EFFECT OF TAIWAN INDIGENOUS *Cinnamomum osmophloenm* KANEH. LEAVES POWDER ON COOKED DUCK BREAST MEATS

Yu-Ning Huang[1] and Kou-Joong Lin[1*]

[1]Department of Animal Science, National Chia-Yi University, Chia-Yi, Taiwan, R.O.C.

Abstract – The objective of this study was to investigate the antioxidant ability of Taiwan indigenous *Cinnamomum Osmophloenm* Kaneh. leaves powder and the quality characteristics of cooked duck breast meats smoked with wood chips and leaves powder, stored at 0 – 4 ℃ for 7 weeks. And cooked duck breast meats samples were collected for analysis of pH value, *L, a, b*, TBARS, total phenolic content, microbial counts, coliform counts, sensory evaluation. The results showed that, pH value of all groups were among 6.20-6.50. L value of cooked duck breast skin of group C and D were significant lower than others (P < 0.05). TBARS value was significantly increased during storage (P < 0.05). Total phenolic content of all groups were significantly decreased (P < 0.05) during storage.The microbial counts of C and D was significant lower (P < 0.05) than others at 0 wk. Sensory evaluation-overall acceptability value were among 4.5-5.5.

Key Words – Antioxidant ability, *Cinnamomum Osmophloenm* Kaneh. leaves, Smoking

I. INTRODUCTION

During processing and storage of foods, lipid oxidation is one of the major factors in deterioration since it could lead to the development of unpleasant tastes and off-flavours as well as changes in color, rheological properties, and solubility [1]. Especially Taiwan smoked cooked duck breast meats.

People having used cinnamon can be trace back to two thousand years ago. Cinnamon is a kind of spice. It is principally employed in cookery as a condiment and flavouring material, and its flavour is due to an aromatic essential oil. Several researchers have reported that cinnamon possessed antioxidant components [2]. If we take it as smoking material, it could develop aroma, flavour, and colour, preserve, creating new products, to form a protective skin and to protect the products from oxidation [3]. The aim of this research was to study the quality characteristics of cooked duck breast meats smoked with wood chips combined with different amounts of the Taiwan indigenous *Cinnamomum Osmophloenm* Kaneh. leaves powder.

II. MATERIALS AND METHODS

A. PART 1 : Preparation of smoking material

Taiwan indigenous *Cinnamomum Osmophloenm* Kaneh. leaves obtained from The Experimental Forest, National Taiwan University(Add：No.12, Section 1, Chien-Shan Road, Chu-Shan, 55750 Nan-Tou Hsien, Taiwan, R.O.C.) Leaves were washed and dried in an air circulatory drier at 40℃ for 6 hrs. Dried leaves were cooled, powdered, sieved using a 16 mesh sieve, packed and stored at -40℃ in high-density polyethylene bags till extraction. Wood chips obtained from wood factory, National Chia-Yi University (Add：No.300 Syuefu Rd., Chiayi City 60004, Taiwan, R.O.C.)

B. PART 2: Preparation of cooked duck breast meats

1. Formulation

Duck breast were obtained from poultry butchery →mixed with ice water (10%), salt (1.5%), sugar (10%), polyphosphate (0.25%), and sodium nitrite (0.01%) →tumbling and massaging →curing at 4℃, 3 days→dried (50-55℃)→smoke (60-65℃) with 100g wood chips plus the following different amounts of Taiwan indigenous *Cinnamomum Osmophloenm* Kaneh. leaves powder : (A) 0g leaves powder, (B) 20g leaves powder, (C) 40g leaves powder, (D) 60g leaves powder →package →store at 0-4℃ for 7 weeks. Analysed for pH value, *L, a, b*, TBARS, total phenolic content,

microbial counts, coliform counts, sensory evaluation.

