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Relationship Between Meat Color And Lipid Oxidation In Fresh Beef Patty With Clove Extract During Cold Storage At 4°C (#445)

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Introduction

Beef patty is a favorite and widely consumed meat product as fast meals regarding the quick growing consumer demand for fast food owing to extreme development of life style [1]. The oxidative reaction prompts alteration of lipids in meat during processing and storage and, consequently, associates in change of nutritional composition, evolution of toxic compounds, and reduction of shelf life [2]. It is then essential to diminish the lipid oxidation by admixing antioxidants as additives into meat and meat products for maintaining the highest quality at storage time. Clove extracts (CE) obtained from total buds of clove have been broadly investigated to have outstanding antioxidant activities in meat and meat products. Thus, the objectives of study were to assess meat color and antioxidant effects of CE in fresh patty.

Methods

Fresh beef patties were prepared in the Laboratory of Meat Processing. The patties contained basic formulation followed by 90.8% beef lean meat, 8% beef tallow, and 1.2% salt. Two kinds of beef patties were made based on the subsequent formation: 1) without CE (control), 2) added with 0.1% CE. Beef patties were shaped by utilizing a handheld patty-maker (90 g/patty). These were packaged individually in a polyethylene pack which was sealed by applying a sealing machine. Then these patties were stored at 4°C for 1 and 10 days of refrigerated storage and, therefore, the total experiment was carried out to evaluate CIE color value, lipid oxidation, and sensory properties of fresh beef patties. The data were analyzed using the PROC ANOVA procedure with Duncan's multiple range test ($p < 0.05$).

Results

Table 1. Results of color (redness, hue angle) and sensory evaluation (discoloration) in fresh beef patty with CE during cold storage

Items	Storage time (days)	Treatments ¹⁾		SEM ³⁾
	CE			
Redness (a')	1	21.19 ^A	19.66 ^A	0.37
10	8.89 ^{Ba}	13.31 ^{Bb}	0.38	
SEM	0.95	0.53		
Hue angle ²⁾ (h)	1	34.47 ^A	35.90 ^A	0.31
10	55.88 ^{Ba}	44.14 ^{Bb}	1.00	
SEM	1.63	0.70		
Discoloration	1	1.04 ^A	1.15 ^A	0.05
10	5.30 ^{Ba}	4.02 ^{Bb}	0.16	
SEM	0.29	0.22		

¹⁾Control: without antioxidant and dot line; CE: beef patty added with 0.1% clove extract.

²⁾Hue angle: $h = \tan^{-1}(b^*/a^*)$

³⁾SEM: standard error of mean. $n=3$.

^{a-b}Means with different superscript small letters in a row within each treatments differ significantly ($P < 0.05$).

^{A-B}Means with different superscript capital letters in a column within at storage time differ significantly ($P < 0.05$).

At the beginning of storage, redness value of beef patties ranged from 19.66 (CE) to 21.19 (Control) (Table 1). On day 10, the redness value was higher for CE sample compared to the control ($p < 0.05$). Addition of CE was more effective in increasing redness value of fresh beef patties compared to the without CE control. On day 1, no significant difference in hue angle value was obtained between the control and CE. However, beef patties containing CE had significantly lower hue angle values than those of the control at the storage 10 days ($p < 0.05$). In sensory evaluation, beef patties treated with CE had significantly lower score than control patties at 10 days storage time ($p < 0.05$). Thus, CE influenced the color as a sensory characteristics in beef patties.

TBARS formation increased dramatically in the control over cold storage time from 1 to 10 days at 4°C. In addition, the TBARS value of CE significantly lower than the control during storage ($p < 0.05$). CE was effective in protecting beef patties from lipid oxidation. Color stability can be explained with the interaction of pigments with the products of lipid oxidation [3]. Natural antioxidants help to inhibit lipid oxidation and degradation of meat pigments [4].

Conclusion

This study shows that the addition of CE to fresh beef patties slows lipid oxidation compared to control. Also, CE helps to stabilize the color of meat

Notes

products. Therefore it can be concluded that the CE can be successfully applied in order to extend the shelf life of fresh beef patties.

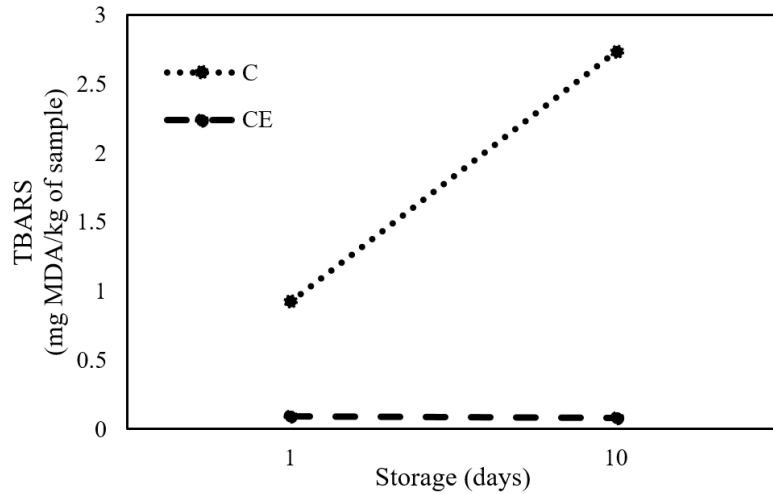
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Changes of TBARS on fresh beef patties during cold storage at 4°C. Control: without antioxidant and dot line; CE: with 0.1% clove extract and dashed line.

Notes