

Original Research Article

Studies on the Physicochemical Properties of the Sandwich Spread in Different Storage Condition with the Role of Different added Ingredients

S. S. Sengar^{1*}, R. C. Keshri² and P. K. Singh³

¹Department of L.P.T., C.V. Sc. & A. H., N. D.U.A.T. – Kumarganj, Faizabad (U.P.), India

²Division of L.P.T., I.V.R.I. - Bareilly (U.P.), India

³Department of L.P.T., C.V.Sc. & A.H., Rewa, (M.P.), India

*Corresponding author

ABSTRACT

Pork sandwich spread is a meat based convenience product constitutes with various standardized additional ingredients like honey, vitamin – C and nisin with its corresponding role this study is focused to standardize the formulation of spread with additional ingredients which should make it stable at different storage temperature viz, refrigerated ($4\pm 1^{\circ}\text{C}$) and frozen ($-18 \pm 1^{\circ}\text{C}$) temperature. A highly significant ($P<0.01$) decrease in the pH values of the product with the increase in days of refrigerated storage ($4\pm 1^{\circ}\text{C}$). a highly significant difference ($P<0.01$) in the TBA values of the pork sandwich spread with the increase in days of refrigerated storage. A highly significant ($P<0.01$) linear decrease in the pH values of the product with the increase in days of frozen storage highly significant difference ($P<0.01$) in TBA values of the samples stored for various periods at frozen temperature.

Keywords

Sandwich Spread,
Physicochemical,
pH, TBA

Introduction

Lipid oxidation is one of the main reasons for deterioration of many kinds of meat products, 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). Storage of meat often leads to the development of abnormal odors and tastes and loss of colour. Acids such as citric acid, acetic acid (vinegar) and ascorbic acid are also known to confer protection against product deterioration. In 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 TBA values also decreased with

increasing levels of added honey in the freshly cooked and 48 hours stored meats. The percentage inhibition of oxidation for the 5, 10, 15, and 20% samples increased from 50 to 76% for the freshly cooked meat and from 34 to 88% for the 48-hstored meat. (Antony.*et al.*, 2000). The pH values decrease when meat spoilage is caused by gram positive bacteria especially lactic acid bacteria (Shelef, 1975). The pH of fresh or cooked meat during refrigerated storage may change due to the metabolites of bacterial action on the meat or meatproducts (Jay, 1996). A non-significant decreasing trend in pH of pork patties (packed in air permeable film) was also observed during refrigerated storage for 7 days (Keeton, 1983). But it was

also found that pH had significantly increased in pork after 10-14 days of storage (Sunki *et al.*, 1978; Murthy, 1980). 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). 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) and higher value at refrigerated storage (4°C) compared to frozen (-18°C) of minced chicken patties (Abd-El-Alim *et al.*, 1999). Brewer *et al.*, (1992) reported that TBA value increased with the increase in frozen storage time of low fat ground beef patties.

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%) 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 on refrigeration and frozen 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 determination of TBA value, The distillation method of Tarladgis *et al.*, (1960) 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).

Results and Discussion

Results of ANOVA revealed a highly significant ($P < 0.01$) decrease in the pH values of the product with the increase in days of storage (4±1°C).

Table.1 Effect on the Physicochemical Parameters of Sandwich Spread at Refrigeration Storage ($4 \pm 1^\circ\text{C}$)

Parameters	O Day	10 th Day	20 th Day	30 th Day
pH	5.69±0.02	5.62±0.003	5.59±0.009	5.56±0.01**
TBA	0.15±0.003	0.35±0.009	0.42±0.006	0.65±0.01**

**Highly significant (P<0.01)

Table.2 Effect on the Physicochemical Parameters of Sandwich Spread at Refrigeration Storage ($-18 \pm 1^\circ\text{C}$)

Parameters	O Day	15 th Day	30 th Day	45 th Day
pH	5.71±0.005	5.62±0.01	5.58±0.005	5.43±0.01**
TBA	0.15±0.00	0.32±0.01	0.46±0.04	0.61±0.005**

**Highly significant (P<0.01)

(Table – 1), this decrease in pH might be due the action of acid forming bacteria present in the product. 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 30th day of refrigerated storage. This finding is in agreement with the findings of Shahidi *et al.*, (1987) in ground cooked pork. Results of ANOVA revealed a highly significant (P<0.01) linear decrease in the pH Values of the product with the increase in days of storage. (Table – 2).This decrease in pH may be due to the action of acid forming bacteria in the product. This finding is in agreement with that of Pandey (2006) in pork sandwich spread. Results of ANOVA revealed a highly significant difference (P<0.01) in TBA values of the samples stored for various periods at frozen temperature. (Table – 2) With the progressive days of storage, the TBA value showed linear increase. However, this Progressive increase in TBA value of the product remained acceptable till 45th day of frozen storage.

This finding is in agreement with the findings of Shahidi *et al.*, (1987) in case of ground cooked pork and that of Pandey (2006) in pork sandwich spread.

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