Quality evaluation of samples of gari from Ghana

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ABSTRACT
The results of the physical analyses of samples of gari from Ghana for moisture content and swelling capacity were 8.1 and 310 per cent, respectively. The chemical analysis indicated that the percent contents of protein, fat, starch, fibre, and ash were 1.2, 0.2, 66.7, 1.63 and 1.30, respectively. The samples contained small amounts of calcium, phosphorus, and iron. The essential quality factors of gari samples conformed to those of the Codex Alimentarius (1994), indicating that the product has standard specifications which meet the requirements of the international market.

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RÉSUMÉ
ANKRAH, E. K.: *Evaluation de la qualité d'échantillons de gari du Ghana.* Les résultats des analyses physiques d'échantillons de gari du Ghana donnaient le contenu d'humidité et la capacité de gonflement de respectivement 8.1 et 310 pour cent. L'analyses chimique indiquait que le pourcentage des contenus de la protéine, la graisse, la fécule, la fibre et la cendre étaient respectivement 1.2, 0.2, 66.7, 1.63 et 1.30. Les échantillons contenaient des petites quantités de calcium, phosphore et fer. Les facteurs de qualité essentielles d'échantillons de gari se conformaient à celles de Codex Alimentarius (1994) indiquant que le produit a des spécifications de standard qui correspondent aux besoins du marché international.

Introduction

Gari is a traditional West African product obtained from grated, fermented, and roasted cassava (*Manihot esculenta* Crantz). It can be eaten soaked in water with added sugar. It may also be soaked with warm or cold water and eaten with fish, cooked beans, soup or stew.

An unpublished report (Ofosu, no date) suggested that in Ghana, the main characteristics on which to formulate the specification of gari were the moisture, extraneous matter, particle size, and swelling capacity. Eyeson & Ankrah (1975) also studied the composition of gari, but did not elaborate on the quality aspect of the commodity.

The objective of this study was, therefore, to investigate the quality factors of gari from Ghana. The exportation figure of gari is likely to rise due to its consumption by many West Africans resident abroad; hence, the need for comparing the results with the international requirements which are documented in the Codex Alimentarius (1994).

Materials and methods

Gari sample

The samples of gari were bought from various markets in Accra for the analyses.

Sample analyses

Moisture, protein, fat, fibre, and total acidity were determined according to the methods described by Pearson (1976). Seven samples were analyzed for moisture and ash while three samples were analyzed for fat and fibre. For protein and total acidity, four and six samples were analyzed, respectively. Starch was determined on six samples by Lintner's method as described in Pearson (1976) as follows: 5 g of gari was mixed with 20 ml of water and 40 ml HCl. The mixture was washed into a 200 ml flask with HCl. Ten ml of 5 per cent phosphotungstic acid was added to precipitate proteins and the volume was made up

to 200 ml with 12 per cent HCl. It was shaken, filtered, and the optical rotation of the filtrate was measured in a 200-mm tube. The percentage starch was then calculated.

The swelling capacity was determined on seven samples according to the method described by the Ghana Standards Board (no date) as follows: Enough gari was poured to the 25-ml mark in a 100-ml measuring cylinder. It was then filled up with water at room temperature to the 100-ml mark. The cylinder was inverted five times and the mixture was allowed to settle to a constant volume. The percent increase in volume was then calculated.

A slightly modified method of the AOAC (1984) was used to determine calcium and iron contents. Phosphorus in solution was measured according to the method of Fogg & Wilkinson (1958). Four samples were analyzed for calcium, iron, and phosphorus contents.

Results and discussion

Table 1 shows the physical and chemical characteristics of samples of gari.

Moisture and total acidity

The mean moisture content of the gari samples was 8.1 per cent. For safe storage of gari, it should be dried to a moisture content not exceeding 12 per cent (Codex Alimentarius, 1994).

The total acidity (calculated as lactic acid) of the gari samples was 0.7 per cent compared with the Codex requirement of not less than 0.6 per cent or more than 1 per cent. Ingram (1975) observed that good quality gari should be slightly sour and sharp in taste, among other factors.

Protein and fat

The gari samples contained 1.2 per cent protein and 0.2 per cent fat. Eyeson & Ankrah (1975) reported 1.5 and 0.2 per cent for protein and fat, respectively.

Swelling capacity and starch

The swelling capacity of the gari samples was

TABLE 1

*The Physical and Chemical Characteristics of Samples of Gari from Ghana Compared with Codex Standards**

Characteristic (%)	*Source of data*	
	Gari samples analyzed	*Codex standards**
Swelling capacity	301	
	256 - 388	
	(7)	
Total acidity	0.7	Not less than 0.6
(as lactic acid)	0.4 - 0.9	nor more than 1
	(6)	
Moisture	8.1	Not exceeding 12
	6.8 - 9.7	
	(7)	
Protein	1.2	
	1.0 - 1.6	
	(4)	
Fat	0.2	
	0.2 - 0.3	
	(3)	
Starch	66.7	
	54.6 - 78.0	
	(6)	
Fibre	1.63	Not exceeding 2.75
	1.50 - 1.80	
	(3)	
Ash	1.30	
	1.10 - 1.50	Not exceeding 2.75
	(7)	
Calcium	77	
(mg/100 g)	71 - 89	
	(4)	
Phosphorus	83	
(mg/100 g)	45 - 114	
	(4)	
Iron (mg/100 g)	2.3	
	1.5 - 4.0	
	(4)	

The analysis figures represent mean and range values. Figures in parentheses denote the number of samples analyzed.

*Codex standards are obtained from Codex Alimentarius (1994).

301 per cent with the range 256 - 388 per cent. This means that the product swells about three times its volume when soaked in water. Akinrele *et al.* (1962) reported the swelling capacity range of 300 to 500 per cent for gari from Nigeria. The difference in the range values for the swelling capacity may be attributed to the different starch levels in the cassava root tubers for the two countries. The gari samples contained 66.7 per cent starch.

Fibre and ash

The fibre content of the gari samples was 1.63 per cent compared with 1.3 per cent reported by Eyeson & Ankrah (1995). The fibre content of the samples fell within the requirements of the Codex Alimentarius (1994) of not more than 2.75 per cent. The mean ash content of the samples was 1.30 per cent, conforming to Codex standard of not more than 2.75 per cent.

Mineral levels

The gari samples contained 77, 83 and 2.3 mg/100 g of calcium, phosphorus and iron, respectively, while Eyeson & Ankrah (1975) reported 43, 66 and 1.7 mg/100 g for calcium, phosphorus and iron, respectively.

Conclusion

Since the essential quality factors of the gari samples so far discussed conformed to the specifications of the Codex Alimentarius (1994), they have good quality characteristics and should be acceptable in the international market. The total hydrocyanic acid content has not been analyzed.

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