EFFECT OF DIFFERENT TYPES OF PRESERVATIVES ON SHELF LIFE OF YOGHURT

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Abstract
This study evaluates the effects of preservatives on the shelf life of yoghurt following standard procedure. The chemical preservatives were added at the levels of 0% (control), 0.10% (sodium benzoate), 0.25 (sodium benzoate), 0.10% (potassium sorbate), 0.25% (potassium sorbate), representing treatments 1, 2, 3, 4 and 5 respectively. The samples were stored at room temperature (37^0C) for 28 days until the samples were acceptable to the consumers. Potassium Sorbate preservatives used at 0.25% gives the best (optimum) concentration on shelf life within 28 days. Among the two preservatives tested, potassium sorbate was found to be more effective than sodium benzoate irrespective of the level used and is therefore recommended for use by yoghurt producers.
Keywords: chemical preservative, yoghurt, storage, producers

Introduction

Dairy milk and its products such as yoghurt are prone to spoilage like cow milk after a few hours of production unless preservatives are used. Since nutrient-dense is healthy for individuals, particularly those that are lactose intolerant and have not been reported to elicit allergic reactions, improving the shelf life should be explored (Imeson, 2010). Preservatives are added to improve yoghurt consistency. These are generally additives, which prolong the life span of foods and drinks by preventing micro-organisms attack.

Technically, preservatives are chemicals used to poison micro-organisms and to prevent the food to which it is added from fermentation and spoilage without causing any harmful effect to the person who consumed the food. The uses of chemical preservatives enhance food quality, reduce waste and enhance consumer acceptability (Friezer, 1989).

The shelf life of yoghurt depends on the initial pH, storage temperature and preservatives, if any, added (Bansode *et al*., 2018). The information concerning the relationship between the changes in pH during storage under room temperature is lacking. This kind of information may be useful to yoghurt manufacturers in estimating pH of their product at the point of sale particularly in underdeveloped countries where storage facilities are either unavailable or power supply is not guaranteed.

Thus, this research aimed to determine the effect of different levels of two chemical preservatives on the shelf life of yoghurt.

Materials and Methods

Study Area

The study was conducted at the physical laboratory of the Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto, Nigeria.

Materials

Powdered milk (Dano Milk®) was sourced from Sokoto Central market and reconstitute milk was mixed well, and divided into 4 replicates each representing a treatment. Reagent-grade media and chemicals were used in the present study.

Yogurt making

Yogurt was prepared as described by Eissa *et al*. (2010). Reconstitute milk was pasteurized (85°C for 30 minutes), cooled (42°C), inoculated (Yogourmet®) at 3% of total milk, incubated (43°C for 4 hours), and stored under ambient temperature (25–40 °C) for subsequent observations, test and analysis.

Chemical Analysis

The pH of yoghurt was measured by using a Digital pH meter (Global Model DPH 500). The acidity content of yoghurt was determined as per the method described in ISI Part XI (1981).

Statistical Analysis

The data obtained during the investigation were analyzed statistically using a completely randomized design as suggested by Jones (1994) with the aid of IBM SPSS (2020) Statistical software (Version 27.0) and the means were separated using Tukey ($P<0.05$).

Results and Discussion

Effect of Preservative on Shelf Life of Yoghurt in Days

Table1 revealed that the effects of preservatives and their levels on the shelf life of yoghurt with initial pH of 5.65-5.70±0.1 at ambient conditions increased the shelf life of yoghurt up to 17-21 days on the addition of sodium benzoate and 21-24 days on the addition of potassium sorbate at 0.1 and 0.25 % respectively. The data indicate that the shelf life of yoghurt was dependent on both preservatives and storage temperatures. The highest shelf life of yoghurt was 24 days with 0.25% Potassium sorbate when stored at 37^0C while the lowest shelf life was 17 days when Sodium benzoate (0.1%) was used. However, the yoghurt without preservative (control), showed a storage life of only 1 day. Ginslov (1970) reported a decrease in shelf life with an increase in storage temperature beyond 5 to 7^0C. Osborne and Pritchard (1974) reported similar results. Al-Kadamany *et al*. (2003) in a study on the shelf life of labneh produced by blending concentrated skim milk and cultured cream, reported the shelf life of up to 19, 9 and 3 days at 5, 15 and 25^0C, respectively.

Irrespective of the level of concentration, the potassium sorbate was superior to sodium benzoate. Hadam *et al*. (1971) reported 32 days of shelf life of yoghurt at 4^0C with 0.1% potassium sorbate. Contrary to these findings, Uduk *et al*. (2007) reported that on the addition of sodium benzoate gave the best results on the storage life of yoghurt in a study on the effect of preservatives sodium benzoate and potassium metabisulphite on the shelf life of soybean milk yoghurt.

Table 4.1: Effect of chemical preservatives on the shelf life of yoghurt in days

Levels (%)	Control	Sodium benzoate	Potassium sorbate
	1	-	-
0.1	-	17	21
0.25	-	21	24
SE±	-	0.87	0.47

Effect of pH, Acidity and Storage Temperature (37^0C) on Yoghurt

The data on the quality of yoghurt as affected by different pH, acidity and temperature of storage are presented in Table 2. The results showed the pH and acidity contents of yoghurt increased with an increase in the storage period from day 1 to 28 days. The yoghurt with initial pH of 4.65±0.1 showed the lowest pH and highest acidity after storage for 4 weeks.

According to the literature, there is an inverse relationship between pH and acid formation. The findings of the present work are in agreement with the earlier findings of Al-Kadamany *et al*. (2003) who reported a decrease in pH and an increase in acidity in Labneh yoghurt during storage.

Table 2: Effect of different pH, acidity and temperature of storage (37^0C) on yoghurt

Parameters	Control	Sodium benzoate (0.1%)	Sodium benzoate (0.25%)	Potassium sorbate (0.1%)	Potassium sorbate (0.25%)	SE±
Initial pH	4.65	5.65	5.70	5.58	5.66	0.005
Initial Acidity (%)	0.85	0.85	0.83	0.88	0.84	0.008
pH (28 days)	2.22	3.09	3.15	3.12	3.21	0.006
Acidity (%) (28 days)	2.15	1.14	1.15	1.25	1.15	0.007

Conclusion

Potassium Sorbate preservatives used at 0.25% gives the best (optimum) concentration on shelf life within 28 days. Based on the findings of this study Potassium Sorbate preservative (0.25%) gives the best (optimum) concentration on shelf life and therefore recommended for use being superior to Sodium benzoate irrespective of the levels (0.1 and 0.25%).

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