THE CHANGES IN PHYSICOCHEMICAL PROPERTIES OF TURKISH COOKED SALAMI AT THE POINT OF SALE (POS)

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Abstract – The aim was to determine the influence of processing and some additives (e.g. carmine) on the physicochemical properties in two different salami products (Turkish brands) made of turkey meat at the point of sale. Data suggest protein concentration (PC) in T1 was much higher than in T2 samples. Protein oxidation that occurred in T2 samples, which noted by malondialdehyde content (MDA) may contribute the reduction in PC of T2 samples. T1 type showed lower values of *L and *b** than T2 samples. Fat, MDA, and anisidine values were higher in T1 than in T2 suggesting a great oxidation process occurred. SDS-PAGE gels also suggest that T2 exhibited more protein bands than in T1 samples.**

Key Words –carmine-E120, fat and protein oxidation, poultry meat

I. INTRODUCTION

Commercial salami of poultry meat type (mortadella of turkey) in the Turkish market is a type of processed sausage mainly consisting of fresh turkey meat, spice, veal fat, and other additives. Historically, salami was popular because of its stability if stored properly at room temperature. Recently, manufacturers try hard to produce subtle salami products at improving the functional and organoleptic properties by adding novel natural ingredients and additives. At the point of sale (POS) color, flavor, microbial load and price are the most important factors influence the consumers' perception and attitude towards meat products. Lipid and protein oxidation is responsible for the production of chemical reaction precursors which usually affect on organoleptic properties and overall qualities of meat products. Also color gets deteriorated by the time during and immediately after processing that because many color stabilizers are used such as nitrate and E120 (carmine). However, consumers are always wondering about the impact of those additives in terms of health, quality and cultural and ethical aspects. This study aimed at characterizing the changes in some physical and chemical parameters of salami made of turkey meat with two different batches.

II. MATERIALS AND METHODS

Preparation of salami: T1 and T2 processed by mixing minced meat with other ingredients, spice and some additives (salt, sodium nitrite, ascorbic acid, *etc*) in a huge blender (Table 1). Further the homogenates were fumed at 23ºC and 30-35% RH. The paste was stuffed and cooked with a steam convection method at 77ºC for 1-3h.
Protein concentration: Protein concentration (PC) was determined using Biuret method (absorbance: 540nm).
Colorimeter measurements: Color measurements were carried by a colorimeter (Konica-Minolta, CR-5, Japan).
Cold extraction of total fat: Around 100g of each salami type were mixed with hexane-acetone solvent. The precipitate was removed after adding water and the supernatant was evaporated and then oils weighted at the end.
Lipid oxidation: Anisidine value (AnV): AnV was measured by a method using trimethylpentane, P-anisidine and iso-octane solution (absorbance: 350nm). While malondialdehydes (MDA µM) in 0.5g fat of each sample was evaluated by using 0.5% thiobarbituric acid in 20% trichloroacectic acid buffer (absorbance: 532 to 600 and 535nm).
Antioxidant activity: In this regard, 2,2-azino-bis (ethylbenzthiazoline-6-sulfonic acid) and 2,2-diphenyl-1-picrylhydrazyl are used for ABTS and DPPH assays at an absorbance of 734 and 515 nm, respectively.
Protein oxidation and molecular weight changes: Total and free thiol groups (SH) were evaluated by using tris-HCL buffer and Ellman's reagent as well as DTNB buffer. The samples checked at an absorbance of 412 nm. Proteins of each sample were separated on SDS-PAGE gels by an electrophoresis system.

III. RESULTS AND DISCUSSION

Results are presented in this article clearly exhibit a great difference in many parameters tested, for instance, pH values were higher in T1 brand than in T2, the difference might be due to the milk protein content in T2. Significantly, PC in T1 samples extracted in three different buffers showed greater values than in their counterparts in T2. Differently, T1 had most fat content than in T2, which basically that refers to the sun flower oil addition in T1. *L** and *b** (blue) values in T1 were much lower than their counterparts in the T2, thus, that might be due to the sunflower addition and E120, which in turn increased *a** values (red). The use of E120 in Halal food is still controversial issue. *L** and *b** values were high in T2, which may also refer to the milk protein and garlic addition.

