EFFECT OF RICE QUALITY, FORMULATION AND STORAGE ON QUALITY OF CANNED RICE PORRIDGE

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Introduction

Rice is a staple grain consumed by more than half of the world's population. It is the chief source of calories in Asia. Most of the rice is eaten as cooked rice as part of regular meals at home, restaurants or schools. Rice has been the staple food in Malaysia for centuries. However, in recent years, the consumption of whole rice in Malaysia, either boiled or steamed, is declining. It is envisaged that the consumption of rice in the two forms will continue to decrease, but the demand for rice in the form of rice-based products such as noodles, snacks and other forms of processed rice is increasing. Thus, efforts have been directed toward development of more convenient rice-based foods. One of these will be the ready-to-eat rice porridge, which is very popular in Japan, China and South Korea, and still not found in the Malaysian market. Therefore, the main objective of this project was to develop a tasty, nutritious and shelf-stable canned rice porridge for 7-12 years old children.

Materials and Methods

Three rice varieties; long-grain rice, broken rice and glutinous rice were obtained from Padiberas Nasional Berhad, Sekinchan, Selangor. Fresh beef, chicken (breast), fish (Jenahak) and dhal (yellow) were purchased from a local supplier in Taman Sri Serdang, Selangor. Texturised soy protein was obtained from Markaids Sdn Bhd in Kuala Lumpur. Vegetables and the other ingredients used were purchased from the local market. Long grain rice was mixed with broken rice or glutinous rice at a ratio of 0:100, 25:75, 50:50, 75:25 and 100:0, respectively. Each mixture was made into canned plain rice porridge. The physical and sensory properties of the products were evaluated. An optimum ratio was selected for the preparation of flavoured rice porridge (chicken, beef, fish and bean flavours). Freshly prepared flavoured rice porridges were evaluated to determine their physico-chemical, microbiological and sensory qualities. A storage study was also carried out to determine the quality changes of the products stored at 27°C and 4°C for 12 weeks.

Results and Discussion

The results obtained showed that plain rice porridge prepared using a mixture of broken rice and long grain rice at a ratio of 50:50 was found to be as acceptable as that containing 100% long grain rice. Incorporation of glutinous rice in excess of 25% lead to a significant decrease in acceptability. Physical characteristics of the products such as pH value, %Brix, viscosity, colour, solids loss and particle size were relatively unchanged with the substitution of long-grain rice with broken rice. When long-grain rice was substituted with increasing amounts of glutinous rice, the pH value and whiteness of the products tended to decrease but their %Brix and viscosity increased gradually. The products showed poor canning stability and were organoleptically unacceptable in all attributes studied when glutinous rice was in excess of 25% in the composite rice. For the flavoured rice porridges, the results of the ranking test revealed that the fish porridge was the most preferred while the bean rice porridge was rejected in terms of appearance, colour, flavour and taste. Results of the nutrient composition analyses showed that the beef rice porridge provided the highest protein, fat, and caloric content and the most amount of calcium and iron among the three acceptable formulations: chicken rice porridge, beef rice porridge and fish porridge. In addition, the beef rice porridge was good in all attributes according to the sensory evaluation. Therefore, fish rice porridge and beef rice porridge were selected to be the most acceptable formulations. Results of the storage study indicated that all samples either stored at room temperature (27°C) or in the refrigerator (4°C), complied with the standard for food hygiene and safety up to 12 weeks of storage. The temperature and time of storage did not affect the dry matter, ash, protein, fat, caloric, calcium and iron content of the porridges. However, low storage temperature caused the porridges to have a lower %Brix and increase in whiteness. Although the pH values of the porridges decreased on week 12, they were still microbiologically safe and organoleptically acceptable. The porridges that were stored at room temperature became thicker visually but no significant changes occurred in their colour, flavour and taste. On the contrary, the porridges that were stored in the refrigerator were thin in appearance, whiter in colour, and scored less in terms of flavour and taste.

Conclusions

A composite of broken rice and long-grain rice at a ratio of 50:50 is recommended for the production of plain rice porridge. A can of the flavoured rice porridge can provide 1/4-1/5 of the recommended daily allowance (RDA) for energy and nutrients for 7-12 years old children. All porridges stored at room temperature (27°C) and in the refrigerator (4°C) complied with the standard for food hygiene and safety up to 12 weeks of storage. However, the canned rice porridge should be stored at room temperature to maintain its sensory quality.

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