2.1 pH value: SP-2200 Suntex pH meter, (Taiwan).
2.2 Lab :Hunter *L, a, b* value。
2.3 TBARS (2-thiobarbituric acid reactive substance,):By Faustman *et al*. (1992) [4]
2.4 Total phenolic content: By Singleton *et al.* [5]
2.5 Microbial counts: Followed by FDA Bacteriological Analytical Manual for Foods (BAM) method. [6]
2.6 Coliform counts: Followed by FDA Bacteriological Analytical Manual for Foods (BAM) method.
2.7 Sensory evaluation :Cooked duck breast meats stored at 0-4℃ for 7 weeks, 10-15 experienced students evaluated, appearance, color, texture, smell, juiciness, flavor, smell of cinnamon, flavor of cinnamon, and overall acceptability on an 7-point descriptive scale. Cooked duck breast meats were warmed in an oven just before sensory evaluation. Cut into small pieces using a sharp knife, and coded samples were served at room temperature in separate bowls. Water was served for cleansing the mouth between samples.

2. Statistical analysis
Statistical analysis was performed with the SAS program for Windows V9.1 (SAS Institute, Cary, NC, USA). ANOVA with Turkey's multiple range tests was carried out to analyze the significant differences among treatments ($P<0.05$).

III. RESULTS AND DISCUSSION

During storage, pH value of all groups were among 6.20-6.50 (fig. 1). The pH value of D was significant higher ($P < 0.05$) than others at 0 wk, and no significant differences ($P > 0.05$) were found at 7 wk. L value of cooked duck breast skin of group C and D were significant lower than others ($P < 0.05$) during storage (fig. 2). It might be due to the functions of smoking being developed aroma and color. On the same group, there were no significant differences during storage ($P > 0.05$). L value of cooked duck breast muscle were also no significant differences during storage (fig. 2). All groups were among 27-32.

The TBARS value was calculated as mg of malondialdehyde (MDA) per kg sample, and it represent the content of secondary lipid oxidation products which contribute to off-flavours in oxidized meat and meat products [7]. On this study TBARS value of cooked duck breast meats was no significant differences among treatments on the same time (fig. 3), but significantly increased during storage ($P<0.05$).

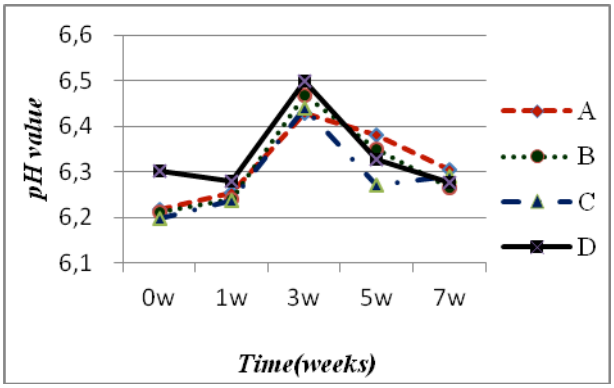

Fig. 1. pH value of cooked duck breast meats smoked with different gram of leaves powder during storage at 0-4°C.

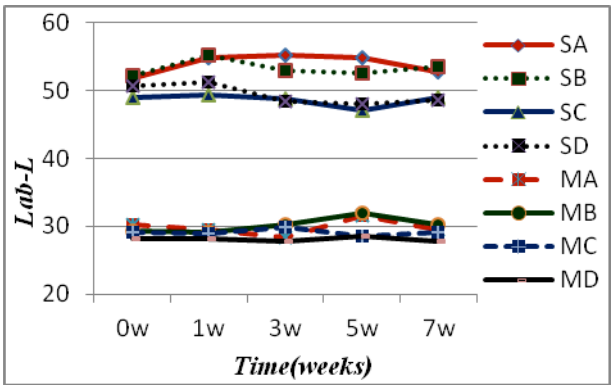

Fig. 2. *L* value of cooked duck breast meats smoked with different gram of leaves powder during storage at 0-4°C.
※SA, SB, SC, SD means the skin of cooked duck breast for A, B, C, D.
※MA, MB, MC, MD means the muscle of cooked duck breast for A, B, C, D.

