Fluorometric analysis of 2-thiobarbituric acid reactive substances in turkey. *Poultry Science*, 77, 475–480.
- Soldatou N, Nerantzaki A, Kontominas MG, Savvaidis IN. (2009) Physico-chemical and microbiological changes of "Souvlaki"—Evaluation of shelf-life using microbial, colour and lipid oxidation parameters. *Food Chem.*; 113:36–42.
- Wood J. D., Enser M., Fisher A. V., Nute G. R., Richardson R. I., Sheard P. R. (1999). Manipulating meat quality and composition. *Proceedings of the Nutrition Society*, 58.363–370

Notes