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EFFECT OF DISPLAY LIGHT AND STORAGE PERIOD ON CERTAIN QUALITIES OF CHICKEN SALAMI*

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ABSTRACT

An experiment was conducted to study the effect of display light and storage period on the subjective and objective qualities of chicken salami. The quality traits evaluated included visual color score, reflectance measurement, reflectance ratio, pH, water holding capacity (WHC), Thio Barbiteric Acid (TBA) value, total heme pigment (THP), moisture, protein and organoleptic qualities. In general, better results were obtained under incandescent light for visual color score, reflectance measurement, T.B.A. value, total heme pigment and overall acceptability. Increasing in storage period resulted in decrease of all the qualities evaluated in the experiment.

INTRODUCTION

The main tools of judging a meat product under the displayed condition at market by a customer are color, appearance, flavour, cost and reputation of its producers. Factors that influence the keeping quality of meat products in retailer's showcase at market are temperature, lipid oxidation and intensity of light (Kropf, 1980). Prolong exposure to light initiates discoloration of meat and meat products. Types of display light can affect the appearance of meat either through temperature elevation at the meat surfaces or through a photochemical effect of rendering light because of different spectral energy distribution pattern (Kropf and Hunt, 1985). Cured meat and meat products are more susceptible to light discoloration than raw meat, because it causes dissociation of nitric oxide from the nitrosomyoglobin. Therefore, in the present study, the effect of display lights i.e. incandescent and fluorescent lights, on the qualities of chicken salami prepared from spent hens meat under refrigerated display condition for different length of storage period was studied.

MATERIALS AND MATHODS

Three groups of chicken salami incorporating 15, 20 and 25% fat levels were prepared using hog casings. The chilled salamis were sliced into a thickness of 0.5 cm (approx.) each and randomly packaged in clean polyethylene packets. Thereafter, with the help of a vacuum

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pump, the inside air of the packets was removed and its mouth was sealed with a burning candle. A total of six packets were made from each of three fat levels. From each of the fat level, three packets were stored under incandescent light (Li) and rests were stored under fluorescent light (Lf) in refrigerated (4±l°C) display condition. The display cabinet was partitioned horizontally into two chambers using an opaque paperboard covered with aluminium foil. The upper chamber of the display cabinet was used for incandescent light (60Watt Philips Bulb) with in-built bowel reflector and its lower chamber was used for fluorescent light where a 2 feet 20 watt tube light was used. The reflected light from the bowel reflector is directed towards surface of the packaged salamis by placing the aluminium foil over the incandescent bulb. The illumination intensity of the fluorescent and incandescent light was adjusted with the help of a light dependent resistor (LDR) connected with a microampere meter. In all the trials, the salamis were exposed to light sources for duration of 8 hours per day. The salami samples were evaluated for different quality traits at the end of 1st, 4th and 7th days of storage. Altogether six batches of such salami samples were prepared and assessed for the following qualities.

Visual color scores (VCS), were assessed by the taste panel members under bright day light. A five point hedonic scale was used. Reflectance measurement was done at 520nm, 540nm, 570nm, 600nm and 650nm. Average of six measurements from the samples of each packet was recorded as the percent reflectance.

The per cent moisture and protein contents were estimated following the standard procedure of AOAC (1990). The pH was recorded by using digital pH meter. The WHC was evaluated as per the technique of Wardlaw et al. (1973). TBA was determined by an extraction method as described by Witte et al. (1970). The THP content was estimated as per the method described by Hornsey (I 956).

For organoleptic evaluation, samples were prepared by warming the salami slices in an oven at 40°C for I to 2 minutes. A nine-taste panel member using 7-point hedonic scale evaluated each sample for color, flavour, juiciness, tenderness and overall acceptability. The data thus obtained were analysed statistically as per Snedecor and Cochran (1968).

RESULTS AND DISCUSSION

The results obtained for different qualities of chicken salami are presented in the table 1. VCS was found to be superior under incandescent light (Li) Table1. Increase in storage periods significantly ($P<0.01$) decrease the visual color scores of chicken salami. The color deterioration under fluorescent light could be attributed to emission of ultraviolet rays which causes light induced discoloration of salamis and was also in agreement with the findings of Kropf (1980). The per cent reflectance was significantly ($P<0.01$) higher under Li than Lf that ascertained the darker color of salami slices that kept under fluorescent light. The lower reflectance measurements were also recorded with longer storage periods. Significantly ($P<0.01$) higher reflectance ratios were found on 7th day than that on 1st and 4th days of storage under both Li and Lf. Similar trend of results were also reported by Brahma (1989) in pork salami. The percent moisture and protein content were not affected by lighting and storage periods which is in agreement with findings of Bhoyar et al. (I 997).