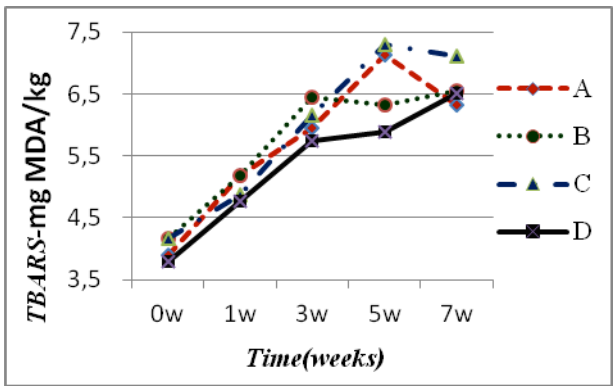

Fig. 3. TBARS value of cooked duck breast meats smoked with different gram of leaves powder during storage at 0-4°C.

The large amount of phenolics contained in cooked duck breast meats might cause its strong antioxidant ability [8]. Total phenolic content of all groups were significantly decreased (P<0.05) during storage (fig. 4), and D was slowly higher (P > 0.05) than others.

The microbial counts of C and D was significant lower (P < 0.05) than others at 0 wk, and no significant differences (P > 0.05) were found at 7 wk (fig. 5). It showed that smoked with 40 or 60 gram leaves powder might decreased total plate counts. At 0w A, B, C, and D was 3.69, 3.90, 3.24, and 3.26 log CFU g^{-1}. During storage, Coliform counts of all groups were among 0.5-2.0 (fig. 6), and there were no significant differences (P > 0.05) were found among the different smoking treatments.

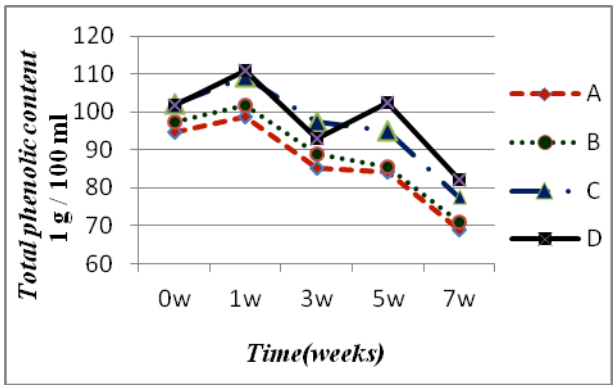

Fig. 4. Total phenolic content of cooked duck breast meats smoked with different gram of leaves powder during storage at 0-4°C.

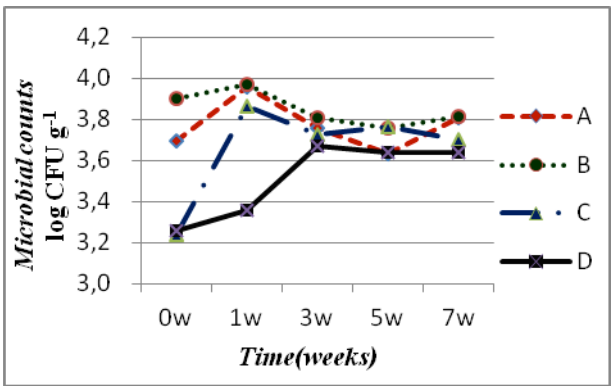

Fig. 5. Microbial counts of cooked duck breast meats smoked with different gram of leaves powder during storage at 0-4°C.