Fat and protein oxidation comes in the first place in terms of quality importance in meat products, simply because they affect on the perception and attitudes of consumers due to the compound they resale once they are oxidized. In addition to causing deterioration of color, texture, flavor, and nutritive value, lipid oxidation in foods generates end-products which may be harmful to human health [1]. Identically, AnV and MDA exhibited significantly higher values in T1 than their parallels in T2. AnV value in T2 was about 1/3 of its value in T1, while MDA in T2 was 2/3 of its value in T2 (Table 1). Given these points, it is suggested that much fat oxidation occurred in T1 which might be due to the sensitivity of sunflower oil to oxidation process. Equally important, however, garlic in T2 should have contributed to the antioxidation effect. Correspondingly, MDA content in protein extracted in KCl buffers showed that T2 had a higher concentration than in T1 MDA in KCL in T2 was 5-foldds the content in T1, in unlike manner, MDA content, in phosphate buffer of T2 was almost half of its content in T1. Presumably, those myofibrillar proteins in T1 were more resistant to oxidation which might be due to the emulsification process and sarcoplasmic proteins in T2 seems to have a lower oxidation process than in T1. Data noticeably suggest that there is a great divergence in the fat and protein oxidation values among the samples tested.

SDS-PAGE gels demonstrate that Phosphate buffer in T1 failed to extract tropomyosin (38kDa) and acidic glycinin IIS (36kDa, a soy protein) (Fig. 1). Clearly, KCl buffer in T2 could extract α-Casein (30 kDa, Milk protein). Generally, by the same token, both T1 and T2 gels expressed most of the proteins.

IV. CONCLUSION

For the first time, this study considered two different batches of salami (Turkish brands). Sunflower and E120 in T1 samples had affected the physicochemical properties of salami. There should be other emulsifiers and color stability agents used instead of sunflower oil and E120, respectively, to meet with the anticipated quality and ethical rules.

REFERENCES

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Table 1. Formula and PC, fat, AnV and MDA values of T1 and T2

Item/ Parameter	T1 (market brand)			T2 (pinar doyum brand)		
Ingredients	Poultry meat (Turkey) Veal fat and sun flower oil Water Potato starch Soy protein Blended spices and salt Stabilizer ($Na_4P_2O_7$) Sodium Nitrite Coloring agent (E120) Antioxidant (Ascorbic acid) Gluten (Allergenic)			Poultry meat (Turkey) Veal fat Water Potato starch Soy and milk protein Spices, salt and garlic Stabilizer ($Na_5P_3O_{10}$) Sodium Nitrite Natural flavoring (Fume) Antioxidant (Ascorbic acid)		
pH	7.13			6.96		
PC (mg/ml)	H_2O	Phosphate	KCl	H_2O	Phosphate	KCl
	11.52	11.42	11.32	6.17	6.74	5.77
Fat g/100g	17.9			11.81		
AnV	32.36			11.42		
MDA/µM	7.76			5.18		

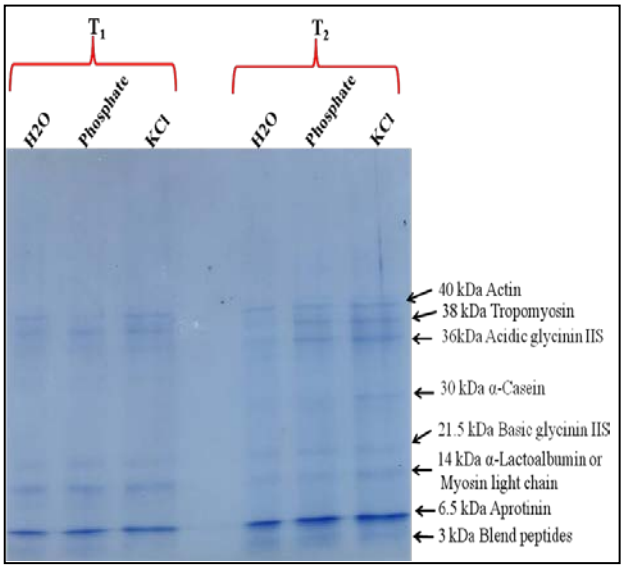

Figure 1. SDS-PAGE image shows MW of proteins in T1 and T2.