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Studies on the physicochemical characteristics of the sandwich spread at ambient temperature in view with its stability

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Abstract

Pork sandwich spread is a convenience meat product which constitutes with various standardized additional ingredients like honey, vitamin – C and nisin with their respective role during the physicochemical storage study. The study is focused to standardize the formulation of spread which should make it stable at ambient temperature (25 ± 1 °C). Results of ANOVA revealed non significant effect ($P \leq 0.05$) of the nisin treated pork sandwich spread up to 5th day storage. The pH values ranged from 5.5 to 5.6. Results of ANOVA revealed a highly significant difference ($P \leq 0.01$) in TBA values between the days of storage.

Keywords: Pork Sandwich Spread, Ambient, pH, TBA

Introduction

Storage of meat often leads to the development of abnormal odors, tastes and fading of colour. citric acid, acetic acid and ascorbic acid are also known to confer protection against meat product deterioration. In all these cases, the pH of the product is shifted to being low, that is, more acidic, where very few moulds, yeast and bacteria are able to grow and multiply. The main reasons for deterioration of any kinds of meat products is the lipid oxidation since this reaction is responsible for changes in the sensory quality, nutritive value and functionality affecting negatively the consumer acceptance (Raharsjos and Sofos, 1993; Chaiyasit *et al.*, 2000; Silvestre *et al.*, 2000) [4, 1, 8]. lipid oxidation increased significantly with advancement of storage at ambient temperature up to 9th day and approximately 10 times increase (0.05 to 0.50) in TBARS values observed in pork sausages during 3 days of storage at ambient storage. (Thomas, 2007) [11].

In a study, Tylkin and Beskrovnaya (1982) [12] founded that the butter readily absorbs nitrogen oxide, the gas produced in hydrolysis of nitrite, leading to lesser hydrolysis as compared to pork fat. It has been found that a mixture of modified butter and pork fat after heat treatment of 50-300°C produced a better flavouring compound that is stable at room temperature (Sexton *et al.*, 1986) [5]. Pandey (2006) [2] used 15% of fat in pork spread. The pH values decrease when meat spoilage is caused by gram positive bacteria especially lactic acid bacteria (Shelef, 1975) [7]. Determination of thiobarbituric acid reacting substance (TBARS) number is a method for measuring oxidative deterioration of lipids in muscle foods. It measures the amount of malonaldehyde, a water soluble secondary product obtained mainly from the oxidation of polyunsaturated fatty acid in food samples (Pearson *et al.*, 1983) [3]. Increase in storage temperature also has a tendency to increase the values which is demonstrated by higher TBARS number at 15°C than 4°C (Wang *et al.*, 1996) [13].

Materials and Methods

Meat samples were obtained from pigs (live weight between 60-70 kg) slaughtered in the experimental abattoir of Livestock Products Technology Division (IVRI, Izatnagar). After removal of all separable connective tissue and fat, meat was trimmed off and stored in colourless polythene bags for overnight at 4 ± 1 °C for conditioning and then frozen at -18 ± 1 °C for further use. Lean meat in the form of small cubes was minced in the meat mincer. weighed refined oil, spices (Pati, 1990), condiments i.e. onion, garlic and ginger (3:2:1), common salt (0.5%) and black salt (1%) were browned in a pan, then minced meat was added to it and braised for 30 minutes at 84 ± 2 °C. The pressure cooking method was opted for the preparation of the product and after cooling, the antioxidants (0.02%) and carrageenan (0.20%), skimmed milk powder (2.5%), rusk (2%) along with molten butter (15%) was added to the product. A pre weighed mixture of sugar (0.25%) sodium nitrate and nitrite (0.02%) citric acid (0.20%)

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sodium tripolyphosphate (0.40%) sodium ascorbate (0.10%) and glycerol (2%) and ice (1.81%) was added to it. Thorough mixing of the ingredients with the minced meat was done to obtain the homogeneity. The product was grinded in the mixer grinder at 500-1200 rpm for 1-2 minutes to get the paste of desired consistency, meanwhile the colouring agent was also added (at the rate of 0.20gm /15ml/1kg batch). The product was transferred in a glass tray and stored for further experiments. Honey (6%) level, Vitamin-C at the rate of 500 ppm and nisin at the rate of 12 mg/kg level was added and carried for the physicochemical characteristics parameters at ambient storage. Plastic pet jars with lid of 200 g capacity were used for storage studies. The pH of meat, meat emulsion and cooked meat spread were measured with digital (Century, Model: CP-901: Sonar) pH meter equipped with a combined glass electrode for meat. For pork sandwich spread, 10 g of the sample was homogenized with 50 ml of distilled water for 1 min using Ultra Turrex T25 tissue homogenizer (Janke and Kenkel, IKA, Labor Technik standard). For the edetermination of TBA nuvalue, The distillation method of Tarladgis *et al.* (1960)^[10] was followed for determination of 2-Thiobarbituric acid reacting substances (TBARS) number. Data were analyzed statistically on a Window XP computer in the Computer Centre of the Institute using Statistical Software Packages developed by following the procedure of Snedecor and Cochran (1989)^[9].

Results and Discussion

Results of ANOVA revealed Non significant effect ($P \leq 0.05$) of the nisin treated pork sandwich spread up to 5th day storage. The pH values ranged from 5.5 to 5.6. Results of ANOVA revealed a highly significant difference ($P \leq 0.01$) in TBA values between the days of storage. TBA value increased on the days of storage but remained under the safe value for the product. (Table-1). This finding is in agreement with those of Thomas (2007)^[11] in pork sausages where lipid oxidation increased significantly with advancement of storage at ambient temperature up to 9th day and approximately 10 times increase (0.05 to 0.50) in TBARS values observed in pork sausages during 3 days of storage at ambient storage. Results of ANOVA revealed a highly significant difference ($P < 0.01$) in the TBA values of the pork sandwich spread with the increase in days of storage. (Table-1). With the progressive days of storage the TBA values showed linear increase. Besides this progressive increase in TBA value, the product was acceptable till 5th day storage. This finding is in agreement with the findings of Shahidi *et al.* (1987)^[6] in ground cooked pork.

Table 1: Effect on the Physicochemical Parameters of Sandwich Spread at Ambient Storage ($25 \pm 1^\circ\text{C}$)

Parameters	0 Day	3 rd Day	5 th Day	Overall Mean
pH [#]	5.56±0.03	5.53±0.02	5.61±0.01	5.57±0.01
TBA	0.15±0.03	0.49±0.07	0.67±0.08	0.44±0.05**

#Scores, 7 points hedonic scale (7-extremely acceptable, 1-extremely unacceptable)

**Highly significant ($P < 0.01$)

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