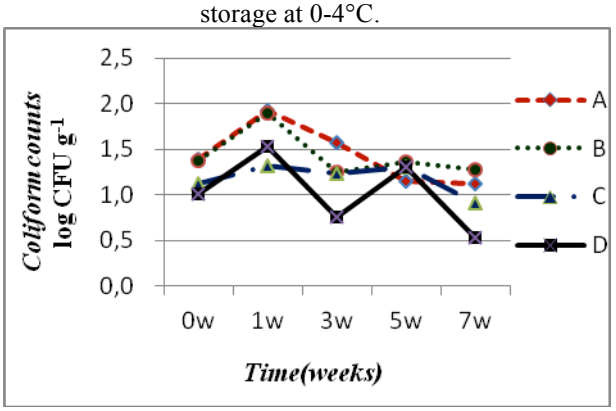

Fig. 6. Coliform counts of cooked duck breast meats smoked with different gram of leaves powder during storage at 0-4°C.

Sensory evaluation-overall acceptability value of cooked duck breast meats were among 4.5-5.5 (fig. 7). All the cooked duck breast meats were more than 4.0, it showed that consumers can accept the products. Although acceptability of all groups were no significant differences (P > 0.05) during storage, D was slowly higher than others.

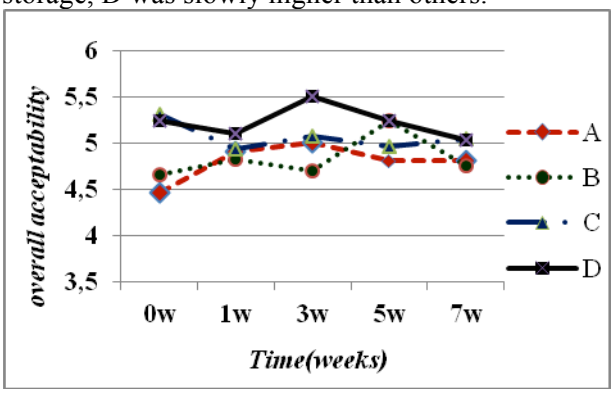

Fig. 7. Sensory evaluation-overall acceptability value of cooked duck breast meats smoked with different gram of leaves powder during storage at 0-4°C.

IV. CONCLUSION

The addition of cooked duck breast meats

Smoked with wood chips combined with *Cinnamomum Osmophloenm* Kaneh. leaves powder would have effective results in retarding lipid oxidation and applicable in meat processing, helping to prevent the formation of off-flavor in meat and their products and increasing shelf-life. Most consumers appreciate the benefits of using *Cinnamomum Osmophloenm* as a flavouring agent.

REFERENCES

1. Fernandez, J., Perez-Alvarez, J.A. & Fernandez-Lopez, J.A. (1997). Thiobarbituric acid test for monitoring lipid oxidation in meat. Food Chemistry, 59: 345–353.
2. Lee, C. C., Wu, S. J. Chang, C. H. & Ng, L. T. (2003) Antioxidant activity of Cinnamomum cassia. Phytother Res. 17: 726-730.
3. Schwanke, S., Ikins, W. G., Kastner, C., & Brewer, M. S. (1996). Effect of liquid smoke on lipid oxidation in a beef model system and restructured roasts. Journal of Food Lipids, 3: 99–113.
4. Faustman, C., Specht, S. M. Malkus, L. A. & Kinaman, D. M. (1992). Pigment oxidation in ground veal : influence of lipid oxidation iron and zinc. Meat Sci. 31: 351-362.
5. Singleton, V. L., & Rossi, J. A. J. (1965). Colorimetry of total phenolics with phosphomolybdic-phosphotungstic acid reagents. Am. J. Enol. Vitic. 16: 144-153.
6. FDA. (1996). Bacteriological Analytical Manual for Foods. U. S. Government printing Office Washinton. DC. USA.
7. Juntachote, T., Berghofer, E., Siebenhandl, S. & Bauer, F. (2006). The antioxidative properties of Holy basil and Galangal in cooked ground pork. Meat Sci. 72: 446–456.
8. Li, Y., Guo, C., Yang, J., Wei, J., Xu, J., & Cheng, S. (2006). Evaluation of antioxidant properties of pomegranate peel extract in comparison with pomegranate pulp extract. Food Chemistry, 96: 254–260.