The pH of the salami was not influenced by lights, but elongation of storage period significantly ($P<0.01$) increased the pH value which could be attributed to higher rate of oxidation

of fat in the salami with longer storage periods. The increase in WHC with increased storage periods could be due to higher pH values. Similarly, the TBA value was increased as the storage period increased and this results was in an agreement with Singh(1996).However, the TBA values of salamis exposed to Lf was higher compared to Li. This might be due to higher ultra-violet ray emission from the Lf, which act as potent accelerator of rancidity. Fluorescent lights radiate about one-fifth of more heat than that of Li for equal light intensities as reported by Kropf (1980). The per cent conversion of THP was not affected by lighting, but significantly ($P<0.01$) higher THP was recorded on Ist day than on 4th and 7th days of storage. These lower values of THP with longer storage periods might be due to high ultimate pH of the salami. Homsey (1956) reported that cooked meat products with higher ultimate pH gave lesser proportion of cured pigments.

Organoleptic quality revealed better color, flavour and overall acceptability scores under Li compared to Lf, while juiciness and tenderness scores were slightly better under Lf to that of Li (Table 1). Significantly ($P<0.01$) lower color, flavour, juiciness and overall acceptability scores were recorded on increase in storage periods. These scores were in agreement with the findings of many workers (Khanna and Panda, 1984 and Nag et al, 1998).

It may be concluded that the incandescent light provides more favorable results on the chicken salamis under the refrigerated display condition without any detrimental effect up to 7th days of storage.

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Table 1 Effect of lighting and storage period on the qualities of chicken salami

Attibutes	Incandescent (Li) Storage Periods (days)			Fluorescent (Lf) Storage Periods (days)		
	1st	4th	7th	1st	4th	7th
Visio-Physio-Chemical Qualities						
Visual color score	4.97a ±0.007	4.55b ± 0.050	3.62c ± 0.061	4.95a ± 0.005	4.36b ± 0.042	3.48c ± 0.0.64
Reflectance measurement	51.36a ± 0.272	50.57b ± 0.262	49.77c ± 0.191	51.07a ± 0.299	50.17b ± 0.304	49.83c ± 0.269
Reflectance ratio	0.655a ± 0.005	0.653a ± 0.006	0.684b ± 0.003	0.670a ± 0.006	0.668a ± 0.005	0.662b ± 0.006
Moisture	62.18 ± 0.234	62.06 ± 0.263	62.34 ± 0.257	62.28 ± 0.267	62.38 ± 0.257	62.56 ± 0.246
Protein	15.18 ± 0.325	15.16 ± 0.324	15.16 ± 0.326	15.19 ± 0.323	15.16 ± 0.327	15.15 ± 0.325
pH	6.36a ± 0.020	6.58b ± 0.015	6.70c ± 0.014	6.37a ± 0.019	6.59b ± 0.014	6.73c ± 0.016
WHC	34.77a ± 0.196	35.26b ± 0.151	35.70c ± 0.081	34.44a ± 0.202	35.22bc ± 0.236	35.59c ± 0.126
TBA	0.162a ± 0.001	0.273b ± 0.004	0.364c ± 0.009	0.160a ± 0.001	0.277b ± 0.004	0.391c ± 0.008
THP	62.98a ± 0.765	58.56b ± 0.581	55.92c ± 0.665	62.84a ± 0.646	57.38b ± 0.615	54.92c ± 0.701
Organoleptic qualities						
Color	6.53a ± 0.019	5.46b ± 0.036	4.38c ± 0.042	6.41a ± 0.015	5.26b ± 0.027	4.22c ± 0.028
Flavour	6.61a ± 0.020	6.31b ± 0.027	5.88c ± 0.051	6.58a ± 0.017	6.25b ± 0.026	5.79c ± 0.051
Juiciness	6.51a ± 0.017	6.48ab ± 0.016	6.46b ± 0.016	6.52a ± 0.015	6.50ab ± 0.010	6.48b ± 0.015
Tenderness	6.51 ± 0.041	6.48 ± 0.035	6.52 ± 0.015	6.52 ± 0.017	6.49 ± 0.012	6.50 ± 0.012
Overall acceptability	6.54a ± 0.014	6.49a ± 0.014	5.88b ± 0.038	6.52a ± 0.015	6.37b ± 0.048	5.76c ± 0.017

Means bearing similar superscripts in a row do not differ significantly ($P<0.01$)